

Nasser Bovoleti Ayash

Approaching the Koumasa Settlement as a Case of Dynamic Topography

Internal Functionality and its Role as a Focal Point in the Messara-Asterousia Region

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Band 14

Herausgegeben von
Diamantis Panagiotopoulos

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“Μῆτερ μὴ με δάκρυε· τίς ἢ χάρις· ἀλλὰ σεβάζου”



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If not otherwise indicated, photographs and illustrations were produced by the author.

Abbreviations

Chronologies

FN	Final Neolithic
EM	Early Minoan
MM	Middle Minoan
LM	Late Minoan
BCE	Before Common Era
CE	Common Era
Bp	Before present

Measurements & Topography

DEM	Digital Elevation Model
GIS	Geographic Information Systems
m	Meters
km	Kilometres
h	Hours

Publications/Corpora

AA	Archäologische Anzeiger. Beiblatt zum Jahrbuch des Deutschen Archäologischen Instituts (Berlin).
AEK	Αρχαιολογικό Έργο Κρήτης (Archaiologiko Ergo Krētēs).
ArchDelt	Αρχαιολογικόν Δελτίον (Archaiologikon Deltion).
AJA	American Journal of Archaeology.
BSA	The Annual of the British School at Athens.
BCH	Bulletin de Correspondance Hellénique (Paris).
CMS I–XIII	F. Matz/H. Biesantz/I. Pini/W. Müller (eds.). 1964–2009. <i>Corpus der minoischen und mykenischen Siegel I–XIII</i> . Berlin/Mainz (Gebrüder Mann/Philipp von Zabern).
CretChron	Κρητικά χρονικά: Κείμενα και μελέται κρητικής ιστορίας. (Krētika Chronika).
Ergon	Το έργον της Αρχαιολογικής Εταιρείας. (To Ergon tēs en Athēnais Archaiologikēs Hetaireias).
Exc. Notebooks	Panagiotopoulos, D. (2012–). <i>Excavation Notebooks of the Koumasa Project</i> . Unpublished Manuscript.

Abbreviations

- Festos II Pernier, L., & Banti, L. (1951). *Il palazzo minoico di Festòs, II: Il secondo palazzo*. Libr. dello Stato.
- IC Inscriptiones Creticae, ed. Margherita Guarducci. 4 vols. Rome 1935–1950.
- IG IV Inscriptiones Graecae, IV. Inscriptiones Argolidis. 2nd edn. Fasc. 1, Inscriptiones Epidauri, ed. Friedrich Hiller von Gaertringen. Berlin 1929.
- Knossos I–IV Evans, A. (1921–1935). *The Palace of Minos at Knossos* (4 vols.). Macmillan.
- Kommos I; V Shaw, J.W., & Shaw, M.C. (Eds.). (1995–1996). *Kommos I: The Kommos Region and Houses of the Minoan Town, Part 1; Part 2*. Princeton University Press; (2006). *Kommos V: Kommos: an Excavation on the South Coast of Crete*. Princeton University Press.
- Praktika Πρακτικά της εν Αθήναις Αρχαιολογικής Εταιρείας (Praktika tēs en Athēnais Archaiologikēs Hetaireias).

Transliteration of Greek Names

The transliteration of Greek toponyms and names aims to follow the phonetic value of modern Greek to the extent that this does not conflict with well-established forms. In these cases, the transcription described here is used upon first mention of a place name.

In this respect, αι Iotacism is indicated by rendering the vowels and diphthongs “ι, η, ει, οι” to “i”. Similarly, “αι” is rendered as “e”. The letter “γ” is rendered as the semivowel “yi” when appropriate, which differs from the traditional Erasmian transliteration. Double consonants and “y” for “υ” will be kept, respecting the well-established norm of modern Greek writing, and given that “y” can have a similar phonetic value to the Greek counterpart. Finally, “δ” is rendered as “dh” and “σ” as “ss” when between vowels.

Examples:

- “Άγιος” is rendered as “Ayios” instead of “Hagios”, respecting the semivowel of modern Greek and the vanishing of the “H” sound due to psilosis.
- “Ιωάννης” is rendered as Ioannis, respecting the tradition of carrying the double consonant in the transliteration.
- “Πεδιάδα” and “Μονή Οδηγήτρια” are rendered as “Pediada”, “Moni Odigitria” respecting the predominant use of these forms in the bibliography that is closer to the phonetic value of modern Greek, rather than the variant “Odegetria” which is, however, also found in the bibliography but less frequently. The phonetically correct transliterations as “Pedhiada”, “Moni Odhiyitria” are mentioned in brackets in their first use in text.

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Preface

The seeds behind this work were first sown during the author's first participation in an archaeological campaign in Koumasa in 2017 and in the subsequent campaigns.¹ In addition to the experiences offered by the direct contact with the material offered, the topographical elements of the region could hardly be dismissed, and they inspired this work. Holistically, its purpose is to shed light on the archaeological area of Koumasa and its diachronic role as a liminal node between valley and mountain. Its main habitation phase is the Minoan, which – although it does feature in the literature of Minoan and Aegean archaeology, mainly due to the tholoi – has been until now relatively obscure. This is also applicable to the area of central Asterousia, within which Koumasa is located. The lower area of the tholoi is dominated by the nearby double peak of the Korakies hill and its corresponding plateau, which was early on dubbed a “settlement”, a use which is adopted in this work. Seemingly an isolated location, the finds there were not consistent with a refuge or a defended position but rather with elements of affluence spanning the whole Minoan sequence.

At the same time, the integration of Koumasa within the rising slopes of the Asterousia mountains strongly focused the author's attention on two fronts. The first is the attempt to identify the topography's impact in shaping the settlement itself on three levels: the plain, where the tholoi are located, the rising slope, where elements of building activity can be attested to, and the elevated plateau of the settlement, all dominated by the local peak, which is the area of the so-called sanctuary of Koumasa, which henceforth will be referred to as ‘sanctuary’. The second is understanding the position of the settlement within Minoan connectivity networks, the wider environment of southern-central Crete, and specifically around the liminal area between the Messara plain and the Asterousia mountains in which it is located. This is furthered by the effort to understand the seemingly anomalous fact of Koumasa's centrality in the Minoan period, which is followed by a gradual descent into obscurity. These two approaches are seen as relevant to the evaluation of the site and aim to act as context for the planned future Koumasa publications.

1 The interdisciplinary research programme on Minoan Koumasa commenced in 2012 under the auspices of the Greek Archaeological Society and with the cooperation of the Institute of Classical and Byzantine Archaeology of the University of Heidelberg under the direction of D. Panagiotopoulos. I would like to express my gratitude to Professor Panagiotopoulos for his support and trust throughout the period of my participation in this project since 2017, culminating with this study.

In this process, with the aid of the archaeological study of the site carried out, older theories will be critically revised, with careful study of both older and more recent hypotheses, which will help to settle the debate about this area, for which previous research has provided contradictory interpretations. For understanding the regional character, the greater Asterousia region, as well as the area adjacent to the settlement, the central Asterousia and the south-central Messara will be investigated. As for Koumasa itself, the analysis will focus on the Koumasa settlement, where the palatial phases have been identified, and specifically on the effect of the dynamic topography of the site, for which a holistic approach needs to be considered. The previous and ongoing excavation campaigns have unearthed ca. 25% of the whole settlement plateau, allowing for the presentation of preliminary conclusions.² The area of the tholoi – the publication of which is pending – will be briefly addressed with a consideration of the tholoi culture.

In understanding the impact of topography on the habitation behaviour within the microscale of Koumasa, special focus is given to the ‘sanctuary’ of Koumasa, which occupies the central and most prominent area of the settlement – which extends on a rocky area around the summit of Korakies – to the east of the Koumasa tholoi and it also overlooks the Messara plain. As the only connected stretch to have been fully excavated, this central and undoubtedly important area offers significant insights into the whole settlement as well as its centrality within the urban landscape, which is at the focus of this work. Previous small-scale campaigns there and the thorough investigation which commenced in 2012 have revealed sufficient evidence to allow a systematic analysis of the architectural remains and the finds from the ‘sanctuary’ area. These are further enhanced by what is known of the rest of the settlement to date, utilising finds of both older and current excavations with the aim of providing answers regarding the character and function of the area as well as its history.

The analysis will rely on models that allow for approaching a building complex, focusing on its environmental influences and agency within the community. A comparison with other contemporary sites will reveal the similarities of the internal arrangements and spatial organisation within a Minoan settlement, which will allow for a better understanding of the functionality of the various areas. Therefore, the evaluation of the topographical arrangement and the finds will be embedded within the theoretical framework of a relational approach. These methodologies will help elucidate the function and character of the building activity in prominent locations not only at Koumasa, but in similar sites as well.

The second layer of the study, constituting the meso- and macroscale research on the Asterousia as a whole, was prompted by the earlier works and field research of Sbonias and Vasilakis up to the more recent work by Vavouranakis, Sarris, and Déderix concerning the nearby and in many aspects parallel settlement of Apesokari, as will be

² See Footnote 88.

presented in this work. Publications on the latter relied strongly on GIS methodologies, which will also be implemented here, based on a long series of accumulated experiences with results pertaining to various archaeological research projects. It is notable that the aforementioned works were mostly concentrated on the western Messara; therefore, this study hopes to act not only as a parallel but also as an extension to these previous approaches, revealing the connectivity potential that Koumasa offered to its inhabitants. This approach is complemented by physically walking through the mountain passes indicated by GIS methodologies and by interviews with contemporary inhabitants who carry out rural activities. Those endeavours highlight the regional importance of Koumasa and reveal the presence of networks that were not hitherto considered. This is intertwined with the question of the site's importance within the Minoan sequence, as well as its subsequent decline.

Structure

This study is organised in five parts. In Part I, a holistic approach to the site and its region is endeavoured, elucidating the cultural landscape of this region and the scientific challenges in its approach. In Chapter 1 the site of Koumasa will be presented as well as the history of research pertaining to it, as, due to its remote location and its very early and rather hasty excavation, the ratio of references in scientific publications to actual research on site was for more than a century quite low, even by the standards of Minoan archaeology. Chapter 2 will tackle a historical overview of the site, encapsulating the broader sociopolitical changes in the surrounding region and their impact on the local cultural trajectories in Koumasa, as evidenced by archaeological finds. The diachronic perspective provides a comprehensive understanding of the distinctive role the site played during Minoan times in contrast to other time periods. The surrounding areas act as the background in the palimpsest of historic development, putting them into context and aiding in deciphering the particularities of individual time periods.

In Chapter 3, the position of the site within its cultural and physical environment is further elaborated, followed by a critical review of the theoretical background used in previous evaluation of the settlement's role in the wider Messara area in the Prepalatial and Palatial periods. The study places a particular emphasis on the topographical element as a main factor in determining the projection of the broader changes in specific regions. To tackle this, an analysis of the surrounding topography and the relation of valley to mountain use is presented as a basis of understanding, or rather, updating established views of the topography around Koumasa.

Part II is dedicated to the GIS analysis. Although it is at times technical, it is deemed that it should be included in the narrative of the work and not in an annex, as archaeological discourse and analysis are being tackled in these chapters. Chapter 4 introduces the GIS methodology and functions used and discusses their usability and limits of their implementation in archaeology, drawing on insights from recent studies. This is

followed in Chapter 5 by the presentation of the results of the work with the DEM models for the wider area of Messara. Least-cost-path analyses and the network connectivity methodology will be implemented, and the results of the algorithm will be critically reviewed, comparing the results of the various methods and the functions used in the bibliography. Following this, the Viewshed and Waterscape methodologies will be applied in the area under study.

At this point, the three-level study commences, beginning with the microscale level in Part III. First, in Chapter 6, the focus is placed on movement patterns and viewshed and movement within the Koumasa habitation area, utilising a DEM model produced locally, followed by an examination of the role of the architectural elements in defining the movement space and its use.

The study can draw from various areas of the ongoing excavation, but it will rely mostly on the preliminary discussion of main archaeological results of the modern excavations in the ‘sanctuary’ area (which were concluded under the supervision of the author), its layout and summary of the finds. The analysis showcases the role of the focal point within the Koumasa area and is the first step of the tripartite scale of this study, the micro-, meso-, and macroscale. Within this context, the rooms, layout, and a summary of the finds per category will be presented (Chapter 7). In Chapter 8, the specific topographical arrangements of the site are evaluated according to its correlation with frameworks of theory of architecture, as per its interface with the outside and the inside of the settlement (Chapter 8).

Then, in Part IV, the adjacent mesoscale will be analysed, examining the areas of interest in the environ of Koumasa and the connectivity networks defined by the topography and seen in the cultural activity. Here, the GIS methods presented in Part II will be utilised, taking into account visibility patterns (viewshed) and the most immediate connections as they expand in the Messara valley (Chapter 9). Chapter 10 will delve into the macroscale of Koumasa, concerning its location in central Crete, while addressing the question of state. In order to address the theories concerning the political landscape of the region in Minoan times, an overview of state formation theory will be discussed, presenting a summary of the “political” systems and this gap in the archaeological research of the Asterousia.

Part V concerns the impact of the mountain movement. Chapter 11 deals with the mountainous part of the mesoscale, the one in the *backyard* of Koumasa, taking into consideration the central Asterousia mountains, i.e. the broader region Koumasa is part of. Though very little of the settlement is directly visible, it is nevertheless utilised and accessible. This accessibility is examined first on the basis of the various *loci* on the mountain range and their connectivity, deduced from the GIS analysis, but also empirically by walking and experiencing the mountains. Connectivity to the sea, until now disregarded, is shown to be of especial importance, which offers an explanation for the recent data regarding a fish-supplemented diet that analysis of the bones from the Koumasa cemetery has offered. Finally, in Chapter 12, various theoretical principles for the relations of people with the mountains will be examined.

Given the multifaceted scope of this study, each chapter is designed to stand independently while employing strategic repetitions and cross-referencing to ensure a unified and cohesive whole.

Methodological Approaches

As the structure illustrates, this work tackles the questions of the topographically most prominent position within a settlement in terms of its role and symbolism therein. In other words, how is this expressed in the architectural implementation, but also in the broader characteristics, in order to understand the role of this settlement in its wider, archaeologically poorly known vicinity. This first approach belongs to the microscale of Koumasa, and the second extends to the macroscale, or macrocosm of which Koumasa is part of.

An examination of the research history not only in Koumasa but also in the region is deemed necessary. In connection with this, a critical view of the analyses of various societal formations will be undertaken based on traditional and newer concepts of characterisations of civilisation's development.

While continuing research on the material on site, it was seen as appropriate to focus the research of this doctoral thesis on the question of location and on three levels of scale out of the five possible ones.³ First, the focus lies internally within the settlement, or its microscale, from the point of view of the settlement's most topographically pronounced feature, the 'sanctuary' of Koumasa. Defined here as overlapping levels of experiencing everyday activities, the microscale of the settlement is characterised by the movements within it and the interactions with its topography and built edifices. Here, the space syntax analysis, as utilised within the frame of the analytical approach, is a useful tool to tackle this subject, alongside elements of architectural theory.⁴ Furthermore, as a second step, the phenomenological approach, as introduced in architecture by Norberg-Schulz, will be useful. This does not rely on the quantitative aspect of the data gathered *per se*, but allows for a second level analysis, in which the liminal nature and potentials of the architectural elements are taken into account.⁵

Secondly, the mesoscale will be examined, i.e. the surrounding environment in which Koumasa is integrated, with which the settlement has a direct connection, and which forms its immediate vicinity. Based on the geomorphology of the island, this region

3 The five possible scales defined here are the domestic, the microscale of a settlement, the mesoscale of the immediate vicinity and daily interaction, the macroscale of the region and finally, the global or international scale. These scales are rather specific to the study of topography and bound by geomorphology. Thus, they differ from other similar definitions, such as those proposed by Knappett, who described a microscale corresponding to the domestic and further defined a macroscale corresponding to the two separate scales of the mesoscale and macroscale as used in this study, which better fit the case of Koumasa (Knappett 2012, 394–396).

4 Hillier – Hanson 1984, 147–155.

5 Palyvou 2018, 3–5.

mainly consists of the adjacent slopes and part of the central Messara with which direct visibility is possible, as well as the area of the central Asterousia, including Kophinas and the seashore, to which Koumasa acts as an access point, especially coming from the direction of Phaistos. Neighbouring archaeological landscapes and the various interconnectivities will be evaluated with the GIS method of viewshed amongst others.

Third is the macroscale of Koumasa, meaning the region of the entire Asterousia, Messara and beyond. Indeed, Koumasa is but one of the many locations peripheral to the peak of Kophinas, which has received less attention in the history of research. The utilisation of GIS methods, combined with on-site observations and empirical experience via walking both known and unknown paths allows for an insight in this region on these three levels.

This serves to illuminate the liminal function within the settlement (on the microscale) and the relevant nearby areas of economic or social interest as well as the wider area of the Kophinas peak and the small harbours to the south of the Asterousia (on the second scale of the mesoscale) and wider central Crete (on the third scale).⁶ Thus, the region of the central Asterousia will be integrated into the ongoing research of Asterousia in general. Although separately presented, the intention is to avoid a strict top-down or bottom-up approach (as Knappett puts it)⁷, but to study each level individually. These views are augmented with the results of interviews with modern inhabitants of Koumasa, Kapetaniana, Loukia and Vassiliki, which offer insights into the traditional use of the mountain resources.

Focusing on these lines, the initial presentation of the archaeological results in Part III will allow for a new understanding not only of the particular area of the settlement but also of the regional dynamics.

The reason this is deemed fitting is that these characteristics of the site provide valuable insights into the discussion on topographic utilisation and the symbolic significance of the mountainous region, which is one of the focuses of this work. Hence this work aims at elucidating the site of Koumasa acting as an introduction to its updated presentation to the academic community, and exploring the impact and interplay with topography, both at a local level but also with its surrounding area.

The multilevel approach aspires to create a holistic approach of Koumasa and its area including elements of the methodological approach of *entopia*, addressing the area not only as a source of archaeological data but going beyond the mere material elements towards an understanding of a heritage landscape and the grammar of location, utilising elements of sociology, ethnology and history.⁸

6 Utilisation of GIS methods aims to use Koumasa as a case study within the fast-developing field of GIS archaeology used all around the world (Verhagen – Jeneson 2012; Herzog, I. 2013). For their consultation and advise on the matter and support for pursuing such an implementation within Aegean archaeology I would like to thank A. Sarris and S. Déderix.

7 Knappett 2012, 394.

8 Panagiotopoulos – Savvatianou 2022, 167–170; Panagiotopoulos 2023a 192–203. For the grammar of location, see Nixon 2006, 92–96.

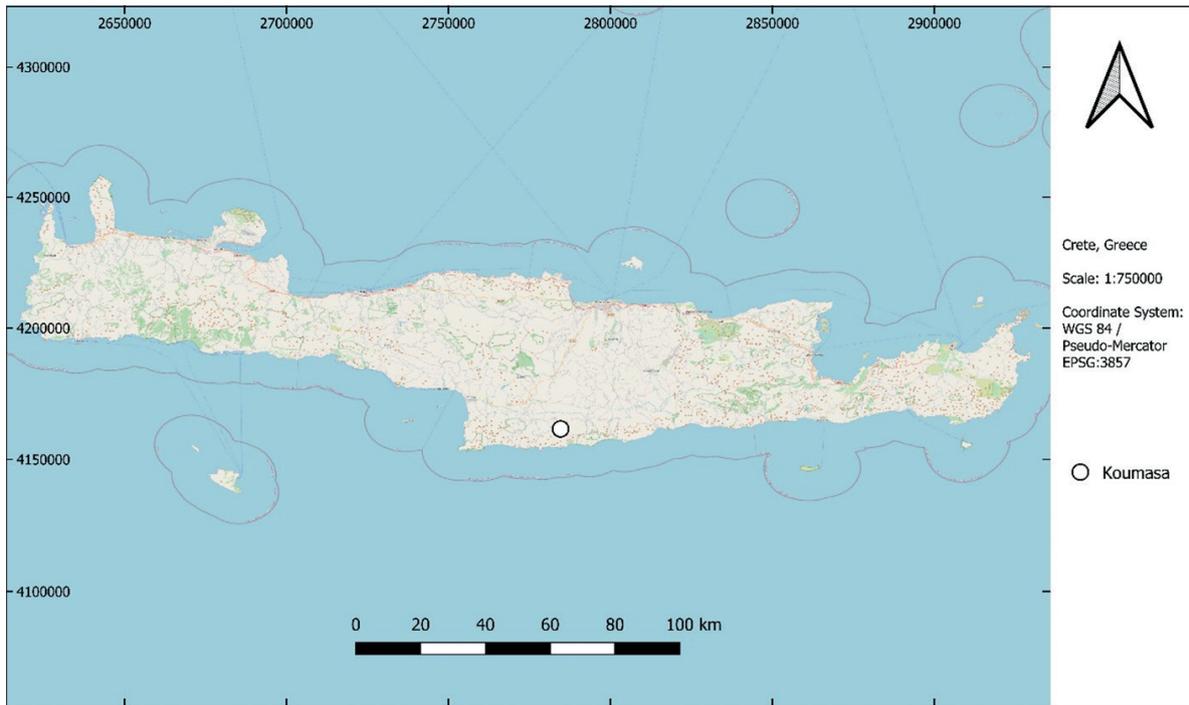


Figure 1: Location of Koumasa within Crete.

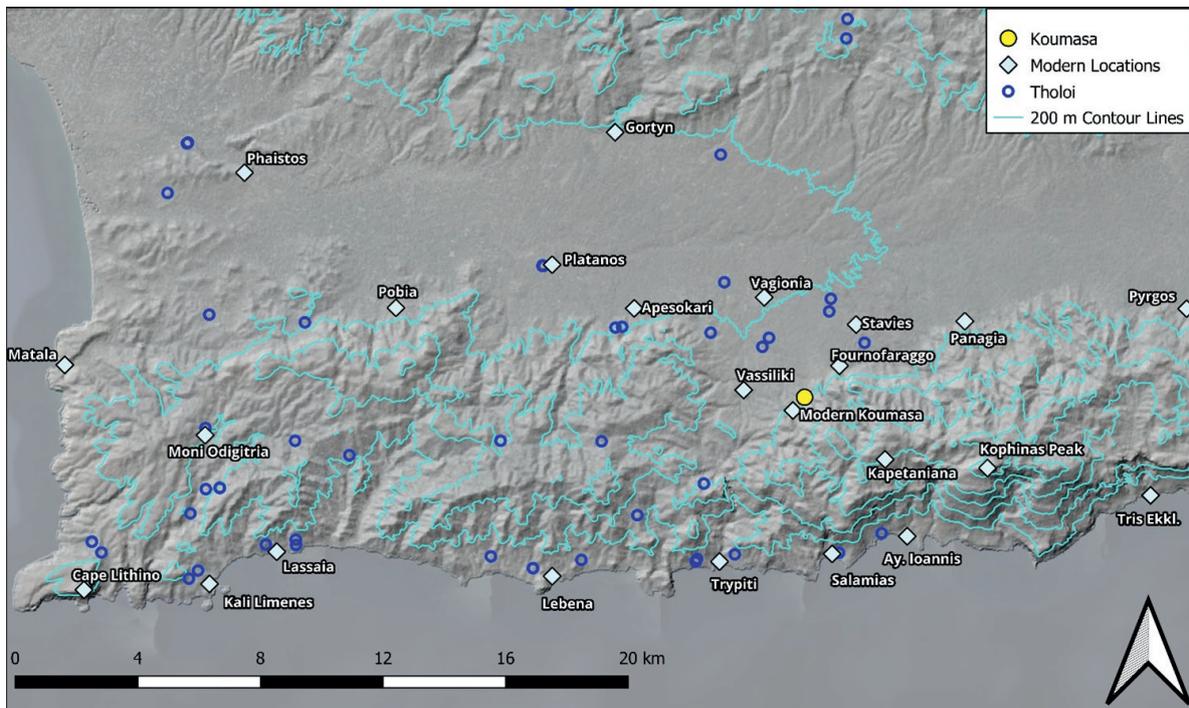


Figure 2: Location of Koumasa, within its region.

Part I
The Archaeological Landscape
of Koumasa

1 Overview of the Site and the Challenging Aspects of Research

1.1 Localisation of the Site

Located in the southern Messara, the settlement of Minoan Koumasa can be found on and around the Korakies hill at the northern fringes of the Asterousia mountains ($34^{\circ}97'92''$ [N] $25^{\circ}00'97''$ [E])⁹ with a mean elevation from the sea of 400 m. Its western boundary is near the road between the modern villages of Koumasa and Loukia, and its eastern near the road leading from the village of Loukia to Kapetaniana.

Geologically, the area is characterised by flysch, a semi-hard sedimentary rock deposited during developments within the Hellenic orogeny.¹⁰ As in the surrounding area, the soil is characterised by a significant erodibility (between 0.048–0.06 t ha/h).¹¹ This, and the steepness of the hill around its two main peaks, need to be taken into account when evaluating the instability of the plain around them, which seems to have contributed to the deformation of some of the remains on the slopes.

It is noted that it is situated near the transition to Pleistocene sediments of the valley proper and the Asterousia mountain to its south.¹² The Asterousia represents the uppermost tectonic unit in Crete, comprising metamorphic rocks and granites, and connects ophiolites, especially in the Miamou region west of Koumasa, and the so-called Mani unit which is made up of amphibolites, schists and marbles. The very west of the Asterousia, as well as the hills north of the Messara and a pocket around Vassiliki, is formed by Neogene deposits of middle to low permeability (yellow in Figure 3 below).¹³ The latter region is centred in a pocket of ca. 2 km. diameter south of Vassiliki and extending from Koumasa to the east to Apesokari to the west and beyond where it narrows to ca. 500 m. Both Koumasa and Apesokari are located in the transition from of this area to the flysch mountainous areas.

9 Coordinates based on World Geodetic System 1984.

10 Faure 1965b, 27–63.

11 Pfeiffer et al. 2015, 3.

12 Kritsotakis 2009, Figs. 4–7, 5–28.

13 Kapsalis et al. 2017, 120–123.

1 Overview of the Site and the Challenging Aspects of Research

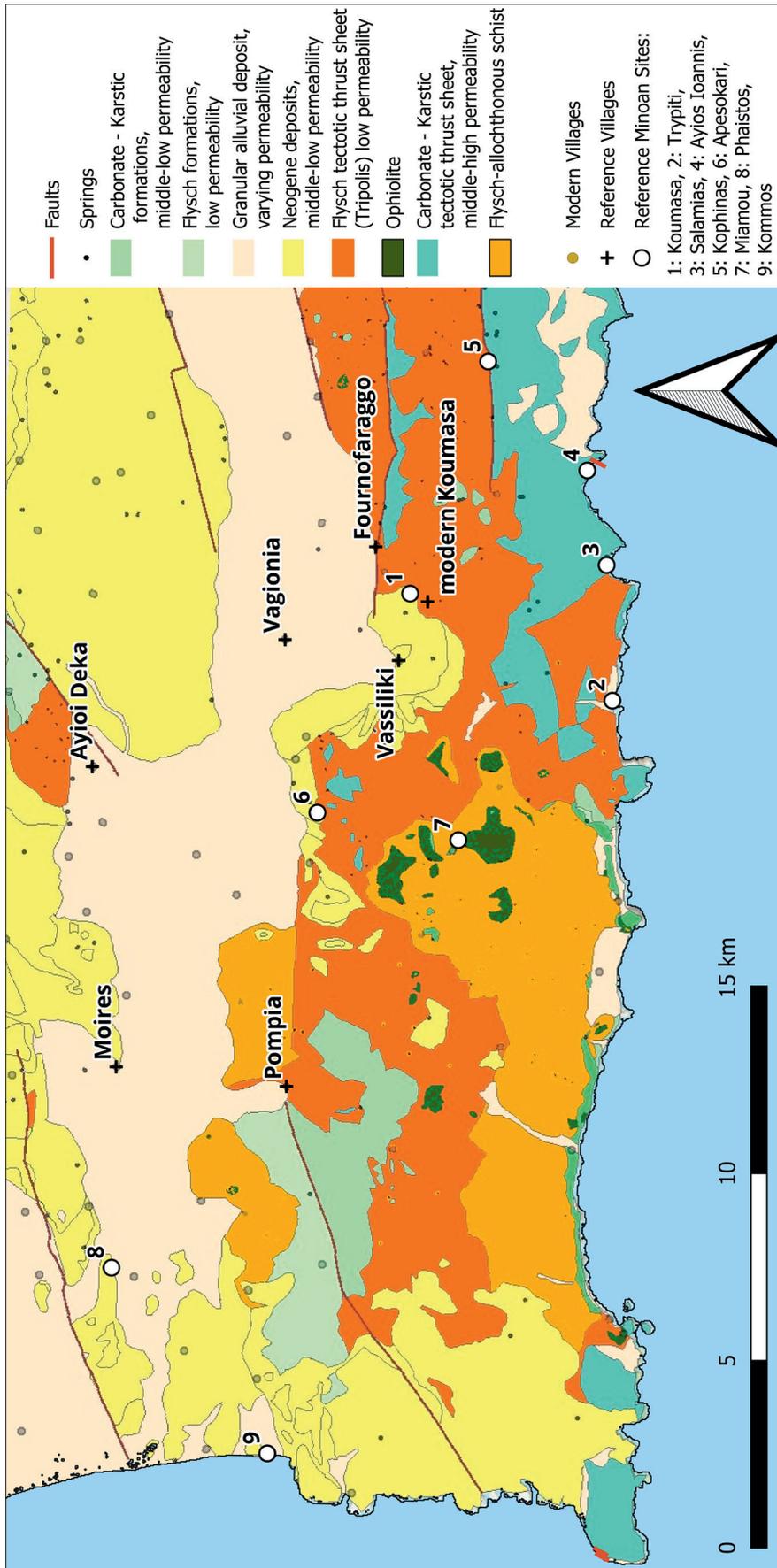


Figure 3: Geology of the west and central Messara-Asterousia.

The rest of the Asterousia, which includes the region south and east of Koumasa, falls within the Tripolis-Mani geological unit with low water permeability or flysch,¹⁴ with pockets of ophiolite around Miamou.¹⁵ The Tripolis formation (orange in Figure 3) is seen in the northern Messara, north of Ayioi Deka around the historical Gortyn. A notable variation is noted south of the main faults, one crossing the Fournofarango and the other the mountain peak, crossing Kophinas, south of which carbonite formations of high permeability are formed,¹⁶ with a concentration of springs around these faults. North of Koumasa is the Messara plain, a Holocene and Pleistocene granular deposit of high permeability, atop marine sediments.¹⁷ A visual summary of the geology in the greater area of interest is provided in Figure 3.¹⁸

Rainwater volume is around the average of Messara and is centred on the drainage basin of Geropotamos, gathering the water from the Asterousia range.¹⁹ The modern vegetation consists mainly of Euphorbio-Verbascion phrygana, also known as Greek Spiny Spurge, alongside other dry soil plants, such as the seasonal sea onions (*Urginea maritima*). In cleared areas, these re-emerge within a span of two years. In summary, the geological substrate of the region consists mainly of flysch and greyish limestone beds. Due to the increase in grazing in the last decades, the rate of erosion has risen significantly, causing land degradation, especially affecting the limestone.²⁰

1.1.1 Topography and Expanse of Cultural Activity

A 2014 survey investigation determined that the evidence for cultural activity covers the entirety of the Korakies hill and reaches into the plain below. The suggested boundary of Minoan settlement activity encompasses 39.330 m². However, in total, the area of settlement should also include some areas which extend beyond the modern boundaries of the archaeological area, namely west and north of the modern road from Loukia to Koumasa. These areas span 13.303 m² and are located in olive fields; investigation was not possible as they constitute private property. From the outside, it could be determined that they also contain Minoan pottery. In total, the likely area of

14 Kapsalis et al. 2017, 124.

15 Papanikolaou 2021, 221–226.

16 Kapsalis et al. 2017, 128–130; 131–132.

17 Kapsalis et al. 2017, 114–116; Papanikolaou 2021, 84.

18 Edited image from the EMERIC project for the geological map of Crete, by the Decentralised Administration of Crete <data.apdkritis.gov.gr/el/dataset/γεωλογικός-χάρτης-της-κρήτης>. Interpolations of Minoan sites and reference villages, as well as adapting the Legend and Layout by the author.

19 Kritsotakis 2009, Figs. 1–12, 1–15.

20 Kosmas et al. 2015, 543; 546.

1 Overview of the Site and the Challenging Aspects of Research



Figure 4: The area of Koumasa with a DEM produced Orthophoto.

Minoan activity on the Koumasa plain under investigation encompasses a minimum of 52.633 m². The hill of Korakies is in the middle of this area and constitutes the highest point topographically; this is where the main archaeological investigation centres.²¹ Figures 4–7 illustrate the topography of the Korakies hill and its surrounding area.²²

The site seems to encompass the whole Minoan sequence, with finds showing elements from the early EM in the tholoi area and in the settlement mainly Proto and Neopalatial.²³ The summit of the Korakies hill is marked by twin peaks, the northern of which (P1) is 428 m. above sea level, and forms its most central area. Around this northern peak the complex of the ‘sanctuary’ is located. The southern peak (P2) lies a little lower, at 420 m. The hill settlement extends on a relatively level plateau (see Figure 4) across an area of 6 ha.²⁴ Finally, a third peak (P3) is located to the north-east of

²¹ Pfeiffer et al. 2015.

²² The images were produced with a locally produced DEM. See details on page 171.

²³ For the chronological sequence see mainly Chapter 3. For a brief summary, see Panagiotopoulos 2024, 443–445.

²⁴ Rutkowski 1989, 48–50.

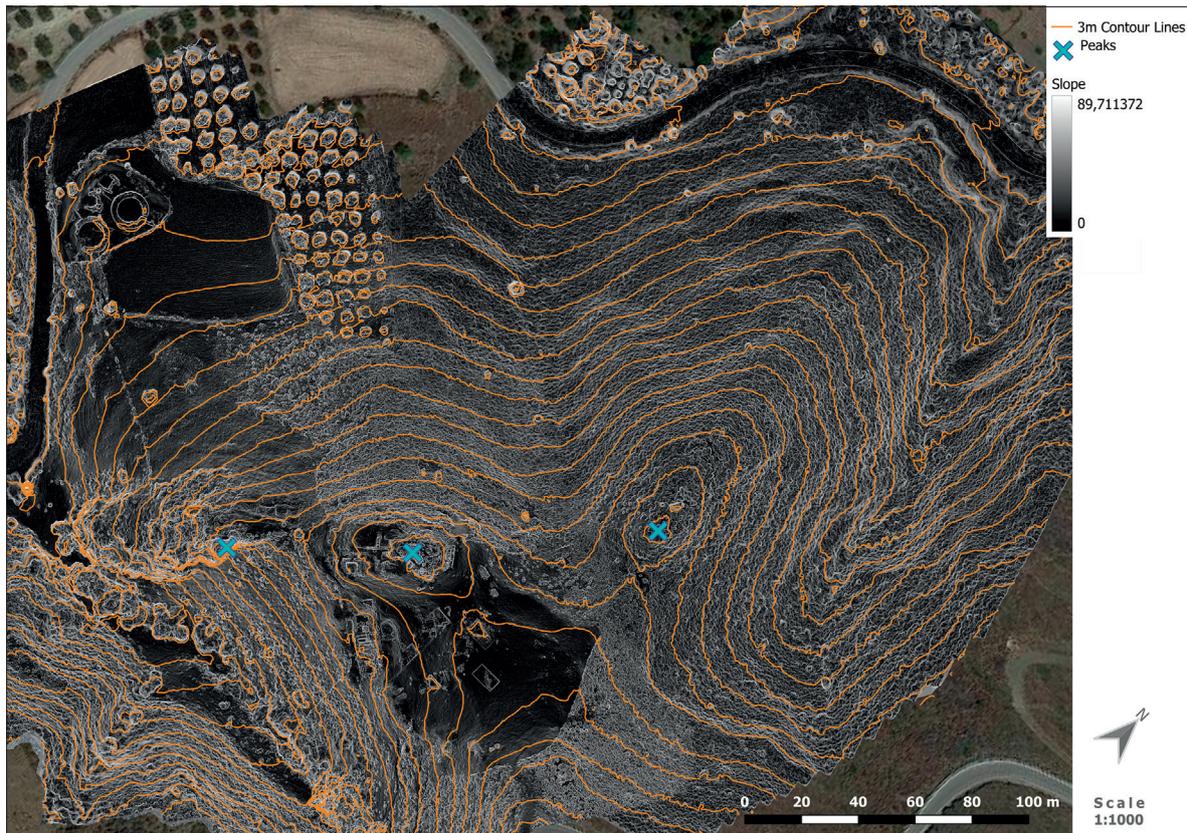


Figure 5: Slope of Koumasa in degrees and contour lines.

the Plateau, on a secondary elevation of the Korakies hill (415 m). The three peaks are visualised in Figure 7, line 3.

On the extent of the produced DEM, cross-section cuts aid in the visualisation of the hill's topography. As per the north axis, six parallel vertical section cuts were drawn 300 m. in length, numbered from south to north, with a northwards view, to represent a viewer looking from the south (Figure 6). Following the orientation of the western slope of the Korakies, five cross-section cuts were drawn with a length of 400 m. in length, numbered from west to east, with a southeastern view (Figure 7), representing a viewer in the valley looking to the southeast. The dashed lines in Figures 6 and 7 represent levels whose main extent is hidden from the assumed viewer's position.

The western side of the hill rises relatively steeply from the level of the tholoi and the olive grove north of them towards Peaks 1 and 2 (Figure 6: first 100 m. of sections 3–5; Figure 7: sections 1–3; Figure 8), then falls slightly until it reaches the hill-top plain (see Figure 5: dark area representing low inclination; Figure 6: sections 3–4 around the 200 m. mark; Figure 7: section 4 around the 150 m. mark; Figure 9).

The plain constitutes the central area of the settlement. It exhibits a lower degree of erosion due to its more even surface, compared to surrounding slopes. Consequently, the Minoan buildings there can survive to quite some height, as revealed during the

1 Overview of the Site and the Challenging Aspects of Research

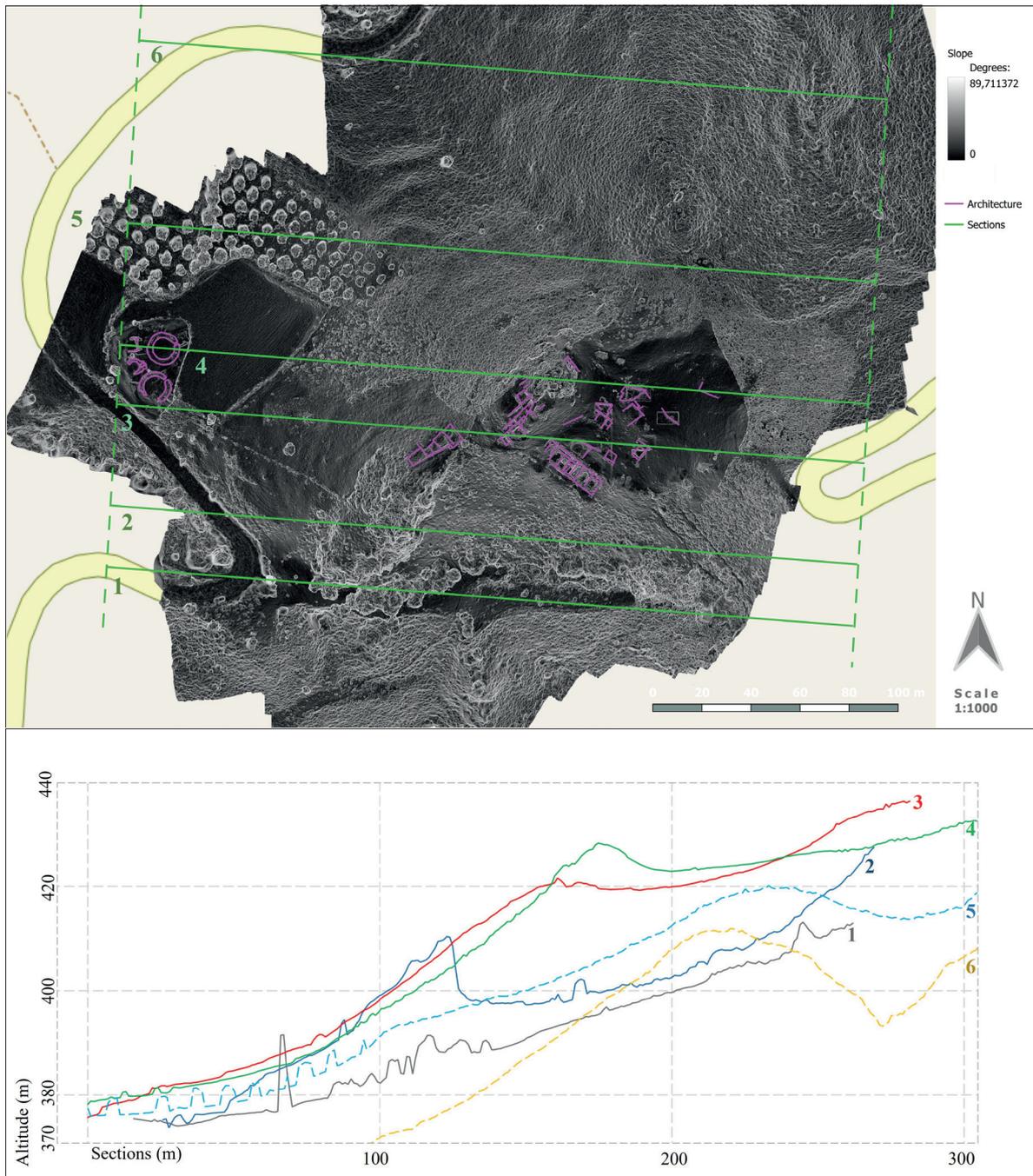


Figure 6: Six parallel section cuts of 300 m. with northwards view.

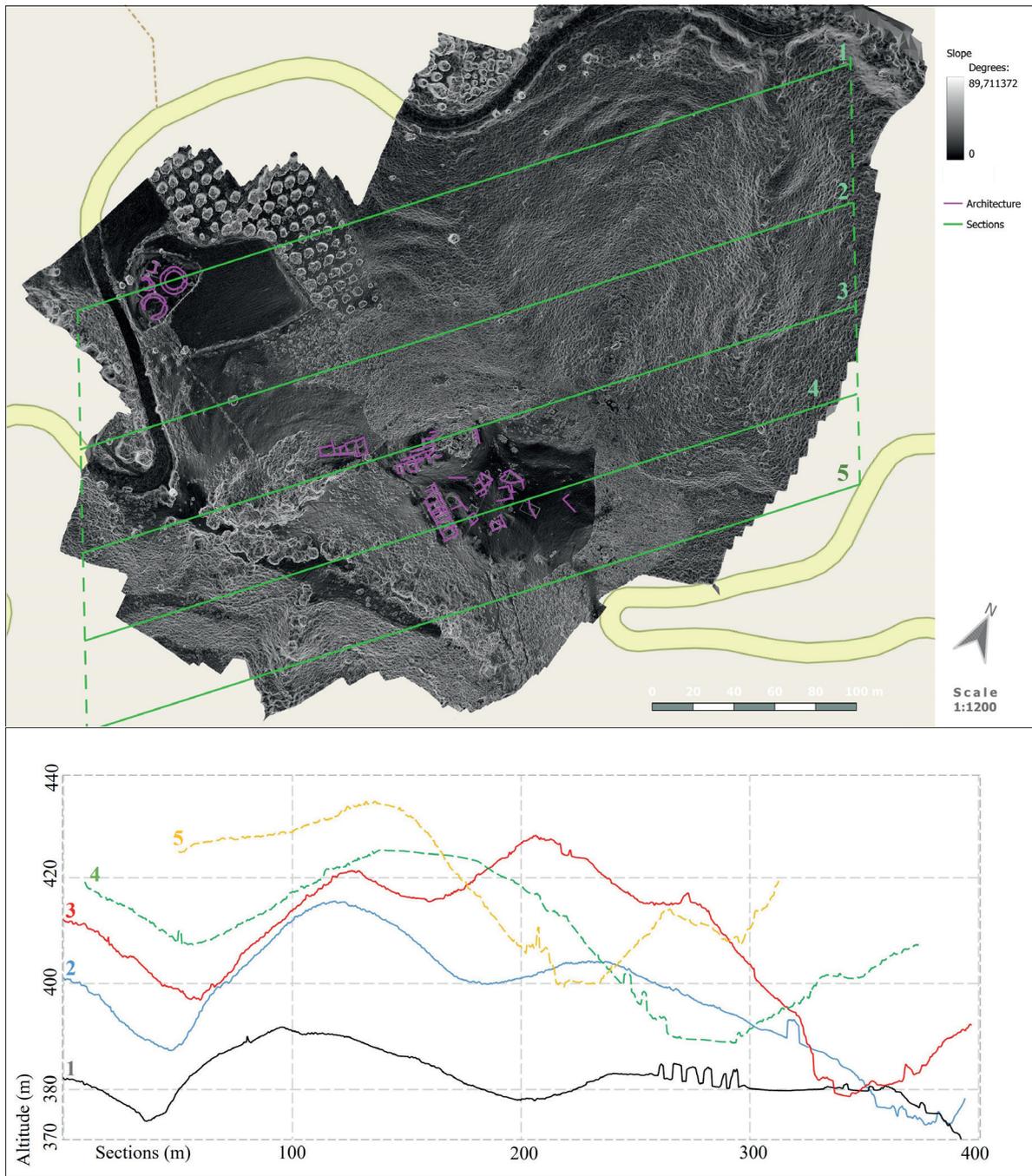


Figure 7: Five parallel section cuts of 400 m. with southwestern view.



Figure 8: View westwards from the Terrace area of the ‘sanctuary’ near Peak 1.

excavation.²⁵ This main plateau spans 100 m. on the west-east axis and 80 m. on the north-south axis. It is accessible from the western slope through a narrow path that passes between the two summits, and also from a steeper path, if one follows the bank of the seasonal gorge and climbs upwards, from the south of the southern summit.

The gorge, over which the southern peak (P2) presides, forms the southern slope of the hill. This southern slope forms a front (southern front) measuring approximately 100 m. that reaches all the way to the rise of the Asterousia mountains to the east.

At the foothill lies a small gorge, where a seasonal stream continues to flow today, fostering a local concentration of vegetation (see Figures 4–5; Figure 6: elevation differences in sections 1–3; Figure 7: the gorge traced through the low points in sections 3–5; Figure 9). The resulting slope, while walkable in certain areas, is notably steep, exceeding 30° of inclination across the whole slope and far steeper in many areas,²⁶ making it

25 Exceeding 1.5 m. in some cases: e.g. 1.8 m. in trenches 1, 16 (Panagiotopoulos 2022b, 325, 331) and even 3.5 m. at the magazine building (Panagiotopoulos 2022b, 324). See also Panagiotopoulos – Savvatianou 2022, 170.

26 See Chapter 6.2 and Figure 64.



Figure 9: The southern front and the gorge. View westwards (Courtesy Koumasa Project).

an unlikely primary access route to the settlement. However, this path would provide visitors with an especially striking view of the buildings atop the hill.

On its northern side, the main plateau overlooks the Messara Plain (Figures 10, 11), with the northern peak (P1) defining its western boundary and forming the northern front, which extends approximately 80 m. towards a third, lower peak. This third peak (P3), located at an elevation of 415 m. on a northeastern slope along the outer edge of the main plateau, has been identified as potentially archaeologically significant through survey work, due to the presence of surface sherds.²⁷

The slope along this front has a similar inclination to that of the western slope, which descends from the ‘sanctuary’ area towards the tholoi. Both slopes are walkable, exceeding the 30° incline limit only for a short distance, thus not quite reaching the point at which a zigzag path (moving with switchbacks) would be favoured over a direct

²⁷ The methodology of concentration evaluation was based on statistical methods, including inverse distance weighting interpolation (Pfeiffer et al. 2015, 9–10). Other aspects, such as the rapid erosion observed in the last 50 years, should also be considered in the dispersion of surface sherds (see Footnote 399).

1 Overview of the Site and the Challenging Aspects of Research



Figure 10: View to the north from the settlement (Courtesy of Gregor Staudacher).



Figure 11: Settlement plateau, elevation of 'sanctuary'. View towards the north (Courtesy Koumasa-Project).

route.²⁸ The line of sight between the main plateau and the tholoi is obstructed by the two summits including the ‘sanctuary’ area. To the east, the main plateau continues upward, culminating in barren cliffs that merge with the rising Asterousia range.

The main plateau enjoys a level of isolation that renders it a strategically easily defensible position while remaining proximate to the Messara valley, enabling it to serve as an entry point from the Messara to the Asterousia. It lies along primary communication routes extending from Gortyn and the interior towards the elevated terrain of Kophinas in the southeast, as well as routes leading to the southern harbors. This pattern bears a resemblance to nearby locations of Apesokari and the Rotasi area, both positioned along the boundary between the Asterousia and Messara regions. Furthermore, building upon a hill on the edge of a plain is a characteristic choice of site for a Minoan settlement, offering obvious strategic benefits. A comparative analysis with similar configurations could provide further insights (see discussion on topographical parallels with selected sites in Chapter 10).

The site is dominated by the Asterousia range to the south, defined by a hill that extends to an azimuthal range of more than 40°. Its peak, defining the skyline to the south, is at a cartographic distance of 700 m. and ca. 600 m. of height above sea level, acting as a local marker to be seen from the hill of the settlement, with an angular altitude of ca. 30° as seen from it. A visit to this site conducted in 2018 did not produce any finds. The local gorge described above divides the main mountain from the Koumasa hill.

To the west, at a distance of ca. 1100 m. and 530 m. of elevation, another small hill named Kephala, overlooking the modern village of Koumasa, is located, where a small survey showed Minoan pottery, possibly EM.²⁹

To comprehend the earliest documented activity in Koumasa, i.e. the area of the tholoi, as well as the later expanse on the hill and its slopes, the relationship with its landscape must be scrutinised. The Korakies hill, with observable settlement activity, is adjacent to the immediate east of the tholoi, a feature not witnessed in front of the entrances of some of the larger tholoi necropoleis like Platanos, Ayia Triada, or Apesokari, making the “spatial text” of Koumasa almost unique.³⁰ The hill’s distance impacts the local horizon, as it expands for approximately 160 m. from a point between the three tholoi up to the top of the hill on the northern summit, while the height difference to the two summits is approximately 45 m., with a maximum of 50 m. at the very top of the hill, depending on the height of the buildings found in the ‘sanctuary’ area (see Figure 6: sections 4, 8, 12). Viewed from the area of the tholoi, the hill appears to have

28 See Chapters 4.4, 5.2 for the effect of slope on the way paths are favoured. The paths in the area of Koumasa are analysed in Chapter 6.2.

29 Nowicki 2014, 159–160.

30 See Discussion in Chapter 9.3.



Figure 12: View to the Korakies Hill from the area of the tholoi.

an altitude of 16° to 17° at the peaks and generally more than 14° for an azimuthal arc of 40° due east.³¹

The summit is located centrally in the area in two respects. First, seen from a bird's eye view, the summit lies centrally, as the settlement expands on the slopes around it. To the north and west, the steep slope that continues until the level of the EM tholoi shows a densely built area with remains that mostly survive to some centimetres above the bedrock.³²

The second level of centrality is topographical, as previously indicated, and becomes further evident upon closer examination of paths and movement within the area. Due to the cliff to the south, any route connecting the western and eastern parts of the settlement must pass through the narrow passage between the two summits, approximately 50 m. apart. This "bottleneck" begins 25 m. from the southern summit (P2) and is

31 These observations are based on measurements done using a total station combined with a 3D model of the site produced with a drone and georeferenced in a GIS programme. The angles were also separately measured with the clinometer. See Ayash 2023, 144–146; Figs. 2, 3.

32 This situation seems to repeat in the northern slope, albeit still no trenches have been opened yet.

less than 10 m. wide, and directs the walker past the southern portion of the ‘sanctuary’ complex. At the same time, the central summit (P₁) provides an optimal view of the Messara plain and the settlement itself. To the north, visibility extends beyond Gortyn, located 10 km. away, reaching the Dikti (Dhikti) mountains, with the entirety of Mount Psiloritis in view. Towards the west, the view of the Messara plain is obstructed by the mountain ridge rising west of the villages of Vassiliki and Kandhila (a ridge that meets the Messara at Porti). To the northeast the view is blocked by the rising Asterousia south of Fournofarango. The angle of the direct line of sight to the Messara (from both ‘sanctuary’ and Messara front) is 100 degrees and allows for observing an area of ca. 110 km².³³

Access to the ‘sanctuary’ area can, therefore, be regarded as the most crucial part of the settlement, at least from the perspectives of strategic and symbolic use. Any analysis of the ‘sanctuary’ must thus consider its relationship with both the broader area as well as the rest of the settlement in which it is located, as the building complex cannot be seen as existing in isolation. As already observed during the first campaigns, there is a SW-NE orientation in many of the buildings, both in the ‘sanctuary’ as well as in the rest of the main plateau – though the grid of the buildings within the ‘sanctuary’ area seems to be self-contained – indicating a common plan, based on a grid at least for the LM period.³⁴ However, contrary to the assumptions of early excavators, the area of the summit does not include any secure connection to the EM period, at least based on the finds thus far, with an overlap seen for the Protopalatial period, the last phase of the tholoi and the first documented on the settlement, including the ‘sanctuary’ area.³⁵ The Protopalatial activity on the hill could be seen in relation to the nucleation processes observed in the Asterousia region during the MM period, which resulted in a gradual regression in settlements and, therefore, in the strengthening of some areas that assumed the role of a main settlement.³⁶

Before proceeding further, it is important to provide an overview of the history of research conducted at the site.

33 Analytically discussed in Chapters 5.4, 9.2, and Figures 45, 46 and 81. The calculations have been made with the open source QGIS, Hannover edition, and using the DEM model.

34 This was observed even in the first Report of 2012 (Panagiotopoulos 2012b, 88; 2012a, 207) and has been confirmed since due to new finds, that allow for more precise documentation. See Panagiotopoulos 2019b, 455; also discussion on pages 169, 187.

35 See Chapter 3.2.1.

36 Vasilakis – Sbonias 2018, 280.

1.2 Previous Archaeological Research in Koumasa

1.2.1 First Excavations Under Xanthoudides

The first mention – and indeed the first archaeological examination – of the Koumasa site was made by S. Xanthoudides. In the first preliminary report of 1905 in the *Panathinaia* magazine regarding the excavation of the Koumasa tombs, which took place in December 1904, Xanthoudides mentioned that, due to the number of human remains, it is to be deduced that the tombs belong to a densely populated settlement.³⁷ He further based this argument on the fact that in the adjacent area, many buildings' remains and retaining walls are visible. As a closing remark, he emphasised that the presence of antiquities in this area was hitherto unknown until he discovered the area in 1904 and expressed his certainty about the presence of a Protominoan town.³⁸ This preliminary report was made before any excavation on the hill itself began.

The brief 1906 report of the first excavation atop the hill in late 1905 describes the Koumasa summit for the first time as “the community sanctuary” at the western part of the hilltop.³⁹ It is briefly described as having many rooms, of which the most important was covered with slabs and with a column-supported roof.⁴⁰ Although not directly mentioned, it seems Xanthoudides also excavated in the area of the magazines, as observed by Kanta – Karetsou.⁴¹

The results of the Koumasa excavations are primarily included in the second chapter of his monograph “The Vaulted Tombs of Messara”.⁴² As in the case above, the settlement of the hill is dealt with superficially, and with contradictory statements and uncertainties. The first of these is in the very first paragraph, where it is stated that the two-peaked hill (Peaks 1 and 2, as Peak 3 is not actively perceived from the tholoi area) of the settlements lies 100 m. south, when in actuality the peak is due east.⁴³ Although this inaccuracy might be due to the translations and the indirect way the book was written, it is indicative of the attention the settlement receives. In the fifty pages of the Koumasa chapter, the settlement occupies only three paragraphs spread over the last two pages.

37 “Οἱ τάφοι ἀνῆκον εἰς συνοικισμὸν πολυπληθῆ ἢ πόλιν πολυάνθρωπον” (Xanthoudides 1905, 215).

38 Xanthoudides 1905, 215.

39 ἱερὸν τοῦ συνοικισμοῦ, Xanthoudides 1906, 32. Although the notion that the summit lies on the western side of the Koumasa summit is correct, the cardinal points mentioned should not be taken at face value, as Xanthoudides' orientation is generally erroneous (see below).

40 “Τὸ ἱερὸν συνίστατο ἐκ πλείονων μικρῶν διαμερισμάτων. ἐν τούτων, τὸ ἐπισημώτερον ἦτο πλακόστρωτον, καὶ ἡ στέγη αὐτοῦ ὑπεβαστάζετο ὑπὸ κίονος, οὗ σώζεται κατὰ χώραν ἡ λιθίνη βάσις” (Xanthoudides 1906, 32).

41 Kanta – Karetsou 1991, 35.

42 Xanthoudides 1924, 3–50.

43 Another instance of inaccuracy is related to the orientation of the tholoi, which was reported to be due east, although the Tholoi B and E are due NE (Panagiotopoulos 2015a, 938; Ayash 2023, 139).

In some investigatory digs, which he called “trial excavations”, he recognised the finds as mostly dating to MM and some to LM. The most important movable finds appear in Plate 33, for which however no context is mentioned. The finds in the room with a column were described in the 1906 report, including a steatite object that he characterises an offering table, and a stone object, described as a baetyl. Regarding the immovable finds, very little of the architecture is discussed. He mentions slabs as “carefully dressed stones”.

As per the chronology, Xanthoudides assumed initially that the EM tombs belong to the settlement above the hill, as mentioned above. In the 1906 report, he had initially argued that the buildings on the settlement belonged to the EM period.⁴⁴ This was revisited in the 1924 publication, where he stated, “my exploration of the settlement was not complete, and I cannot affirm that there were not EM buildings, too, under the foundations of the later houses”.⁴⁵ These statements form a picture of a rather hasty excavation, aiming to prove EM traces in the settlement, and being rather dismissive of the smaller MM and LM sherds, that were disregarded there (as the modern excavations have shown). It is, however, to be noted that – as in the case of the half-excavated Tholos B – it seems that Xanthoudides operated within some time constraints.⁴⁶

These factors can be attested in the discoveries of the modern excavation campaigns; on the slopes of the hill within the ‘sanctuary’ area, debris was found containing a mixture of many sherds belonging to various epochs, while on the top of the hill in many places bedrock was reached with little to no finds. This interruption of the excavation site at the top of the hill needs to be addressed when discussing the small amount of pottery in contrast with the areas of the ‘sanctuary’ that were previously undisturbed (see Chapter 7.3).

It is to be understood that the assumed settlement extended on the slope of the hill of Korakies and, for Xanthoudides, according to established ideas of traditional archaeology, the two peaks and the area east of it constituted an Acropolis. It might be for this reason that stone rows beneath the peaks were interpreted as a part of the fortification.⁴⁷ For the ‘sanctuary’ area, the term “MM Shrine” was used, for which only the finds are catalogued, with no mention of the architecture or buildings, let alone their context.⁴⁸

44 Xanthoudides 1906, 32.

45 Xanthoudides 1924, 49.

46 Panagiotopoulos 2015a, 939–940. Beyond the briefly mentioned settlement, similar inaccuracies in the measurements and descriptions are more obvious in the description of the tholoi, where the lack of detail in the description of the archaeological method by Xanthoudides is in clear contrast with his focus on the finds (see Trautmüller 2011–2012, 70).

47 See Footnote 59.

48 The objects from the shrine, for which interpretations of a sacred character were given, are shown separately in Plate 33 (Xanthoudides 1924, 50).

In summary, the views expressed within the first accounts of the area by Xanthoudides are mostly speculative in nature and should not be relied upon, but an interpretation of his idea is worth noting. The main elements on the hill mentioned are the settlement and the ‘sanctuary’, which he saw as distinctive elements united within a “cyclopean” fortification.⁴⁹ In light of the new data, these notions need be revisited. It seems that the settlement was spread across the whole hill of Koumasa, including the south and east slope, which reaches up to the tholoi, as indicated by survey finds of a variety of pottery.⁵⁰

As for Xanthoudides’ “cyclopean” wall, it refers either to vanished stones or more likely to the impressive – at least in contrast with the surrounding remains – building elements in the magazine area in the southeast of the settlement. “Cyclopean” is an epithet he used to describe the masonry of the tholoi, indicating elaborate building blocks rather than the LM or LH-specific building technique we refer to by this name today.

1.2.2 Accessibility of the First Excavation Data

Another difficulty for the interpretation of these short and sometimes vague statements arises from the fact that the diary of the excavation has been lost. One of the only sources of context derives from the inventory of the Herakleion Museum, referring to special areas such as the “corridor of the sanctuary”. This terminology has logically been assumed to refer to locations further analysed in the lost diaries of the excavation.⁵¹

These uncertainties in the excavation itself, and also of its documentation and publication have posed interpretative challenges for the period to follow and also archaeological questions for the recent archaeological investigation of the site.

Lacking the notebooks, one must rely on preliminary reports such as Xanthoudides’ entries in the Panathinaia magazine or as the early mention by Körte⁵², where a “cyclopean” wall around a settlement is mentioned as surrounding many rectangular houses, each having many rooms and one with a staircase.

Another disruptive factor is the possible reuse of the material from the hill by the local community or passersby.⁵³ One case was the slabs missing at the beginning of the 2012–13 campaign, which had been documented by Kanta and Karetsou in 1992. This

49 In the 1924 publication, he presents the fortification relating to the summit of the hill where the settlement is located, whereas in his previous short report of 1906 Xanthoudides presented the fortification concerning both summits.

50 For indications of Neopalatial activity on the western slope, see Panagiotopoulos 2022b, 338.

51 Georgoulaki 1990, 12. In the modern excavations, there was an effort to identify the locations of the mentioned areas, but with some uncertainty. However, in some areas the traditional naming such as the “corridor”, or even “sanctuary” have been carried forward.

52 Körte 1907.

53 This is a phenomenon which was widespread in the whole region of Asterousia-Messara (Vasilakis – Sbonias 2018, 276) and it is well attested in Koumasa (Branigan 1993, 49; Georgoulaki 1990, 6–8).

can mainly be seen, though, in the prominent example of a now missing column base and the material surrounding it. A reference to a column base in the ‘sanctuary’ was given both during and after the Xanthoudides excavation.⁵⁴ Two photographs of the column base *in situ* were taken in 1909.⁵⁵ Most of the slabs, thresholds and even stones on the walls, together with the base, have since vanished. Based on the few remains, rocks and skyline, the original position of where the two photographs were taken and also the initial position of the lost architectural elements, the position of the threshold and base could be approximated.⁵⁶ This could very well be the base mentioned because for Xanthoudides, the ‘sanctuary’ comprises the area around Peak 1, where the photographs were taken. The problem is its location, which is not central and not in the main ‘sanctuary’ room, as alluded to by Xanthoudides.⁵⁷ This seems more likely, as the main ‘sanctuary’ room (Room 1, as discussed in Chapter 7.2) is rather small, unless Room 3, whose dimensions would allow for a base, was meant.⁵⁸ Another possibility however is that this is a second column base that came to light after the end of the excavation, which Xanthoudides therefore did not mention. This assumption would mean that illicit activities took place and that the base mentioned by Xanthoudides has also vanished. Although less likely, this is the only possibility in which the mention of a base in the main ‘sanctuary’ building is not incorrect. But if the room that Xanthoudides mentioned as the main ‘sanctuary’ room was the one with the column, then there would be no contradiction. And this is what was assumed by Rutkowski.

The fact of the looting in the area might explain yet another detail from Xanthoudides: “On one of the peaks, where the Acropolis would have been, a section of polygonal or Cyclopean wall is preserved, but there is nothing to show to what precise period it belonged”.⁵⁹ It is not clear if this is a reference to some of the structures at the foot of the southern peak, for which the term “Cyclopean” would be an exaggeration, or to worked stones surrounding the peak, of which today there is no evidence. However, the same term was used by Xanthoudides to describe the masonry of the tholoi and should be taken there to denote a thick stonewall 1m wide made of small stones, which is rather typical. The accuracy of the localisation or of the epithet, on the other hand, is not obvious.

54 Körte 1907, 108; See also Footnote 40.

55 The first photograph was first published by D. Fimmen 1921, and both of them together were first published by Rutkowski (See Rutkowski 1989, Table 5). The negatives are kept in the DAI Athens (photographs D-DAI-ATH-Kreta-0157, D-DAI-ATH-Kreta-0158).

56 For the differences between the modern situation and that in 1909 (also tackled in Rutkowski 1989, 48) and the method for identifying the positions of the lost elements, see discussion in Chapter 7.2.6 and Figures 71–73.

57 Xanthoudides 1906, 32.

58 Room 2, in its widest possible extent, could be around 25–30 m². For analysis of the rooms, see Chapter 7.2.

59 Xanthoudides 1924, 49.

1.2.3 Studies in the Area After Xanthoudides

After the end of the excavation, for most of the 20th century, Koumasa was not excavated further, probably because of its remote location.⁶⁰ Nevertheless, this abandonment did not reflect the academic community's stance regarding the site. It remained relatively present in archaeological discourse, mainly due to the EM tholoi and – to a lesser extent – to the 'sanctuary'. The summit and later buildings were often regarded by the *communis opinio* to play a role of a sacral nature, but without consensus as to what type. These hypotheses, however, seem to be solely based on the vague evaluation of the preliminary Xanthoudides' reports accompanied by occasional visits and assessment of the hill's architectural remains.

One of the first mentions was in 1907 by R.M. Dawkins, who characterised the area as a pillar crypt, based on the mentioned column base.⁶¹ Another early notion was based on the topography of the region, proposing a peak sanctuary.⁶² Often this term was used without scrutiny.⁶³

These early opinions influenced many publications, such as that of N. Platon, who, in the 1950s, also mentioned both functions. In 1954, the crypt of Koumasa is briefly mentioned, referencing a column or a pillar; he stresses, however, the lack of additional information.⁶⁴ As for the role of peak sanctuary, Platon expresses his belief with certainty in 1951, alluding to the two peaks with one having the settlement and the other the sanctuary.⁶⁵ This picture contradicts the fact that Peaks 1 and 2 have a distance of only 50 m. between them, and therefore do not constitute separate locations but rather act as two topographical *loci* to the hill. Furthermore, the 'sanctuary' area is located centrally in the settlement rather than in isolation (Figure 4). Here the lack of observation of the site, in combination with Xanthoudides' vague description – that stressed the topographical criteria he deemed important – led to an inaccurate perception. Regarding the chronology question, Platon sought parallels with the peak sanctuaries of Petsofas and Youktas, following the initial suggestion of MM II for dating some of the finds.⁶⁶ Other

60 The only activity involved restricting access to the area and performing restoration activities (Alexiou 1973, 466; Lebesi 1977, 316).

61 Dawkins 1907–8, 457.

62 Rutkowski 1986.

63 Warren 1969, 62. The term is mentioned without further comments during the discussion of the item HM 1017 as a MM I libation table, and thus, the earliest up to that point. (Warren 1969, 63).

64 Ἀτυχῶς δὲν ἔχομεν περισσοτέρας πληροφορίας περὶ τῆς ἐνδιαφερούσης ταύτης κρύπτης. (Platon 1954, 457).

65 Βέβαιος εἶναι ὁ χαρακτήρ του ὡς ἱεροῦ Κορυφῆς (Platon 1951, 146).

66 Namely, the dating of artefacts in MM II and LM IIIB lets him speculate about a possible MM I open courtroom, as with the other peak sanctuaries mentioned, and also to speak of the rekindling of the cult in the later period (Platon 1951, 146–147).

epithets used for the ‘sanctuary’ include the terms domestic sanctuary.⁶⁷ A further correlation of the whole settlement area only with the area of the ‘sanctuary’ is made by Faure, who stressed the LM III B date in addition to the MM II.⁶⁸

As an assumed Protopalatial building, it is one of the few cult rooms in a non-palatial context for Gesell. The author regards the previous characterisations critically, and describes the room as a town sanctuary, an idea already brought up by Hood⁶⁹ and which goes back to the Xanthoudides report of 1906.⁷⁰ Gesell postulated further the possibility that a row of stones in the northern part of the ‘sanctuary’ could be a bench, thus including Koumasa in the broader bench sanctuary type.⁷¹

A critical stance on the variety of suggestions and the need for further investigation were put forward by Georgoulaki in 1990. She conducted the first thorough examination of the material finds of the Xanthoudides excavation, many of which were never published, and stressed the need for further archaeological study at the ‘sanctuary’ and of the material.⁷²

As for the site, the first investigation was conducted by Rutkowski in the late 80s and produced some maps of the whole settlement with emphasis on the ‘sanctuary’.⁷³

Finally, the aforementioned Mycenaean phase and the LM dating influenced later ideas of habitation or the use of the site as a refuge. However, the LM III elements can be seen as part of the reuse of some areas, but with no elements to support the settlement type of refuge, as is understood within the LM III.

1.2.4 The Site in View of Modern Excavations

The next excavation activity on the hill of Koumasa was conducted by Kanta and Karetsou with investigatory digs in the area of the magazines southeast of the ‘sanctuary’ in 1991 and in the ‘sanctuary’ area in 1992, near Peak 1. Various finds in the magazines, including plaster, loom weights, stone and ceramic vases indicated the potential of this area which was proven correct in the modern campaign.⁷⁴ The works on the ‘sanctuary’ concentrated on cleaning and then beginning the excavations of the two main rooms (Rooms 1, 2). Red, blue and white-coloured plaster and an abundance of

67 *Knossos IV*, 147: The reference appears during Evans’ discussion of the Koumasa snake tube as a primitive type of water pipe (see also Rutkowski 1989, 49). The conclusion is reached based on the fact that the objects identified as cultic of nature were few and concentrated in one room out of a multi-chambered complex.

68 Faure 1967, 125.

69 Hood 1977, 158; 163–164.

70 Xanthoudides 1906, 32.

71 Gesell 1985, 13–14.

72 Georgoulaki 1990, 6.

73 Rutkowski 1989, 48; Rutkowski – Nowicki 1990, 114–116; Fig. 4.

74 See Chapter 2.2.

1 Overview of the Site and the Challenging Aspects of Research

ceramic was found during the initial cleaning. Further investigation was focused on the two main rooms and the area behind them to the east, the first of which was dubbed the corridor⁷⁵ – possibly referring to the initial reports of Xanthoudides – and the adjacent area. As the debris showed, it was an area Xanthoudides had already excavated.

Generally, one of the first observations was the existence of a complex beside the main two excavated rooms.⁷⁶ The architectural remains were characterised as Neopalatial, with evidence of a Protopalatial phase, as the ceramic of the deepest layers included pottery of the Kamares type and sherds of barbotine vases.⁷⁷

A new interdisciplinary research programme on Minoan Koumasa commenced in 2012 under the auspices of the Greek Archaeological Society and with the cooperation of the University of Heidelberg's Institute of Classical and Byzantine Archaeology. This research programme, the Koumasa Project, is taking place under the direction of D. Panagiotopoulos and aims at the systematic excavation of the tholoi and the settlement. The excavation of the tholoi produced many new finds and anthropological remains, that have added to our understanding of the tholos building culture and their environment.⁷⁸ One of the areas of focus so far has been the areas of the magazines and the 'sanctuary' area, expanding to other trenches (see Figure 4). The summit area was excavated further, in and around the main rooms of the 'sanctuary'. Additionally, these excavations showed an extension of the 'sanctuary' complex to the southern side of the summit, which proved rich in finds. In the magazines' area, the long retaining wall has been found to extend to a total length of 27 m., encompassing at least eight rooms of various phases that extend to Protopalatial deposits and have yielded various artefacts. Particularly noteworthy is the standing profile of the retaining wall, boasting a height comparable to a building, reaching up to 3.5 m.⁷⁹ making it one of the tallest standing structures within Minoan archaeology. Moreover, ongoing excavation reveals additional walls and rooms, all consistently dating to the later phase of LM I. These structures exhibit a canonical grid pattern that extends across the entire plateau, suggesting the possibility of a single complex or building covering the entire area.⁸⁰

75 Kanta – Karetsou 1992, 86.

76 Kanta – Karetsou 1992, 77.

77 Panagiotopoulos 2015a, 936.

78 E.g. Panagiotopoulos 2022b, 339–340; Panagiotopoulos – Savvatianou 2022, 173–177, See also Footnote 407.

79 Panagiotopoulos 2022b, 324.

80 Panagiotopoulos 2023a, 196.

1.2.5 Evaluation

Although the excavation of the tholoi has been completed, the plot directly to the east of the excavated area will be crucial for determining the extent of the built activity, as well as the relation with the material on the slope of Korakies.⁸¹ As for the settlement plateau, while so far, only a small percentage of the settlement's buildings have been unearthed,⁸² the Koumasa hill summit – on which the 'sanctuary' occupies a prominent spot – has been almost completely excavated and therefore the evaluation of the finds and the complex can commence.

Previous proposals that the finds stretch from Protopalatial to the Postpalatial period⁸³ were confirmed by the modern excavation campaigns, which has brought to light architectural remains, a large quantity of pottery (mainly dating to the range of MM IB/II A to the main phase of LM I, in at least two phases)⁸⁴ and finds such as fresco fragments, whose uneven distribution allows for an analytical study that could help determine the purpose or functionality of the rooms. Such an analytical study has yet to be undertaken,⁸⁵ so the finds and the remarks on the earlier excavations will be taken into account and re-evaluated.

From an archaeological perspective, the difficulty of assessing the function of the summit stems mainly from two factors. First, the material finds seem to suggest a specific importance of the building(s) on the summit, but with no clear indication regarding the function, or even the precise chronology of its usage, as was confirmed by the modern excavation campaigns. Second, the unclear indications of the campaign of Xanthoudides, and the usage of the slope as a fill of the excavation near the summit posed some difficulties in the modern campaigns.

A secondary focus point of this work is the evaluation of the architectural layout of the site in terms of stratigraphy and building phases, as – even in the excavated areas – this is still far from clear. Such an analysis of the excavation results needs to be done in order for a hypothesis to be formulated regarding the history and the building phases and whether the area constitutes a "complex", as the parallel arrangement of all the walls seems to suggest, or a gathering of independent rooms but under a common, well thought out masterplan.⁸⁶ This can be exemplified in the case of the area of the settlement that is almost fully excavated, that of the 'sanctuary'. In Chapters 7 and 8, this area will be described in light of the archaeological data.

81 E.g. Panagiotopoulos 2015, 539.

82 See Footnote 88.

83 Georgoulaki 1990, 12–21.

84 Panagiotopoulos 2024, 450–452.

85 The portable finds of the Xanthoudides excavations from the main rooms of the so-called 'sanctuary' have been studied, but without taking into account the pottery. They are also lacking precise contextual description due to the state of the first excavations' documentation.

86 See Footnote 80.

1 Overview of the Site and the Challenging Aspects of Research

In Part III (Chapters 7, 8) the area of the ongoing excavation will be analysed based on the archaeological data and also within a topographical framework, in an effort to contextualise the insights of the excavation.

In Chapter 1 an overview of the site and the details of the history of research were presented. In the following Chapter 2, a diachronic overview will be presented, assuming a wider view of the area of Messara and Asterousia in the hope of illustrating the role of Koumasa in the tapestry of activities in which it is situated.

2 Summary of the “Political” Systems and Correlation with the Finds from the Area of Koumasa

In this chapter, a summary of the various political systems that have influenced the region of Koumasa will be provided, each impacting it in different ways as the area transitions, or rather oscillates, between periods of centrality and obscurity.

This is not intended as an exhaustive history of the region, but rather the aim is to contextualise the island’s history, with a specific focus on the area of Koumasa.⁸⁷ For each period, the examination delves into Koumasa’s material affluence as formed by its unique topographical characteristics and how these manifest in archaeological finds. Although the excavation is ongoing, with around a quarter of the excavated area of the settlement plateau unearthed so far, preliminary opinions can be formed on the basis of the these finds.⁸⁸

This can be seen within investigations of island-wide settlement changes that have been undertaken within the research, here seen from the point of view of Koumasa.⁸⁹ To generalise upon the position of Gragson et al, it is not only one human activity, but the potential intertwining of pastoralism, agriculture and specific location between the ever-changing *needed*⁹⁰ networks that are “enmeshed in a complex interaction between broad-scale drivers, local resources, institutions, and individual agency”,⁹¹ thus affording the otherwise “static” topographical background a certain agency throughout the regional Anthropocene. A palimpsest which gets reused, as per the needs defined by the regional historical phases. Studies of transitions in land-use indicate that these changes are driven by exogenous innovations which originate outside the boundaries

87 It should be stressed that one element which will not be explicitly examined is the matter of precise chronology, as the nuances of the broader subject of Aegean chronology are beyond the scope of this work (see Manning 1995 for an introduction to the subject).

88 The percentage of the settlement area excavated is 1,420 m² (including the area of bedrock, which exceeds 200 m²), of a total of 6,300 m² comprising the whole settlement plateau; the excavated area corresponds to 22% of the total area.

89 Pollard 2022. See Ghilardi et al. 2019 for a diachronic analysis of a certain region, that of Phaistos and the western Messara. On using a diachronic approach as a means of a holistic understanding of a region, specifically the Sphakia region, as well as the “predisposition of a landscape”, see Nixon 2006, 60–88, 109–116.

90 As opposed to *available* communication networks that are specified by the positions of the settlement and the terrain and that can be determined by application of DEM methodologies, the networks that actually form are those that cover or relate to the broader needs of the given society at a specific time period.

91 Gragson et al. 2020, 2.

2 Summary of the “Political” Systems

of the local system.⁹² The stark variation of relevancy is associated with the various phases of socioeconomic interdependencies that made use of the same landscape in different ways.

These phases will be examined with a particular focus on the development of network connectivity that commenced at the latest during the EM period and assigned Koumasa a central role, a phenomenon that reached its zenith in the palatial periods.⁹³ A local identity as seen in the distribution and context of the EM graves gives way to an era of Phaistian cultural domination in the region during the time that coincides with the first phase of the building programme on the Korakies hill. This is followed by the so-called Knossian (LM I) phase, that covers the establishment of most built structures on the hill. After all, built space can be viewed as an expression of many aspects of social and political organisation in which the building activity takes place.⁹⁴ Hence, examining the developments in the area in the EM period, and then the nature of this assumed Phaistian and later Knossian cultural dominion and to what extent it also constitutes a political one, is of great interest. It not only concerns agricultural control and the pathways to the harbours in the south explored in this work but also the Kophinas sanctuary and, ultimately, the choice of the Korakies hill as a settlement location; at a second level, it influences the portrayal and message the built environment tries to convey.

Given the central theme of this work, which explores the enduring utilisation of the same environment throughout shifts in cultural activity, the concise historical overview – while assessing the role of Koumasa within this context – will encompass all periods of habitation on the hill as indicated by the archaeological record. This extends beyond the Neopalatial period to encompass the LM III, Graeco-Roman, and Early Byzantine eras.

2.1 Prepalatial Period

Hypotheses on the settlement history in the region during the Prehistoric era are numerous, including but not limited to Relaki, Alexiou and Warren, Watrous, Tomkins, Nowicki, Vasilakis – Sbonias.⁹⁵ The information these theories are built upon is, unfortunately, based mainly on funerary evidence, gathered mostly from surveys and salvage

92 Lambin – Meyfroidt 2010.

93 Within the scope of the historical overview, the chronological system of Pre-, Proto-, and Neopalatial periods are used as traditional terminology, without commenting more than necessary on the modern understanding and revisions regarding the applicability of this terminology. See discussion in Panagiotopoulos 2021, 37–43.

94 Letesson – Knappet 2017, 5–6.

95 Watrous 1994; Relaki 2004; Alexiou – Warren 2004; Tomkins 2008; Legarra Herrero 2014, 35–64; Nowicki 2014a; 2018; Vasilakis – Sbonias 2018; Todaro 2023.

excavations, as discussed in Chapter 3.1.⁹⁶ The archaeological evidence of the tholoi, along with its apparent topographical isolation, has led earlier researchers to perceive the regions of Messara and Asterousia as a continuum of shared cultural homogeneity, suggesting an expression of common social structures.⁹⁷ However, viewing short-term processes and re-examining the region in smaller, overlapping units of varying scales offers a more nuanced approach that illuminates divergent regional dynamics and approaches.⁹⁸

2.1.1 FN–EM I

In the Asterousia, the earlier phases of likely habitation seem to extend to the later phase of the Neolithic period, with a pastoralist character, as evidence from Ayiofarango or the Miamou cave suggests.⁹⁹

FN presence is scarce, but nevertheless evident in the mountainous regions in strongholds, such as have recently been documented based on the surveys conducted by Nowicki.¹⁰⁰ New settlements appear in the FN II–EM I in defensible positions along the coastal region of the Asterousia, as well as the northern side of the Asterousia and some evidence from the Messara proper.¹⁰¹ They mostly show a single deposition phase, as after this period, these sites are abandoned. The pottery yield of those sites, most of which – with the exception of Phaistos and (to a lesser extent) the Gortyn Akropolis – are surveyed rather than excavated, is rather poor.¹⁰² EM I proves to be similar to FN, as it covers the same locations as before and favours similar settling pattern on hilltops. However, in the Asterousia, distinct EM I sites are less known.¹⁰³ For this reason, the common chronology used by Nowicki as FN II–EM I is here followed. In general, it is argued that the Asterousia region appropriated elements adapted to social practices pre-existing in the Messara, but deviated in the funerary practices, as the role of the

96 See page 71ff.

97 Manning 1995, 104–18; Sbonias 1999; Relaki 2004, 170–171.

98 Relaki 2004, 171.

99 Taramelli dates the finds to the Late Neolithic or very early Bronze Age (Taramelli 1897, 308–309), with Blackman and Branigan preferring the Late Neolithic dating. A presence in the area is assumed for the mid-4th millennium (Blackman – Branigan 1977, 66–67). However, a survey conducted in 2015 in the area of Miamou-Porti did not produce Neolithic finds, such as those located in the cave of Miamou. In contrast to EM finds, the evidence securely dated to the Neolithic is scant (Vasilakis et al. 2019, 16). See also Tomkins 2012, 66–69.

100 Nowicki 2018, 8–9; 29–39.

101 The three possible FN–EM I settlements on the edges of the semi-circle over which Koumasa presides are discussed in Chapter 9.2.2 (see Figure 86).

102 Relaki 2004, 176–177; Nowicki 2018, 9.

103 Relaki 2004, 177–179.

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tholoi indicate, leading to a distinction between the plain and the Asterousia, which Relaki calls two sub-regions.¹⁰⁴

The tholoi, to us the defining architecture of the period, have been shown to have different chronologies. In the valley, the appearance of the tholoi seems to be in EM II,¹⁰⁵ while the presence of the Ieroditis tomb – which is not a tholos – has been used as an argument for a presence of a different tradition in the western Messara before the arrival of the tholos tradition.¹⁰⁶ In contrast, in the Asterousia the tholoi can be dated to EM I which acts in favour for assigning the origin of this tradition along the southern coastline. For some of them, the existence of FN foundations has been argued for.¹⁰⁷ Even if not the case, building tholoi in the vicinity of FN sites is an observed trend, verified by new observations, as seen in the case of Salamias and Ayios Ioannis discussed below.¹⁰⁸ This tendency can be found even at the eastern extension of this coastline, at Livari in eastern Crete.¹⁰⁹ Further data – such the dispersion of certain types of pottery as well the pattern of settlements – show similarities with other coastal areas of Crete, arguing for the importance of the sea connections at the dawn of the EM era.¹¹⁰

The archaeological evidence available for the EM Koumasa area is mainly of the funerary type, namely the area of the three tholos structures at the base of the hill and their annexes, with a dated main use ranging from EM II to MM II. Tholoi E and B were built in EM II, with a possible earlier use of the area where Tholos B was built.¹¹¹ The earliest elements, namely Tholos A and the adjacent ossuary, have been confirmed by the current excavation with an EM I dating for Tholos A, and the deepest layer of the ossuary produced pottery dating to EM IA or FN, thus belonging to the earliest phase of the Koumasa cemetery.¹¹²

2.1.2 EM II–MM I

With the shepherds’ presence at the foot of the Asterousia seemingly starting at the end of the Neolithic, Branigan argues for an *egalitarian* society in EM II, until the popula-

104 Relaki 2004, 179–180.

105 Branigan 1993, 13.

106 Relaki 2004, 178; Another, rather unlikely suggestion made is that the two burial types indicate differentiation in social status (Watrous et al. 1993, 226).

107 Vasilakis 1989–90. The case for this has been contested however, arguing for the mere vicinity of these EM I structures near the FN ones (Relaki 2004, 179).

108 See the consideration of dealing with the FN II to EM I within the same time reference above.

109 Used in EM IB to EM III, after Papadatos – Sofianou 2012, 51–52; no. 426 in Legarra Herrero 2014, 285.

110 See discussion on page 307ff.

111 Panagiotopoulos 2016, 562–563.

112 Panagiotopoulos 2018, 489. The analysis of the chronological phases in light of the finds of the recent excavations will be holistically presented in the future by Diamantis Panagiotopoulos.

tion starts expanding its radius of activity and eventually leading to settlements.¹¹³ This expansion, and the reason behind it are linked with the theoretical studies that will be portrayed below. The term *egalitarian*, however, remains vague and difficult to interpret as applicable to the time and its people. As other data from the Asterousia and the Messara suggests, it could mean a larger role for a heterarchical structure, alluding to horizontal relations without excluding the idea of hierarchy.¹¹⁴ The role of international trade, evident amongst other things from the obsidian cores in a Neolithic context at Phaistos,¹¹⁵ can be considered to play a role in the formation of local traditions.¹¹⁶

The nucleation observed in the early stages at Phaistos, as noted by Branigan, was considered to prelude similar developments in the mountainous regions. This phenomenon was interpreted as a consequence of the valley's more suitable affordances.¹¹⁷ The climatic criteria described in Chapter 3.4 may be seen as one reason for this development. Some have argued that this nucleation was an element of an emerging egalitarian organisational structure.¹¹⁸ The appearance of areas with two or three tholoi are indicators of the growth of some settlements and for the emergence of inner sociological factors.¹¹⁹

In the EM II, the dwellings in the western Asterousia become generally more visible, in locations demarcated by possibly defensive walls.¹²⁰ This defensible aspect is seen in the central Asterousia as well, as at Trypiti.¹²¹ The tholoi receive architectural formalisation and boundaries, with the addition of antechambers and paved areas, emphasising the activity outside the tholoi. Notably, many of them, including in the region of the central Messara, do not produce finds by the end of EM II or in the EM III.¹²² Concerning the region of Koumasa: Tholos E at Koumasa,¹²³ Ayia Eirini E, Salame and

113 Branigan 1985, 61.

114 Legarra Herrero 2011, 325–342.

115 Vagnetti 1972–73, 92.

116 Vagnetti 1972–73, 131–134.

117 Branigan 1993, 114–15. On the non-linear but rather oscillating nature of the nucleation in Prepalatial and Protopalatial Phaistos, see Todaro 2023.

118 Relaki 2004, 180.

119 As Sbonias notes, a second tholos does not indicate a doubling of population, or rather, it is not necessarily linked with capacity issues but could denote a certain need for segregation or expression of status. In any case, an increase in the local population can be hinted at by the presence of a second or even a third tholos (Sbonias 1999, 27).

120 Blackman – Branigan 1977, 39–47.

121 See discussion on pages 242ff., 301ff.

122 This hiatus is frequently associated with cleaning activities in the cemeteries, which do not necessarily indicate a cessation of activity, but rather suggest changing patterns in funerary practices (Branigan 1970, 107–109).

123 On later finds in front of Tholos E, see Panagiotopoulos 2024, 224.

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Koutsokera all seem to have discontinued use by then. To those, Drakones, Porti and Christos could be added.¹²⁴ This tendency is also observed in the western Messara.¹²⁵

This lack of knowledge about this period in the region can be attributed to several factors. First, in addition to the evidence gap in the aforementioned cemeteries, the absence of east Cretan wares, which were instrumental in identifying this period in other parts of the island, is notable in the Messara region.¹²⁶ Additionally, there have been suggestions of misdated evidence,¹²⁷ as the gap in the funerary record makes the clear distinction of phases a challenging task. Instead, it hints at a transitional period between EM II and early EM III on the one hand, and late EM III and MM IA on the other.¹²⁸

Within the EM II period, the grave goods increase in variety, indicating the establishment of connections with locations outside the island. Although the imports begin appearing in the EM I, it is in the EM II that they take hold.¹²⁹ Koumasa belongs to the rather few places that exhibit a possibility of EM I dating for many types of foreign goods.¹³⁰ At the same time, local variations appear. The characteristics of various locally created artifacts show a differentiation between the tholoi centres, such as Koumasa, Platanos or Ayia Triada. The presence of different variations of similar products can be highly localised, indicating different centres of craftsmen particular to some tholoi.¹³¹ Another explanation is a variation in preferences. Of the various objects it is the seals, that have been seen a measure of regionality and the representation of a certain level of hierarchy.¹³² This and other observations have led to the assumption that the spread of the tholos tombs is to be seen not as sign of homogeneity but rather as that of competition.¹³³ Thus, the extensive discourse on urbanisation and the emergence of a

124 See discussion on page 246.

125 Watrous 1994, 717–753; Relaki 2004, 181; Legarra Herrero 2014, 47. The list for the western Asterousia includes Kaloi Limenes A; B and Lassaia B.

126 Betancourt 1985, 53.

127 Referencing cemeteries in the vicinity of Koumasa, Legarra Herrero (2014, 49) proposed a correction of previously assumed EM III dating as follows: Finds from the cemeteries of Drakones and Porti should rather be dated to MM I, and from Christos to early EM III or even EM IIB.

128 Legarra Herrero 2014, 47–49.

129 This period could be adjusted from EM I to EM IIA when the whole of the island is concerned, as already in EM IB there is a decline in elements of trade with the Cyclades (Legarra Herrero 2011, 340). In any case it is in EM II that foreign goods from the East appear rather suddenly (Colburn 2008, 112). See also: Branigan 1970, 70–79; Branigan 1993, 151.

130 A variety of object types, such as gold, ivory, and imported seals, have a *terminus ante quem* extending back to EM I. Ayia Triada is the other place sharing this tendency (Colburn 2008, 112, Table 1, Fig. 5).

131 The observed differentiations include the metalwork; the types of seals in Platanos; or the preference of the tubular drill for the stone vases in Koumasa (Branigan 1993, 114; Sbonias 2010, 355–358).

132 Sbonias 2010, 350–351.

133 Sbonias 1999, 27–28.

hierarchically structured society during EM II should be approached cautiously.¹³⁴ At the same time, the nucleation into centres, spread out into the Messara allows for assuming local spheres of influences.¹³⁵ In any case, the significance of the local context remains paramount. When adopting this perspective, it becomes necessary to consider how precisely defined the competing parties or regions might be. This issue will be revisited later, taking into account visibility range as one element of the spheres where Platanos and Koumasa, respectively, exert more influence.

The EM III follows the abandonment of many places in Crete.¹³⁶ Concerning the tholoi this is seen by a discontinuity in the usage between EM II and MM IA.¹³⁷ A tempting interpretation framework is provided by the discussions of the effects of climate change, as presented below.¹³⁸ In this brief summary, we will not delve further into the complexities of EM III in south-central Crete.

In the context of MM I, heterarchical structures exhibit a more pronounced presence during the late Prepalatial period.¹³⁹ However, these local networks gradually diminished during the transition into the advanced Protopalatial phase, marked by the expanding dominance of the emerging states, which extend their influence beyond their initial, more confined boundaries.¹⁴⁰ Particularly in the vicinity of the Asterousia Mountains and the central-eastern Messara region, numerous settlements were abandoned, while a select few settlement sites where the population aggregated grew further. Notable examples of these areas include the vicinity of the palaces, and around Platanos and Koumasa.¹⁴¹

The MM I period introduces new technologies, and is the traditional date for the appearance of the palaces.¹⁴² It is in this period that the rate of population growth, at least in Knossos, reaches its peak which leads to an assumed general population growth.¹⁴³ As for the area of Koumasa, the general trend of furthering the work at cemeteries or establishing new ones is observed. This includes the Annex at Porti, and the establishment of Apesokari and Drakones cemeteries, while on the Asterousia in general and the southern coast, no new tholoi seem to be founded and a minimal building activity in existing ones can be observed.¹⁴⁴ It is therefore an inversion of the roles of mountain

134 Summarised in Watrous 1994, 712–717; Whitelaw 2012.

135 Watrous et al. 2004, 267–268.

136 This tendency is seen as actually beginning in EM IIB (Legarra Herrero 2011, 340).

137 Watrous 1994, 717–720.

138 See discussion on pages 92ff.

139 Sbonias 2010, 359–360.

140 Sbonias 2010, 361.

141 Sbonias 1999, 31.

142 In MM I B (Legarra Herrero 2014, 50).

143 Whitelaw 2012, Figs. 4.12, 4.13.

144 Legarra Herrero 2014, 50.

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and valley, as the main field of tholoi-activity. As for Apesokari and Drakones, both are located at the meeting point of the valley with the mountain and both almost symmetrical on the semi-circular expansion of the valley which Koumasa oversees.¹⁴⁵ In a diachronic parallel that may allude to the same strategic needs, the locations of these two coincide with that of the two known periods of habitation activity in the FN–EM I period, at Afentis Christos and Apesokari Vigla and the Kalamaki at Fournofarango, as discussed above.¹⁴⁶

This seems to concern also Koumasa, which these two locations flank. In the cemetery, the preliminary reports indicate that Tholos A has an EM I dating, with Tholoi E and B following in EM II.¹⁴⁷ Although such an early utilisation of the settlement plateau cannot be excluded, no secure signs of activity in the upper Korakies hill have been reported to date. It should be noted, however, that the hill dominated the area of the EM tholoi below. Thus, even if not actively walked upon or containing built structures, it was at least indirectly – particularly visually – included in the ritual activities taking place there.¹⁴⁸ As for the tholoi themselves, although adapting to the broader tholoi culture, a certain amount of regionality is observed in them. This extends to the finds themselves,¹⁴⁹ as well as the adaptation of architectural characteristics, namely the orientations, to accommodate the needs specified by the local landscape characteristics, a fact perhaps leading to the establishment of local traditions.¹⁵⁰

Another aspect of the tholoi, namely their distribution within their landscape and particularly regarding their vicinity to water sources, will be presented in Chapter 9.3, especially of those close to Koumasa in the discussion of the Mesoscale.

In the Prepalatial period, mountains were scarcely populated. The need for a Minoan sanctuary arose with the impetus of economic expansion to these mountains in the late Prepalatial Period (EM III–MM I), perhaps in conjunction with fitting climatic conditions.¹⁵¹ But the peak sanctuaries themselves were in areas free of direct exploitation, such as Atsipades peak sanctuary or Kophinas, where apart from the sanctuary itself no built activity is observed, thus maintaining its symbolic aspect. This aspect of the peak

145 See discussion on page 241.

146 See Footnote 101.

147 Panagiotopoulos 2016, 562–563. For the possibility of an earlier dating for the ossuary, see Footnote 112.

148 The hill’s distance impacts the local horizon, as it expands for approximately 160 m. from a point between the three tholoi up to the top of the hill on the northern summit. Viewed from the area of the tholoi, the hill appears to have an altitude of 16° to 17° at the peaks and generally more than 14° for an azimuthal arc of 40° due east, corresponding with the two peaks of the Korakies hill (Ayash 2023). In Tilley’s discussion of the landscape as a “spatial text” (Tilley 1993), space can be seen as socially constructed, and therefore the monuments within it led to the creation a new landscape, which is bound to the local landscape characteristics.

149 Branigan 1993, 114.

150 On orientations of the tholoi and particularly that of Tholos E to the summer solstice sunrise, see Ayash 2023.

151 See Chapter 3.4.3.

sanctuaries can be codified as them being places of symbolic expression of the relation to the mountain, which was brought forth during the exploitation of the mountain.¹⁵²

2.2 Protopalatial

As for the growth of centres in and after the MM I, the notable developments in the region concentrate on the establishment of the palace in Phaistos and the founding of Kommos. The formation of a *state* in the Messara region and its specific structure and the balance between palace or elite-centred models has been a subject of great consideration.¹⁵³ Nevertheless, the rise of these centres in the west Messara and the proliferation of their material culture in the central Messara, as observed in Koumasa, allows for the usage of the term “Protopalatial” to refer to this period, acknowledging the problematic nature of the term.¹⁵⁴ The local characteristics of pottery and seal practice, allows for an identification of a distinct district of central Crete, centred around Messara, with differences than that of the Knossos-Malia region.¹⁵⁵ The Phaistos palace, with its many building blocks founded in MM IB, appears as a candidate for consolidation of power in this region mainly in MM IIA, when the economic role of the palace seems to rise, with an additional emphasis on the cultic sphere. The latter might also be linked with the end of the tholos tomb tradition and indicates another level of change beyond the economic.¹⁵⁶ Understanding the cultural tendency in the region is vital in understanding the particulars of the local history. This period coincides with the decline of the great number of settlements in the Asterousia¹⁵⁷ as well as in the Messara plain; the nucleation of the population in Phaistos can be understood as a result of the elite’s increasing land control pressuring the rural settlements in favour of a select few (as discussed below).¹⁵⁸ One must note, however, that a nucleation process already in EM III, or even earlier, has been argued for.¹⁵⁹ These circumstances would lead to the emergence of peripheral centres, the location of which could be explained by a continuation of a previous usage of the area, a point, which amongst others, might be relevant to Koumasa. There, the abandonment of the area of the tholoi by MM IIA (as seen by

152 Peatfield 1994, 25. See also Chapter 11.4.

153 Watrous et al. 2004, 253–276; Schoep 2010, 116–117; Rethemiotakis – Christakis 2011a, 213–215; Knappett 2012, 389.

154 On the evolution of the understanding of the terms Pre- and Protopalatial, and the radicality – or lack thereof – in the transition between them see Schoep 2012.

155 Anastasiadou 2016, 160–169. On the territorial question, see also Cadogan 2022, 210–212; Driessen 2022.

156 Militello 2012, 266.

157 Sbonias 2012, 273.

158 Watrous et al. 2004, 267–268.

159 Todaro 2023, 21–52.

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the latest publication of finds from the area)¹⁶⁰ shows an overlap with the earlier phase of the buildings above the hill.

A series of events in the central Messara in MM II, such as the cessation of wealthy burials in Platanos, the abandonment of the Apesokari tholoi to the Vigles settlement, higher on the hill, and the apparently similar transition or expansion from the Koumasa tholoi to the plateau above the Korakies hill have been interpreted as signals for the expansion of Phaistos.¹⁶¹ But as the modern excavation shows, this looks like a simplification. Watrous, in his argumentation for Koumasa, used the view of Xanthoudides regarding the *cyclopean* walls of Koumasa, as evidence of defensive activity, which is not the case. Furthermore, the final phase, at least, of the tholoi was used parallel to the earliest known elements of the settlement,¹⁶² showing an expansion of activity rather than the dramatic abandonment of the plain, as in the case of Apesokari. Another perspective, based on the natural sciences, would help in analysing aspects of this *Phaistian* territory (Chapter 10.2).

Regarding the nature of the assumed Protopalatial state, a state-like settlement hierarchy is proposed by Watrous, offering a range of possible factors, but without defining a certain timespan for the developments, although the transitional period from MM IA to MM IB is crucial.¹⁶³ A main characteristic is the nucleation process around important centres, well documented for the area of western Messara around Phaistos, where the number of MM IA settlements dropped by 78 percent in comparison to those in EM II, and indicated in other areas to the east, where rural settlements may have been abandoned in favour of larger sites such as Koumasa, Porti, and Marathokephalon at the fringes of the Phaistos region.¹⁶⁴ One of the means for such an evaluation of the decentralised sites is the abandonment of the EM tombs, in all but a few exceptions such as Lebena. In Koumasa, however, the tomb activity, as indicated in the last campaigns, showed some MM material.¹⁶⁵ Although this does not necessarily speak of continuity in the usage, it does, however, fit with the pattern of possible relocation, as it suits the defensibility above the Messara plain.¹⁶⁶ Furthermore, the definitive abandonment of the

160 Panagiotopoulos 2024, 448.

161 Watrous et al. 2004, 286.

162 Panagiotopoulos 2024, 450.

163 Watrous et al. 2004, 261–273. The reasons presented include deterministic approaches, such as the neo-evolutionary theory that correlates the state formation with the growth in the Prepalatial period, and to various levels of social development. This pertains mainly to social competition among elite groups in urban centres. Underlying, in his view, is the political evolution in Egypt between the 6th and the 12th dynasties and the rise of the elite, as seen in the funerary praxis, which, for Watrous seems to be more than just a cultural parallel.

164 Watrous et al. 2004, 253.

165 The latest pottery examples stem from the area outside and between the tholoi and not from their interior, indicating a different ritual approach and perhaps a usage that extends beyond that of the funerary one. For the dating of finds (see Panagiotopoulos 2023b).

166 Watrous et al. 2004, 255.

tholoi in the direct vicinity of a flourishing settlement that extends well into Neo- and Postpalatial periods adds another level to the concept, as the lack of even circumstantial finds of those later periods in the area of the now-abandoned tholoi contradicts the idea of natural distribution of sherds in a site, and suggests instead a purposeful avoidance.¹⁶⁷

The earlier evidence of use of the ‘sanctuary’ and the settlement plateau atop the Korakies hill, however, as mentioned above, coincides with the finds from the area of tholoi, hence indicating an overlap, at least in the MM II period:

In the tholoi area, the Protopalatial finds originate mostly from the open area of the cemetery and are of less volume in comparison to earlier phases.¹⁶⁸ Evidence of active usage in Tholos B stretches down to MM IIA.¹⁶⁹ As Panagiotopoulos observes, this final secure use coincides with that of Tholos A of Apesokari, but is earlier than the end of Platanos, Porti or Vorou, which continue in MM IIB.¹⁷⁰ It should be noted that much of the Protopalatial evidence in the tholoi stems from the areas in front and between them.¹⁷¹ These open areas that are found in many tholoi necropoleis are considered as a ritual space that gradually arose over a longer period of time, as a collective nature was suggested for the social structures, even if this might stem only from the type of evidence available and hence might be misleading.¹⁷²

Regarding the settlement, Protopalatial finds indicate “that the settlement must have also had earlier phases that correspond to those of the cemetery”,¹⁷³ covering a rather extended area.¹⁷⁴

In general, the Protopalatial features that are found beneath the Neopalatial layout or integrated with it in the settlement appear to involve a significant construction programme. This includes the construction of retaining walls, storage facilities, and other structures. Additionally, there is evidence of establishing more luxurious areas, such as in the vicinity of the ‘sanctuary’ (see Chapters 7 and 8).

167 This phenomenon appears to be attested in Neopalatial settlements on Crete (Panagiotopoulos 2019a, 368).

168 These include vases and fragments of polychrome and barbotine pottery from the Xanthoudides excavation and the modern one, dating to MM IB–MM IIA (Panagiotopoulos 2024, 445–448; Figs. 27.3, 27.4).

169 Some material, including the late phase of the MM IIA period, originates from the inside of Tholos B, as the preliminary reports indicate, suggesting the activities included usage of the tholos down to that period (Panagiotopoulos 2024, 448). The Protopalatial finds produced in Tholos B include a Protopalatial seal (Panagiotopoulos 2014, 431), a small structure analogous to MM IA parallels (Panagiotopoulos 2013, 327).

170 Panagiotopoulos 2024, 448–449.

171 Panagiotopoulos 2024, 447.

172 Relaki 2012, 292.

173 Panagiotopoulos 2024, 450.

174 MM I–II pottery was produced in more than one settlement building, such as the magazines building with more than one Protopalatial phases (Panagiotopoulos 2012a, 198–200; 2013, 315; 2014, 425–6; 2014, Figure 2; 2023b, 300–308) or in the rooms of trench 16, north of the magazines (Panagiotopoulos 2023b, 311–313) whereas in the ‘sanctuary’ – the area on the summit with optical view of the tholoi – Protopalatial pottery also was found, some of which dated to MM II (Panagiotopoulos 2014, 428; 2018, 488; 2019b, 450). See Panagiotopoulos 2024, 450–452, Fig. 27.7.

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This gradually unfolding story from Koumasa seems to fit with similar processes of nucleation in the early MM that were also observed in other parts of the Asterousia region, although mostly documented for its western part, where after MM III a rapid decline was observed.¹⁷⁵ It is to be noted that few extensive surveys have been carried out so far in the Asterousia.¹⁷⁶ However, the extent of a state might not be considered as a given. Knappett refers to the uncertainty of any existence of such a state and that, in case it existed, it should be seen as temporary and ultimately failing. The data for the chronology of the assumed Phaistian state or Phaistian sphere of influence, for which the traditional name *state* is here used, seem to concentrate on MM IIB, i.e., late Protopalatial. This is much later than the traditional dating of Protopalatial institutions in MM IB¹⁷⁷ (when the palace was founded, but not necessarily its territory, as the surplus management systems may not have been established yet).

This sphere of influence need not in all cases be top-down in type, or politico-economic in nature. Sbonias, drawing on evidence for the manufacture and trade of seals and other objects, argues for a collection of interacting localities for the MM I and of a possible transition towards an overreaching territory after the MM II, where Phaistos could be involved in the management of large-scale agricultural surpluses.¹⁷⁸ But again, it might not have acted as an inducer of transformation in all social aspects, for example, in the tradition of sealing practice continues, albeit with adaptations to the new era.¹⁷⁹

As for the relation of the centres with their periphery, it has been argued that it is political and ideological in nature,¹⁸⁰ following Knappett’s term. This influence would nevertheless lead to similarities in materials and objects.

Regardless of the nature of such a state and its longevity or form of domination, its reach was wide and extends in and beyond the Messara as seen in the material culture of Monastiraki and Apodhoulou to the north, which is linked with the Phaistian tradition, but also to an even lesser extent to the east, to Apesokari and Koumasa, which is why this particular part of the academic discourse regarding Phaistos is relevant here. In Apodhoulou, the ceramic finds included Phaistian imports as well as a great number of local productions imitating other places, although mainly Phaistos.¹⁸¹ Furthermore, the alignment expands in the phases of the three areas of Apodhoulou, Monastiraki,

175 Vasilakis – Sbonias 2018, 280–281. An example is around the area of Moni Odigitria where all settlements but two ceased to be used, and the burial complex went out of use by MM IB. One of the two exceptions was the settlement at Aloniou Kephali which seems to evolve into the main settlement, spanning 1.5 ha. (Branigan – Vasilakis 2010, 18–20; 26–27).

176 See discussion in following chapters.

177 Knappett 2012, 386–389.

178 Such an indication is that after MM II, the local glyptic style is replaced by an overarching palatial style (Sbonias 2012, 285–286).

179 Relaki 2012, 290–291, 314–320.

180 Venieri 2016.

181 Venieri 2016, 193.

Phaistos, namely MM IA, the beginning of MM IB, and the end MM IB.¹⁸² A discussion of distances and the insight GIS offers for the relationship between these regions will be presented in Chapter 5, showing that Koumasa is not further than Monastiraki, in terms of path cost.

Koumasa belongs to the settlement type with EM and MM sites beneath LM ones, belonging thus to the third type of EM settlement as discussed by Legarra Herrero.¹⁸³ He noticed that the deposits are usually insufficient to provide a fuller picture. Furthermore, there is a lack of clear correlations between settlements and their cemeteries, as there is no extensive excavated material to allow an assessment of a Pre- or Protopalatial settlement in relation to a cemetery.¹⁸⁴ In both respects, the Koumasa excavation adds to this discussion, as the Protopalatial substratum beneath the Neopalatial level seems to allow for the formation of a coherent narrative, as future publications within the Koumasa Project will demonstrate.

2.3 Neopalatial

The transition of MM III to LM I centres decrease, both in their number as well as in their size. In the western Asterousia, at Ayiofarango a particularly sharp drop was observed.¹⁸⁵ This does not in itself mean a population drop, but perhaps rather relocation that Watrous associates with the LM IA earthquake destruction horizon. In fact, LM IB sees a rise in the settlement density, often in new areas.¹⁸⁶ The population density seen in Phaistos seems to rise, which could explain the abandonment of peripheral sites discussed above,¹⁸⁷ but it also is a phenomenon engulfing the greater area of western Messara.¹⁸⁸ The local nobility, or at least a group that lived in the outskirts or on the edges of palatial power, seem to benefit from a regional shift of power in LM IA. This includes those living at imposing *cyclopean* rural villas, such as Kouses, Kalamaki, Plakoures and Kannia, all indicating a local land-owning aristocracy. The urban Building X in Kommos and the Ayia Triada villa seems to belong to this change also. At the end of LM IA some areas, such as Plakoures, Kouses and Selli are abandoned,¹⁸⁹ a fact

182 Venieri 2016, 191–192. Further connections and the expanse of art styles will be discussed in Chapter 10.

183 Legarra Herrero 2014, 26.

184 Legarra Herrero (2014, 27) gives the examples of Trypiti and Ayia Triada as false positives, i.e. cemeteries that seemed to produce material of the same period, but it seems that the settlement was not in use when the tholoi were built.

185 Watrous et al. 2004, 291–295.

186 Watrous et al. 2004, 296–297; Mandalaki 2011.

187 Whitelaw 2011, Table 4.2.

188 Whitelaw 2011, Table 4.4, Fig. 4.17.

189 Watrous et al. 2004, 295–298.

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associated with the expansion of Knossos in the area.¹⁹⁰ Ayia Triada seems to have become the centre of residence under the Knossian influence after the decline of the Phaistos Palace.¹⁹¹ The eastern Messara showed early Knossian influence, perhaps due to its connection with the Pediada-valley (Pedhiada), through which the contact with the north was facilitated.¹⁹² A population rate drop can be seen at the end of this period, however.¹⁹³

In LM IA, the transition of the Messara to the dominion of Knossos is accompanied by the expansion of the Knossian style to rural areas.¹⁹⁴ The *palatialisation*, i.e. the process of emulating palace forms, is a characteristic of the LM IA period but decline through LM IB.¹⁹⁵ In the Messara region these include locations in the western part, such as main cities like Kommos and buildings of the villa type in Pitsidia.¹⁹⁶ The Gazetteer of Neopalatial sites by Driessen and Macdonald include eight sites in the western Messara, while the central Messara and Asterousia, aside from the mention of the peak sanctuary of Kophinas, appears empty, with the next LM occupation appearing outside of this area, such as around Chondros Viannou in the east and Prinias to the north of Messara.¹⁹⁷ Since the publication of this Gazetteer more than 20 years ago, there has been an expansion in our knowledge, including the sites of Skinias to the east of Asterousia, Koumasa, and Dhamantri in a central position of the Messara, as explained in Chapter 3. The later, being in the valley directly by Anapodaris (Anapodharis), indicates a relative level of peace and security.¹⁹⁸ The habitation along the Anapodaris and in the central-eastern Asterousia can be evaluated mostly on the base of chance finds, as will be presented below.¹⁹⁹

After this period, the decline in LM IB is also implied by studies of population levels, and seen in the evidence for restricted cultivation.²⁰⁰

Traditionally, the assumption of a decline in settlement activity was assumed for the Asterousia coast after the Prepalatial period.²⁰¹ The record of Minoan finds in Egypt,

190 Watrous 2007, 103.

191 La Rosa 2010, 499.

192 Wiener 2007, 233; Warren 2004, 164.

193 Whitelaw 2012, Figure 4.12, 4.13.

194 Watrous 2004, 448; Wiener 2007, 234; Shaw 2009, 169.

195 McEnroe 2010, 99.

196 For Pitsidia Villa see an introduction in Adlung 2020, 71–74, Fig. 23.

197 Driessen – Macdonald 1997, 120–258.

198 Wiener 2007, 234.

199 See discussion on page 71ff.

200 Whitelaw 2012, Figs. 4.12, 4.13.

201 Vasilakis – Sbonias 2018, 10. As discussed above, unfortunately, the Asterousia harbours have not been holistically approached but rather locally studied within excavations or surveys; for example, the Anapodaris river meeting the sea or the western Messara seems to remain an active region.

a source which has to be approached with care, shows a gap in the evidence found between MM III and LM IA, which then picks again in LM IB.²⁰² To what extent could this be considered in relation with the use of harbours for these connections and to an extent with building activity, such as in Koumasa, for which a connection to some of these harbours (Trypiti, Salamias and Ayios Ioannis) is assumed?²⁰³

Before discussing the areas under study, the situation in the western Asterousia will be briefly presented, as it will put the discussion of the central Asterousia shoreline, discussed in the chapters below, in the right context. The western Asterousia has been analysed to a greater degree than the shoreline of the central Asterousia, particularly the area from the cape of Timios Stavros to Trypiti, for which the work of Vasilakis is inciting. The later was carrying on the work of the systematic survey by the University of Bristol that stretched from Ayiofarango towards the Lassaia region in 1971,²⁰⁴ which was followed by a smaller scale one in 1975.²⁰⁵ Further small-scale examinations include the ten-day excavation in Martsalos of a 150 m². coastal building, the inner wall surface of which carried plaster traces of good quality, with stripes in white, blue and red colours. The finds include Phaistian ceramics of good quality, dated to MM II B. Nearby by the coast, stones seemed to Vasilakis to be a marker of a harbour, which remained unstudied.²⁰⁶ As will be presented below (Chapter 3.4.1), any structures by the “Minoan shoreline” in the region will be encroached on by the sea. So, in essence, the Martsalos building, alongside the Hadjidaki mapping of the Ayios Ioannis harbour, are the only efforts concerning clearly Minoan harbour buildings on the western and central side of the Asterousia shoreline. Alongside these is what one sees in Salamias (see Chapter 11.3).

It appears that a new phase of growth occurred during the Proto- and Neo-palatial periods, likely linked to maritime connections along the southern coastline. Consequently, Moody’s earlier hypothesis (see Chapter 3.4.3) of the gradual abandonment of the Asterousia region during the Protopalatial period and beyond should be reevaluated, as there seem to be differing developments between the interior and coastal regions of the Asterousia.

The general degree of homogeneity of LM architecture, that appears also in rural areas, indicate an element of external influence, at least in the need for experienced builders and artisans.²⁰⁷

202 Manning 1995, 221.

203 Beside the obvious care that such “intellectual gymnastics” require, the political situation and the changes prior to the beginning of the 18th Dynasty, whose start is assumed to correspond with LM IB (Manning 1995, 220ff.), have to be taken into consideration.

204 Blackman and Branigan 1977.

205 Blackman and Branigan 1975.

206 Vasilakis 1996, 644.

207 Shaw 2009, 169.

2.3.1 Koumasa in LM I

LM I constitutes the main architectural phase of activity at Koumasa. It extends not only on the settlement plateau but also onto the slopes, as evident from surveys and the identification of the LM building on the northern slope of the Korakies hill.²⁰⁸ The structures on the plateau seem to have been built within a unified masterplan, as the parallel walls would indicate,²⁰⁹ as well as the uniformity of finds. The increase in the proportion of drinking vessels, as a general phenomenon of the Neopalatial period,²¹⁰ is reflected in the finds of this period in Koumasa as well.

The Neopalatial period is characterised by the expansion of the Knossian style. Indeed, the first research interest in the Asterousia lay in determining the routes between Knossos and Phaistos.²¹¹ Koumasa is seen to be very peripheral to the optimal road network.²¹² Nevertheless it is in LM I that the main architectonic phase of the settlement is observed. The ceramics dating to this period shows similarities with other southern locations. Such an example is Skinias, a location with ceramic decorations posing similarity to Koumasa.²¹³ Of the excavated regions of southern Crete, Skinias offers a good parallel to Koumasa, not only due to the type of pottery recovered, but also due to its nodal location in the area, allowing a connection from the Messara to the Inatos region, along the Anapodaris stream.²¹⁴

Here the open question concerning the contradiction between the extensive activity in the region and the evident lack of activity in the tholoi area, needs to be addressed. As mentioned above, while building activity from the LM period has been observed on the slopes of Korakies hill and beyond, there is no evidence of any activity in the now fully excavated region of the tholoi.²¹⁵ This is particularly intriguing given that the Protopalatial phase of the settlement aligns with the last phase of use in the tholoi area, suggesting a distinct cut-off point during the course of a seemingly continuous habitation of the area, after which the area of the tholoi is no longer utilised. Panagiotopoulos suggests that this is more than mere chance and proposes that the area was actively avoided.²¹⁶ The use of the tholoi was part of performative acts relating to the funerary rituals, designating the space in and around the buildings as heterotopic, distinguishing

208 Figure 4; Panagiotopoulos 2014, 424, Drawing 1.

209 Panagiotopoulos 2023a, 196.

210 Hamilakis – Sherratt 2012, 192.

211 *Knossos II*, 60–61.

212 Déderix 2016, 558–560.

213 Adlung 2020, 111, 163.

214 This region, in contrast to that of Koumasa, retains its strategical role in following time periods, as the city of Praisos in the Classical-Hellenistic period, and later with the Belvedere castle in Venetian times.

215 Panagiotopoulos 2024, 451.

216 See Footnote 167.

the areas of the living from that of the dead.²¹⁷ It has been argued that these areas were imbued with a degree of fear towards the liminal transition that death denoted.²¹⁸ It is tempting to consider such views were carried on in the LM I phase, after the abandonment of the tholoi.

2.4 Postpalatial

The termination of the main habitation phase marks the end of the large building programme which was followed by *ad-hoc* habitation of a more or less permanent character. The main evidence is scattered pottery in the surface layers in the ongoing excavation. Although the pottery analysis is still ongoing, certain periods are clearly represented. Continuing the analysis in chronological order, the LM III phase is clearly represented with a not insignificant amount of pottery sherds, which were found on the western slope,²¹⁹ and also with a certain concentration around the ‘sanctuary’.²²⁰ The most characteristic decoration type is red stripes on ochre or light red. Within the wider area of Koumasa, LM III is less well represented. The peak sanctuary of Kophinas witnesses a period of reuse in LM III C.²²¹ In Koumasa, beside pottery sherds, there are two clay objects of the category of snake tubes found by Xanthoudides in the area of the ‘sanctuary’, dating to LM III B.²²² It is tempting to assume a ritual significance for the site of the ‘sanctuary’ in this late period. After all the practice of repurposing earlier Neopalatial structures is quite common in Crete. This trend is particularly seen in places with religious significance, so it is tempting to follow this notion for Koumasa, assuming an important role of the area of the ‘sanctuary’.²²³ Furthermore the tubes have been considered part of the Postpalatial cult involving the goddess with upraised arms, alluding to open space communal rituals.²²⁴ But this need not be the case, as these tubes are also seen as part of domestic shrines,²²⁵ and the certainty of a cultic significance has been

217 The term was used by as per Foucault – Miskowiec (1986), to discuss the interior of the tholoi, here extended also to the performative area in front of the tholoi. For the implications of the methodological approach of archaeology of the senses in this matter, see also Hamilakis 2002a, 128.

218 Branigan 1970, 111.

219 Panagiotopoulos 2022b, 337.

220 Panagiotopoulos – Savvatiannou 2022, 172–173.

221 Chatzi-Vallianou 1990, 429.

222 Published as four items in Xanthoudides 1924, Pl. 33, 5002–05, it seems they form two objects, as seen in Gesell 1976, Fig. 2, left; Fig. 19, middle; see also discussion in Georgoulaki 1989, 19.

223 For a recent summary of these ideas presented in the discussion of the LM III reuse of the building in Kannia, see Cucuzza – Palio 2019. The reuse of the Kophinas sanctuary mentioned above, constitutes an example of this tendency in the vicinity of Koumasa.

224 Peatfield 1994, 31.

225 Gesell 1976, 247.

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doubted.²²⁶ Although the dating for this type is inconclusive, the general agreement is LM III. The main *comparanda* from the broader region of Gortyn are 6 tubes from Kannia, which can be dated to LM III B and share a close resemblance.²²⁷

Those from Kannia are dated, based on their typology, to LM III B and C, although problematically one was located in an LM IB destruction layer.²²⁸ Koumasa 5002–03, with their long form, are similar to the early example from Pyrgos, of LM IB dating, but can be assumed a development of the early form.²²⁹

In conclusion of the discussion of this period, the preference for remote, difficult to access settlements in the LM III period, dubbed as refuges²³⁰ does not seem applicable for Koumasa, nor it is documented in the surrounding area.²³¹ It nevertheless can be seen as a fit on the decentralisation tendencies in the mid-late LM III.²³²

2.5 Post-Minoan Periods

The evidence for a presence in Geometric and Classical times in the region around Koumasa can be described as weak. Beside mentions of a Geometric settlement in Trypiti and the late Geometric activity at Kophinas peak,²³³ one needs to reach Gortyn or Lebena for evidence predating the Hellenistic period.²³⁴

The next chronological phases to produce evidence are the Hellenistic and Roman eras. This holds true also for Koumasa, as the ongoing excavation shows a reoccurrence of material evidence only in the Hellenistic period. It is noted that in this time period this region should be seen as part of the wider Gortyn area, with its development denoted by it. For that reason, the brief summary in the following chapter spans the Late Classical, Hellenistic and Roman periods.²³⁵

226 Georgoulaki 1989, 19.

227 Gesell 1976, 251–252. Other *comparanda* to the Koumasa tubes are found in Ayia Triada (Gesell 1976; Fig. 5); Gournia (Gesell 1976; Fig. 3); Kannia (Gesell 1976; Fig. 6; Fig. 19 right); Pyrgos, Myrtos (Gesell 1976; Fig. 22).

228 Gesell 1976, 255.

229 On this earlier form, see Cadogan 2009.

230 See e.g. Nowicki 1987.

231 Nowicki 2002, Fig. 13. An exception could be the building near the area of the Christos Tholoi (see Footnote 1124 in Chapter 11.1.1).

232 On the settlement patterns and transitions in LM IIIB–IIIC, see Pollard 2023, 114–123.

233 For Kophinas: Platon – Davaras 1961–62, 287; Chatzi-Vallianou 1990, 429. Geometric evidence in Trypiti: Pendlebury et al. 1935, 88.

234 For Lebena and Gortyn, see the Chapters below.

235 For a settlement map of Asterousia in the Hellenistic and Roman times see Sanders 1976, 135; Sporn 2002, Table 3.

2.5.1 Hellenistic and Roman Periods

The main political development concerning the central and western Messara amidst the turbulent political developments and wars of the Hellenistic period is the expansion of Gortyn.²³⁶ Gortyn's access to the western harbours seems to be an early development, as Matalon passed into the possession of Gortyn possibly already from 220 BCE.²³⁷

Trade centres and Asclepius cult

Despite its vicinity to Gortyn, the region encompassing Koumasa experienced a decline in its role as a central point within the trade network, a fact reflected in the absence of major urban centres in the area. The nearest settlement locations in the Messara, beside Gortyn, are the city of Rhytion to the east and the settlement of Pyranthos to the west, a ca. 25 km. distance in which the existence of small hamlets in strategically located areas is to be expected.²³⁸ Evidence for these are coins, cisterns, scattered pottery and very few architectural elements that indicate a presence, possibly connected with local agriculture, and certainly to be assumed as part of the suburban Gortyn and its hinterland. The elements found in the immediate vicinity of Koumasa include, going from west to east, pottery sherds of Classical/Hellenistic periods found in the western slope of the hill of Afentis Christos,²³⁹ and cisterns in Vagiona, Stavies, Panagia, Sternes and Ayia Photia.²⁴⁰ Other scattered elements include Greek and Roman coins²⁴¹ and the Roman sherds seen by Pendlebury a little east of Fournofarango, north of Vassiliki and at the chapel of Ayios Savas, by the pass towards Trypiti.²⁴² Finally, at Ayio Sidhero, west of Porti, Roman sherds were seen and the presence of a Roman wall is assumed.²⁴³

These elements, especially the cisterns, indicate a settlement pattern laid out for maximum efficiency.²⁴⁴ The urban centres seem to move from the mountain northwards to the valley proper within the Roman period, taking advantage of the political stability,²⁴⁵ which left the mountain slopes even less urbanised. In this respect, the evaluation of the area of Koumasa as less prominent in this period can be seen as because of its

236 Sanders 1976, 136; Chaniotis 2022, 100–102.

237 Sporn 2002, 208.

238 Sanders 1976, 135.

239 Nowicki 2018, 26.

240 These were connected since their discovery with their agricultural role (see discussion of the 10–12 cisterns in Ayia Fotia in Xanthoudides 1916, 24), an opinion endorsed by Sanders (1976, 135).

241 In Panayia and Sternes, two coins of Gordian III and an earlier Aeginetan turtle were found, and a little east of Fournofarango, a number of Roman coins were seen (Pendlebury et al. 1935, 86; Sanders 1976, 135).

242 Pendlebury et al. 1935, 86–87. See also Chapter 11.1.1.

243 Pendlebury et al. 1935, 88.

244 Sanders 1976, 136.

245 Sanders 1976, 136–137.

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vicinity to Gortyn not despite it. Another parameter is the change in trade characteristics, which differ from those in the Minoan period, requiring more stable and easily traversable roads for the use of carts, as well as well-founded harbours due to the volume of goods and associated bureaucratic requirements. This led to the establishment of primary harbour centres in the western part of the Asterousia region, leading to a clear trend that the majority of independent communities in this area are harbours.²⁴⁶ These include, notably, Matalon, Amyklaion by Kommos,²⁴⁷ and on the southern shore of the Asterousia, connected to the Messara through the Ayiofarango, Kali Limenes and Lassaia.²⁴⁸

The consequence of this transition was a period of economic growth, especially in the western part of the Asterousia, driven by intensified trade activities. This economic activity is noted around Kali Limenes with the presence of shrines, and also includes sites in Martsalos and south Ayiofarango, which attest to this growth.²⁴⁹ Moreover, at the northern entrance of Ayiofarango, in Ayia Kyriaki, two votive inscriptions dedicated to Asclepius were discovered, dating from the 2nd century BCE; they show the early control of Gortyn and underline the existence of a dedicated cult to Asclepius in this region.²⁵⁰ In Lassaia a main harbour region is detected, with habitation mainly in the Hellenistic and possibly in the Roman periods.²⁵¹ In contrast, Lebena did not function as a main trade node, although the presence of a polis there is indicated already from the 5th century; instead, it appeared to have been associated with a degree of privilege, potentially due to the presence of an Asclepeion.²⁵² The Asclepeion was considered one of the crucial centres for the cult of Asclepius, supported by both archaeological finds and historical sources. Its mention in the Delphic Theorodochoi Inscription illustrates a wider knowledge of this area, as well as of Lassaia, already in the early Hellenistic period.²⁵³ In the Roman era it is recognised as one of the most significant sanctuaries of Crete, attracting visitors not only from the entire island but also from Libya, as

246 Viviers 1999, 231. For a discussion of harbour communities and their diachronic role in the social upheavals of the regions, see Watrous 2007.

247 As for the identification of Amyklaion with Kommos, see Chaniotis 1996b, 395–396.

248 See Sporn 2002, Table 3.

249 For the Naiskos Temple in Martsalos, see Chatzi-Vallianou 1979, 383. For the altar of the Hellenistic period in Ayiofarango as well as generally on the scattered Hellenistic pottery presence in the region, see Sporn 2002, 194.

250 Sporn 2002, 194.

251 Sporn 2002, 193. Though the acropolis of Lassaia seems to have been abandoned during the Roman period, this does not exclude a continuous use of the region in this period. In fact, as mentioned above, Lassaia is described as a harbour at the end of the 1st century CE (See Footnote 441).

252 Sporn 2002, 187–192.

253 Plassart 1921, 21, 61–62. Mention of Leben and Lassaia in col. IV.1 8; 9, after mentioning Gortyn and before Phaistos. It is to be noted that the dating of this list is controversial and varies in research between the middle of the 3rd century and the middle of the 2nd century BCE (for a summary of this debate, see Cherry – Davis 1991, 14).

suggested by the writings of Philostratus. The cult's prestige was reinforced by mythological references and accounts of miracles associated with Apollonius.²⁵⁴

The prevalence of the Asclepius cult was notable in the western Asterousia region, and taking into account another inscription at modern Apesokari, it becomes evident that the western Asterousia and Gortyn collectively contributed to four out of the 16 places in Crete featuring elements of the Asclepius cult.²⁵⁵ While the representativeness of this percentage is a matter that warrants careful consideration, this representation in an area afflicted with high rate of illicit excavations underscores the significant influence of the cult within that area. This view is strengthened by some chance finds, such as the torso of an Asclepius marble statue from Miamou, that most probably originated in Lebena.²⁵⁶

While the Asclepius cult has been traditionally associated with the western part of the mountain, indirect evidence from later times suggests a possible presence in the central Asterousia as well. A dedicatory inscription in the Monastery at Ayios Ioannis, dating to the middle Byzantine period, mentions Asclepius with his ancient attribute, naming him “he who walks beside one in the dream”.²⁵⁷ Bougrat proposed that the part of this inscription mentioning Asclepius might be a copy of a Roman inscription found in Lebena. Not only is the language ancient, demonstrating a knowledge of the attributes of Asclepius, but it also seems to mention two dedicators found in a Roman inscription from Lebena.²⁵⁸ Another inscription by the same dedicators was also discovered in Lebena, with the same wording as in the Byzantine dedicatory inscription, supporting Bougrat's theory of a copy.²⁵⁹ Nevertheless, the possibility of an independent inscription in Ayios Ioannis dedicated to Asclepius, and part of another sanctuary for this deity there, cannot be dismissed. If Asclepius was considered an appropriate figure for a dedicatory inscription, perhaps within a syncretistic context, it would make sense to use the same area for establishing the monastery in that place in particular.

254 Philostr. vit. Apoll., 4.34; The link with Libya is stressed by the narration of Pausanias (Paus., 2.26), who assumes that the Lebena sanctuary was founded by the Asclepeion at Balagrai in Lybia.

255 Sporn 2002, Table 16. To this list could be added the inconclusive find of a Hellenistic temple north of the court of the palace of Phaistos, that Pernier regarded as dedicated to Apollo or Asclepius. See discussion in Sporn 2002, 197–98.

256 Platon – Davaras 1961–62, 289.

257 Patedakis, 2011, Pl. 13.3 The small letter text sample follows the main dedicatory reference and proceeds further with rules for the monks. The transcription is Ὑ ἀποίοιν νύγκανρος κ(αί) σωτοίοις ασκλήπιου | οοίρην σηνωδοιπόρω κατώναρ Patedakis, 2011, 207–208; Pl. 13.3; Bougrat 1982, 150.

258 The Roman inscription is dedicated to Hygeia rather than Asclepius. Οὕλπιοι Νείκανδρος καὶ Σωτήριος Ὑγεία Σωτ[ε]ί-ρη Συνοδοι[πόρ]ω κατ' ὄναρ (IC XVII 26, A).

259 []λπιοι Νήγκανρος καὶ Σωτοίοις Ασκληπιου οοιρην συνωδοιπόρω κατ' ὄναρ (IC I XVII 26, comm). Bougrat discusses the variation in the orthography of the Byzantine inscription, especially the rendering of the name Ulpia, stemming from the lack of recognition of this name, obsolete in the late Middle Ages (Bougrat 1982, 150).

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The running water in the area, later attributed with miraculous characteristics in the Post-Byzantine era, might not exclude such a function in antiquity.²⁶⁰

Asterousia range

In the search for references to Asterousia in classical antiquity, a starting point is the Kophinas peak and its cult, and the contested references to it. One proposed reference to the peak by Ptolemy can be disregarded.²⁶¹ After some use in the late Geometric period, the area was abandoned until the late Hellenistic times, and then an identification with the sanctuary of Zeus Skyllios has been proposed.²⁶² A possible reference to Skyllios Zeus has been suggested for a graffito with two letters that could be part of Zeus name.²⁶³ The concordance being made is with Skyllios Zeus, a local cult of Rhytion, the closest city to Kophinas, that was already present in Greek times and continued to be honoured after the Roman conquest.²⁶⁴

Lactantius narrates the myth, as described by Ennius, that Pan took new-born Zeus to *caeli stela* where he founded an altar to Ouranos and sacrificed first to Zeus.²⁶⁵ This reference can be translated either as the *column of heaven* or the *star of heaven*, depending on the presence or not of the second letter *l* in *stel(l)a*. Faure, favouring the reading *stella* assumes Asterousia is meant, as its etymology contains the meaning “star”.²⁶⁶ This view has, however, been contradicted on the base of the name being a crude translation of Asterousia, and on the fact that the term *pillar of heaven* is more appropriate for a

260 For the Ayios Antonios cave see below, and Footnote 1186. Further, some practices associated with healing are observed in this monastery. These include sleeping in the monastery to be cured (a practice being reported for the recent past) as well as the iconographical representations of Saint Damian, Cosmas and Ephraim the Syrian; saints associated with healing (Griffith 1989; Shemunkasho 2002). Ephraim the Syrian, in particular, is rarely depicted in Cretan iconography (Andrianakis – Papitsoglou 2012, 137). Also, Saint John, the saint of this monastery, is also the name of the church on the site of the Asclepeion of Lebena, and possesses attributes connected with healing. These factors, taken together with the mentioning of Asclepius, may allude to the awareness of the monks of this syncretistic approach to Asclepius. On this issue, see also discussion on page 63.

261 The mention of ἱερόν ὄρος by Ptolemy (Ptol. geogr., 3,15,2) has been proposed to be a reference to Kophinas (Sporn 2002, 186), which can be seen vaguely in Faure also (1965a, 438). This opinion is opposed by linking this reference with the Hermes-Aphrodite temple in Symi Viannou, based on the rich finds of the latter (Lebesi 1972, 202). Plotting the coordinates from Ptolemy (see Figure 13) in addition to the relative importance of the later temple almost conclusively disproves the correlation to Kophinas.

262 Chatzi-Vallianou 1990, 429; Platon – Davaras 1961–62, 287; Chaniotis 1996b, 70.

263 Sporn 2002, 187. The inscription TH was understood as an abbreviation of TH[ví]. The rendering of the name in the local alphabet with this form for the letter Z can be seen elsewhere, such as in the inscription of this region of Crete: IC IV 174, ll. 57–58; 73.

264 The Roman honours bestowed upon the cult of Skyllios Zeus are attributed to Metellus (IC I xxix, 23–24). This inscription, dating from the time of Trajan, was erected to commemorate the appointment of a new priest of this cult: Ἀμβροσὸς ὁ [κατασ]ταθεὶς ἱερεὺς Διὸς [Σκυλίου] τῆς Ρυτιασίων κώμης καὶ Πύργου (IC I xxix, 6–8).

265 Lact. div. inst., I 63.

266 Faure 1965a, 438; 1967, 125.

mountain. It is further argued that Pan he should not be associated with Crete.²⁶⁷ This is, however, not the case as Pan and the cult of Nymphs with which he was associated is well documented in Crete.²⁶⁸ Sporn agrees with the identification of *caeli stela* with Asterousia, and assumes a connection with the cult of Skyllios Zeus in Rhytion. The myth blends the relatively seldom cult of Ouranos, and that of Pan, the representation of which in the Asterousia is at least probable.²⁶⁹ Finally, as for Kitchell's observation that *caeli stella* would not be a proper translation of the Asterousia, the fact is that the toponym *Asterousia* appears in late Roman times and might be an evolution of a now-lost original name for the mountain range.

The mention by Ennius as transmitted by Lactantius, although weak, is the earliest possible mention of the mountain. This brings us to the greater problem of the mentions of Asterousia in ancient literature, or rather the lack thereof. A possible corruption of the name of the mountain *Atera* mentioned by Hesychius of Alexandria should be taken with caution.²⁷⁰ If one searches the ancient geographies, one sees that the Asterousia remains obscure in Greek and Roman authors. Stephanus of Byzantium mentions it only as a name, and is the earliest reference that uses the modern name.²⁷¹ In Strabo although mountains and capes are significant for their function as reference points,²⁷² with regards to Asterousia the geographer remains silent, apart from the vague notion, while describing the white mountains, that there are others of equal height in the west as well as the south.²⁷³ Finally, Peutinger's Tabula is considered as evidence for the late Roman period; there the Asterousia are also not depicted, while the internal layout of the Messara and its rivers is largely erroneous.²⁷⁴ The absence of Asterousia in the

267 Kitchell 1977, 301–303.

268 In the Classical period, the deity Pan was introduced in Athens and thereafter he and the nymphs were very often worshipped together as a group. Starting in Attica, the combination of the nymphs and Pan becomes iconic and spreads throughout the Hellenic world (Kopestonsky 2016, 712; 714). 27 cult places are identified for Pan, Nymphs and Kouretes in the whole island of Crete, of which 11 contain a reference to Pan (Sporn 2002, Table 15).

269 Sporn also alludes to the relief of Nymphs sold in Vassiliki, for which he assumes an origin from Kophinas (Sporn 2002, 186–187).

270 Hesychius of Alexandria mentions the mountain *Atera*, indicated as an Eteocretan name; a reference that cannot be linked with any known mountain in Crete. For this reference, considered corrupt, Kitchell sees, amongst other alternative interpretations, the corruption of the word *Asterousia* (or even the original version of the name?). Beside the phonetic similarity, he strengthens his argumentation by noting that the word *gorgon* is also mentioned in Hesychius; the gorgon is mythologically associated with *Asterius*, who, in turn, could be considered associated with the name of *Asterousia* (Kitchell 1977, 310–311).

271 Steph. Byz. A,139.5.

272 The Krioskephalon cape held significance as a reference point in Strabo's description of Crete, especially for measuring travel distances from Cyrene (Strab. geogr. 10,4.5).

273 Strab. geogr. 10,4.4.

274 The Peutinger map as a source for ancient geography and cartography is controversial, as is its actual date. Furthermore, geographical accuracy was not the aim of this map, therefore, its mention here is supplementary (see Salway 2005).

literature is in sharp contrast with the other three mountain ranges in Crete, which were entangled with symbolism and myth in literature.

Cities and Settlements around Asterousia

Generally, historical records are sparse for the southern Asterousia, with Lebena and Lassia to the west, mentioned above, being notable exceptions. In the Hellenistic period, a vague reference to the Eileithuia sanctuary at Inatos appears in a fragment of Callimachus, who mentions the goddess with the epithet Einatia, derived from the toponym of the city Inatos, in the area of which the sanctuary is located.²⁷⁵

From the geography of Ptolemy, a list of 13 toponyms with their coordinates is transmitted for southern Crete, beginning from the NW of Messara to Itanos.²⁷⁶ The analysis of those coordinates illustrates some elements of these locations. In Figure 13, the coordinates of Ptolemy are plotted in an x,y chart (adaptation to a modern coordinates system is irrelevant for the plotting of the points.) The highest degree of inaccuracy is noted for the turning around cape Lithino at the westernmost of Asterousia, as Matala appears to be further south than the Asterousia. However, the shoreline of the southern Asterousia until the edge of the SE end of Crete at Xerokampos is fairly accurate, with a discrepancy being introduced east of Hierapytna, and the next major error occurring by Inatos, considered by Ptolemy to be also on the southern coast. The distance from Lebena to Inatos and from Inatos to Hierapytna is fairly accurate. Further, *hieron Oros* is located between Inatos and Hierapytna, which mirrors the reality, with the difference that Syme Viannou is further inland.²⁷⁷ Also, a further correction to this map is the fact that the coordinates for the river outlet of Lethaios (Geropotamos) correspond to that of Anapodaris.²⁷⁸ Uncertain are the locations of the Erythraion promontory, and that of the Katarrhaktos river outlet. The later appears to be between Leben and the Anapodaris outlet – Inatos area, and to be somewhat closer to Inatos than to Lebena. Its name implies a strong ravine. Possible identifications of this area include: the Trypiti valley, where water pours violently during the winter season. An analysis of rivers and subbasins in Crete shows an important output into the sea only in the area of Trypiti, with no other such output until Inatos.²⁷⁹ Other possibilities are the Salamias gorge and

275 Εἰνατῆν ὁμόδελφον ἐπ’ ὠδίνεσσιν ἰδοῦσα (Call. fr., 524); Eileithuia with this toponymic adjective appears in the treaty concerning Priansos with the nearby territories (IC IV 174, ll. 61; 76).

276 Ptolemy 3.15.4. See Figure 13 below.

277 Lebesi 1972.

278 This error was carried forward in the mapping in https://topostext.org/work.php?work_id=209.

279 See Chapter 5.5, Figures 53–55; Chapter 9.3.3, Figures 88, 89. The stream at Trypiti is the only one in the area with Strahler Order of 8–9, followed by one in Ayios Ioannis and one in Trachoulas with Strahler Order of 7. See also the drainage basins and streams calculated in Malagò et al. 2016, Fig. 4. (As this map was not annotated, the identification of the region that gathers three streams with Trypiti was possible by georeferencing the map in GIS based on the coordinates of the geographical features of Crete, showing a concordance with the data of the method presented in Chapter 5.5).

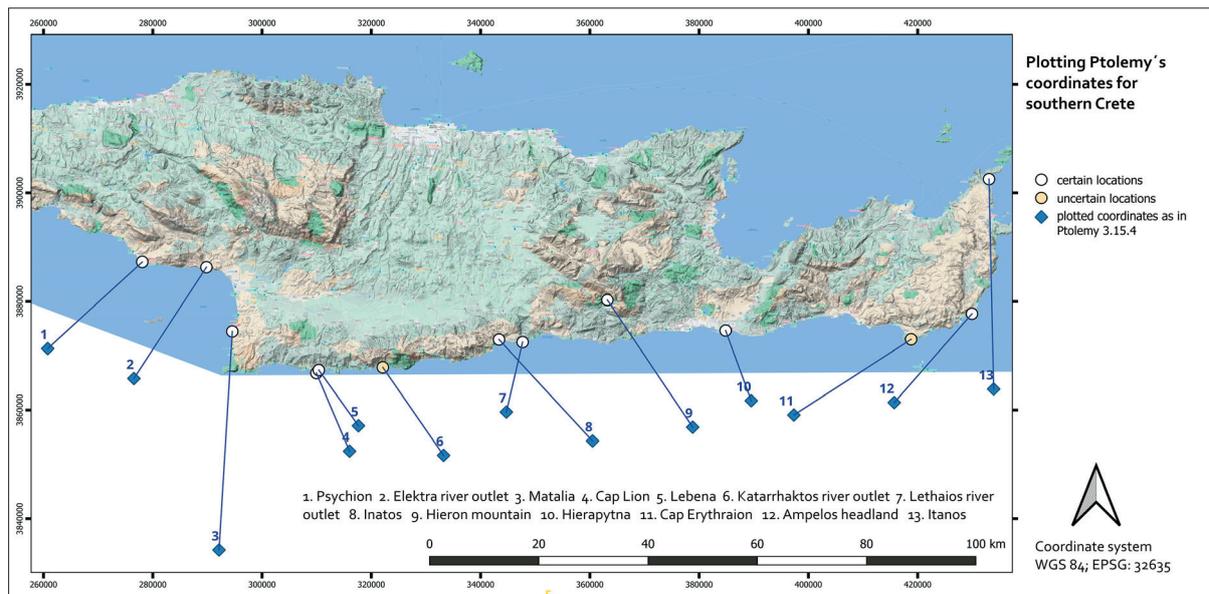


Figure 13: The plotted locations of the toponyms mentioned by Ptolemy (Ptol. 3.5.14) (bottom, with blue diamonds on the white background) and the concordance with the actual locations (white points, on the modern map above).

Gerakia ravine, west of Ayios Ioannis,²⁸⁰ where the water flow after rain has led to a colloquial name of cataract, used today by the locals. The Aba waterfall by Tris Ekklesies is also an obvious candidate, no less because it is closer to Inatos than to Lebena, with the downside that this is not visible from the sea, as is the case with Gerakias ravine.²⁸¹

As for the northern slopes of the Asterousia, following the Anapodaris, after passing Priansos, Rhytion is the main city that acts as node between the valley and the mountain for the eastern part of the range. The city was populated in the Geometric and Archaic periods,²⁸² and must have been of some importance as it was listed in the ship's catalogue in the *Iliad*.²⁸³ The next habitation period is shown for Hellenistic and Roman times with mainly funerary evidence. However, a wide expanse of habitation is to be seen from the broad fortification on three hilltops.²⁸⁴ Rhytion appears to have come early under the dominion of Gortyn, as evident by an early Hellenistic treaty.²⁸⁵

280 See Chapter 11.3.2–3.

281 The sequence of the locations, as well as their names, are as in Ptolemy (author's translation). The Ptolemy's coordinates are plotted in an XY axis, independently of the actual coordinates. The identification of most of the locations is done based on topostext: <https://toplevel.org/work.php?work_id=209> with a correction in the case of Lethaios river outlet, as explained above.

282 Galanaki et al. 2017, 105–106.

283 Hom. *il.* 2, 648.

284 Galanaki et al. 2017, 106–108; map 4.

285 The treaty in the inscription IC IV 174 dates to ca. 200 BCE. (Chaniotis 1996b, 255).

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That part of the valley and west of it has produced only surface chance finds (regions of Charakas and Dionysi), showing also activity in the Classical period.²⁸⁶

In the Hellenistic era, the whole of Messara proper comes gradually under the control of Gortyn. The cult of Skyllios Zeus mentioned above provides such evidence.²⁸⁷ Mentioning the cult in a peace treaty indicates that Gortyn had Rhytion under its control.²⁸⁸ The early expansion of Gortyn westwards mentioned above, and the eventual conquering of Phaistos, allowed for the use of harbours that, although further, had easier access to Gortyn. In the trade-off of distance versus difficulty, the road difficulty would render a road as rather unsuitable to support the growth of trade networking in this period, especially concerning one rapidly growing city, thus favouring harbours that are more distant, over those that are close but difficult to reach. This, in turn, favoured cities such as Lassaia and Matalon rather than locations in central Asterousia with high terrain profile.²⁸⁹

However, the presence of various autonomous nuclei of habitation in the southern coast has been noted, such as sanctuaries near Kali Limenes and the Villa at the Gero-kamos Plateau around Lebena,²⁹⁰ and Trypiti.²⁹¹ Furthermore, Hellenistic or Roman concentrations of pottery were observed during surveys in a number of sites along the coastline, extending to Trypiti, to Ayios Ioannis and the area Stous Ayious, near the modern Koudhouma Monastery.²⁹² The regional small settlements however diminish over time.

Even within the Asterousia, its central area, when juxtaposed with the western region, was perceived as somewhat of a hinterland. From the new centres on the northern side of the Asterousia region, the city of Pompeia (Pyranthos) stands out as the sole urban centre located to the south of Gortyn, located near the middle of the road from Ayiofarango to Matalon towards Gortyn, as well as Rhytion in the east and Priansos further east of it, which, located on the Anapodaris, acts as a nodal position between

286 Such as an Archaic pithos fragment at Dionysi (Platon 1956, 420), a Sigillata fragment at Livadi near the village (Alexiou 1964, 443) and a coin hoard at Dhamantri (Thompson et al. 1973, 17–18; Inv. Number 109.) containing more than 70 coins of the late 4th century BCE.

287 See discussion on page 54.

288 Anapodaris is mentioned as part of the borders between the states of Priansos, Gortyn and Hierapytna (IC IV 174, ll. 25–27; Chaniotis 1996b, 252). Further, the oath undertaken including Skyllios Zeus, implies the position of Gortyn over that region rather than that of Priansos (Chaniotis 1996b, 254). Strabo mentions it as part of the Gortynian dominion: “Γορτυνίων δ’ ἐστὶ καὶ τὸ Ῥύτιον σὺν τῇ Φαιστῶ” (Strab. geogr. 10,4.14). His source is assumed to be the Hellenistic writer Apollodorus, which would date this statement to the Hellenistic times (Sanders 1976, 131; Chaniotis 1996b; Sporn 2002, 185).

289 See cross-section profiles of the Asterousia (Chapter 3.3, Figure 18).

290 Chatzi-Vallianou 1989, 9.

291 Vasilakis 1992, 561–562. A Roman cistern was located there (Pendlebury et al. 1935, 88) as well as early Roman structures. (See Footnote 1170).

292 Some of these locations are based on surface surveys, such as between Salamias and Ayios Ioannis (See chapter 11.3.3), on the eastern edge of Asterousia around Tsoutsouros (Nowicki 2018). Regarding the area Stous Ayious, see Sanders 1976, 134.

the valley and the sea, at the eastern end of Asterousia, where the Anapodaris outputs. This city is mentioned here in contrast to the relative seclusion and lower level of urbanisation around Koumasa, as this region gradually receded from its prior central role in the trade network.

The economic activity that could potentially explain the role of the Koumasa area in this period is closely tied to animal husbandry in the areas around Gortyn. This was a central aspect of the economic organisation and a key component of the self-sufficient model of Cretan *poleis*. It is also a driving force in political instability, as in contrast to agriculture, herding required movement of people beyond the accepted borders between the various territories.²⁹³ City treaties, exemplified by agreements such as the one between Praisos and Hierapytna, highlight the importance of the right to graze flocks in the land belonging to neighbouring poleis.²⁹⁴ Concentrating on the macro-scale of Koumasa, further evidence from the eastern slopes of the Asterousia is informative: an early 2nd century treaty between Praisos and Hierapytna, explicitly stated that pasturing in each other's land would be exempt from tax.²⁹⁵ This underscores the significance of long-distance grazing, as flocks would need to traverse the territories of Biannos and Malla to reach the territory of Praisos from Hierapytna.²⁹⁶ Such long-distance movements are akin to modern transhumation practices where herders stay in another area for several months in huts (*mitata* and *katounes*). Taking again an example from the Asterousia region, herders from Mount Ida find winter quarters in the area of Kali Limenes.²⁹⁷ Although direct references to transhumation may be lacking, elements of covering long distances are discernible in narratives that reach back to Archaic and Classical times.²⁹⁸

Based on the discussion above, Koumasa has the benefit for the Gortynians of being in their own back-yard, with no confrontation or treaties with nearby *poleis* being necessary.²⁹⁹ At Koumasa itself, pottery sherds, especially black furnished ware, were found in abundance across the whole area, including a possible Hellenistic or Roman spindle whorl in the middle of the settlement and Hellenistic and Roman pottery on the western slope.³⁰⁰ One of the areas of pottery concentration was around the 'sanctuary'

293 Viviers 1999, 222.

294 Chaniotis 1996b, no 5 B 33–68.

295 κατὰ ταῦτὰ δὲ καὶ εἴ τις κα νέμ[ηι ἄτε]λῆς ἔστω IC III, iii 4, lines 27–28.

296 Chaniotis 1996b, treaty no. 28; Chaniotis 1999, 199.

297 Chaniotis 1999, 191.

298 Such is the legend of Epimenides, whose adventure in the Ida cave occurred as part of his quest to find his lost sheep, beginning from his home in Knossos (Diog. Laert. 1, 199) or Phaistos (Strab. geogr. 10,4.14). This tale may act as a traditional indication of long distances covered. Chaniotis further summarises the strong cultural indications of the importance of herding in Archaic and Classical period which was carried forward in the Hellenistic period (Chaniotis 1999, 192–197).

299 The other closest city to Koumasa would have been Rhytion.

300 Panagiotopoulos 2022b, 337.

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and the central region above the magazine area, and much of it was found in heaps left by Xanthoudides. Most numerous are black glazed sherds, often glazed on the exterior and the interior, and to a lesser extent sherds with light red slip. These belong to the typical Hellenistic pottery found in other regions of Crete.³⁰¹

Another element is the abundance of grinding stones of the saddle type and oblong type.³⁰² Most circular or oblong stones appear scattered around the peak. Their even distribution there allows for the assumption of a common use of the area in a time when the room demarcations by the walls were obsolete after the LM I destruction. As these stones were not found in clear contexts but rather identified near bedrock, relying on relative chronology is not easy. However, the Hellenistic or Roman periods seem, along with LM III usage, to be the most likely periods, as the find spots of these grinding stones correlate to a certain extent with the location of the Hellenistic pottery.³⁰³

As for the early and middle Roman period there is no concrete evidence yet. Given the gradual growth of Gortyn, which reached the apex of its size and regional importance as capital of the province of Crete and Cyrenaica at this point, the seeming abandonment of the Korakies hill is a contradiction that requires an explanation. The peripheral role the hill possessed in the Hellenistic period might have been abandoned, as a result of the rapid urbanisation of the metropolis of Gortyn, or due to the rise of the importance of the peripheries to the west and the coastal areas described above. Also worth considering is the phenomenon observed by Sanders of moving the centres from the mountain to the valley,³⁰⁴ with the role of agriculture increasing over that of shepherd herding, as implied by the systematic presence of cisterns mentioned above, that are spread at the foot of the mountain range, at the level beneath Koumasa.³⁰⁵

The evidence shows a level of habitation on the site, which should be understood as part of the greater suburbs of Gortyn. The sarcophagus relief from Vassiliki and the Asclepius dedication at Apesokari, as well as the cult activity at Kophinas, indicate a cultural sequence in the area of central Asterousia which is, at any rate, of lower impact than other regions of the mountain range, to its east or to its west.

In the late Roman period, activity in the area recommences: two Roman graves were found by Xanthoudides, one above Tholos B and another between Tholoi B and A.³⁰⁶ A coin of the period of Constantine was also found on the rock atop Tholos B, dating

301 The black glaze has parallels in examples from Ayia Irini near Rethymnon (Nota 2010, Figs. 5, 6) or in Antikythira (Johnston et al. 2012, Figs. 9, 26, 88); the red slip is paralleled with Nota 2010, Fig. 8. For *comparanda* to the vessel types from those indicative locations see Nota 2010, Fig. 8; Johnston et al. 2012, Figs. 9, 13, 27, 28, 65, 73.

302 See discussion on pages 191ff.

303 The notion that the round grinding stones could be dated to early EM times (Nowicki 2011–12, 15) seems less likely.

304 See Footnote 245.

305 The cisterns mentioned above (see Footnote 240), are located within a radius of ca. 5 km. from Koumasa.

306 Xanthoudides 1924, 4.

most probably to the period of these Roman graves.³⁰⁷ At the foot of the hill east of the location of the tholoi Roman elements including fragments of *terra sigillata* and Roman bricks indicate a use of the area in the Roman times.³⁰⁸ On the settlement itself, a ca. 4 m² structure with two phases was erected, the earliest of which is dated to the late Roman or early Byzantine period; it was built atop of earlier material, which includes a lamp of the late 1st or early 2nd century CE.³⁰⁹

2.5.2 Byzantine Period

The Messara region experienced relative prosperity during the early Byzantine period, known in Crete as the first Byzantine period, with the city of Gortyn maintaining its wealth and influence despite the destruction caused by earthquakes and a subsequent period of decline, at least when compared to its peak in the early Roman period. This period of prosperity is shown archaeologically to have extended until the earthquake of 794 CE,³¹⁰ and eventually to the conquest and destruction of Gortyn by the Arabs in 824 or 828 CE which ended the first Byzantine period in Crete.³¹¹ The relocation of the island's capital to modern-day Heraklion marked the end of the urban phase for the region of central Messara.³¹²

During the early Byzantine period, churches were constructed on the northern slopes of the Asterousia, at sites such as Rotasi and Rizokastro by Anapodaris that had evidence of habitation dating back to the Roman period, as already described, indicating a continuity of settlement and religious activity in the region.³¹³ Furthermore, the first elements of monasticism, better known from the second Byzantine period onwards, may appear already in the first Byzantine period.³¹⁴ Looking at the churches built in the first Byzantine era, a construction phase is to be seen in the area in and around Messara in the 6th–7th centuries. The gazetteer of Volanakis include a church at Gergeri, one at Matala, and in Gortyn churches of saint Titus and two others in the city itself are listed, along with some other evidence from the surrounding area towards Mitropoli, Ampelouzos and in Ayii Dekka, which surround ancient Gortyn to the south, west and east respectively. Also, two basilicas on the Gortyan acropolis to the north are

307 Possibly 315 CE; Panagiotopoulos 2016, 559.

308 Panagiotopoulos 2022b, 337.

309 Panagiotopoulos 2023b, 319–320.

310 Hammond 2017, 121.

311 Treadgold 1997, 436. For a thorough analysis of this event and its consequences, see Christides 1984.

312 Gortyn, the capital city of Crete up to that time was left to fall into decline, but it is unlikely to have been actively destroyed (Christides 1984, 92–94).

313 Pendlebury et al. 1935, 85–86.

314 Voulgarakis 2017.

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documented, with a date also in the 6th–7th centuries for at least one of them. From the area of the eastern edge of the Messara, two possible churches are located in Kasteliana and near Inatos. Finally, from the southern coast of Asterousia, a possible early basilica is to be found at Lassaia, and also the mentioned early basilica at Lebena.³¹⁵ There, the Ayios Ioannis chapel (Saint John) is built on the ruins of a basilica dated to the 5th or 6th century, in the area of the former Asclepeion.³¹⁶

In the previous chapter the possibility of the continuous adaptation of Asclepius in the Christian tradition is mentioned, albeit with no certainty whether this tendency existed in the first Byzantine period also.³¹⁷ It is to be noted that, one of the earliest basilicas in Greece, the church built north of the temple of Asclepius at Epidaurus, was dedicated to Saint John in its later phase, and he could have been its original saint.³¹⁸ Another example to be taken into consideration is the Saint John chapel in Athens. The chapel, built also in the 6th century, incorporates a Corinthian column which penetrates its ceiling.³¹⁹ The chapel is associated with healing attributes and is built on the area of an Asclepeion.³²⁰ This evidence allows the possibility that there was a conscious effort to integrate aspects of the ancient cult into that of Saint John already in the early Byzantine times.

Regarding water management, the period of the 5th–6th centuries witnesses a spreading of bathhouse-type structures in or around churches, with the suggestion of religious role (*bapristeria*), as at Ayios Pavlos near Phaistos, in Gortyn and the church of Ayios Georgios near Phournofaraggo.³²¹

In Koumasa scattered pottery of this period has been found in surface levels in the settlement. Byzantine pottery of more than one phase was present in the above-mentioned square building, the first phase of which was erected in the late Roman or late Byzantine period using spoils from the surrounding Minoan structures.³²² The second phase dates also to the Byzantine period, indicating a span within the whole first Byzantine period.³²³ After this point, no further activity is documented from Koumasa.

315 Volanakis 1987, 250–256.

316 Gerola 1915, 1153; Sotiriou 1929, 193.

317 See Footnote 260.

318 Sotiriou 1929, 199. The church’s position is noted as east of the propylon, which is, in fact, to the north of the Asclepius Temple.

319 Image from DAI arachne.dainst.org/entity/6889.

320 Goette 1993, 83; Bridges 2021, 453.

321 Kelly 2014, 106–107. The spring east of Fournofarango is seen in the map of springs in Figure 3.

322 On account of the pottery found in that area, a Hellenistic or Roman date was initially assumed (Panagiotopoulos 2015, 529–531); the stratigraphy, however, while showing usage in various periods, indicates that the first phase of the building dates to this late period (see Footnote 309).

323 Panagiotopoulos 2023c, 53.

During the second Byzantine period, one of the military interests in the region is to fortify the southern frontier, as can be seen in the Messara in the establishment the Rizokastro castle on the site of ancient Priansos.³²⁴

2.5.3 Post-Byzantine Period

No evidence from the site postdates the early Byzantine period, which can be understood within the context of Gortyn's abandonment. However, at a close distance from the settlement, 470 m. to NE, on a hill overlooking the modern Loukia village, a ruin of a square tower stands, whose architecture type resembles that of the Venetian forts. Its sides measure 5 m. with the maximum surviving height of ca. 3 m. Pottery belonging to that period is scattered around it. From a topographical aspect, it dominates the area around it while being well-situated on a steep cliff. The erection of this fort, albeit small, accompanies other defensive structures in the regions of the Messara, such as the Castle Belvedere located on the hill of Priansos by Anapodaris, or that at Charakas, two sites from the region at the northern end of Asterousia. These indicate the strategic value of the region, possibly for controlling agricultural production and also movement within Messara.³²⁵ It is to be noted however that the distribution of castles and forts during the Venetian period in and around the Messara, are mainly on the northern slopes. These are, from west to east: Nuovo by Kastelli near Moires, Kavalou by Larani and Voros, and Bonifacio by Kastelli Monofatsiou.³²⁶

In the case of the Kavalou castle, it is tempting to recognise a parallel with that of the Loukia fort. Similar to the latter's close distance to Koumasa, Kavalou is in the vicinity of the tholoi at Vorou, with a distance of 1.1 km. from the closest of the two tholoi. In this case, both structures represent the utilisation of the natural environment in a similar manner, particularly in terms of the defensibility of transitional zones from the mountain to the valley. This topographical pattern holds true for most of the Frankish castles, with the only ones situated in the valley proper being Charaka and Nuovo. Additionally, the Ottoman Ano Moulia castle holds a strategic position between the Messara and Malevizi valleys, further emphasising the significance of natural features in the selection of defensive locations.

This description denotes, however, the relative abandonment of the Asterousia region. In fact, the area of Asterousia was known in the first and second Byzantine period

324 See Footnote 325.

325 Belvedere was initially constructed by the Byzantines around the 10th century and its initial name was Rizokastro. It was occupied by Enrico Pescatore, and further fortified by the Venetians. Charakas was constructed by the Venetians in the 14th century. See Papathanassiou 2012–2024.

326 Castle Nuovo was built in 1206 by the Genoan Enrico Pescatore. Castle Kavalou by Larani and Vorros is first mentioned in 1301. The fort Bonifacio is in the records since 1212, and was also built by the Genoan Enrico Pescatore, named after a castle in Corsica. It gives its name to the region of Monofatsi today (see Papathanassiou 2012–2024).

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as *Erimoupoli*, a name denoting the empty region but also associated with the hermit monks, whose securely documented presence begins after the Byzantine reconquest³²⁷ and who might have been there even earlier.³²⁸

This movement grew during the Venetian period, especially under the monk Philagrios, who founded the Tris Ierarches monastery at Lousoudi in 1393, located along the route from Kapetaniana to Kophinas, which subsequently developed as the spiritual hub of this movement.³²⁹ The period coinciding with the activities of Philagrios is the only period, to our knowledge, in which the central Asterousia was the focal point of the region, at least in a symbolic or spiritual way, if not political. The dedicatory inscription of the monastery of Ayios Ioannis (mentioned in the discussion of Asclepius above) offers an insight to many aspects of the era. The inscription, dating to 1360, mentions the donors as of the same tribe and Christians³³⁰ under the regency of Ioannes V Palaiologos and Helena Katakouzine.³³¹ The mention of the Byzantine authority in a time of a Venetian dominion of the island is to be seen as a statement of the autonomy within which the region operated, as well as an opposition to the Venetian authority, which is made explicit in the case of religious matters.³³²

This association with monastic life, but also with the rather isolated nature of this region of Crete, continued until today, where the region of Koumasa is surrounded by small villages, connected with the road network just in the 1970s. The area of the tholoi as well as the settlement, was used for farming in the recent past.³³³

2.6 Diachrony Within the Cultural Landscape Approach

This analysis of the diachronic development is not just a sidenote, but a crucial element of this effort to understand the role of activities within the broader region and how these developments are mirrored in Koumasa based on the finds there. It aids our understanding of human agency, and how practices are shaped by the indigenous or traditional knowledge, which is in itself affected by both the practicalities of everyday life and the ever-evolving zeitgeist.³³⁴ These practicalities are a function not only of historical developments presented here and the topography (discussed in Chapter 3), but

327 Psilakis 1988 69–74; Paliouras 2017, 8.

328 Voulgarakis 2017.

329 Paliouras 2017, 13–14.

330 Ομοφύλων, transcribed as ὁμοφύλων, is translated by Bougrat, (1982, 149) as Cretan Greeks.

331 Bougrat 1982, 149.

332 Bougrat 1982, 150.

333 Near the tholoi the fields are cultivated today, and the settlement area was also farmed, which explains the low height of walls in most of the central area of the settlement (Panagiotopoulos 2012a, 204).

334 Nakashima 2010; Panagiotopoulos – Savvatianou 2022, 168.

also of various social conditions, some remaining latent, that can partially be decoded through archaeological data and theory.

Returning to the site of Koumasa, the contrast in activities there from the EM times through LM I and with later periods is striking, but it follows the trajectory of the region through the centuries. When one considers the period in which the site flourishes, when approaching the Korakies hill, its peak stands prominently visible; in contrast to nearby formations, like the less inviting Kalamaki hill, Koumasa, while imposing, does not exude an unwelcoming aura.

A relatively recent trend in landscape archaeology involves considering space's importance as socially constructed. Monuments within this space are viewed as efforts to shape a new landscape, as exemplified by Tilley's examination of the landscape as a "spatial text".³³⁵ The landscape and the monuments can "become fused and join in union to become a central point, an axis mundi."³³⁶ This has led to a focus on the correlation of location and cultural memory, as discussed by Assmann.³³⁷ This theoretical approach fits well with the site of Koumasa because of the continuous usage of the same area for over a millennium for burials, as well as the development of the settlement on the top of the hill overlooking the tholoi in the Protopalatial and Neopalatial times.

The continuous repetition of an act, in this case the burial ceremonies, imbues it with a performative character.³³⁸ This act – or "form" in the words of Assmann – can evolve from ephemeral memory to become codified in tradition, or rather to become entangled with the cultural memory of a society.³³⁹ These acts become then crystallised in tradition, and act as a "mnemonic device".³⁴⁰ The movement of people in space facilitated the contact with the environment around it and relates to the memory of past activities in it, to create what has been called a "memory space",³⁴¹ pertaining to the lived-in space and its transformation towards a memory space, referred to also as *Mnemotope*.³⁴² For the LM I usage, for example, this explanatory framework would suggest that the tholoi area had become a landmark, that was collectively deemed unapproachable, even after the activities within them ceased. With regards to the gradual abandonment of the area in the Post-Minoan period, the historical factors contributing to this phenomenon have been summarised here, while a more deterministic approach,

335 Tilley 1993; Goodison 2019, 123–124.

336 Richards 1996, 206.

337 J. Assmann 1992, 59–66; A. Assmann 2013.

338 Especially if it was associated with specific seasons within the agricultural cycle (Goodison 2001, Pl. 19; Goodison 2018, 282; Ayash 2023, 139–142).

339 J. Assmann 1992, 56; 64.

340 The memory function is examined by J. Assmann within three categories: that of material objects, action, and texts (J. Assmann 2006, 69). In the case of the memory aspect of the use of the tholoi we have direct evidence only for the first category and partial evidence for the second.

341 J. Assmann 1992, 38, 56–65; Glaraki 2016, 84.

342 J. Assmann 1992, 59.

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based on both quantitative and qualitative methods for approaching the landscape, as will be presented in Parts II and III.

This chapter laid out the diachronic activity of Koumasa and its region. Upon this, the background of the palimpsest of activities which Koumasa is part of, can be scrutinised. This framework, which is employed in the structure running through Part I, is that of the cultural landscape or heritage landscape. This method, although based on archaeology, goes beyond it to encompass the surrounding topography, including flora, fauna, geology and land use as a background of human activity.³⁴³ This completes the diachronic overview, seen not just as a side note, but as a crucial element within the effort to understand the role of the region described and in understanding the choice of activity in the region as entangled with the indigenous or traditional knowledge of each period.

In the next chapter, the wider area of Koumasa will be approached again, this time focusing on the topographical details, so that the previous theories will be revisited and re-evaluated through a comprehensive and modern approach, while trying to offer answers regarding the role of the settlement of Koumasa within its area. Topographical and archaeological evidence will be explored in the analysis of the Microscale (Chapters 6–8), while the Mesoscale and Macroscale, in Chapters 9 and 10, will be analysed using GIS based approaches and archaeological data.

343 Swanwick 2002, 2–3; Panagiotopoulos – Savvatianou 2022, 167–168; Panagiotopoulos 2023a, 168–200.

3 Cultural Regionality. Older Views and New Tendencies

This chapter aims to set the diachronic overview of the previous chapter within the context of the region's topography, by addressing both its previous characterisations and modern approaches within the framework of the heritage landscape, including looking at early and contemporary land usage, the perception of the region, as well as the evolution of factors such as climate and geology. This framework, within which Chapters 2 and 3 were conceived, offers a holistic understanding of the region beyond just the archaeological and historical data.³⁴⁴

Located on the northern slopes of the Asterousia mountain range and overlooking the Messara plain, Koumasa shares an identity with both regions (see Figures 14, 16). This liminal nature extends also to the geological characteristics,³⁴⁵ as well as the land use.

The agricultural horizon in the area can be divided into two zones; the lower one, extending from the coast up to an elevation of 300 to 400 m. is defined by olives (*Olea europaea*) and carob trees (*Ceratonia siliqua*).³⁴⁶ The hilly zone surrounding the plain extends from an elevation above 300 m. and is mainly dominated by the presence of kermes oak (*Quercus coccifera*) for elevations between 300 and 600 m., combined with a lesser density of olive trees (that can continue up to 800 m.) and a predominance of shrubs and phrygana.³⁴⁷ It is noted that Koumasa sits in the transitional area of these two zones at ca. 350 m. (see Figures 14–16).

In delineating the distinctions between the valley and the Asterousia in terms of land cover, comprising shrubs, grasses, and assorted flowering vegetation, one can observe significant overlaps, albeit with discernible variations in frequency, which is sometimes substantial.³⁴⁸ As for the Messara valley, the characteristic vegetation is observed,

344 See Footnote 8; on the limitations and pitfalls of analysis of just the archaeological data, see Cadogan 2022, esp. his quote: “it is easy to over-emphasise the contribution of material culture, forgetting perhaps that understanding it is not the end itself, but the means to the end, to making comprehensive history of anonymous humans of long ago” (Cadogan 2022, 209).

345 See Footnotes 10, 12.

346 Bottema 1980, 196–197.

347 For the different agro-ecological characteristics, see also Rikli – Rübél 1923; Kabourakis, 1996; Daliakopoulos – Tsanis 2014.

348 Daliakopoulos – Tsanis 2014, 77. For example, the percentage of brome in the Messara and Asterousia is almost equal, while wild barley and wild oats are more frequent in the Messara valley by 6 and 4 times respectively.



Figure 14: Koumasa as a node between the valley and the mountain (original photograph, courtesy Koumasa-Project). a: Korakies hill and Minoan Koumasa; b: modern village of Koumasa; c: Loukia; d: Fournofarango, with Kalamaki hill above it.

which in the preindustrial age was characterised by barley (*Hordeum vulgare subsp. Polystichon*), bumblebee orchid (*Ophrys bombyliflora*), and a very strong presence of the yellow bee-orchid (*Ophrys lutea*), in addition to the various trees.³⁴⁹ Wild bushes and shrubs include the thorny burnet bush (*Poterium spinosum L.*), the Jerusalem sage (*Phlomis*), the star clover (*Trifolium stellatum*) or the daisy flower (*Chrysanthemum coronarium*). There are a great variety of herbs, of which the study of Rikli and Rübel lists 24.³⁵⁰

The main difference between the two regions observed today is in the type of land use, which emphasises the stark division into two areas, the plain and the mountain, and obscures the transitional zone, as will be discussed below. But first, the position of Koumasa, and how this has been perceived in the history of research needs to be discussed.

349 Rikli – Rübel 1923, 110–114.

350 Rikli – Rübel 1923, 123, 190.

Figure 14 is indicative of the liminal role of Koumasa within the modern landscape, where the mountain-valley distinction is emphasised by the modern land use for the cultivation of olive trees.³⁵¹

3.1 Previous Partitions of Messara and the Rather Problematic History of Research

The Messara-Asterousia region has not generally been regarded as a unified entity, instead often being viewed as divided between the mountainous Asterousia region and the Messara valley. This division arises not only from the geological and vegetational contrasts discussed earlier but also from entrenched perceptions of a distinct cultural environment, which have contributed to the relative neglect of certain areas, particularly the central Asterousia. As an instance of this neglect, Faure's geographic description of the Asterousia merely mentions its expansion from Priansos to Matala.³⁵²

Within research in Cretan prehistory, the general area of the Messara is seen as a different district than that of eastern Crete, on the basis of pottery, seals and funerary rites.³⁵³ In many previous analyses, however, an internal partition of the Messara and Asterousia can be seen. Namely, Koumasa, and the wider central and eastern Messara, tend to be excluded from the immediate cultural environment of Phaistos, drawing most of the attention of Minoan archaeology to its western front.

This is apparent in Warren's division of Crete into a minimum of 13 territories. The eastern part of south-central Crete is allocated to the great Minoan triangle made up by Kommos, Ayia Triada and Phaistos.³⁵⁴ To its east, the eastern Messara and the Anapodaris river territory is mentioned, with Dhamantri of Praitoria and the Rotasi-Priansos area as its foci and Kophinas as its main sanctuary.³⁵⁵ Koumasa would possibly fit here. But, interestingly, the central Asterousia region, with the Kophinas sanctuary and its harbours on its south, is even rather ignored in this version. In alternative perspectives, even when these locations are considered, they are often assigned to the sphere of influence of palatial centres, usually either Knossos or Phaistos. So, in the example of the political divisions suggested by Bevan – Wilson, a separate unit based on the movement analysis includes Koumasa and Kophinas in the calculations but is analysed assuming Knossos Galatas and Dhamantri as foci,³⁵⁶ or otherwise within the Phaistos area.³⁵⁷

351 See also Panagiotopoulos 2023a, 197, Fig. 6.

352 Faure 1965, 437.

353 See Anastasiadou 2016.

354 The use of the term is after Shaw, following whom it is common to identify the whole western Messara region with the questions of the interrelationships of these centres. (Shaw 1985).

355 Warren 2002, 202. In the bibliography, Praitoria often appears erroneously as Protoria.

356 Bevan – Wilson 2013, 2420–21, Figs. 3–4.

357 Bevan – Wilson 2013, Fig. 6.

A separate, more local region can be seen as suggested, assuming the Neopalatial centre of Dhamantri as its centre.³⁵⁸

This view has led to interesting results in the effort to allocate a specific centre for the control of the Kophinas sanctuary. It is often attributed to Phaistos' sphere of influence, although the distance to Phaistos by far exceeds the typical distances between peak sanctuaries and their related palatial centres.³⁵⁹ While other approaches indicate centres more local to Kophinas, such as Dhamantri, they still consider the vicinity to a great palatial centre as a desired criterion.³⁶⁰

In his monumental work on the so-called 'State of Phaistos', Watrous identified the region of western Messara – and subsequently the region with Phaistian influence – as eastward up to Agioi Deka (Ayii Dheka) and Vassilika Anogeia (Vassilika Anoyia).³⁶¹ This leaves Koumasa near the borderline of the two regions and rather on its eastern side. From an archaeological point of view, one of the reasons for this is the general lack of evidence in central and eastern Messara.³⁶² Also often in the research on the Palatial and Neopalatial environments here – often summarised under the umbrella term 'Messara' – the focus lies mainly on the palatial centres of the eastern Messara.³⁶³ This trend can be seen also in various proposals for the political geography of the island.³⁶⁴

This is the case also for the Prepalatial Messara, as most maps of the tholoi distributions show a concentration in the western part, with the eastern *front* of this being identified by the tholoi of Vorou, Ayia Irini, Drakones, Koumasa and Trypiti (from north to south).³⁶⁵ In contrast to this, the study of the Hellenistic and Roman

358 Driessen 2022, Fig. 3.c.

359 In a comparative study, Megarry showed that the walking distance from Phaistos to Kophinas exceeds 25 km. in line of sight and a distance of more than 300 minutes of walking time, while the second furthest distance, that of Juktas to Knossos is 6.7 km. with ca. 150 minutes of walking time (Megarry 2012, 220).

360 Soetens et al. 2008, 159–160, Fig. 8. Without excluding the validity of this approach, more local focus in the case of Kophinas is entertained in Chapter 11.4.

361 It is to be noted that in the survey conducted in 1982 and 1984, the easternmost limits of the main region of interest were defined even more to the west, as the line running north-south from Kalyvia to Petrokephali (Watrous et al. 1993, 215).

362 Knappett 2012, 389. See also Footnote 380 on the chance finds in the region, and Vasilakis 2017, 80–81 for the gap in the region and the significance of Dhamantri complex in potentially filling it.

363 In the analyses of Neopalatial regional tendencies, the *desideratum* is often a dialectic with Knossos, hence focusing on the strategically located villas or the three main Messara settlements (Adams 2017, 124–125). This can be based on topographical criteria, the interpretation of which is, however, still performed on the basis of this *desideratum* (Bevan – Wilson 2013, 2420–2421; Fig. 4).

364 Driessen 2022, 6–8.

365 Goodison – Guarita 2005, Fig. 1, 172. The recent discovery of tholoi to the east of this line along the shore, should aid in changing this perception. (See discussion on the recent tholoi investigation at Ayios Ioannis and Salamias, in Chapter 11).

Messara, due to our more concrete knowledge, presents the region as rather divided in three parts.³⁶⁶

Beyond this point, however, the distinction between the eastern and western regions of the Messara and Asterousia – less valid from a topographical point of view than the north-south distinction – is strongly influenced by the local division both seen and perceived in modern times. The eastern Messara is considered poorer and strictly agricultural.³⁶⁷ Furthermore, when considering the networks of the island, Koumasa, as well as the general Asterousia region, is considered rather isolated.³⁶⁸ This modern isolation has been established since the end of antiquity, when the economic centres of the island were relocated to the northern part of the island. A major turning point in this direction – although it seems to have started earlier – was the Arabic capture of Crete in the decade of 820 CE and the destruction of Gortyn, after which the centre of operations and the capital of the Emirate of Crete were established in the north of the island, in the Khandaq fortress, modern Herakleion, as described in Chapter 2.5. This marked a big shift in the inner political geography of the island, with the Aegean side becoming significantly more relevant.³⁶⁹ The Messara – although remaining Crete's metaphorical grain basket – lost political significance, and the Asterousia mountains were shunned completely; especially after the Arabic period, they were known mostly as a centre of pasturing and monachism. Adding to this, during the 19th century, a process of village abandonment began.³⁷⁰ Today, the western part of the central Asterousia, west of Kophinas, is defined only by the small villages of Kapetaniana, Koumasa, and Krotos. The striking shift in the role of Koumasa is accentuated in Figure 15, which includes both modern and ancient Koumasa, stressing the difference in the importance of this area in ancient and modern times. The 20th century could be viewed as the final stage in the gradual shift of centrality toward the north, a trend which underscored by the absence of modern roads in the area until the 1970s.³⁷¹

During the expansion of Minoan archaeology in the 20th century, the Asterousia and eastern Messara regions were perceived as remote and culturally peripheral. Consequently, perhaps due to this cultural bias, they were not automatically regarded as particularly significant in their own regard for the Minoan period. The finds of the tholoi, the Kophinas sanctuary and as far as the Tsoutsouros cave were brought to light

366 The first extends from the coast roughly up to modern Moires, in the area of the polis of Phaistos; the second being around Gortyn; and the third, the land south of the Yeropotamos as far as the Anapodaris (Sanders 1976, 134). The third one corresponds with the immediate world of Koumasa.

367 Watrous et al. 2004, 34; 111–112.

368 Vasilakis – Sbonias 2018, 276. On the input of topographical analysis for this point, see Bevan – Wilson 2013; Paliou – Bevan 2016.

369 The vicinity to the Aegean islands and mainland coasts made the northern coast a strategic location (McMahon 2015, 38–40).

370 Stamatakis 2007; 2020.

371 See discussion on page 74. For the historical review, see Chapter 2.

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Figure 15: Comparison of modern and ancient Koumasa. a) View northwards, taken from the Asterousia Slope. b) View from the west of modern Koumasa eastwards (raw photographs, courtesy of Andreas Neumann).

as a result of isolated excavations and were linked to nearby known locations as a feature of the Phaistian influence or the Messara culture rather than being considered as a local Asterousia-centred phenomenon.³⁷²

Furthermore, any archaeological work in the region faced difficulties, not least because of the inaccessibility of the region, as shown in the case of Xanthoudides' excavation or Evans' difficult travels in the region, which included Trypiti.³⁷³ Even today, many of the campaigns are done in areas that can be approached only with great difficulty.³⁷⁴

All these reasons have in the past minimised the chances that the region might be considered a valid candidate for a large campaign. This tendency is also seen in an extensive analysis of Cretan surveys by Gkiasta, which included 35 surveys of different methodologies. Of these, none were conducted in the central and eastern Messara.³⁷⁵ However, Nowicki's research on early settlements in Crete should be included, as he traversed the Asterousia, with results that will be discussed in Part V.³⁷⁶ As for archaeological work, in the 1960s Alexiou, Davaras, and Sakellarakis showed interest in the Asterousia, continued by Karetso with small campaigns, mostly as salvage archaeological projects after reported illicit activities.³⁷⁷ In total, the list is very short and often as a reaction to illicit looting or as part of further study of known locations and tombs;³⁷⁸ projects in new areas are very infrequent, and normally in the shadow of illicit activity. It is remarkable how high the percentage of excavations in the area is a response to illicit activities or are salvage excavations,³⁷⁹ which are an enforcing act, meaning it will

372 This tendency can be seen in the discussion of topography in the publication concerning the Eileithyia cave by Inatos (Galanaki – Papadaki 2022).

373 *Knossos II*, 78–84.

374 E.g., the excavation of Vasilakis at Martsalos was only possible via boat access (Vasilakis 1996, 644); the excavation at the tholos at Salamias required a two-hour walk from Ayios Ioannis, itself a peripheral location.

375 Her thesis contains an analytical examination of the results of surveys on Crete and their comparison in terms of the theoretical and methodological frameworks within which research was produced, bringing forth many innovative insights for the past and future of surveys. As for the geographical coverage, out of the 35, only five surveys are spread in the western Messara (Kommos, Phaistos, Ayiofarango). It is to be noted that this list does not cover some of the smaller range surveys, such that by Vasilakis – Sbonias in 2018 around Trypiti and Phylakas or the one by Vasilakis et al. 2019; Alušík et al. 2019 in the Porti-Miamou area (see also Gkiasta 2008, 41–50). To Gkiasta's list, the surveys of Blackmann and Kalantzopoulou and of Nixon in the Sphakia region could be added (Nixon 2006; Beckmann 2015; Kalantzopoulou 2022).

376 Nowicki 2014a; 2014b; 2018.

377 Branigan 1993, 97.

378 For example, the Trypiti excavations, the Miamou-Porti Project by Vasilakis, or the Koumasa project fall into this category. The Dhamantri project by Antonakaki falls into the category of newer excavations with very promising results that have not yet concluded.

379 To include a few only from the Asterousia, from west to east, illicit excavations in cemeteries and settlements were noted in Moni Odigitria (Vasilakis – Branigan 2010); Martsialos, Kali Limenes (Vasilakis 2017, 69–70); Stou Skaniari to Lakko, Megali Skini (Alexiou 1967, 483–484), Lassaia (Chatzi-Vallianou 1979, 382–83); Krotos, both tholos and nearby settlement (Vasilakis 1983, 355); Christos (Vasilakis 2017, 73); Salamias, Treis Ekklisies (Kanta – Serpetsidaki 2015, 59–60); Skinias excavated in response to looting (Mandalaki 2011, 379).

be a shorter campaign. Additionally, if the illicit activity is thorough, it will leave a disturbed, partially emptied area. To give an example, denser activity in Minoan times can be assumed for the area from Rotasi to Dhamantri, based on the various chance finds or salvage excavations.³⁸⁰ The situation at the output of the Anapodaris is similar. There, at Ayios Ioannis – Plaka, a large MM III–LM I settlement was discovered. At a distance of 1 km. east of this settlement, a smaller hamlet of the same era was found, as well as habitation traces at Trapeza, above the modern Keratokampos.³⁸¹

These issues have contributed to underplaying the role of central Asterousia and eastern Messara in the perceived cultural landscape of southern Crete, favouring instead the westernmost Messara as the heartland. This area has traditionally been the most densely settled part of the plain, characterised by the open coastline on the one hand, and a fertile alluvial lowland basin, with ample groundwater on the other.³⁸²

3.2 Modern Perspectives and the Duality of Mountain and Valley

A development that goes beyond the categorisations mentioned above is the tendency to view the regions of the southern Messara and Asterousia as a united cultural continuum.³⁸³ Vasilakis even noted that the so-called Messara Culture, referring to the EM tholoi culture, could be called the Messara-Asterousia Culture.³⁸⁴ He further suggests that this cultural unit consists of two parts; the first extending from the western edge of the Asterousia and the coastline upwards – which includes Kommos – and stretching to central Asterousia, up to a supposed dividing line which runs from north to south from Asimi in the southern Messara up to Kapetaniana and Agios Ioannis on the coastline in the southern Asterousia. The second part stretches further eastwards of this line to include the eastern Asterousia up to the delta of the Anapodaris stream at Dhermatos, less than 5 km. east of Tsoutouros.³⁸⁵ Within this scheme, Koumasa is located in the first part but very near the dividing line, as it occupies a rather central position within the whole Asterousia-Messara unit.

This longitudinal division of Vasilakis is, on the one hand, symbolic as an arbitrary division emphasising where archaeological research is being done, while on the other

380 These include evidence of settlement activity in the Farmakara and Empesos hills in the direct vicinity of modern Rotasi (Galanaki et al. 2017, 96); further, in the broader region between Rotasi and Dhamantri, a LM treasure of 19 bronze tools and weapons was found in Asprolivada, including four double axes and a spearhead, and evidence of an extended Minoan settlement, of which nothing can be seen due to modern agricultural activity (Platon 1957, 339; 1958, 480). In the area of Livaditis, near Mesochori, five stone vessels were found, including a bird's nest bowl type (Alexiou 1969a, 540; Lebesi 1969, 414).

381 Rethemiotakis 1981, 390.

382 Watrous et al. 1993, 193–194.

383 Vasilakis 2017, 64.

384 Referring to the term used as a chapter title in Hutchinson 1962, 151–155.

385 Vasilakis 2017, 63–64.

hand it creates a geographical symmetry: in the valley, it divides the areas whose main streams are Geropotamos to the west and the catchment of Anapodaris to the east. This fits with the two main hydrological catchments, representing these two main streams as the drain basins of the smaller mountain streams.³⁸⁶ In the Asterousia, it divides the mountains on the two sides of the Kophinas central range, with the conceptual dividing line passing through the highest and roughest areas of the Asterousia, which include the peak of Kophinas.³⁸⁷

This scheme puts Koumasa near a separation line that makes sense only macroscopically, or even retrospectively. For example, from a geological perspective, it becomes obvious that the area around Koumasa belongs to the hydrological catchment of Geropotamos. However, the macroscopic symmetry of mountains and terrain is not perceived from Koumasa itself.³⁸⁸ The actual distances from the settlement to the Anapodaris and Geropotamos streams are 13 km. and 5 km. respectively, which places both at an approachable distance without much difference in distance between them. However, this distance is irrelevant for the question of direct water access, as this need would be covered by nearer sources. It is rather the created cultural landscape that is of relevance, defined by the stream paths that lead to Geropotamos. The closest water sources are the two smaller streams, one at the settlement itself as discussed above, and another, bigger one called “Koumasiano” today, that brings water through the modern village of Koumasa near its modern cemetery and continues between the villages of Vassiliki and Loukia until it reaches Geropotamos.³⁸⁹

The relation of Koumasa to the valley is very clear – not only optically but also culturally – from the EM period onwards, as Koumasa is well integrated in the “tholoi landscape”; the network of tholoi is spread evenly towards the Koumasa region, with six tholoi being at a line of sight distance of just above 3 km.³⁹⁰ Cultural relations to Porti are also seen in the material evidence from the tholoi, for example the representation of man and bull on clay vessels from these tholoi.³⁹¹

A longitudinal division of Messara does not, therefore, represent any tangible differentiations in the region, either culturally or geographically. A lateral division that creates a separation of the valley and the mountainous region would be more apt from

386 For the watershed see Daliakopoulos – Tsanis 2014, 68 and in this work Figures 49–55, in Chapter 5.5. For the author’s proposal for divisions of the Asterousia range, see Figure 78 in Chapter 9.1.

387 This area is also, to a large extent, archaeologically unstudied, despite clear settlement activity appearing in places such as to the south of the villages of Panagia, Rotasi, and others, which can be seen while walking these areas.

388 It is interesting that the peak of Kophinas is not visible from Koumasa and is last visible from a point between the modern Loukia and Vagionia (Vayionia), in the vicinity of the Koutsoukera and Salame EM tholoi.

389 The Koumasiano stream is at a distance of ca. 650m from the western part of Minoan Koumasa. See also Figure 17 below and discussion in Chapter 9.3.3.

390 The tholoi are Koutsoukera, Salame, two at Ayia Irini, Drakones (Dhrakones) near the village Stavies and Porti.

391 Xanthoudides 1924, Plates II and VII; Branigan 1993, 122.

the point of view of Koumasa, as it fits the experience of dwelling there and is more in line with the effect of the landscape. It acts as a liminal point in the transition from the valley to the mountain, as seen in Figure 14 and Figure 16.

The observations based on this lateral division carry with them a potential methodological inaccuracy that needs to be kept in mind. It is often arbitrarily assumed that valley and mountain dwelling styles are based on clearly separated economic activities. This separation is emphasised both by modern specialisation and modern preconceptions induced by map readings. While there is some truth in such observations, when studying ancient activities, it would be wrong to monosemantically assign livestock activities to the mountain and agriculture to the valley.

Historically, in periods of prosperity, the exploitation strategy of the mountain can vary between the seasonal, such as transhumation, to a more systematic one, which includes habitation. This expansion, in turn, reflects on the valley, allowing for the growth of the settlements there in support of the mountainous ones. In Crete, the dense interchange between valley and mountain terrains would typically result in an increase in the number of settlements engaged in such exploitation rather than permitting one to dominate.³⁹² The diversity of products, both agricultural and animal-based, would support self-sufficient habitation, while the exchange of goods specific to each area facilitated the stabilisation of this dynamic dyad.³⁹³

The modern tendency towards mass production has forced a spatial separation of activities, i.e., sizable agricultural fields that can only be established in the valley and large herds of sheep and goats that graze on the mountains. This segregation is further emphasised by the trend of monoculture in the fields. Modern inhabitants of Koumasa and Kapetaniana divide their daily labour between the valley, where they take care of the fields, and areas near their villages where their herds are kept. This, however, is a modern trend, as small-scale farming has given way to industrial-scale production; agricultural policies favoured more dedicated production per region, pushing for monocultural use of the plain since the 1970s, and especially since this agricultural policy was given further impetus by the Common Agricultural Policy of the European Union in 1981.³⁹⁴ Taking the Messara valley into consideration, about 250 km² are cultivated (the general land use has been the same since before the war); 15 percent is used for various vegetables and cereals, and another 15 percent for grape vines, the second-largest crop yield. The largest type of production by far is that of the olive tree, which has also seen the biggest increase. Of the total farming area of 250 km², olive-growing covered

392 Chaniotis uses this phenomenon as a framework for explaining the fragmentation of the island, and the multitude of smaller *poleis*, since the earliest records of the Archaic period (Chaniotis 1996a, 255). On the settlement trajectories from the LBA to the Classical period, see Pollard 2023, 132–135.

393 Chaniotis 1996a, 257–258. Input also from the public lecture: Papadatos, Y. & Kalantzopoulou, T. (2024, February 19) “The mountains of Crete in the Bronze Age: Current archaeological approaches. 3rd Hybrid Public Lecture. Archaeological Research Unit, University of Cyprus”. See also Kalantzopoulou 2022.

394 Daliakopoulos 2014, 82–84. A major milestone and incentive for the expanse of olive farms was the installation of the drip irrigation network in 1984.

an area of 38.5 km² in 1984 (15 percent of total land use), increasing to 110 km² in 1997 (44 percent) and 175 km² in 2014 (70 percent of total land use).³⁹⁵ The olive tree thus became dominant in the Messara region, pushing away other types of land use, defining but also overbearing the plain.³⁹⁶ The modern association of the Messara with olive trees is a modern perspective. It is telling that investigations around Phaistos show olive trees decreasing after the Geometric period and barely present during Greek and Roman times around some centres.³⁹⁷

This impacted other land usages, marginalising smaller farms with a variety of produce and animal grazing, which was consequently pushed to the mountains. This overturning of the biodiversity balance that had lasted for millennia is combined with an increase in numbers of flocks, causing a great concentration in the mountain areas, exceeding the grazing capacity.³⁹⁸ This in turn is linked to erosion, and the increasing aridity in the mountains.³⁹⁹

The gradual abandonment of smaller farmsteads has been observed in the 20th century.⁴⁰⁰ The financial incentives for turning to large production types came at the expense of keeping smaller, more diverse gardens near the villages, which were crucial for the level of dependency and autonomy of mountain regions. These changes have sociological repercussions that need to be kept in mind when judging ancient or traditional village life based on the modern.⁴⁰¹

This is true also for the area of modern Koumasa. After interviews with locals and surveying the mountains, it became clear that agriculture was taking place near and around the villages in the recent past, with a focus on greater varieties of grain, albeit smaller in quantity. Some of the older households in Koumasa still continue this activity at a smaller scale, in a market garden capacity.

To the west of Kapetaniana abandoned fields can be located by their built terraces. Upon inquiring on their state, the locals, the eldest of whom remember them still in use, point out the difficulties in their keeping, as the low yield quickly rendered such work a burden and a distraction from more profitable activities i.e., flocks on the mountains or the olive trees and grapes in the plain, or other types of activities such as beekeeping.

395 Daliakopoulos – Tsanis 2014, 71.

396 On the negative effects of the water-intensive olive tree production on the local hydrology horizon, see Croke et al. 2000; Daliakopoulos – Tsanis 2013; Daliakopoulos – Tsanis 2014.

397 This phenomenon is linked with the aridification of the period (Ghilardi et al. 2019, 13).

398 Daliakopoulos – Tsanis 2014, 78–79.

399 For analytical discussion of the erosion problem in the Asterousia, see Kosmas et al. 2015, 543, 546; and in the Messara, see Daliakopoulos – Tsanis 2014, 82–83.

400 The land, even in rocky areas, forms local catchments making the land arable (Blackman – Branigan 1977, 28–29). E.g., references of such farmsteads or their rests have been mentioned for the area near the tholos of Ayia Kyriaki or above the ancient harbour of Lassaia (Blackman – Branigan 1977, 80) and also in Koumasa, such as on the Korakies hill (Panagiotopoulos 2012a, 204).

401 For sociological aspects of standardisation and shift to industrial farm production, see Williams 1981, Carrosio 2005.

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Modern means of transportation and new roads allowed for an easy commute between the valley and the mountain, while grains are now imported. For many locals, the activity around their mountainous village is now almost exclusively pastoral, and they commute to the valley for the agricultural.

Turning to vegetation as a factor of altitude, a differentiation between the lowlands and highlands can be observed. Watrous defined the splitting of the elevation of the valley from the mountain at 350 m.⁴⁰² By chance, this is at the exact height of Koumasa (its lower levels) and coincides with the extent of the dense olive tree cultivation seen today, making this transition more pronounced (see Figure 15). While this is indicative for the transitional role of Koumasa, the modern land-use-based segregation can influence the academic opinion of land use in premodern times and on the evaluation of the dynamics defined by the topography. This is further enforced on a subconscious level by the traditional maps, which use the two-colour scheme for valley and mountain.⁴⁰³ These elevation maps are not very useful in codifying the realities of life and experience of the terrain (discussed in Chapter 11) because they are based on an arbitrary categorisation of areas according to their elevation, thus making very dissimilar areas look similar on the map colour. Figure 16 shows such a map, marking the elevation of Koumasa as the dividing line of the mountainous (brown) and more level areas (green).

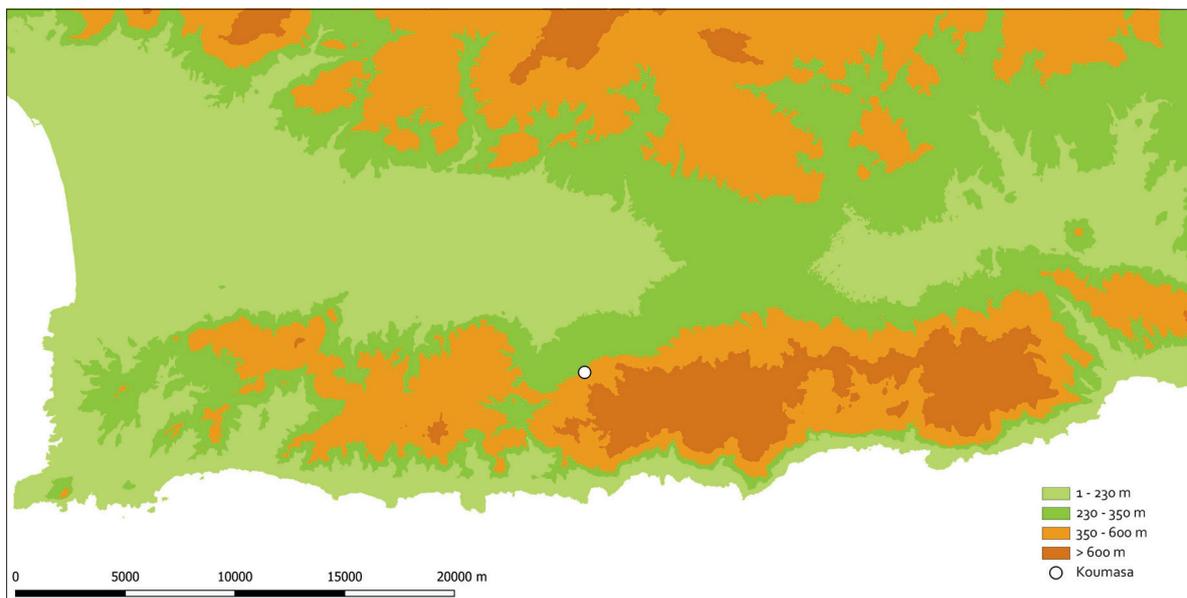


Figure 16: Produced four-colour map, following the traditional map norms. Here with the position of Koumasa as the threshold for the colour scheme.

402 Specifically, a differentiation of lowlands for altitudes of 0–350 m. and highlands from a 350–700 m. elevation is noted (Watrous et al. 2004, Table 5.10).

403 On the psychological impact of colours used in various representations in academic research, see Cramer et al. 2020.

In sum, Koumasa overlooks a region that smoothly transitions from the valley to the mountain, a transition which in the microscale of Koumasa is very much visible, reflecting in some regards the four-colour map. While this dividing line around the height of Koumasa does reflect the transitional area of 300 to 400 m., important in the change of vegetation coverage discussed above, it is inadequate for accurately describing other aspects, as the altitude criterion gives a misleading depiction of homogeneity in the similarly coloured regions, e.g., north and south of the Asterousia. A proposed definition of the Asterousia is presented in Chapter 9.1, taking into account topographical parameters.

3.3 Neighbouring Minoan Locations

The local topography, as defined by the hills and streams, is vitally important for the understanding of both modern and ancient activities. Topographically, the area Koumasa presides over is a niche of the valley going southwards, encompassing Vassiliki and the Kephala hill, seen as a semi-circular plain surrounded by the mountain. The modern immediate neighbours of Koumasa are Loukia on the eastern side of the niche, and Vassiliki and Kandhila to the southwestern side on the road leading to Vassilika Anoyia to its eastern side. Centrally, on the diameter of this hemisphere, Vagionia (Vayionia) is located in the valley proper. Topographically, however, the edges of this hemisphere across its diameter are the Kalamaki ridge at Fournofarango to the east and the Afendis Christos hill to the west. Unfortunately, other than the tholoi, some evidence of Prepalatial settlements and some sherds, no other Minoan activity is known from the area.⁴⁰⁴

This region is characterised by a transition into mountainous terrain, marked by streams that carve shallow gorges into the landscape so that local hills appear. The primary streams in the area, taken from the west, are the Vassiliki and Kandhila streams, which merge north of Vassiliki; and the Koumasiano stream, which runs through modern Koumasa (the stream passing through Minoan Koumasa also joins the Koumasiano stream north of modern Koumasa). These two streams converge in the vicinity not far from Porti and continue their course to the west of Vagionia, ultimately reaching the Gerokampos area. Another significant stream in the region flows along the eastern side of Loukia and proceeds east of Vagionia. Vagionia serves as a focal point where multiple water sources appear to converge, which might explain its location. GIS analysis has been employed to study the water catchment in the Messara – Asterousia (Chapters 5.5, 9.3.3), with the results relevant to this area introduced here. A segment is shown in Figure 17, showing the distribution of the tholoi and modern locations as per the streams.⁴⁰⁵ The waterflow accumulation depicted is based on the catchment of the area in the valley area north of Koumasa, based on ArcGIS and QGIS tools applied on the Messara

404 See discussion in Chapter 9.2, and Figure 80 therein.

405 The validity of the resulting stream routes was crosschecked with the reality on the ground.

3 Cultural Regionality

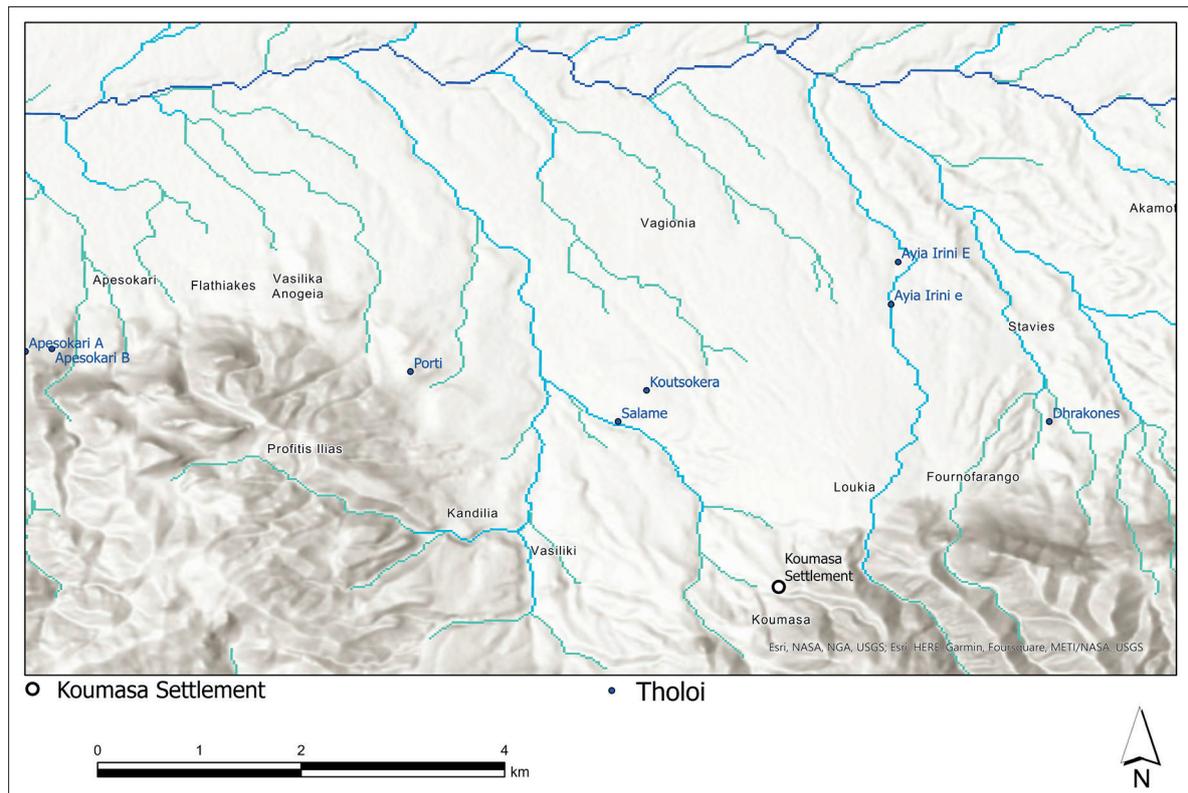


Figure 17: Flow accumulation in the valley in the immediate north of Koumasa.

DEM. Further analysis of subbasins and the role of rivers in the establishment of tholoi will be presented in chapter 9.3 (Figures 87–90).

The distribution of tholoi, as well as modern settlements near streams, is to be noted, a fact that stresses the similar usage of the landscape by different cultures. The result is not unexpected, but it showcases the usage of modern methods that could be further used in the discussion of possible settlements near the tholoi (Chapter 9.3). In modern times, these streams are seasonal but impactful. Since the terrain in preindustrial times defines the way life is conducted,⁴⁰⁶ the existence of the modern villages there, alongside the distribution of tholoi, suggests a correlation between historical settlement patterns and the local topography. It indicates similar needs and a given topographical background predetermining certain areas as conducive to supporting human habitation, thereby influencing the spatial distribution of both ancient and contemporary populations.

A coherency of the areas in this valley niche is enforced through studies in Koumasa. Strontium analysis of the skeletal remains in combination with analysis of strontium in various areas of Crete showed a correlation of the values that are seen in the

406 For parallels in the use and adaptation in the environment of the modern preindustrial and Minoan culture, see: Kanta 1983.

area of Koumasa from Loukia towards Vassiliki, indicating that the buried individuals were dwelling in that region.⁴⁰⁷

As for the contact between sites on the southern side of the Asterousia and the Messara plain, it is facilitated by passages that offer shortcuts through the rugged terrain. Koumasa, notably, is situated on the northern side of one such passage group – one that allows contact towards the region of Ayios Ioannis, Trypiti and Salamias, as well as their corresponding coastline, and thus offers a direct route from the southern central Asterousia to the central Messara. The broader area is referred to as the mountainous mesoscale, not necessarily based on distances alone, which are not significantly greater, but because it constitutes another geographical unit. Firstly, there is no direct line of sight connection to Koumasa. Secondly, it features uneven terrain that connects to the larger network of the mountain range, extending beyond the immediate vicinity of Koumasa's location. This area fades into the wider areas of the macroscale which encompasses a wider geographic context beyond the everyday activity.

The EM usage of the area is marked by the tholoi expansion at the southern coastline, including Gerokampos, Lebena (Levina – Lentas), Trypiti,⁴⁰⁸ and Ayios Ioannis and Salamias.⁴⁰⁹ Beside the coastal tholoi, those scattered in the mountain in the vicinity of Koumasa are of interest, which include Christos and Krotos.⁴¹⁰ The Christos tholos lies 700 m. from the gorge that acts as a path connecting Trypiti with the Messara (a road that leads to modern Koumasa, as well as modern Vassiliki) and can be seen as related to this pass, while Krotos also lies on a way leading to Trachoulas. Bronze Age settlements and tholoi on mountain passes are known from Ayiofarango in the western Messara, from the earliest phase of the Bronze Age.⁴¹¹ Similarly, the other mountainous tholoi, Miamou-Korakies and Ayios Kyrillos, also lie on mountainous paths, as seen also with the aid of GIS analysis.⁴¹²

The need to emphasise paths as a physical attribute is an issue that has been addressed in the past. The existence of these paths in the otherwise rough terrain makes

407 Chatzikonstantinou 2025; also: lecture at the 13th International Congress of Cretan Studies, 05–09 October 2022, Agios Nikolaos, Greece, entitled: Αποκλίσεις και ασυνέχειες στη μεταχείριση των νεκρών στην προανακτορική Κρήτη: η περίπτωση του θολωτού τάφου Β στην Κουμάσα Αστερουσίων.

408 Summarised in Legarra Herrero 2014, Fig. 8.

409 Based on more recent discoveries (Chapter 11.3).

410 Their distance on the map – 4.5 km. and 6 km. respectively – is indicative but not the defining characteristic of their close distance, as will be discussed in Part II. The tholos at Krotos shows a diameter of 4 m. and with an earliest period of use in EM II (no. 72 in Legarra Herrero 2014, 190; no. 44 in Branigan 1993, 146). At Christos two tholoi are known: Christos B of unspecified diameter, and Tholos X with a diameter ca. 6 m., with possible first use in EM III (Xanthoudides 1924, 70; no. 46, 45 in Branigan 1993, 146; no. 11 and no. 12 in Legarra Herrero 2014, 171).

411 Blackman – Branigan 1977, 66–67.

412 See Figure 86, Chapter 9.2.2.

their diachronic use logical.⁴¹³ Also, the mountainous tholoi mentioned above all lie near modern settlements on the mountain, reflecting an adaptation of different cultures to the same environment. This aspect can be made clear when traversing the mountains, where the existence of such paths feels valuable.

As for the link to Trypiti, there is little doubt of the probability of its use. Judging by modern behaviour, Trypiti is considered one of the easily reachable sites from modern Koumasa. It is the pilgrimage route towards the church of Panayia Trypiti on the day of 1st September, when locals approach on foot. Those beginning from Loukia require around two hours at a leisurely pace.⁴¹⁴ The route taken is the one going near Christos, emphasising the diachronic element of this path.⁴¹⁵ Additionally, the area was used by modern, preindustrial locals; for example, Adamis, the name-giver of the lot of the Trypiti hill known *as tou Adami to Korphali*, was a resident of Koumasa.⁴¹⁶

A hierarchical communication network map for the Messara is produced in this work, with a version already available by Déderix.⁴¹⁷ There, two likely paths link Koumasa directly to the southern Asterousia shore: the first – which is considered to be of the major path type – leads to Ayios Ioannis and the bay of Salamias located between Trypiti and Agios Ioannis, and a second heads directly to Trypiti on a route that is mainly marked as a major path and partially as a secondary path.⁴¹⁸ This would render these two routes accessible from the Messara through paths that are overlooked by Koumasa. Further analyses in Part III seem to render its position not as a central point within the greater Messara, as previous analyses have also concluded,⁴¹⁹ but as a gathering point, a link for many of the routes traversing the Asterousia and linking the central valley with the mountain.

Adding to these points, emphasising the liminal point of the region of Koumasa within its region is illustrated in Figure 18, which features five cross-sections of the 20m.-DEM model of the Asterousia. The sections are directed to the east, 10 km. in length, starting from the same latitude on the Messara and ending in the Lybian Sea, with the Kophinas Peak, Minoan Koumasa and the tholoi of Apesokari and Ayia Kyriaki

413 On the diachronic aspect of mountain passes, one can note areas near the Anapodaris stream, the roads to Trypiti and to Lentas, but also the above mentioned Ayiofarango, with use not only in the Bronze Age, but also for Classical and Roman times and later periods attested in ancient sources and archaeological remains (Blackman – Branigan 1977, 72–77).

414 Based on interviews with locals from Vagonia, Loukia, Koumasa, Vassiliki and Kapetaniana.

415 See Chapter 11.1.1.

416 Ownership of land and properties in the Trypiti area by the villagers of the wider Koumasa area, including Vassiliki and Loukia, continues as it would be expected to this day.

417 Déderix 2017, 17. See also Chapter 5.3.3.

418 The established path types are major, secondary, or minor paths (Déderix 2017, 17).

419 Bevan – Wilson 2013; Paliou – Bevan 2016.

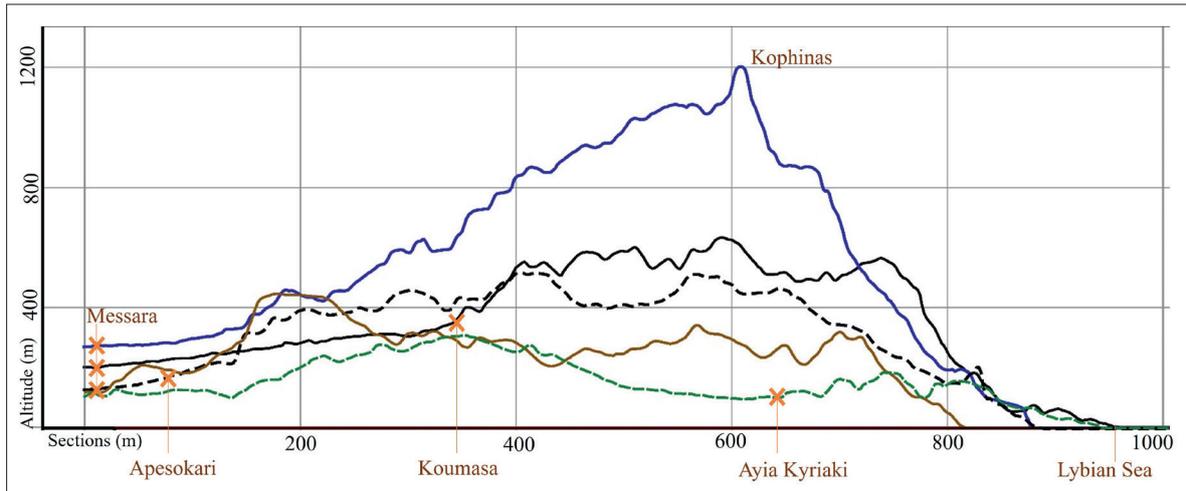


Figure 18: Cross-section cuts of the Asterousia along 10 km. lines, with view eastwards. The cuts from east to west: blue – section crossing Kophinas peak; black – crossing Koumasa; black-dashed – crossing Apesokari; brown – crossing Lassaia; green-dashed – crossing Kali Limenes and the Fournofarango near Ayia Kyriaki.

marked in their respective sections as references.⁴²⁰ It shows the high terrain of the central Asterousia, represented by the section crossing the Kophinas peak (blue line), but also the fact that the mountain profile smoothens significantly from the longitude of Koumasa and westwards, a lowering that allows for shortcuts to the harbour regions around the longitudes of Apesokari and Koumasa (solid and dashed black lines) and further smoothed at the longitudes of Lassaia and Kali Limenes.

It is of note that many of the Asterousia harbours seem to have been highly dependent on trade. Ayios Ioannis is suggested to be a very indicative example; although it likely had access to fresh water via streams and a well just east of Ponta, the Minoan structures are built on a narrow area of land with no room for cultivation and elaborate buildings, according to Hadjidaki.⁴²¹ Of course, small-scale cultivation cannot be excluded, as is discussed in Chapter 11.3.2. Furthermore, as Hadjidaki suggests, its location 40 km. from Phaistos and on the south side on the Asterousia excludes the possibility of any dependency Phaistos itself may have on this harbour. Rather, it appears that during its period of use – determined by pottery finds to date to the periods EM II through MM III – the location functioned as a supply point for the Messara.⁴²² The discovery of

420 The cuts begin from the Latitude 3876200. From east to west, the 1km. sections are on the following longitudes: 324548, 318648, 312745, 301067, 298700 (coordinate system EPSG 32635).

421 Hadjidaki 2004, 55–56.

422 The notion of the surveyor was of independent inhabitants, exchanging trade goods, possibly Egyptian, for agricultural products from the Messara (Hadjidaki 2004, 59), which will be disavowed in Chapter 11.3.2.

tholoi and the observation of a wider settlement at nearby Salamias speaks further in support of the existence of permanent inhabitants in the region.⁴²³

The same principle seems to apply for Trypiti, the other bay in the vicinity of Koumasa, where, in the EM period elements of the Messara culture in the form of tholoi and an EM II settlement are located,⁴²⁴ as well as two FN II–EM I settlements on the northern side of the Trypiti plain and further east of it.⁴²⁵ Subsequent habitation occurs in the MM and LM periods, with evidence of activity spanning the whole of Minoan chronology.⁴²⁶ The lack of centralisation is indicative of the absence of direct threats, as evident by the building activity alongside the shore. Elements supporting an adaptation to the wider cultural networks – perhaps due to its role as a trade centre – could be suggested by Linear A evidence.⁴²⁷

This region has room for developing crops, but the existence of an autarchy is debatable. Other examples of coastal settlements, such as the nearby Lebena and Gero-kampos regions, repeat this pattern so that direct contact with two or three locations in the densely occupied southern coast between Lebena and Trypiti and the more isolated Ayios Ioannis and Salamias would make Koumasa and Apesokari candidates for the function as a nodal point in the trade network.⁴²⁸ The topographical conditions and mountain paths aside, contact with the sea has been proven in settlements on the northern side of Asterousia, such as Koumasa and Apesokari, via the presence of sea-shells and, most indicatively, by the bone analyses performed on the skeletal remains of Tholos B, which showed fish as a main source of nutrition for all humans.⁴²⁹

One after the other, extending along the bays, these areas dubbed here as harbours are dispersed, equidistant along the shore. They have exhibited evidence of similar cultural and social trajectories. Traditionally, this coastline has been studied from Cape Lithino to the Trypiti area. However, recent discoveries, coupled with the topographical study presented here, indicate that this active coastline extends to include Salamias and Ayios Ioannis, at the very least, as presented below.

For these harbour areas, a direct contact to the central Messara – beside the alternative sea link provided by the western Messara, which is open to the sea and has harbours such as Kommos – would further benefit trade and cultural contact. It would also add to their role as end-stations to ship routes, and not just as nodes in the route

423 Kanta – Serpetsidaki 2015, 59. See Chapters 11.3.1–2.

424 Vasilakis 1995.

425 Nowicki 2018 24–25; 37–38; analytical discussion is presented in Chapter 11.3.1.

426 Vasilakis – Sbonias 2018, 282–293.

427 *Knossos II*, 83–84. Analytical discussion is presented in Chapter 11.3.1.

428 For this function related to Apesokari: Flouda 2023, 65–66.

429 See Footnote 407.

towards the western Messara coast.⁴³⁰ This would consequently add to the strategic importance of the Koumasa region and those other southern Messara settlements assumed to have similar arrangements, such as Porti, Korakies and Apesokari, which share similar chronological strata, showing EM tholoi and a nearby settlement that stretches to the LM period.⁴³¹ These areas are situated at the nexus between valley and mountains, bringing together and benefiting from two worlds, while also being a region home to the shepherding community that has seemingly been present on the Asterousia since prehistoric times.

These factors would elevate Koumasa to a region of strategic importance and give to any local elites the means to accumulate wealth; while any authority presiding in the Messara – even if its residence were located in the western part of the plain – would feel the necessity of enacting control over it. As mentioned above, much research regarding the Messara has concentrated on the Phaistos network, and, if not assuming a Phaistian state, then has at least mentioned the area as being under its influence. The question remains whether the Phaistian style material culture seen in Protopalatial Koumasa is imposed within a state module or reflects an adaptation by the local elite to the cultural environment.

Similar conclusions regarding the local role of Koumasa seem to be obtained in newer studies, utilising DEM models for the recreation of social networks in the Messara. The technical aspects of this methodology, conducted by Paliou – Bevan, Déderix, and reproduced by the author, will be discussed in Chapter 5.3.3.⁴³² The evaluation of the results, however, is pertinent at this juncture, as the author, while generating the same data, assesses the findings differently. The methodology shows the density of the produced networks based on the landscape and indicates the natural connectivity paths and, thus, the spatial relevancy of various areas. This methodology is a quantitative one and not qualitative, as it takes the landscape topography as its main input. It proves that the area of Koumasa is not central in this wider network; an observation that, instead of prompting a dismissal of the region based on quantitative facts, makes it a more interesting example that merits the development of an explanatory framework to explore the obvious importance the area had from the EM to LM I periods in a qualitative manner. So, while adhering to the principle that *geography matters*,⁴³³ one could even argue that locations that deviate from the obvious geographical norm offer a greater potential for analysis, as their growth in a specific period, despite of their geographical marginality, means there is a reason for it.⁴³⁴

430 The exotica in Lebena and Koumasa can be regarded as obtained directly from these harbours, rather than as a result of inner distribution in the Messara, and seen thus as *en par* with Mochlos with which the chronology of documented exotica coincides in the EM II–MM IA (Colburn 2008, 210–215, Tables 1, 4, 5).

431 Vasilakis et al. 2019.

432 Paliou et al. 2014; Paliou – Bevan 2016; Déderix 2017, 17. See also Bevan – Wilson 2013.

433 Massey – Allen 1984.

434 I would like to thank Déderix for her kind input on this issue.

This can be seen in numerous examples, modern and ancient: for example, Johannesburg's significance, despite lacking proximity to a major water body, stemmed from the nearby gold mines, shaping it into a vital trading settlement. Other modern examples, like Brasilia as Brazil's capital, or the New Cairo City emphasise cultural and political considerations specific to the 20th and 21st centuries over purely geographical logic. Obvious in this consideration are important sanctuaries in religious movements that valued hermitic life, which grow in importance exactly because of the obscurity of their location. Another aspect is specific trade routes that evolve with time. Changes in these criteria bring some areas to relevancy that then diminish when said trade routes, religious significance, or other cultural or political aspects become less relevant so that the region regresses to its relevancy dictated by the *predisposition of the landscape*, as Nixon put it.⁴³⁵ Sometimes, this relevancy is maintained, however. Such an example is the case of Damascus, which one would not consider as a logical point for the main city of a region if one is not familiar with the Silk Road, which became obsolete at some point after the city's importance was codified. This is why it retained cultural and political importance even after the trade routes declined. Drawing a parallel from Physics, these less obvious or difficult-to-quantify cultural aspects resemble an external energy source, impacting a closed system; without such input, the system reverts to its natural state. This perspective explains the rebound to the level of importance, intrinsic to (and aligned with) deterministic geographic criteria understood through deterministic analyses, such as the DEM method mentioned above.

Koumasa is an example of the later cases, as its importance diminished after the LM period. However, its importance during that period should not be dismissed solely on these geographical criteria; rather, explanatory frameworks should be developed to address this apparent discrepancy. In this work, trade networks and exclusivity to the southern harbours, as well as its nodal role as a gateway to the central Asterousia and Kophinas for those approaching from the valley and Phaistos, are identified as the main reasons for Koumasa's growth that overcame the other purely geographic criteria. Its decline seems to be generally synchronous with the decline in the use of the harbour areas. The timeframe of LM I is also consistent with a narrative that appears to emerge regarding the Neopalatial occupation of the mountains. This is evident in the study of the Lasithi mountains, where such occupation is attributed to demographic and economic pressures from the lowlands in the Neopalatial period.⁴³⁶

435 Nixon 2006, 60, 88–90. The case of the Cretan cities has been discussed above; another example from the Aegean to be added is the history of the cities on the island of Samos, with Vathy and Pythagorio in direct contact with Asia Minor, which decreased in importance due to the political borders that formed in the Aegean in the 20th century, in contrast to Karlovasi, which increased in importance only due to its position nearer to Ikaria, and by extension, Athens. So, it is political geography and not the physical geography that shaped the importance of the most populous city of Samos.

436 See Footnote 393 above.

The older divisions, therefore, do not necessarily fit with the newer studies concerning the network connectivity in prehistoric times briefly discussed here, which show the connectivity of the central Messara areas to the ports of the south, rendering them trade nodes rather than just peripheral centres. Therefore, the Vasilakis definition of a western-central Messara that includes the Koumasa region seems more fitting with the reality of the Minoan world, at least in the Bronze Age periods. In a more concrete example, there is no good reason to assume a different cultural environment for the Koumasa and Apesokari settlements (which according to some of the above-mentioned distinctions would be marginally located in different regions). This connection with the greater Messara tradition is reinforced by the archaeological finds, that denote – at least for the Protopalatial period – a strong connection with the Phaistos tradition, but also form a specific identity focused around the central Asterousia. To approach the questions of to what extent the neighbouring regions were under the control of Phaistos, or if they managed to maintain a separate identity, as well as the role of the local geography in this interaction, the matter of state formation in the Protopalatial period will first have to be addressed (see Chapter 10.2).

3.4 Archaeometrics

Concluding the holistic approach to the cultural landscape of the region, after laying out the topographical and historical elements in previous chapters, here aspects of forestation and climate in the ancient period will be tackled, with the aid of modern methods. This constitutes a crucial point in understanding the coastlines, mountains, and agricultural behaviour, that is, their state of evolution in the time period addressed. Geological changes, including seismic activity and tectonic shifts, have left their mark on the soil itself, and their analysis for the periods encompassing human habitation in Crete offers valuable insights.

3.4.1 Geological History of the Sea Level

One aspect that the state of research can shed light on is the matter of the Minoan sea-level, which is located some meters below today's coastline due to the turbulent geological history of the region. It is imperative, in the geologically very active region of Crete, to know if the effects of tectonic activities on the sea level would leave any evidence of potentially sunken Minoan harbours recognisable. In their extensive analysis on Crete, Mourtzas and Kolaiti established a certain geological history for the sea levels, and a methodology for determining the mean shore level in each period arriving at the conclusion that 4200 to 3930 years bp, the mean sea level was 5.15 m. lower than the present one, but not evenly around the whole island. The change of sea level occurred at certain geological events that caused the coastline to rise, creating new mean sea-levels.

Each level is marked geologically by a new bedrock formation. This method also uses C₁₄-dating of the submerged marine notches.⁴³⁷ Furthermore, in these kinds of analyses, correct reading of archaeological indicators of ancient buildings adjacent to their sea level can translate into elevation calculation.⁴³⁸ In this regard, implementing marine archaeology techniques on Crete could be useful.

Regarding prehistoric times, there are two main paroxysmal subsidence events, with the first sinking the entire island by approximately 2 m. (4000 to 3600 years bp). The coast in the eastern part of the island remained stable for about 300 years, until the next event caused 1.5 m. further sinking, with the new sea level settling at around 2.7 m. below the present mean sea level. Mourtzas connects this with the wider neotectonic upheavals in the area of the south Aegean that accompanied the strong eruption of the Thera volcano. Hence, he recalibrates the approximate C₁₄-dates based on the Thera eruption, which, according to Fantuzzi's synthesis and Manning's analysis, falls within the margin of possibilities, as the end of the 17th to mid-16th century dating remains the most probable.⁴³⁹ The next event is identified as taking place in the 13th century BCE, when the coast rose by 1.3 m., which Mourtzas and Kolaiti correlate with the tectonic events assumed to coincide with the end of Bronze Age.⁴⁴⁰

An analytical study was done by Mourtzas for the sea level of Lassaia (Lassea). It is not only a very good example to showcase the different tectonic events in its shoreline, but it is also part of the geological formation of the Asterousia range. Additionally, the immediate vicinity to the harbours studied in this work provides an excellent opportunity for deriving information on the sea level changes similar to that of other southern Asterousia locations.

Lassaia – towards the western part of the Asterousia range, but still clearly dominated by the mountain range's slopes – derives a diachronic importance from the sea, with presence since the Minoan times and a flourishing harbour town of the Hellenistic and Roman times.⁴⁴¹ In fact, the very existence of connections between Lassaia and Gortyn (presented in Chapter 2.5), raises similar questions about mountain crossings

437 Mourtzas – Kolaiti 2021, 8–11.

438 Sivan et al. 2001; Yasur-Landau et al. 2021.

439 A later date, mainly 1561 BCE, is favoured by the former and an earlier date, such as 1611–1600 BCE, by the latter (Fantuzzi 2023, 96; Manning 2024, 266).

440 Mourtzas – Kolaiti 2021, 8–12.

441 The Minoan finds of Lassaia, some buildings and pottery on the so-called Akropolis, have been considered as part of the Ayiofarango environment and seem to be very small in scope in relation to the Hellenistic town (Hatzı-Vallianou 1979, 382–383). In the Iron Age, besides the epigraphic evidence, it is only mentioned once in literature, in the Letters of Paul, as a town near the harbour of Kali Limenes, where he arrived on Crete (Acts of the Apostles 27.8). Interestingly, this pertains to the strategic position of the southern Asterousia even in the modern sea trade: since 1966, the “Vardinogiannis Fuels Bunkering Station” (SEKA bunkering station S.A.) completed the construction of the tank farm on the little island of Ayios Pavlos, situated in the Kali Limenes bay, being on the sea route coming out from the Suez Canal to the rest of the Mediterranean. The company's website states, regarding the choice of Kali Limenes: “the area climate in general gives mild weather and seas, maximising the operating days of the station.”

as those encountered during the Minoan period. One such question is whether the route through the western Asterousia (which is much smoother than routes across the Trypiti – Tris Ekklesies zone, but nevertheless still mountainous) is more beneficial in terms of travel-cost compared to the longer but smoother route towards Matalon and Amyklaion, near the Kommos bay.⁴⁴² Of course, other parameters are to be considered here, regarding the rivalry between Gortyn and Phaistos, and other issues, such as the question of dependency of Lassaia on Gortyn, and when this came to be.⁴⁴³

The analysis by Mourtzas and Kolaiti of the coast of Lassaia, in correlation with the general principles mentioned above, show (in absolute dates) the stability of the coast at 2200 BCE. The first event is hence calculated at 1900 BCE, bringing the sea level to 4.15 m. below the modern mean sea level. This was followed by a rise by 1.65 m., due to the Thera eruption (here dated at around 16th century BCE), which led to the sea level being 2.5 m. below the modern sea level. The coastline itself receded by 15 m.⁴⁴⁴

In the light of this data, the presence of harbours near today's coastline can be assumed, but the receding coastline must also be taken into account, which would make coastal structures, especially those before the Thera eruption within the sea level today. The evidence of the building of Martsalos, the moles in Ayios Ioannis, and the Roman walls entering the sea at Lassaia indicate the existence of now sunken information, which marine archaeology could elucidate.

3.4.2 Historical Evolution of Forestation and Timber Types

Another consideration is the matter of forest areas in ancient periods. In Prehistoric times, Crete is generally considered to have been rich in wood.⁴⁴⁵ As early as the EM period, timber was used in construction around the Messara. The use of wood was initially very tentative, but evolved to serve the purposes of consolidating the walls for earthquakes, and also for lintels or frames. As for load carrying beams, they had to be both strong and long.⁴⁴⁶ The vertical timbers in buildings with a second storey are ubiquitous.⁴⁴⁷ For

442 Matalon replaced Kommos as the main harbour, with a town expanding to 3–6 ha. plus seasonal buildings. (Watrous 2007, 102). For the identification of Amyklaion, see Footnote 247.

443 As analysed in (Chaniotis 2000) epigraphic evidence from the Lassaian Asclepion seem to verify the dependence of Lassaia on Gortyn, but it is not clear if at some point, it was an independent polis and what the importance of Lassaia as a gateway of Gortyn to the sea was in the times of the clash between Gortyn and Phaistos.

444 Mourtzas – Kolaiti 2021, 19–20.

445 Pollen analyses in Ayia Galini and the seabed south of Crete indicate oak forests for the period coinciding with the Final Neolithic (*Kommos I*, 125).

446 Meiggs 1982, 90–91.

447 Meiggs 1982, 89–90.

second-storey floors, an indicative example can be observed in Kato Zakros in room 29, where wooden boards were placed atop supporting beams.⁴⁴⁸

In the area of the ‘sanctuary’, the discovery of three vertical beams originating from a collapsed second floor – in what is named as Room 4 in this work – point toward a less intricate arrangement, placing the beams paratactically one near the other to form the lower part of the upper storey.⁴⁴⁹ The analysis of charcoal taxa from this concentration indicates olive wood.

This result is based on the analysis of wood samples from Koumasa by Ntinou, which yielded some preliminary results that are discussed in this paragraph.⁴⁵⁰ In fact, olive wood constitutes 85.9% of the selected charcoal taxa analysed in all of Koumasa, with a significant difference in the concentration of other plants, both in the settlement and in the tholoi area. Analytically, the elements represented at a rate higher than 1% are: olive (*Olea europaea*) with 85.9%,⁴⁵¹ *Amygdalus sp.* with 3.5%, Labiatae with 2.9% and *Angiosperm* with 2.1%. Looking at the areas of settlement and tholoi separately, olive in the trenches of the settlement plateau constitutes 88.8% of the analysed samples, *Amygdalus* 3.7%, and *Angiosperm* 1.4%. At the necropolis, olive constitutes 57.1% (*Olea europaea*), *Labiatae* 33% and *Angiosperm* 9.5%. The tholoi area showed less variety of wood types than in the settlement, with the exception of *Labiatae*, which appears only in the necropolis. Nine species appear in only one or two samples in the settlement.⁴⁵²

The timber used in Crete, as analyses show, is normally cypress (*Cupressus*), fir (*Abies cephalonica*), and to a lesser extent pine (*Pinus*) and olive (*Olea europaea L.*).⁴⁵³ The preference for olive in Koumasa could be an indicator of a shortage of the other two types of timber, or indicate a local preference. If one takes EM II Myrtos as another example of southern Crete, the use of olive, pine, as well as holm oak (*Quercus ilex L.*) has been microscopically identified.⁴⁵⁴ In Kommos, the percent abundance of selected charcoal taxon for oak is 35%, with the combined percentage of the taxa for cypress and pine being 11%, and olive constituting 25%.⁴⁵⁵ Although the presence of olive increases with time in Kommos, it does not exceed 37% in total in the LM period;⁴⁵⁶ Olive, based

448 The Banquet Room. Platon 1964, 150; 1971, 172; 1974, 159–160; for contextualising this find, see Shaw 2009, 107–108.

449 Panagiotopoulos 2019b, 449. See also discussion on page 202.

450 The analysis of the samples was performed in 2023 by Maria Ntinou. The results here are based on calculations on her preliminary results, to be published in the future.

451 Differentiation between the cultivated (*Olea europaea*) and the wild (*Olea europaea ssp. oleaster*) is not easy to determine due to the number of varieties of the two subspecies, and the close relation between them.

452 Those are *Quercus sp. deciduous*, conifer, pine (*Pinus brutia*), *Platanus orientalis*, *Vitex agnus-castus*, *Fraxinus*, *Cupressus sempervirens*, *Fabaceae*, *Juniperus*.

453 Shaw 2009, 94.

454 Meiggs 1982, 100.

455 *Kommos I*, Table 4.9.

456 *Kommos I*, Table 4.10.

on tree charcoal in Kommos is about 20% in MM and LM and 36,6% in LM II–IIIB.⁴⁵⁷ These percentages are well under half of the respective presence in Koumasa. In this regard, cultivation of olive trees has to be assumed.⁴⁵⁸ In Koumasa, cypress, oak and pine have been seen in one or two samples (constituting less than 1% of the samples), and fir and cedar are conspicuous in their absence.

Evans hypothesised that a timber shortage occurred during the Late Minoan period and suggested that deforestation was a contributing factor. This conclusion was drawn from evidence of timber being exchanged for gypsum.⁴⁵⁹ Other reasons, however, such as the change in style of construction, may be cited as an explanation for this development, as that may have caused a different timber distribution.⁴⁶⁰ Looking at other areas on Crete in the LM period, Zakros, an area which today is considered a dry one, shows abundant wood use for the building activities after the LM IB destruction, and therefore indicates a sufficient source of wood at that time.⁴⁶¹ As for the Messara region, at Phais-tos, wood continued to be used in the second Palace period, with no indication of shortage;⁴⁶² likewise, the intense building activity in Koumasa, where olive was recognised as timber in areas of architectural use of the LM I period. In Kommos, some fluctuation in wood usage has been noted, particularly in the drop in use of evergreen oak, indicating a shortage in that regard, linked with the change in local climate, but not in the holistic sense proposed by Evans.⁴⁶³ It is to be noted that timber at a site is used mainly as fuel for everyday activities, rather than for the building itself and the less frequent maintenance.⁴⁶⁴

Certainly, wood was a vital resource used in the construction of various objects, and, not least of all, in shipbuilding, where the island's supposed abundant forest resources historically played a critical role.⁴⁶⁵ Timber such as elm wood and willow is also mentioned at later stages for wagon production, as evident in Linear B.⁴⁶⁶ Subsequent evidence from Post-Minoan periods points to the continued capacity of the island as a timber resource. In the introductory paragraphs of his description of Crete, Strabo characterises it as mountainous and densely wooded.⁴⁶⁷ In the Classical period,

457 Watrous et al. 2004, Fig. 5.10.

458 For example, an olive pollen amount of 35% at Tersana in central Crete was sufficient to assume cultivation before EM II (*Kommos I*, 125).

459 *Knossos II*, 518–519, 565.

460 *Festos II*, 420; Shaw 2009, 98.

461 See discussion in Shaw 2009, 98.

462 *Festos II*, 420.

463 *Kommos I*, 129–135.

464 *Kommos I*, 128.

465 Meiggs 1982, 97–98.

466 Ventris – Chadwick 1973, 370–372: So 438, 439, 440.

467 ἔστι δ' ὄρεινή καὶ δασεῖα ἢ νήσος (Strab. geogr. 10,4.4).

two instances reference Crete as exporting wood: during the Peloponnesian war, in a comedy by Hermippus, the import of cypress wood from Crete (as a dedication) is mentioned.⁴⁶⁸ A little later, during the construction of the Asclepius temple in Epidaurus in the beginning of the 4th century, cypress wood from Crete is again mentioned.⁴⁶⁹ Finally, this characterisation can be found in Theophrastos, who describes Crete as warm and with an abundance of cypress.⁴⁷⁰ In Roman times – besides the account of Strabo – Pliny mentions Crete as the home of cypress⁴⁷¹ and, together with Vitruvius, also mentions cedar,⁴⁷² which since the Baroque era has vanished from the island.⁴⁷³ This resource continued to exist on Crete through the Middle Ages, with Venetians using it for their fleet,⁴⁷⁴ as did the Arabs upon conquering the island in the 9th century.⁴⁷⁵

The intensive use of timber, and the continuous habitation, has led to gradual deforestation of the island,⁴⁷⁶ as the case of the local extinction of cedar trees shows. The general trajectory in the region indicates a decline in the density of forestation, due to erosion, climatic and human factors.⁴⁷⁷ Regarding the Asterousia, the evidence, from the presence of the tholoi to the existence of harbour areas, suggests wood must have been available. With the caveat that none of the above-mentioned observations on Cretan timber refer to the Asterousia directly, there is no indication of different behaviour with regards to wood consumption than at Zakros or Phaistos. Today, the Asterousia is considered barren, but it is difficult to ascertain the situation during Minoan times. As mentioned above, a similar phenomenon can be argued for the Zakros region, which did not hinder the abundant use of timber then.

3.4.3 Periods of Climate Change

In the last decades, a new insight into the natural environment of ancient cultures has been provided with the study of climate in ancient times through to the Holocene, based on paleoclimate data, glacier shifts, and deep-sea fossil records, as well as volcanic activity, that yield results of changes in temperature and humidity level within

468 ἡ δὲ καλὴ Κρήτη κυπάριπτον τοῖσι θεοῖσιν from a fragment of the comedy *Phormophoroi* (Athen., *deipn.* 27de).

469 Meiggs 1982, 423–424, 426; IG IV.2.1. 102, 26.

470 Theophr. *hist. plant.* 4.5.2.

471 Plin. *nat.* 16,141–142.

472 Vitr. 2.9.13; Plin. *nat.* 16,197. See the indication of the name of Mount Kedros (Maiggs 1982, 100).

473 The last mention of cedar on Crete is from Fynes Moryson in the 16th century (Warren 1972, 70).

474 Meiggs 1982, 99–100.

475 Salem – Alebadi 1969, 84.

476 Sands 2005, 19–27.

477 Watrous et al. 2004, 98–100.

this time period, some of which also include seasonality. The results of these analyses in the Aegean, and Crete specifically, have been used to explain social transformations, or rather to put them in context.⁴⁷⁸ The archaeological record in the Mediterranean has shown a correlation between rapid social changes and weather deterioration.⁴⁷⁹ A fine-tuning of some aspects of the Aegean chronology with the help of this data has been attempted.⁴⁸⁰ It has been used further as an explanatory framework for developments in the Bronze Age Argolis.⁴⁸¹ However, the case has been made for careful use of this data and the avoidance of quick conclusions regarding social developments.⁴⁸² In this chapter, while heeding the calls for caution, a chronological summary of these events is presented, focusing on those relevant to the chronology of Crete.

A study of the temperature in the Aegean based on the fossil record in the sea allows for determination of seasonal differences in temperature and rainfall back in time until 10000 years bp.⁴⁸³ Four main cooling events have been observed in the Aegean.⁴⁸⁴ For the second cooling event, corresponding to the EM III to LM III periods, evidence comes directly from the wider Koumasa area, from a study of the Anapodaris river.⁴⁸⁵

This analysis leads to the conclusion that EM II is characterised by relative climatic stability. Winters are assumed to have been slightly cooler and summers less evaporative than the FN–EM I period. The changes, occurring at the transitional phase EM III–MM I, include an increase in temperature in the winter, while the evaporation rates during the summer months significantly escalated. These alterations occurred relatively swiftly, likely transpiring over the course of just one or two generations. Consequently, the periods suitable for cultivating plants were limited due to the intensified summer droughts. The abrupt desiccation of vegetation during the summer months would have been a notable challenge for a society unaccustomed to such conditions.

478 Papers on the study of historical shifts of climate and their impact on ancient cultures are included in McIntosh et al. 2000; a review of paleoclimatic data for the eastern Mediterranean reaching to 6000 bp is included in Finné et al. 2014; for climate changes in the Holocene, see Mayewski et al., 2004; McKay et al. 2024. For a study based on deep-sea fossils at the coast of northern Crete dealing with the impact of climatic changes in Minoan culture, see Moody 2009; and for a study based on the Anapodaris catchment, the closest study area to Koumasa, see Macklin et al. 2010. These studies are supported by analysing excavated organic finds, such as pollen and other plant elements (Moody – Watrous 2016). Further on the impact of climate change on ancient cultures, see Tainter 2000; Diamond 2005.

479 Manning 1997; Moody 2009.

480 Manning 1995.

481 Maran 1998.

482 Finné et al. 2011, 3163; McKay et al. 2024, 2.

483 Moody 2009, 241.

484 The first in the 7th millennium BCE; the second 4300–3600 BCE, thus ending within the FN period; the third in a couple centuries before 1150 BCE and the fourth concentrated around 900 BCE (Moody 2009, 243).

485 Macklin et al. 2010, 49. The cooling event in this study is evaluated from 2200 to 1400 BCE. This is followed by an aggradation phase from 1400 to 1000 BCE. Another phase of widespread incision in the Anapodaris Gorge began sometime after 1000 BCE and was completed by the 1st century BCE.

This phenomenon likely incentivised individuals to relocate to higher altitudes during the dry season.⁴⁸⁶

In the period of 2200–2000 BCE, a drought event affected the Mediterranean and the Middle East.⁴⁸⁷ The effects of this event have often been associated with rapid changes and the fall of empires, having, for example been argued to have caused the fall of the Akkadian empire and changes in the Aegean.⁴⁸⁸ Other voices, while acknowledging the effect, tend to suggest caution in exaggerating the effects of this event.⁴⁸⁹ Although test regions in the Aegean showed warmth and water presence above the average in the Mediterranean,⁴⁹⁰ the 4.2k event is also attested by the fossil record on the coast of Crete, showing an aridity period that affected the island during a time which coincides with the EM III–MM I period.⁴⁹¹ Discussing how this could have impacted the region under study in this work is deemed important, as the Messara is considered to be one of the hardest-hit regions of Crete.⁴⁹² The decline at the end of the EM II was related to a possible refugee crisis caused by the effect of this event. However, the fact that Crete itself was affected creates room for the possibility that these changes are a result of internal turmoil.⁴⁹³

An interesting take on the development of society's association with its landscape has stressed the role of these incidents of climate change. Moody proposes a correlation of the introduction of peak sanctuaries with the period of drought: “The 3rd-millennium aridity event, then, not only helps to explain the cultural stress that led to the development and proliferation of sanctuaries in EM III/MM I, but it rationally explains their locations in the landscape: peak-tops for rain and summer pasture; caves for groundwater”.⁴⁹⁴ This is not surprising as in other cultures as well, events such as this may have laid the groundwork for the inception of sacred spaces.⁴⁹⁵

The study of glacial advances documented in European mountains, and also in other continents, indicates a period of cooling spanning from 1870/1800 to 1370/1230 BCE; a small ice age characterised as unique within the Holocene, at least in central Europe.⁴⁹⁶ In Crete, based on glacial advance in the Alps, this period seems to be contemporary

486 Moody 2009, 247.

487 Mayewski et al. 2004, 250–251.

488 Weiss et al. 1993; Maran 1998. See also below.

489 The often exaggerated use and reliance of archaeology on the 4.2 k event is criticised and put in context by McKay et al. 2024, 2, 7–8. See also Finné et al. 2014, 3169.

490 Finné et al. 2014, Fig. 4.b.

491 Whitelaw 2000; Moody 2009, 245.

492 Moody 2005; Moody – Watrous 2016.

493 Manning 1997; Moody 2009, 246.

494 Moody 2009, 249.

495 Kopestonsky 2016, 729.

496 Moody 2009, 246.

with MM IB/II to LM IIIA/B, and related, amongst other things, with the Thera eruption. Its effect on the island amounts to, as the sea fossil analysis shows, colder summers, but not colder winters.⁴⁹⁷ The onset of the colder winters occurs in a later phase within this period and can perhaps be associated with the Thera eruption.⁴⁹⁸

As the deep-sea pollen core analysis shows, the climate in the south Aegean experiences a cooling event between 1150 and 900 BCE. Subsequently, the temperatures began to rise reaching a peak around the Archaic times (beginning ca. 600 BCE), becoming stable until the end of the timespan of the analysis, 1000 bp.⁴⁹⁹

A reluctant interpretation of this data is that during the Greek period, a gradual deforestation might have occurred, especially in the drier Asterousia region. Within this framework, the importance of the Hellenistic cults of Pan and Nymphs that are seen around the Asterousia and in the Messara could be reconsidered. As Kopestonsky mentions, climactic events, such as a drought or a unique feature in the landscape, may have sparked the transition from protected water to sacred space.⁵⁰⁰

In conclusion, Chapter 3 analysed Koumasa's position, within its broader environment, building on the insights of the previous chapters in Part I. The area is seen as a marginalised location in the research, but could be viewed as part of the circulation of the greater Asterousia-Messara region, within the context of the interconnectivity networks developed in various historic contexts. These networks will be further analysed in Chapters 9 and 10, within the Mesoscale and Macroscale approaches, utilising the input of the GIS analysis. First, in the following Part II, these methodologies will be introduced and applied to the area of interest.

497 Moody 2009, 246.

498 Moody 2005, 461. For questions of the chronology of Thera eruption and considerations of it taking place during, but not at the end, of LM IA see Manning 1995, 200–15, 220. For the possibility of the eruption occurring before the onset of LM IB, however, noting the uncertainties and the ongoing research, see Fantuzzi 2023, 95–96; Manning 2024, 263–264.

499 Moody 2009, 243, Fig. 20.2. Original data in Rohling et al. 2002, 590–591.

500 See Footnote 268.

Part II

GIS Analysis. The Insight of Modern GIS Analysis of a DEM

Introduction

In this section, the use of GIS and the main methodologies employed throughout this work are introduced. Following a brief history of the use of these methodologies an analytical evaluation of these data will be pursued. Despite the more technical content of this part, it was deemed important not to add it as annex, as in many instances the discussion is mainly archaeological. Further, the scope of this chapter is not to act as a technical manual for this study, but rather to elucidate, and perhaps even act as a point of reference for archaeologists embarking in similar studies.

In one a previous analysis for the Messara region by Déderix focusing on Apesokari, mobility networks in the western and partially central Messara were calculated in which a central role of Koumasa does not show in the hierarchical mobility network produced.⁵⁰¹ In her paper (which was the spark behind the conception of the effort presented here, and hopes to build upon its results concerning the question of connectivity in central Messara, as it concerns the nearby locations to Koumasa) a central role is not necessarily indicated in these environmentally deterministic predictions as they are tasked to answer certain questions. The formulated question there is the relevancy as for the main Messara sites.⁵⁰² To verify these results concerning Koumasa there is a need for a calculation that takes into consideration the entirety of the Messara Asterousia, including the whole of the Messara Valley until Anapodaris stream, which both has Koumasa in the centre of the search area and also encompasses a complete geographic feature which is the main Kophinas peak and the main part of the Asterousia range including the slopes eastern of Kophinas. So a DEM model of this area would include Treis Ekklesies, Rotasi, Charakas and Dhamantri; locations towards which the network of Koumasa (at least partially, within its Macroscale) extends.⁵⁰³ But even in this case, the partially noncentral role is seen to remain, as Koumasa finds itself in a geological niche, in a drop-shaped extension of the Messara to the south, being thus partially

501 Déderix 2017, 17. See also Paliou et al. 2014; Paliou – Bevan 2016. In this analysis, Koumasa’s position at the edge of the map is partially subject to the “edge effect,” as some of the locations that are primary targets of Movement from Koumasa or their paths, as will be presented in the analysis here, are cut off. The analysis, however, is also indicative of this region, as it shows its role as peripheral when movement only in the frame of central and western Messara is concerned.

502 See discussion on 84ff.

503 In the analyses of Déderix and Paliou – Bevan (see above) the DEM used stretch from Kommos to Kophinas at its eastern side.

embedded within a mountainous terrain, that amongst others influences the direct line of sight, as it will be discussed separately in the Chapter 5.4. In the following methodology, the a priori knowledge of the settlement's importance will not be addressed. Only given Koumasa's location, the topographical connectivity potentials will be explored, so that a biased approach would be avoided.

At a second level, during the evaluation, the landscape-driven results are one input, the other being the archaeological situation, as any explanation must exceed the purely topographic criteria, which is the defining characteristic of the GIS methods. Indeed, it is imperative to exercise caution when attributing significance solely based on a series of GIS methods. The efficacy of such methods heavily depends on the precision of the parameters set, thus necessitating a nuanced approach in formulating pertinent inquiries, i.e. one must pose the right questions. Hence the diverse array of approaches delineated below (see also the discussion of the limitations of GIS). As was demonstrated in Chapter 3, the history of the site ranges from centrality to irrelevancy. The results of combining the computed results with the reality of the finds, partially already presented in previous chapters, allows for an interpretation of the location's relevancy per time period, and thus the cultural biography of the site.

Three levels of geographical understanding can be identified concerning mobility networking, each embedded within the other, similar to the popular example of onion layers. The one alluded to above is the macroscale of Koumasa including the Messara-Asterousia region as defined in the introduction. Beside the large-scale focal networking, the results are similar to those obtained by Déderix, so that an interpretation of the importance of the site has to be sought in other parameters, as many other factors can play a role for a site's location beside the vicinity to a main artery of the cumulative cost paths calculated for the extent of the Messara-Asterousia. For example, the strategic route control, which will be explored here. Here, the area identified is the mesoscale of the central Messara-Asterousia region, which includes the locations around the Kophinas peak, and the existing paths between them. These smaller locations, in themselves part of the periphery within the scope of the entire Messara, seem to offer a possibility of a local co-existent and to an extent co-dependent network, that forms an approximate inertial reference frame, to translate this Newtonian term to sociology.⁵⁰⁴ In the analysis done in two parts below in this part, the potential routes to and from Koumasa will be explored looking for the strategic or special features of its locations that will explain the emergence of a regional centre there. Free movement and conditional, i.e. defining locations of interest will be performed, as well as many algorithms, including some problematic ones, as usable results can be obtained when the weakness of the algorithm is taken into consideration, either for comparison or direct use. Another level is the microscale, i.e. the lived experience within the settlement, and the paths leading to, and also crossing the settlement, analysed in Chapter 6.

504 See pages 85ff.; 267ff.

In summary, structurally, this chapter will begin with a history of GIS use and its methodologies from the perspective of the present aims. In Chapter 5, the question is defining movement patterns and connectivity networks in the mesoscale and macroscale of Koumasa, concerning the locations within eye's reach and/or the immediate vicinity from the settlement, so that aspects of the potential role of Koumasa in this network would be presented.

Two fronts are identified. The first, is the relation to the networks traversing the Asterousia ridge. Indeed, on the southern foothills of the Messara, a number of locations have been identified that function – amongst others – as harbours, possibly for the sea route that ended in Kommos. The other front will be in the Messara plain itself and beyond, adding to the above-mentioned insights made by Déderix, but this time focusing on the Messara plain including centres such as Dhamantri and Rotasi to the east. (A macroscale GIS analysis is here performed, partially to evaluate previous results). To adequately cover both sides of the Asterousia region, but also to avoid any phenomenon of edge effect, a DEM will be used having Koumasa central within it, so that the Macro- and Mesoscale in which Koumasa lies may be explored.

In the Chapter 6, a separate DEM, produced by drone flight, will concern the microscale of Koumasa, concerning the direct vicinity of the settlement addressing the movement patterns within it, the intervisibility between various points within and beyond the settlement will be analysed with viewshed analysis and optimal paths.

As the terrain must play a deterministically important role, the paths extrapolated will affect our reading of the map and evaluation of cost distances instead of distances, so that any social networking theories will be evaluated.

4 Modelling Movement Patterns. History of Research

In recent decades, the application of GIS methods in archaeological research has played a crucial role in expanding our understanding of the relationships between space, place, and culture in both regional and transregional behaviours.⁵⁰⁵ GIS applications have been implemented across a range of cultures and time periods, yielding paradigms for interpreting diverse landscapes. Particularly promising is the recent adoption of these methods in Aegean archaeology, a trend that has notably increased since the 2010s.⁵⁰⁶ Indeed, understanding the orographic characteristics of the Cretan terrain based on similar analyses has been helpful in interpreting the choices in the development of populated settlements and the establishment of trade networks and their connectivity patterns. The rise of technology has reached a level where it has allowed an insight into these characteristics and therefore for the cultural biography of a site to be approached with these methods that are often linked with landscape archaeology.⁵⁰⁷ This landscape-driven cultural biography can be used to support or challenge other types of evidence,⁵⁰⁸ but most importantly, and mainly what this chapter will focus on, is used to provide essential complementary insights that allow for an intrinsic understanding of site's place within "its" world, what is referred to in this work as the *locus*. Its understanding is not era-specific *per se*, but it could aid in an explanatory framework of the rise and fall of specific locations, taking into account the historical development.

However, absolute reliance on these techniques risks confining arguments within a purely quantitative framework, lacking the insights derived from walking and experiencing the area, and can be thus subject to critique.⁵⁰⁹

505 Indicatively, see: Chapman 2006; Bevan 2010; White – Surface-Evans 2012; Herzog 2013a; Paliou et al. 2014; Bevan – Lake 2016; Sarris 2024.

506 Which covers a wide geographical area. To name a few examples: Efkleidou 2019 (for Mycenae, Peloponnese), Vouzaxakis 2015 (Thessaly), and for central and southern Crete: Sarris et al. 2011; Bevan – Wilson 2013; Beckmann 2015; Paliou – Bevan 2016; Déderix 2017; 2019; Antoniadis 2024. For a diachronic approach considering the settlement patterns on the island, see Pollard 2023. Although the use of experiences gathered and algorithmic methodologies is not location specific, it is, however, encouraging to have available analyses of a generally similar location and time period that would have been subject to similar weather conditions, climate phenomena or even cultural traditions and other parameters that might not be codified in the landscape.

507 Kluiving – Guttman-Bond 2012.

508 Bintliff 1977.

509 Wheatley 2014, 117–118; Nowicki 2019, 2.

Scepticism toward these methods began to emerge at the end of the 20th century, with some researchers raising concerns not about GIS itself, but rather about its application. The widespread use of GIS, often without critical evaluation, was seen as potentially reintroducing problematic issues, including oversimplification and a lack of contextual sensitivity in archaeological analysis, and reviving “a functionalist approach to archaeological explanation, which had supposedly been discredited by the humanistic critique of processual archaeology”.⁵¹⁰ Therefore the analysis in Part II also aims to demonstrate that the application of these methods is neither uncritical nor limited to a monosemantic explanatory framework. Instead, GIS is employed as an enhancement to traditional practices such as surveying, field walking, and broader archaeological work, enriching rather than replacing these foundational approaches, as will be presented in subsequent Parts.

4.1 History

While the use of GIS has been prevalent in social sciences for some time, its application in archaeology is relatively new and has considerably increased since the end of the 1990s.⁵¹¹ This growth can largely be attributed to the surge in computational power, accessibility to the larger public, availability of geospatial data and the prevalence of user-friendly GIS software that offers tools for the analysis of digital models. A number of experiences have already been available before the 2000s, which since then has been enhanced upon.⁵¹² The GIS methods are particularly applicable in the study of visibility analyses, movement patterns and path systems, as those who used them usually did not leave tangible evidence.⁵¹³

The expansion of GIS methodologies in archaeology has significantly influenced various areas of archaeological practice. However, as Chapman noted, these methodologies have also been shaped by archaeological practice itself, as accumulated insights, nuanced observations, and emerging needs have driven adaptations and refinements in GIS applications. Methods have been developed to overcome various analytical and technical challenges, enabling researchers to bypass potential pitfalls in these applications.⁵¹⁴ This push towards new solutions has posed some issues as the limits of the

510 Bevan – Lake 2016, 23.

511 Herzog (2013a, 179), while addressing primarily the method of least-cost paths (see also Surface-Evans 2012).

512 Fábrega-Álvarez 2006, 7. See also Harris 2000.

513 White – Surface-Evans 2012; Hazell – Brodie 2012. The *Journal of Computer Applications in Archaeology (CAA)* provides a broader scope with a variety of applications.

514 Chapman 2006, as well as Conoly – Lake 2006, reflect an academic interest observed in the decade of 2000s, which saw a rise in publications concerning GIS-based archaeology that not only proposed methodologies but also wrote in a way meant to popularise the subject to non-IT experts, allowing a further boost to these ideas.

algorithms and potential drawbacks began to appear. Standard GIS software offers a wide accessibility to archaeologists without the need for programming IT knowledge, achieving thus the prerequisite expressed by Gaffney – Stančič for a method to be considered successful.⁵¹⁵ One negative aspect is that the underlying methods and procedures are sometimes blindly followed by users with no IT experience, without an assessment before use or in the interpretation of the results. Therefore, it has been argued that these standardised versions lack some features that are important in archaeological optimal use and calculations.⁵¹⁶ Due to the design of these systems, such as Esri's ArcGIS and the open source QGIS used in this work, readily available tools for this purpose can be found. These have led to a much wider interest in the application of these techniques for research. Despite the fact that the workflow in these solutions follows predetermined steps, some manoeuvring is possible.⁵¹⁷ However, the core algorithmic approach is normally not amendable by the user. At least, not without some programming background, so an examination of the back-desk algorithm and methodology is useful. Not doing so can be problematic in the assessment of the results.⁵¹⁸ In a collective work, Kantner offered an overview of the available methods and their shortcomings.⁵¹⁹

Another source of errors is posing the wrong questions or extracting argumentations solely through the GIS analysis.⁵²⁰

The positive development is that these methods continue to improve; however, it is essential to cross-check the results of any model through different iterations and avoid accepting them at face value without critical evaluation. There is a variety of examples and explanations for methods, some of which are clearly constructed guides for archaeologists.⁵²¹ Furthermore, the abundance of examples facilitates the development of an approach that critically builds on previously established methods and trodden paths while employing *ad hoc* parameterisation to better address the specific characteristics of the area under study.

515 Gaffney – Stančič 1991; Herzog 2013a, 198.

516 Herzog 2013a, 198.

517 In ArcGIS, the number of choices in the toolboxes and the parameterisation allows for some freedom. Further, in QGIS one can use independently developed add-on tools through the Extensions tab and even request for, and actively participate in improvements.

518 Herzog 2013b finds an issue with some definitions of anisotropic behaviour.

519 Kantner 2012.

520 Such an example is the refute of an otherwise logical assumption by Bell – Lock (2000), as well as Batten (2007) that suggested the use of least-cost paths for the relative dating of sites, as the location of sites along routes between two others suggest a later dating for them. This, although maybe true in some cases, excludes the natural network development and also seems not to take into account other parameters. For example, in medieval Britain, roads often bypassed villages (Hindle 2002, 16). Similarly, other factors, such as the presence of sanctuaries or obsolete trade networks, will not be represented in this method. See also Wheatley 2014, 117–118.

521 These include Herzog 2010; White – Surface-Evans 2012, Schild 2016.

In summary, GIS used in archaeology, as examined in studies focusing on Bronze Age Crete, is mainly employed for (1) viewshed and visibility patterns,⁵²² (2) watershed analysis, which offers a more nuanced reading of the topographical map of the region, or water drainage around a specific site, and (3) modelling movement; i.e. time or energy to move between (a) set locations (least cost path analysis), analytically presented below; (b) from a specific location across an area (movement without a destination),⁵²³ or focal mobility network analysis, which shows the most practical corridors of movement, in essence being an intrinsic characteristic of the landscape and independent of any areas of interest.⁵²⁴

While all the above methods will be implemented in Chapter 5, given the introductory scope of this chapter, the aspects of cost, slope and used functions will be introduced below.

4.2 Methodology of Modelling Movement

In essence, with the use of GIS analysis of the geospatial data, the problem of seeking the connectivity between regions or places of interest transposes to the study relating to Zipf's assumption regarding the principle of *least effort*. Namely, there is a tendency for human networks to be formed around routes of minimal effort, economising the frequent tendencies.⁵²⁵ Of course, this will be in well-known and often traversed landscapes so that these minimal-cost routes will have been established.⁵²⁶ Possible optimal paths that require a bird's-eye view to recognise might remain unused by a population less familiar with the terrain. These methods have, for example, been used to determine networks of a variety of cultures that show the prevalent role of viewshed and direct visibility in establishing network patterns. This was not always done necessarily based on an in-depth understanding of the terrain or aiming in an optimal use of it, but instead focusing on the temporality of spatial organisation for hunter-gatherer settlements or a grandstand action towards neighbouring regions.⁵²⁷

522 For example, used for visibility networks between peak sanctuaries (Soetens et al. 2002; 2008) and visibility of tholoi (Dédérix 2016).

523 This is also linked with the isochronous lines. E.g. Pollard 2022, 111–112, Fig. 4.

524 Bevan – Wilson 2013; Dédérix 2017.

525 Zipf 1949 took the idea out of the philosophical plain, as it had been introduced by Guillaume Ferrero and quantified it, as can be seen by Zipf's law, as an empirical mathematical expression applicable in many aspects of human behaviour, from frequency of words in speech to distances in movement. This allowed the introduction to the economy of geography as a principle of potential movement analysis. This idea was further imbued with insights from realms of evolutionary psychology and sociology.

526 Branting 2012.

527 Kantner – Hobgood 2016 analyse the viewshed of the pre-Columbian Chacoan towers, exploring their potential beyond the pure defensiveness in their visibility potential. A different strategy for land use seems to appear for hunter-gatherer settlements. Kendra – Friedel (2009) shows the effect of seasonality in the choice

Using GIS to identify such routes poses specific challenges, particularly when studying complex societies for which we have limited knowledge of social dynamics. These latent factors could influence choices that cannot be ascertained based purely on geographic data and the study of geomorphology.

The parameters defining more complex behaviour such as trade is less straight-forward than needs of hunter-gatherer routines. In a more complex network, optimal routes can be avoided or preferred based on the relative importance of some of the nodes, which is not always tangible in the terrain. Further parameters for path choice can be taxation, the presence of robbers or even taboos relating to religious traditions, that would render a central position less frequented or vice-versa.

In the context of the issue at hand, the rise of Koumasa during the Minoan period, despite its apparent topographic limitations, was discussed above.⁵²⁸ The role of Kophinas sanctuary and the harbours in the Asterousia can be one of the latent factors that allow for a node to emerge in the area of Koumasa. Of course, harbour use during the Minoan and Post-Minoan periods might have varied significantly. They might have functioned as pit stops for ships on their route towards destinations like Kommos or, later, Matalon. Alternatively, they could have served as end stations, or perhaps their role might have comprised both possibilities. The parameters to be explored include aspects of the political landscape that could exert pressure on controlling trade routes. During the Palatial period, would eventual shortcuts through the Asterousia be seen as a potential loss of revenue for a centralised power in the Phaistos area, or would this possibility offer advantages in connecting the far inland locations with their coast, thereby enhancing the trade networks within the Messara, thus fitting in a narrative of decentralisation? Similarly, the chronology of the Kophinas sanctuary is known. But to what extent would a settlement like Koumasa profit from its strategic location along the access route to the peak sanctuary from the west? What GIS can contribute – and will be explored in this chapter – is the analysis of possible linking routes, followed by a quantitative comparison to provide an evaluation. Additionally, comparing the paths from the small harbour areas to Koumasa with the route toward Kommos would be of particular interest. Evaluating these results may offer insights into such a network's potential existence and functionality. The qualitative analysis, taking into account the archaeological finds, will be discussed in Chapter 10.

of settlements and a network pattern for each site is extrapolated with a preferred daily travelled distance of 10 km. This idea is further explored with cost catchment models in Surface-Evans 2012. Similar efforts include Byrd et al. 2016 which examines the results of modelling foraging ranges for late Pleistocene locations in the southern Levant.

528 See discussion on pages 84ff.

4.3 Costs

A fundamental challenge of the method lies in quantifying the difficulty of paths, which is crucial for establishing a reliable framework for assessment and comparison. A central concept in the development of these algorithms is the “currency cost”: In summary, it is used as an indicator of either time or energy required for traversing a sloped terrain. The popular Tobler’s equation discussed below assumes time as a currency.

The main parameter used in archaeology over which cost is defined is slope, which was favoured since the dawn of the GIS usage, as it was argued that slope can reasonably predict actual human movement costs.⁵²⁹ It is, however, the method that diverges most when compared with other methods, and has some intrinsic problems, (as will be explained below further, in Chapter 4.4). Therefore, careful implementation is required.⁵³⁰

Isotropic-Anisotropic

Generally, the costs can be divided in two types, isotropic and anisotropic, referring to those independent and those dependent on the directionality of movement. The isotropic calculation is frequently employed in cost accumulation techniques, wherein the cost of a path between two points is treated as equal, regardless of the direction or the starting point.⁵³¹ Vegetation, land cover, an approximately flat surface and the calm sea can be considered isotropic, and the algorithm assigns the same level of costs independently of the content of the neighbouring cells. Meaning that movement from a cell to each of the neighbouring eight cells will add the same cost as movement to it. Whereas this does not occur in anisotropic movements, such as up and down a river, or – more relevant to the task at hand – steep slopes.⁵³²

Ancient forestation or presence of thieves or other social barriers cannot be easily represented. Also, after a certain degree of the slope (discussed analytically below) will force shortcuts or zigzagging. Another element for choosing a path is the readiness of the walkers and the nature of the path, with an established path being of course much easier than a similar one in virgin terrains.⁵³³

Time – Energy Currencies

Various GIS approaches stress the element of time, following Bintliff who underlined the importance of walking time rather than map distances in the evaluation of the actu-

529 A fact often mentioned (see Herzog 2010, Kantner 2012, 226) that becomes obvious when one looks at the archaeological case studies.

530 Kantner 2012, 234. As he adds, one solution to verify the results is beyond GIS, namely to empirically test the algorithms with contemporary examples of human movement.

531 Llobera – Sluckin 2007; Kantner 2012; Déderix 2017.

532 Conolly – Lake 2006; Herzog 2013a, 18.

533 Llobera – Sluckin 2007, 216.

al feeling of a distance between to places.⁵³⁴ Regardless if it was known to him, he put forth the same argument that was used in the beginning of the 20th century by Pendlebury of walking time rather than map distances. As he pointed out, “only those who have actually walked the mountains can tell how misleading a map may be”.⁵³⁵

An algorithmic model will rely on coding a mathematical expression, and there have been mathematical expressions correlating speed, or time directly to slope. Most algorithms are based on the most popular of these. These include the Naismith and Langmuir rules of walking time, which was used by the `r.walk` function in GRASS, and Tobler’s hiking function.⁵³⁶ The latter is extracted from data of the Swiss military on walking time, and is frequently used by a number of developers.⁵³⁷

Downhill movement is easier for humans up to a certain degree than uphill movement.⁵³⁸ This is demonstrated in the Tobler-function, which will yield different results for movement between two points, based on the direction of movement.⁵³⁹ The $T(x)$ function used in Chapter 4.5 represents the isotropic version of the Tobler function, taking the mean of the two anisotropic functions. Various versions of this equation have been produced, taking time as the crucial factor to be determined.⁵⁴⁰

Other approaches focus on the weight and load of the walker,⁵⁴¹ and others on visibility.⁵⁴² The load of the walker pertains to energy spent. This term, in essence, corresponds to metabolic rate. Pandolf’s team analysed the correlation of load carrying and slope in laboratory conditions, the data of which were used to produce an equation of energy consumed as per slope. It was found that this has a significant impact on how people could move through the landscape and particularly the time required for movement.⁵⁴³

534 Bintliff 1977, 112–113.

535 Pendlebury 1939, 7. It is noteworthy that there is an effort to correlate Pendlebury walking times with those computed in GIS (Bevan 2010, 31–32, Fig. 2)

536 For an introduction and comparison of these rules, as well as their adaptation to algorithms used by GIS applications, see Herzog 2010, 377, Fig. 2; Wood et al. 2023, 2–4, Fig. 1.

537 Kantner 2012, 227 (see Tobler’s function below).

538 See Footnotes 547 and 566 below.

539 Tobler 1993. Moving away, often understood from a higher area to one further below. The equation representing speed is given by the equation: $f(s) = 1/(6 - 3,5 * \text{abs}(s + 0,05))$; whereas the different direction of movement is expressed by: $f(s) = 1/(6 - 3,5 * \text{abs}(s - 0,05))$; where s represents the slope degree.

540 Kantner 2012, 227. On the issue of choosing suitable functions for a problem at hand, see Antoniadis 2024, 118–119.

541 Duggan – Haisman 1992.

542 Verhagen – Jeneson 2012.

543 Pandolf et al. 1976; Pandolf et al. 1977; for developing the equation, see Duggan – Haisman 1992; for a critique of the results and suggestions for optimising, see Drain et al. 2017; for an application of the principle in extracting a velocity function, see Groenhuijzen – Verhagen 2015, 29–30.

4.4 Slope Issues

The debate about whether slope inherently represents a cost surface or if it requires additional weighting is complex and depends on factors such as the topography of the area in question. Kantner's differentiation based on whether the area is relatively level or not is relevant, as it influences amongst others the isotropy or the anisotropy of the slope.⁵⁴⁴ The region of Koumasa combines both possibilities in all of the three scales under study. The area to the north of Koumasa tends to be closer to a level terrain, while to the south, it is more rugged. This mixture of conditions necessitates careful consideration of the isotropy or anisotropy of the slope in the analytical process but also of the model used.

The consideration of how humans, animals carrying load, or wagons navigate slope inclines is crucial in understanding real-world movement patterns. The tendency for individuals is to adopt a zigzag – or switchback – approach on steeper slopes, deviating from the direct path, and favouring a less steep sideways path with sharp turns. The angle of slope, above which a Z-shaped path is favoured, is dubbed as “critical angle”. This behaviour is a practical adaptation to reduce the overall steepness of the ascent and make the climb more manageable, albeit longer in total distance. It introduces a level of complexity that goes beyond a simplistic linear path, and capturing such nuances is important for a more accurate representation of movement in the landscape.

The choice of establishing such paths is highly connected with the difficulty to a walker per unit distance. In the analysis of this phenomenon is dubbed “metabolic cost”, and is defined as a function of the gradient in the direction that the walker is travelling and of the total distance. Plotting the calculated function the metabolic curve is received, as seen in Chapter 4.5.

Most approaches try to identify a critical angle, or slope, above which either a zigzag pattern is sought or the path would avoid. It was seen, a fact that for terrains will a gradient less than the critical angle, or slope, zigzagging is adding no benefit to the walker. The generally accepted limits are around 15 degrees for carts or heavy load and 25 degrees for paths.⁵⁴⁵ For antiquity, it was observed that Roman roads almost never exceed 15 degrees.⁵⁴⁶ Using more advanced approaches to the issue, critical slope was calculated by Llobera – Sluckin at around 16 degrees upwards and 12,4 degrees in downward movement.⁵⁴⁷ This critical gradient is steeper for uphill walking than downhill, which directly renders slope as an anisotropic criterion.

544 Kantner 2012, 227.

545 This limit stems back to Langmuir 1984; in Llobera – Sluckin (2007, 216), the notion is made that modern roads are often based on paths, pulling thus the limit towards their result (see next footnote). This was noted also in Tobler 1993, 2. Often, a value of 20 degrees is given.

546 Verhagen – Jenson 2012, 125; Antoniadis 2024, 110.

547 Llobera – Sluckin 2007, 215. The authors note that their results fit with the empirical knowledge. This is visually best represented in Llobera – Sluckin 2007, Fig. 5, following the analysis in: Llobera – Sluckin 2007, 208–12.

It is noteworthy that the upper limit for the Roman road is fitting with the Llobera-Sluckin results. Furthermore, it allows for higher degrees in the less demanding conditions (both in distance as well as in transfer means and requirements) of the interest area in this work. Efkleidou offers a summary of the approached on critical slopes.⁵⁴⁸

In the relatively narrow central Asterousia, the number of paths is limited, as will be shown in the chapters below. Therefore, a two-direction road can be assumed. This understanding opts for isotropic application. Coming back to the question of energy and time as cost currencies, most of the above mentioned ideal-slopes for roads pre-assume a macrocosm in which options for avoiding mountain areas are possible. Movement within Asterousia however, including the transportation of goods, requires a different approach. On the issue of the critical slope, the area lacks paved roads or smooth paths, that large scale transport requirements of later periods would presuppose, such as the Roman road networks, which is the subject of many of the GIS-based movement analyses.⁵⁴⁹ Therefore the critical slope will be revisited with *ad hoc* approaches, in Chapter 5.2, Study 3. As per the movement itself, humans carried load could be considered as well as the use of equines.

The parallels from various cultures of using equids for transport in mountainous terrain are numerous, as the donkey (*equus asinus*) is better adapted and surer footed in hilly and mountainous terrain.⁵⁵⁰ Furthermore, in longer distances the use of animals is more economic for transporting goods, as the crew needed per kilogram transported is minimum.⁵⁵¹ The equids are used to carry 75–80 kg. of load when divided on the two sides, a practice recorded for modern and ancient Near East alike,⁵⁵² while on the extreme side of modern use, more than 100 kg. on smooth surface have been recorded.⁵⁵³ Regarding mountainous terrain, measuring the oxygen consumption, donkeys running at full speed on 10% slope performed excellently, although causing more fatigue.⁵⁵⁴ Furthermore for short distances up to 8 km., even in uneven terrains, a donkey can carry more than half its weight.⁵⁵⁵ These data indicate why donkey and mule is a preferable way of transport in mountainous areas, with studies being done worldwide, from South Africa, to the Andes. These studies indicate a 100 kg. weight limit is a practical consideration, taking into account both the capability of the animals and the challenging terrain

548 Efkleidou 2019, 491–92.

549 E.g. Verhagen – Jeneson 2012; Groenhuijzen – Verhagen 2015; Abou Diwan – Doumit 2017.

550 Brodie 2008, 301.

551 Brodie 2008, 301.

552 There is old Assyrian textual evidence for a standard load weight of 75 kg recorded for the ass (Larsen 1967, 141–155), which, as Shai observes, is very near the modern practice recorded in Egypt, which is 80 kg (Shai 2016, 4).

553 Bukhari et al. 2021; 2022.

554 Mueller et al. 1994, 1433–1438.

555 In a study for equine use in Pakistan, donkeys and mules travelling over 8 km. per day were more than 90% likely to carry loads of more than 50% of their body weight (Bukhari et al. 2022, Table 3; Fig. 3).

they may encounter. Overloading can lead to difficulties in transportation, especially in areas with steep slopes, and can cause fatigue in the animals due to the complexities of mountain topography.⁵⁵⁶

Modern use of donkey use in the Asterousia is known.⁵⁵⁷ To what extent can such a usage be assumed for the Minoan times? While no direct finds in the southern Messara support this idea, the equine's presence and use on Minoan Crete is considered secure. A sub-species of the African wild ass is recorded for Egypt of the 4th millennium and in western Asia in the 3rd millennium at the latest, perhaps since the Chalcolithic.⁵⁵⁸ Its integration into the rural culture around the Mediterranean is manifested in the animal's representation in art and literary references, as it was able to carry a huge weight for very long distances.⁵⁵⁹ Its earliest presence in the Aegean is from a zoomorphic terracotta in Sitagri III (early 4th millennium) and physically attested through bone fragments in Lerna since the EH II.⁵⁶⁰ On Crete, the earliest evidence for equids is through assumed representation on seals as early as MM IA and one with a MM IB–II or EM chronology from central-east Crete, on an engraving of a three-sided prism bead representing an equid: an ass according to Evans or a horse according to Kenna.⁵⁶¹ The donkey's head appears as a sign in the MM hieroglyphic syllabary⁵⁶², that could denote a significance for the newly arrived animal. Modern bone analyses suggests neolithic dates for the first equites on Crete with a greater presence beginning in the MM I period.⁵⁶³ A main

556 See a study conducted on the mules used today in rural villages on the Andes (Pineda – Florio-Luis 2016, 77).

557 In the earliest mention of walking on the Asterousia by Fynes Moryson in the 16th century, the essential role of equines is made clear (see Footnote 1104). On modern use in the area of central Asterousia, see discussion on page 1138.

558 Shai 2016, 1–2.

559 For Minoan representation, see below. As for other Bronze Age references for the use of the equid, the Middle Kingdom story of the “Eloquent peasant” from Egypt is enlightening, as donkey caravans are mentioned carrying load from his home to central Egypt: “Then this peasant left for Egypt, after he had loaded his donkeys with vine, purple nutsedge, natron, salt, sticks from [...], pieces of wood from Farafra, hides of panthers, skins of golden jackals, pondweed, anw-stone, tnm-plants, wild carrot, serpentine, s3kswt, mjswt-plants, ochre, wild mint, hedge plants, pigeons, narw-birds, gutted fish and plucked fowl, wbn-plants, tbsw-shrubs, gngnt-beans, fenugreek and anise. Abound with all good products of the Wadi Natrun This peasant then went south.”; lines 1.7–6.2 (Translation after Parkinson 1991). See also mentions of their use in the Assyrian textile trade in Anatolia in the 19th century BCE (Michel 2014, 113–114) and the standard load weight mentioned above (Footnote 552).

560 Brodie 2008, 299.

561 *Knossos IV*, 520; Kenna 1960, 94, Fig. 50.

562 Crouwel 1981, 36; the reading is, however, rather uncertain. For the sign in question, see Montecchi et al. 2021, Fig. 1, sign 014.

563 Only two bones have been dated to the Neolithic period, originating from Knossos and Kavousi. The subsequent period of presence commences from MM I, after which there is a consistent increase in data across all periods (Klontza-Jaklova 2024). The absence of evidence from the Early Minoan period and the initially low representation in the Neolithic may indicate that the presence of donkeys during the Neolithic was not sustained.

reason for their expansion is that donkeys are adept at navigating steep and rugged terrain, making them suitable for transportation in mountainous areas.⁵⁶⁴

The assumption of the hypothetical use of donkeys in the Asterousia area remains speculative. However, considering their arrival in Crete during the Protopalatial period, as suggested by evidence, it is likely that their use had an impact on trade, potentially expanding its usage to various regions.

The examples above illustrate that, regardless of how the mountain communities were connected, the methodology for identifying routes will differ from the most prolific methods used for more level plains. Hence, the study of the routes in the mountain will differ from parallel studies done for the Messara plain, with one difference being identifying time as the cost currency for walking in the valley and energy for movement on the mountain. Koumasa, namely, presents a challenge of being on the verge between the mountain and the valley, with a stark difference in the geomorphology. Besides the least-cost-path analyses, which could be divided into mountainous and level ones, the differentiation in the topography will pose an issue in choosing the functions for flow accumulation and the reclassification used, in which either the paths of the mountainous region or those of the more level Messara region show more realism, but not both at the same time, as it will be presented below (Chapter 5.3.2).

4.5 Functions

One of the most known equations taking time as its currency is given by Tobler's hiking function, as presented above, which was estimated from empirical data given by the Swiss military.⁵⁶⁵ In this function, the critical slope can differ in anisotropic algorithms, e.g. 11 degrees for ascending and 23 for descending.⁵⁶⁶ Function $T(x)$, as presented in Figure 19, represents one of the isotropic versions of Tobler's function. The pace is the element shown, which is the reciprocal to speed.⁵⁶⁷

The critical slope is a parameter representing the limit where the transition to zig-zagging (or switchbacks) becomes more effective than direct uphill or downhill paths. For a small downward slope of 5% until a 1-degree upward slope, the speed maximises (the -0.05 in the exponential causes an offset to -2.8 degrees of slope). It is noted that off-path travel increases the difficulty by a factor of 0.6.⁵⁶⁸

There are many variations of the Tobler function, with the Kondo and Seino Function resulting in a much steeper drop-off in speed with increasing slope compared to

564 Crouwel 1981, 43.

565 Imhof 1950, 217–220; See Footnote 539.

566 Kantner 2012, 227–228.

567 Based on the formula $1/6 \times \exp(-3.5 \times |\tan(x) + 0.05|) = 0.6 \times \exp(3.5 \times |\tan(x) + 0.05|)$.

568 Tobler 1993, 2.

4 Modelling Movement Patterns

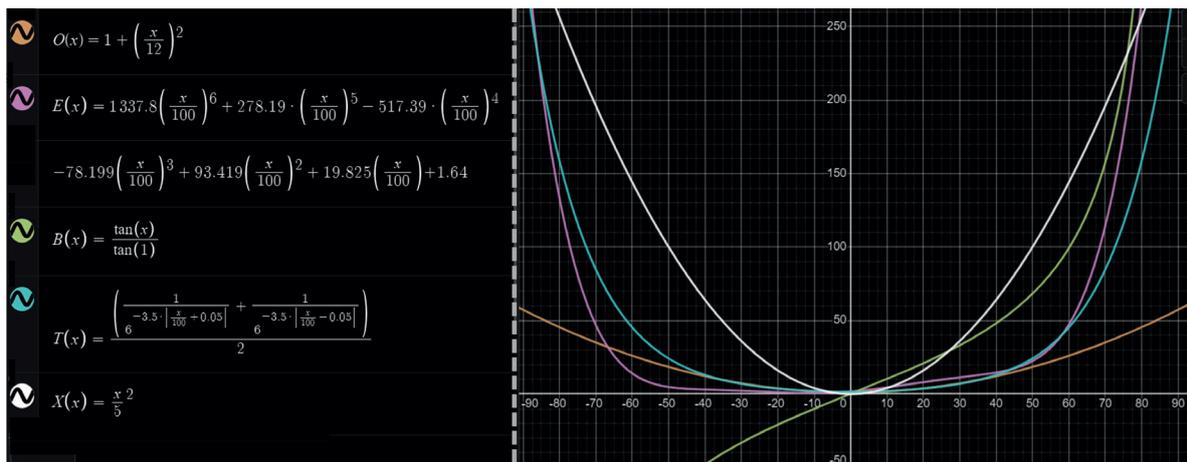


Figure 19: Overview and plotting of the functions under discussion.

Tobler’s function, meaning it models higher movement costs on steeper slopes.⁵⁶⁹ A further example, $E(x)$ function in Figure 19, is a fifth-degree polynomial curve that was proposed as an energy consumption function, based on physiological data, which has nevertheless been criticised for the downhill slope values.⁵⁷⁰ These modifications did not yield different results than the Tobler in the region of interest, possibly due to the relatively small area of the mountainous region of the central Asterousia, and thus will not be discussed further, although their applicability in larger areas should be taken into consideration.

An effort to improve these algorithms is undertaken based on empirical data of walking from all around the world.⁵⁷¹ Other approaches, however, take human metabolism as a factor, as discussed in Chapter 4.3. It is clear that the reality is more complicated if carts or load-animals are taken into consideration.⁵⁷² As for carts or animal-powered movement, the “Ox cart” function is one proposal to codify this type of movement, which could also be considered for moving with the load on animals.⁵⁷³ The function was used considering a critical slope of 12 degrees.⁵⁷⁴

569 $KS(x) = 5.1 \times \exp - 2.25 \times \text{abs}(\tan(x) + 0.07)$, while the energy spent is given by a modification of the inverse for the speed, $0.315/5.1 \times \exp - 2.25 \times \text{abs}(\tan(x) + 0.07)$. See Kondo – Seino 2010, 162–163.

570 Herzog 2013a, 184.

571 Kantner 2012, 234.

572 For the question of donkeys, see above. As per carts and their use in the Aegean Bronze Age, see Crouwel 1981.

573 Llobera – Sluckin 2007; Herzog 2010, 378.

574 $1 + (x/12)^2$.

Two other easily implemented functions include one based on the tangent of the slope ($B(x)$ in Figure 19).⁵⁷⁵ This equation states that the relative cost of moving either up or down the slope is equal to the tangent of the slope (s , in degrees) divided by the tangent of 1° .⁵⁷⁶ The final function approximates a second-degree polynomial, where the raster is reclassified with steps of 5 degrees, and the cost assigned to each step increases analogous to the x^2 function ($X(x)$ in Figure 19). This is often referred to as an exponential function, a name which is adopted here, although the name is not precise.

Figure 19 offers a summary of the main functions discussed and used in this work. This graph is used as a representation and not as a classification of the cost units chosen, be it energy or time-based. Their currency (y-axis) is portrayed here in a nominalised way in order to allow for a visual representation and is plotted against slope degree (x-axis).⁵⁷⁷

The Ox-cart function $O(x)$ does not increase at the rate of the others, walked by humans carrying the same load, which is a logical conclusion. It assumes zigzagging for higher slopes, however. $E(x)$ is anisotropic, as the cost (energy required, i.e. difficulty) rises more rapidly for uphill movement. However, its results in the high slopes downhill have been criticised as mentioned above. Its results do not differ rapidly from the mean Tobler function $T(x)$ for a slope less than 60 degrees, which includes the range of walkable slope. For this reason, within the scope of this work are considered similar. Bell-Lock's tangent function $B(x)$ is isotropic if the absolute value is taken, but here it is plotted to include all integers to showcase the relation of the function to the tangent. Its characteristic is that it mathematically never crosses 90° which fits the theory of the slope. In relation to other functions, it is closer to the exponential function, and could be used for the scope of studying movement in the Messara. It is somewhat closer to the linear function for degrees up to 40° . If $\tan(2)$ is used instead of $\tan(1)$ in the denominator, the function comes closer to Tobler's function in the high-degree slope, but it yields less natural results overall, especially in the small degrees where the function is very close to the linear function $f(x) = 2x/3$ for degrees up to 50. Finally, the exponential function ($X(x)$), although it varies from the empirical data, nevertheless could be argued that it can be used as a crude approximation of them, which has the positive aspect that it is easy to implement. Especially in more theoretical approaches, such as those in this work, no great differences or crucial errors were observed using this function when comparing it with the results of the others.

Discussion

Another point related to the nature of Zipf's principle applied in computers is the monosemantic result pattern. The optimisation component will push less-than-optimal

575 This model relies on the friction surface: $C = \tan s / \tan 1$. Bell – Lock 2000, 88–89. This function was used by Déderix (2017, 15–16).

576 Bell – Lock 2000, 88–89.

577 Plotting the equations was done with the help of the site: <https://www.desmos.com/calculator>.

solutions to irrelevancy, leading to one clear result. This will offer “one” good solution, but as we know from experience, the most optimal route is not always the one chosen. Also, choosing between the determining factor of time and energy (i.e. metabolic cost) is not always easy. Small variations from the major path are expected between two points when terrain and other parameters allow it. Furthermore, weighing other parameters not known to us plays a significant role in the presence of optimal paths.⁵⁷⁸

All accumulation cost and least-cost-path algorithms, beginning at the starting point, take the centre of each cell as a node and begin to form links with the nearby cells, exploring all possible directions. At its core, the spreading algorithm performs a raster-to-vector calculation. The produced links to the starting point will be weighed against each other as per the cost, extracting the most beneficial one. During this process, essentially, a conversion of the input raster into a weighted graph with positive weights proportional to the travel cost is extrapolated. Although different algorithms are available, most rely on Dijkstra’s algorithm, a brute-force algorithm that has not been free of criticism.⁵⁷⁹

Due to its user-friendliness and compact design, Esri’s ArcGIS is one of the most popular solutions, and due to its widespread use in archaeological research, it is used here as a parallel control of the results.⁵⁸⁰ The main source of the presented results in this work is based on the platform of QGIS, which has the benefit of being open-source, with its algorithms being more transparent and amendable.⁵⁸¹ A negative is the lack of the holistic approach offered in ArcGIS.⁵⁸²

An augmentation of these methods is experiencing the suggested paths by walking the mountains. This empirical verification was done both as an effort to verify the suggested paths, as, in the end, the algorithm is based on simplifications, starting from the raster form of the DEM itself, which is, after all, an approximation of reality. Evaluating the suggested paths offers tangible information not subject to algorithmic methods but based on the human element. Further, it offers an experience no map can provide; an empirical understanding of the surroundings, be it the terrain characteristics, the wind, perception of the surroundings along the way, and even the fatigue felt after a long mountainous walk. Pendlebury had already touched upon this within his effort to experience walking the island as opposed to merely studying it on a map.⁵⁸³

578 Variations on the parameters have been suggested as a method to confront this issue, and is the reason for the approach undertaken here (Saerens et al. 2009; Herzog 2013a, 199).

579 White – Surface-Evans 2012; Schild 2016, 19.

580 Abou Diwan – Doumit 2017, 229.

581 Versions used are 3.16 Hannover and 3.28 Firenze.

582 For a practical comparison of the methodologies, see Seifried – Gardner 2019, Chapter 4.

583 See above Footnote 535.

It is crucial to physically traverse paths to empirically test algorithms, rather than just calculating them, using contemporary examples of human movement before applying them to prehistoric scenarios.⁵⁸⁴

Walking is part of the sensory experience involving all senses, for which it can be argued that is subject to investigation of the archaeology of the senses.⁵⁸⁵ It renders the activity of path walking to the overall experience of living in that place and puts the researchers (literally) in the footsteps of ancient inhabitants' everyday lives (see Chapter 11 for further elaboration).

584 Kantner 2012, 234.

585 Hamilakis 2011, 209, 216–217.

5 Insight of GIS for the Mobility Networks around Koumasa to Messara

Using geodata as the primary analysis tool prerequisites a consensus on the unchangeability of the region for the subject time period. The Messara-Asterousia region has not experienced a significant change as it appears in other locations (such as the presence of man-made lakes, major modern constructions, etc.). The coastline of the eastern part of the island is considered fairly stable, as discussed above,⁵⁸⁶ a fact verified, amongst others, by the presence of ancient harbours at the modern coastline. As for the mountain range, the natural corrosion and landslides might have affected certain locations on the microscale, especially given the earthquake history of the island as an area, i.e. certain rock collapses that block or free certain paths and thus minimally affecting human walking behaviour, but in the macroscale, a terrain stability can be assumed.⁵⁸⁷ A large-scale change in the region is climate-based, caused by deforestation and fires; however, a fully forested Asterousia that would block the ways is hardly conceivable. It is to be added that there are not enough sources on this matter.⁵⁸⁸ Literary notions such as the large-scale fire in the Asterousia upon the first Ottoman period can be considered exaggerated. Still, a core of truth in this narration could be considered valid.⁵⁸⁹

In Chapter 5.1, the setting up of the GIS project is presented; in Chapter 5.2, the implementation of the concepts elucidated in the preceding chapter is presented in the case of least-cost-path analysis, offering a more detailed exposition rather than merely presenting the raw results.⁵⁹⁰

586 For changes in the geology of Crete, see Chapter 2.4.1.

587 Stiros – Jones 1996; Jusseret – Sintubin 2017. See also Discussion in Chapter 2.4.1.

588 For our knowledge of forestation on Crete, see Chapter 2.4.2.

589 See Vrentzou 2017, 32.

590 The wide and ever-growing available literature on the subject, ranging from the fields of computer science, geography to archaeology, the main bibliography for the steps in this chapter includes Déderix 2016; 2017; Schild 2016; Seifried – Gardner 2019.

5.1 Setting up the DEM Modell in GIS

The first step for the analysis is deciding on a DEM, its resolution and its range. It has been presented that a finer resolution than 30 m. for a large area does not affect the results of least-cost-path analyses, even by going down to 5 meters: In a 2012 study, a 5 m. resolution Airsar DEM produced very similar results to that of a 30 m. Aster DEM. Those, in turn, were seen as very accurate compared to a 90 m. DEM.⁵⁹¹ It should be noted that vertical accuracy is, for some developers, a much more relevant criterium than that of spatial resolution and should not be overlooked.⁵⁹²

For the purpose of this work, a DEM for the Messara-Asterousia region was requested from Mr. A. Sarris and provided, courtesy of the Laboratory of Geophysical-Satellite Remote Sensing and Archaeo-environment IMS-FORTH.⁵⁹³ The region chosen ranges between 0 and 1470 m. above sea level and has an accuracy of 20m. It is bordered by the Libyan Sea to the south and southwest, and includes the large Messara plain, the southern slopes of the Psiloritis, and the Asterousia Mountains (see Figure 20). This DEM will henceforth be referred to as the 20m.-DEM

Another raster (SRTM DEM) extending to the whole central Crete from with 30 m. accuracy was used.⁵⁹⁴ This raster will be referred to as the 30m.-DEM.

After receiving the DEMs, functions and cost attributions could be made to export useful results. The DEMs were imported in Esri ArcGIS and QGIS for quality control, but the results from the two programmes were identical. ArcGIS will mainly provide the following images in this chapter, while the QGIS images were mainly used in the other chapters.⁵⁹⁵ The illustrations created with ArcGIS will primarily use the “terrain” base map, while in QGIS, the “hillside” base map will be mainly utilised. Other options, such as topographic and satellite imagery, will also be included, as each base map provides a unique perspective on the area being analysed.

After experimenting with a variety of coordinate systems, the two main projects were set to the Greek Hellenic Geodetic Reference System GGRS87, EPSG: 2100 and UTM 35N, EPSG: 32635.⁵⁹⁶

A next step to be taken is the extraction of the zero value from the DEM, thus removing the possibility of sea route. Then, from the sea-free DEM a slope raster can be produced that will not allow the sea route in the search for optimal paths.

591 Doyle et al. 2012.

592 Racoviteanu et al. 2007.

593 I would like to express gratitude to Mr Sarris and IMS-FORTH for allowing the acquisition of this raster.

594 NASA Shuttle Radar Topography Mission (SRTM GL1) Global 30m Ellipsoidal, acquired from <https://opentopography.org/> (Data exported in a WGS84 [EPSG: 4326] coordinate system).

595 This choice should not reflect a preference for one of the two solutions, except in some respects to be presented separately.

596 A third parallel project was run using the raster coordination system EGSA87_Transverse_Mercator, with no influence on the results.

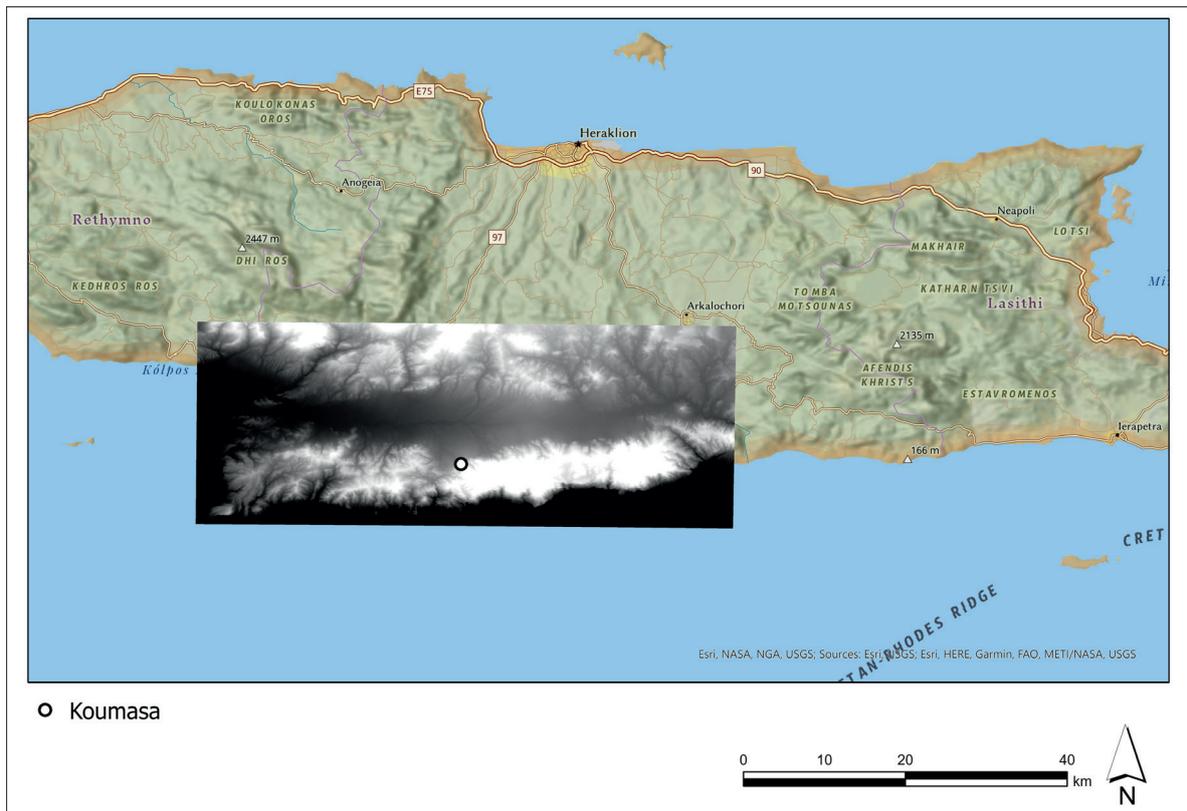


Figure 20: The extent of the acquired 20m.-DEM model. The SRTM 30m Model extends to the whole of central Crete, from Ierapetra to Prasies by Rethymno.

The zero value is useful to remove since calculations of walking on land would otherwise tend to use the zero value, which, in the examples of this work, are either the sea or the area outside the DEM. This step can be taken on the slope raster if the region under study does not contain level areas.⁵⁹⁷ This is a common procedure in regions proximate to the sea, especially when determining the viability and efficacy of land routes is of concern.⁵⁹⁸ However, in some of the iterations, the DEM, including the zero value, will be presented, as the nature of the sought network around the Asterousia cannot exclude the zero-value connection, as the sea shortcuts are vital.

A slope raster was extracted, both in degrees and in percentages. The mean slope value in the case of the 20m.-DEM is calculated at 13,5 degrees while the maximum slope (located near the Kophinas peak) reaches 79 degrees. As is to be expected from a mostly even surface, the mean deviation around the mean is 10,74. The 30m.-DEM produces slope that reaches a maximum of only 72 degrees, which is an effect of the higher

⁵⁹⁷ In ArcGIS the zero value can be replaced with *nodata* from the reclassification toolbox set. In QGIS there is no tool to make the transformation automatically, so the zero value can be removed by utilising the Raster calculator and applying the following transformation: (“DEM_Slope_re@1”)/ (“DEM_Slope_re@1”>0).

⁵⁹⁸ E.g. Schild 2016, 24.



Figure 21: Calculated slope on the 20m.-DEM after removal of zero value (sea level). Locations of interest around Koumasa are 1: Apesokari, 2: Trypiti, 3: Salamias bay, 4: Ayios Ioannis, 5: Dhamantri.

degree of rasterification (or pixelation) of the second case. Figures 21 and 22 show the slope from the DEM without the zero value for the two DEMs.

The slope in degrees will be used in the next steps as it is the most commonly utilised cost surface for further cost-path analyses. Given its long-standing success in GIS archaeology, as mentioned earlier, and the wealth of parallel case studies, this approach will be favoured in this work. However, it is important to note that other methods are available where using percentages may be more practical.

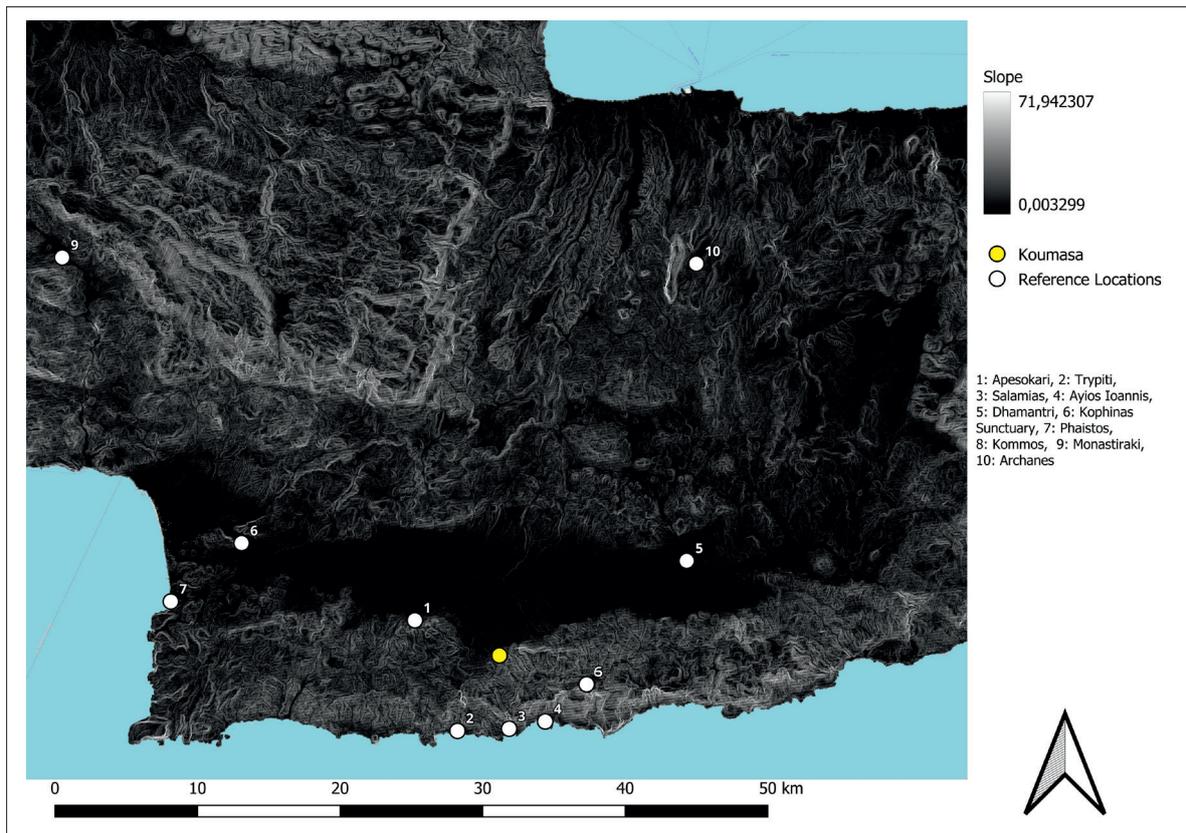


Figure 22: Calculated slope of the 30m.-DEM, after removal of zero value.

5.2 Least-Cost Paths Between Defined Locations

Least-cost-path analysis building on its implementation thus far in the Aegean Archaeology⁵⁹⁹ is used here to study mesoscale and macroscale of Koumasa and paths around the central Messara and central Asterousia. In Chapter 6, the same methods presented here are used for the microscale of Koumasa. For the primary investigations of paths through the Asterousia the method of least-cost path is first presented. Separate iterations were conducted and presented analytically below, with the results of each contained therein. At the end of the chapter, under the conclusions, a summary of all the results of the least-cost-path analyses will be presented together with an evaluation of this method, which, although not sufficient on its own, nevertheless yields useful insights.

In this first application, the direct method was used, where the locations of interest are preassigned by the author so that the programme will enforce a search based on the preloaded places. The optimal paths are calculated using the cost distance tool from the

⁵⁹⁹ See Siart – Eitel 2008, Fig. 1 for paths in central Crete; Efkleidou 2019 for paths around Mycenae; Antoniadis 2024 for paths from Knossos.

spatial analyst toolbox, the slope from the DEM as an input parameter, and the vector layer of the chosen locations as the network nodes.

This approach clearly has the limitation of assuming direct connections of the assigned locations, so any unknown nodes that had been places of interest but are unknown to us will not appear. The question of finding paths through a mountain range for archaeological purposes is fruitful when these connections are proven, such as in the work done by Schild regarding the mountain range of Amanus to calculate the paths across the western and eastern side of the Amanus Mountains regarding investigations for the Bronze Age and Iron Age communication networks in modern southeast Turkey. There, the points chosen were on the foothills of the two sides of the mountain range, and the optimal paths were searched.⁶⁰⁰ A second issue is that the method is sensitive to parameterisation since only the optimal path will be presented based on the criteria, which encourages the user to run multiple iterations.

Study 1

Based on the 20m.-DEM, the Tobler function of moving towards a location, the Ox-cart function, the Bell-Lock function, and the exponential (second-degree polynomial) function were used to produce optimal paths from Koumasa towards a chosen set of reference locations. Figure 23 visualises the paths, and Table 1 analyses their costs.

The routes in the Messara are, to a great extent, similar for all functions. The most obvious deviation is the preference for a more northern route towards Apesokari, Phaistos and Kommos by Bell-Lock and the exponential function (both pass through Vayionia, whereas the rest prefer the route near Vasilika Anoyia). The reason for this is illustrated in the plotting of the functions in Figure 19 above, as $B(x)$ and $X(x)$ have higher costs for medium slope than the others, thus the algorithm is pushed in preferring the lowest slope possible for walking in the valley, even though this does not reflect the reality of walking.

As for the mountainous Asterousia, there are more deviations between the functions. The direct way to Trypiti is recognised by all functions except the exponential, which favours a way passing through Krotos and north of Trachoulas. The other noteworthy deviation is towards Kophinas, for which a route through Panayia is proposed by $B(x)$ and $X(x)$. Both reflect the tendency of slope minimisation discussed above. The other functions have a greater degree of correspondence, with the Bell-Lock function being the one deviating the most, proposing a point west of Panayia to ascend to Kophinas, and proposing a route to Salamias and Ayios Ioannis through Trypiti via the coastline. As in the case discussed above, this function limits crossing high terrain, i.e. the Asterousia, as much as possible.

The Ox-cart and Tobler functions propose a route to Kophinas and to the coastal destination points that correspond most to the empirical data of walking (Chapter 11). The Ox-cart function is the only one recognising the route to Ayios Ioannis through

600 Schild 2016, 23.

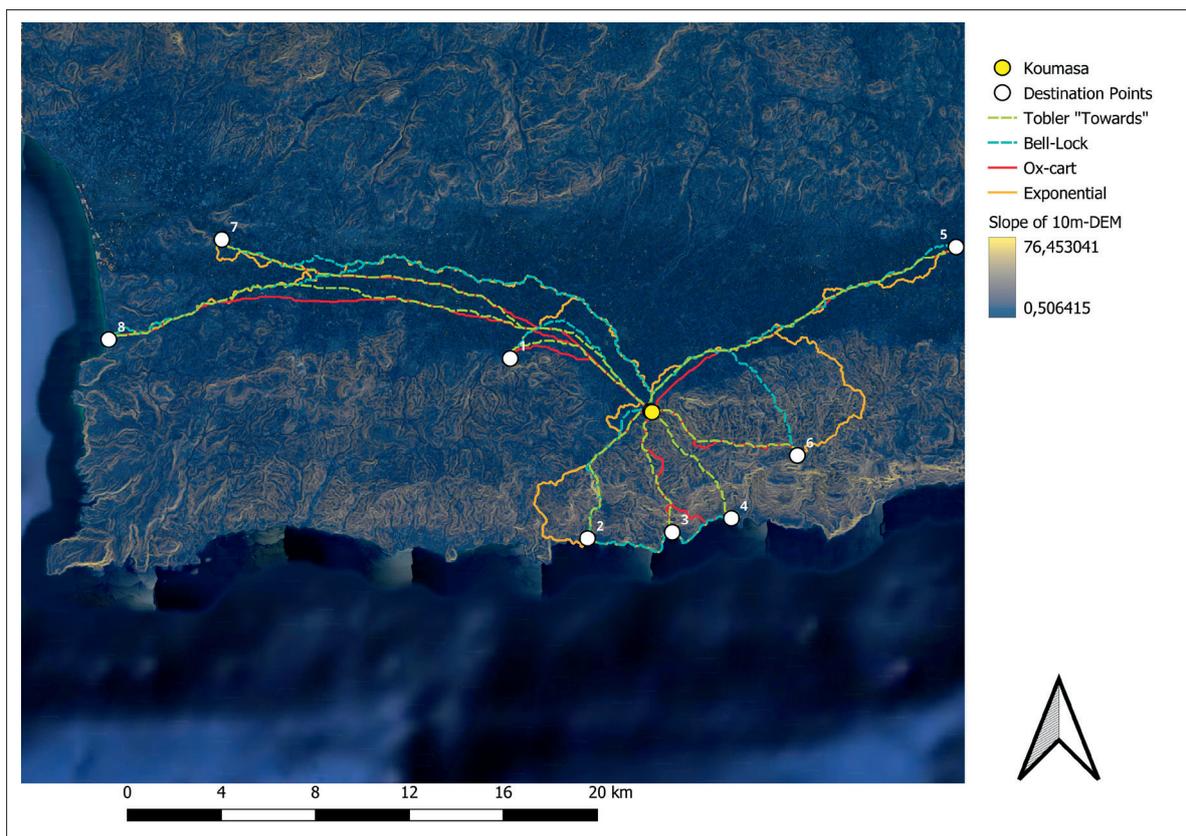


Figure 23: Least-cost paths from Koumasa to chosen locations; interpolation of 4 functions. Based on 20m.-DEM.

Seferis, which is a possible route but a difficult one.⁶⁰¹ Similarly, both functions propose a direct route to Salamias through the Salamias Gorge, which is rather misleading due to sudden drops of elevation in this gorge that are not captured in the 20m.-pixel DEM.⁶⁰²

In summary, the Ox-cart and Tobler functions appear to be closer to the reality of walking. The table compares the costs for walking from Koumasa to the reference locations, with the numerical sequence of the difficulty of each path per function shown in brackets. Normalised costs, based on the shortest distance for each function, are also presented for a visual representation of the results. The locations are arranged based on their nominal distance from Koumasa, as the crow flies, which serves to prove the relative irrelevancy of this metric, a fact known empirically and also highlighted with the comparison to the actual difficulty of travelling to each location, calculated on the basis of the analysis per the functions.

⁶⁰¹ See discussion at the end of Chapter 11.1.3.

⁶⁰² See discussion on page 284f.

Table 1: Comparison of the costs for moving towards the reference locations per used functions.

Analysis Locations	Distance from Koumasa (km)	Tobler	Normalisation	Ox-cart	Normalisation	Bell-Lock	Normalisation	Exponential	Normalisation
Salamias	5.3	25914 (3)	1.5	737,256 (3)	1.72	40,393 (7)	3	1120,092 (6)	6.78
Ayios Ioannis	5.7	31572 (6)	1.82	883,319 (6)	2.06	43,112 (8)	3.2	1151,087 (7)	6.97
Trypiti	6.1	25623 (2)	1.48	626,696 (2)	1.47	32,707 (5)	2.4	918,588 (5)	5.55
Apesokari	6.3	17326 (1)	1	427,335 (1)	1	13,479 (1)	1	176,460 (2)	1.06
Kophinas	6.5	30437 (5)	1.76	764,054 (4)	1.78	39,391 (6)	2.9	1338,886 (8)	8.1
Dhamantri	14.8	30325 (4)	1.75	852,652 (5)	1.99	17,245 (2)	1.3	165,216 (1)	1
Phaistos	19.6	41028 (7)	2.3	1143,952 (7)	2.6	24,242 (3)	1.8	240,431 (3)	1.4
Kommos	23.2	50728 (8)	2.9	1389,952 (8)	3.2	29,766 (4)	2.2	259,080 (4)	1.57

As for their costs, as the table above shows, Tobler’s function considers Apesokari the quickest to reach, with Phaistos and Kommos the furthest. Normalisation was performed on all elements of the table based on the path with the least-cost for each function to facilitate a comparative analysis. In the case of the Tobler model, the least-cost path is the one to Apesokari, which was assigned a value of 1. When normalising according to this quickest route, Kommos has a cost distance that is 2.9 times greater than that of Apesokari, while Phasitos is 2.3 times greater. (i.e. Apesokari is 2.9 times faster to reach than Kommos). Both Trypiti and Salamias have a time cost of 1.5 times the distance to Apesokari.⁶⁰³ This pairing is interesting as it showcases the effect of the mountain. Although Salamias is closer in cartographic distance, the walker would lose time due to the greater difficulty of this path. This is even better demonstrated for the next two locations, Kophinas and Dhamantri, where both have a similar relation close to 1.8 as per the normalised cost.⁶⁰⁴ Ayios Ioannis shows greater cost behind Kommos and Phaistos, at 1.82 normalised cost units. This is to be explained by the very mountainous path identified by this function, which is, to a great extent, unnatural (climbing to the top of Gerakias gorge, which is a significant effort). The longest distance is less than 3 times that of the shortest. The longest two are the furthest, which corresponds with this function’s main optimisation being for time.

The correlation of the Ox-cart function with the Tobler is also seen in the costs, as the Ox-cart shows a similar sequence and normalised values with the Tobler. An

603 1.48 for Trypiti and 1.5 for Salamias.

604 1.75 for Dhamantri and 1.76 for Kophinas.

inversion is seen in the sequence of Kophinas and Dhamantri. The normalised ratios also change slightly, with the difference between Dhamantri and Ayios Ioannis being minimal. Again, the route to Ayios Ioannis shown by the Ox-cart is not the one chosen when walking, but the path shown exists. The one indicated by Tobler to Ayios Ioannis, however, cannot be walked without climbing.

In Bell-Lock function, the smallest cost is again for Apesokari, with the cost, beginning from this iteration being the metabolic factor. Dhamantri is 1.3 times more fatiguing to reach. Phaistos and Kommos follow with 1.8 and 2.2 times the normalised value, respectively, with the mountainous path to Trypiti (at 2.4) and Kophinas (at 2.9) following. The last two places are occupied by Salamias and Ayios Ioannis, which are shown accessed through Trypiti, leading to a less accurate path cost. The most difficult distance is due to these last two locations, more than 3 times that of the easiest.

The Exponential function vary the most also in its costs, as can be seen in the table. As in the Bell-Lock, Salamias and Ayios Ioannis are accessed through the coastline from Trypiti, with the algorithm failing to find the mountainous ways (as discussed above, and as seen in Figure 19, the exponential function would stress the minimisation of slope more than the others). This contributes to the distribution of the costs to be similar to the Bell-Lock. Dhamantri and not Apesokari is the lowest cost destination, although barely. A great variance is observed in the case of Kophinas, as the destination with the most cost is ca. 8 times more than the cost to Dhamantri.

This analytical presentation of the results of these functions should demonstrate the inadequacy of choosing only one method and further shows (or rather verifies) that Tobler and the Ox-cart yield good results when mountainous terrain is under investigation.

Study 2

Applying the same steps to the 30m.-SRTM-DEM with the addition of Monastiraki as a target (see Figure 24), the results for the other locations vary slightly but not greatly for those destinations discussed in study 1, which is in correlation with the notion that a 30m.-DEM is not crucially worse than a 20m.-DEM.

One of the most notable discrepancies is that the Bell-Lock and Ox-cart functions now show identical paths for Salamias and Ayios Ioannis, which is considered an improvement. The Bell-Lock function now provides a different route to Trypiti, avoiding the Trypiti Gorge. However, this new route is deemed impractical based on empirical criteria. A further simplification introduced by the wider pixels is noticeable in the level area of the Messara, where the Ox-cart function presents non-naturalistic segments of straight lines. This pertains to the lesser applicability of the Ox-cart function on level terrain, as it will be presented below.⁶⁰⁵

⁶⁰⁵ See an evaluation of these functions on page 639.

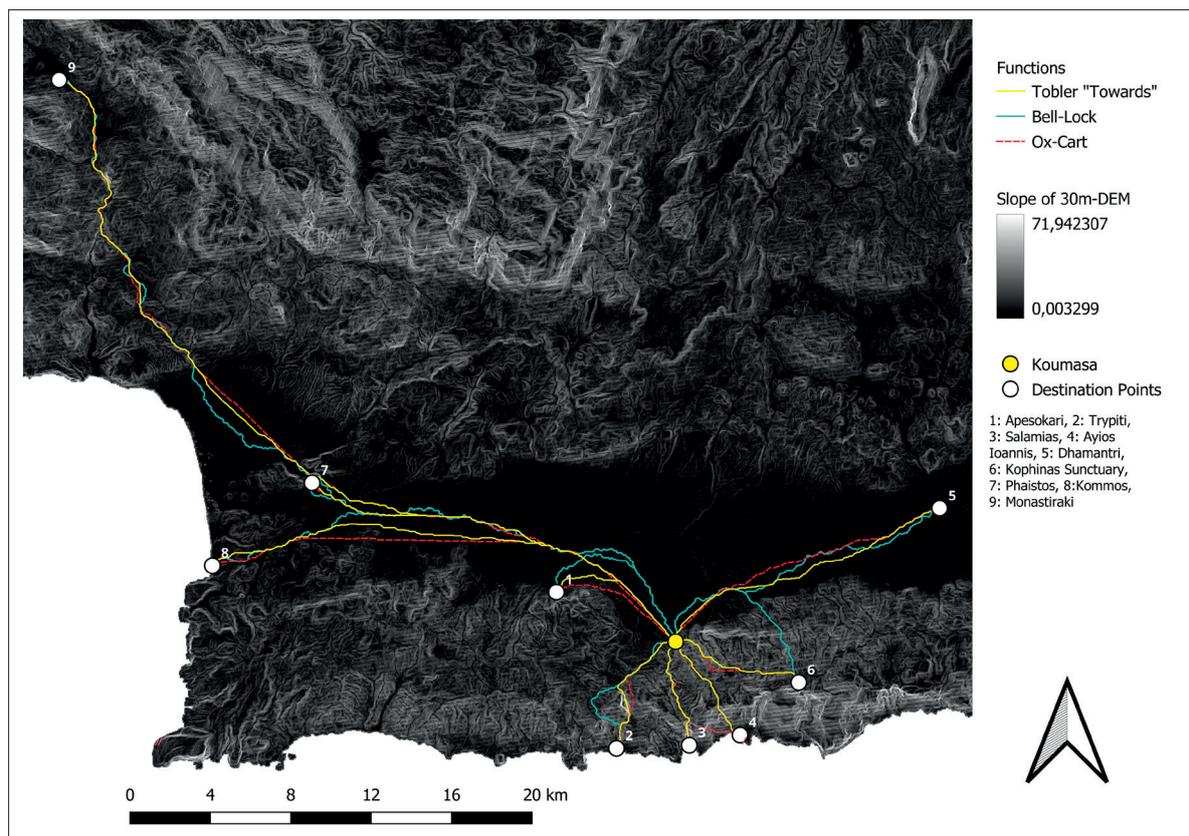


Figure 24: Least-cost paths from Koumasa to chosen locations on 30m.-DEM; interpolation of 3 functions.

Implementing Tobler and Oxcart, the least-cost paths were estimated, this time originating from Phaistos (Figure 25).

An interesting result, seen in the costs of Tobler, is that the path from Phaistos to Monastiraki is the second most costly after the path to Ayios Ioannis. The destination of Monastiraki is calculated to be 1.8 times more time costly than the path from Phaistos to Koumasa. In the case of the Ox-cart function, the path is 1.4 times more costly, approximating the distance ratio, which is 32 km. from Phaistos to Monastiraki and 23 to Koumasa.

Study 3

After studying the effects of various functions above, study 3 will follow a smaller scope of step-by-step implementation, aiming to take a closer look at the region of the Koumasa mesoscale and act as a guide for similar implementations.

As one of the interests of this work is showing the routes traversing the mountain range, only locations on either side of the Asterousia will be taken into consideration, thus excluding Kophinas in this study. Two Messara locations are included as a reference, which will also help the discussion.

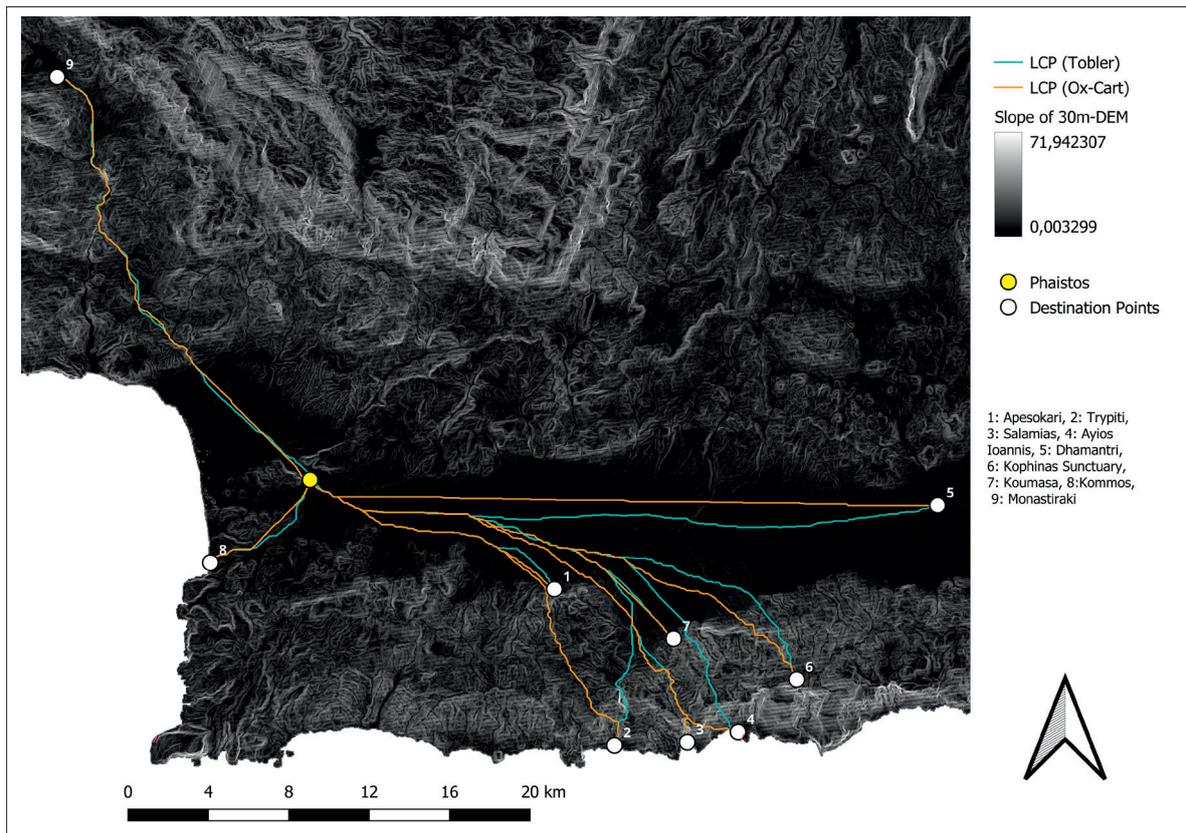


Figure 25: Least-cost paths from Phaistos to chosen locations on 30m.-DEM; interpolation of 2 functions.

The slope is used here with no reclassification, meaning the default classification of the GIS programme will be accepted, as to avoid discussion of the functions discussed above and focus on other parameters. The reclassification is close to the second-degree polynomial (the Exponential, as discussed above), which, although problematic, serves as adequate here. It is recommended, however, to avoid using the automatic reclassification. As in the previous studies both origin and destination points are allocated, which in itself might not be the most holistic approach. The downside of this method and the proposals to overcome it will be discussed in Chapter 5.3. The points chosen, despite being few, indicate nodes critical in understanding mobility through Asterousia in the central Messara-Asterousia region. The points include some of the harbour areas at the southern side of the range that are relevant in this work, beneath the highest points of Kophinas. Further, some exit points to the north are defined. As a quality control, other known nodes were expected to appear.

Iteration 1: Least-cost-path between the two sides of the centre of Asterousia

In this iteration, the zero values are not removed from the DEM, allowing for the sea route. The resulted paths are seen in Figure 26.

The fact that the zero value is not removed is clear from the mobility presented along the coastline. To further study the results, the field of length is added in the attribute table of the created path layer so that a cost and a length value are available for each path. This length does not correspond with the distance of these two locations in general but only expresses the length of the path. The cost/distance values for the various route locations are analysed in Table 2.

Cost accumulation and pathfinding techniques

Even when the points included in the input layer for the function of cost distance analysis only included Koumasa, Apesokari and Dhamantri to the north of Asterousia, and Ayios Ioannis and Trypiti on the coastal side, without adding Salamias or Tris Ekklisies, path passing through them are obtained, meaning the paths through Salamias bay and Tris Ekklisies were deemed the most natural connections, thus highlighting their importance as nodes for the connection to the coastal region (in the case of Salamias) and between the two sides of the mountain range (in the case of Tris Ekklisies).⁶⁰⁶

In total, four distinct paths traverse the Asterousia in this iteration. This clear-cut result is, of course, influenced by the intrinsic characteristics of the algorithm. The lack of alternatives or forks, for example, is due to the nature of the least-cost-path approach, in which secondary and tertiary results are being neglected. The resulting four paths do, however, remain indicative of the movement possibilities. Two of them lead from Salamias bay and Trypiti to Koumasa. Another leads from Trypiti to Apesokari through the area of Krotos.⁶⁰⁷ The last one, bypassed the mountain peak from Tris Ekklisies, representing the way from the eastern end of the central Asterousia⁶⁰⁸ and through the Anapodaris valley towards the Messara, towards the region of Dhoraki, Rotasi, and ultimately reaching Dhamantri.

For all paths, the length and the total cost are presented in the table above, except the last one, which, since it follows the 0 value for half its course, is less relevant. The parameter of cost takes into account the accumulation of the slope factor. This is clear in the comparison of the paths from Koumasa towards Apesokari and from Koumasa to Ayios Ioannis, with similar path lengths of 9.73 and 10.56 km. respectively: The accumulated cost of the path to Apesokari, which traverses mostly a relatively even plain is calculated at 34 units of cost, while the one through the Asterousia to Ayios Ioannis has

606 In Figure 26, Salamias is indicated as a target location, but even when it is not, the path calculated towards Ayios Ioannis passes through it. Similar behaviour of some functions was discussed in Study 1.

607 As already mentioned, this automatic reclassification resembles the Exponential of Study 1. This is mostly evident in the path through Trachoulas, and Krotos mentioned here, which is similar to the paths of the exponential and the Bell-Lock presented in Study 1 above.

608 On the proposed regions of the Asterousia, Chapter 9.1.

5.2 Least-Cost Paths Between Defined Locations

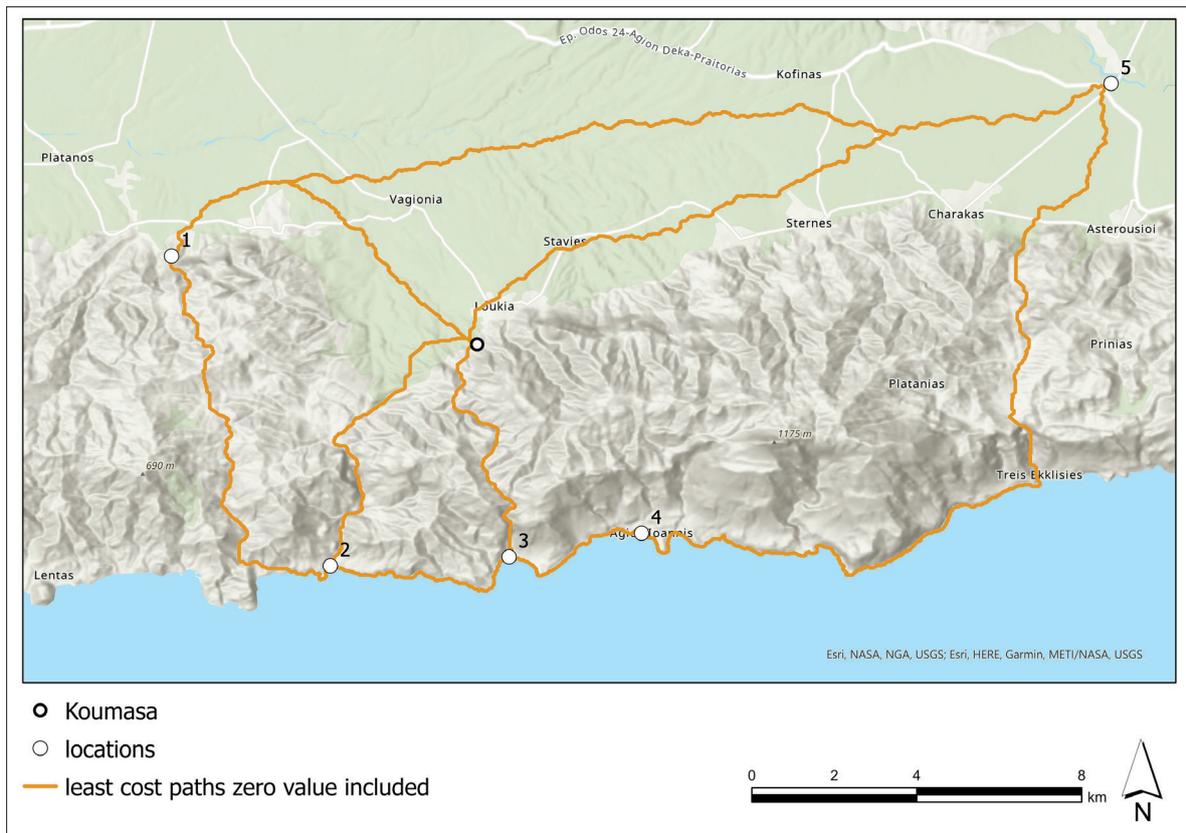


Figure 26: Least-cost paths between Koumasa and the locations of 1: Apesokari, 2: Trypiti, 3: Salamias bay, 4: Ayios Ioannis, 5: Dhamantri. The calculation was based on the 20m.-DEM including the sea level (zero value).

Table 2: Cost and distance of Routes calculated in iteration 1.

Route	Cost (in thousands)	Distance (km)
Koumasa–Apesokari	34,057	9.736
Koumasa–Ayios Ioannis	84,599	10.56
Koumasa–Trypiti	68,971	8.36
Koumasa–Salamias	78,125	6.831
Koumasa–Dhamantri	35,481	17.67
Salamias–Ayios Ioannis	5,474	3.73
Salamias–Trypiti	16,202	5.05
Trypiti–Apesokari	84,111	11.72
Apesokari–Dhamantri	45,327	23.65

more than double the cost, namely 85, despite having approximately the same length. Most of this cost is due to the path from Koumasa to Salamias, with 78 units of cost for 6.8 km. through the steep slopes of Asterousia, with the rest 3.76 km. from Salamias to Ayios Ioannis being covered by the coastline. Yet another example to illustrate the point of the inadequacy of the length alone to estimate difficulties of travel, the Koumasa–Trypiti path measuring 8.36 km. is shorter than the Koumasa–Apesokari path of 9.73 km., but its cost of 69 units is almost exactly double of the above-mentioned cost of the Koumasa–Apesokari path.

Discussion

The analysis alludes to dependencies of the harbour regions on the few mountainous paths to reach the centres of Messara on the northern side of the Asterousia. The Kophinas peak and the surrounding range act as a clear obstacle, allowing only a few paths to traverse it. Around the exit points from the mountain, such as the area of Koumasa or the Rotasi area, have the potential to assert a degree of control over these routes. Trypiti is connected with both Koumasa and Apesokari, with the cost and path distance to Koumasa being somewhat smaller than that to Apesokari.⁶⁰⁹ Salamias, where a Minoan port has been alluded to,⁶¹⁰ connects to Koumasa through a path, that is also used by the path to Ayios Ioannis, continuing 4 km. east of Salamias along the coastline. The reason is that the land route between Salamias and Ayios Ioannis is deemed more costly than the zero-cost alternative of the sea route in this iteration. Koumasa is then in potential contact with three ports in total, of which exclusive contact with two. It is also at the end point of two paths through Asterousia, being located at the exit point of them towards the Messara.

Further to the east, the fourth path of the central Asterousia is to be seen on the eastern side of Kophinas. The path begins at Tris Ekklisies and ends in the Messara not far from Dhamantri or Rotasi. Evidence of settlement activity at the output of Anapodaris further to the east has been known,⁶¹¹ and this access illustrates the importance around Rotasi, which remained in the Post-Minoan times.⁶¹²

Iteration 2: Removal of the zero value

As could be verified from the attribute table of the DEM raster, the point count stretches from 0 to 1208, which corresponds to the height of Kophinas according to the projection followed by this DEM. The “count” field for the value of zero (which can be obtained from the preferences of the raster) has the highest count number, as to be expected from

609 On the existence of tholoi on two of those paths at Krotos and Christos, see below and discussion in Chapter 9.3.

610 See Chapter 11.3.2.

611 See Footnote 381.

612 See Footnote 288 and discussion in Chapter 2.5.

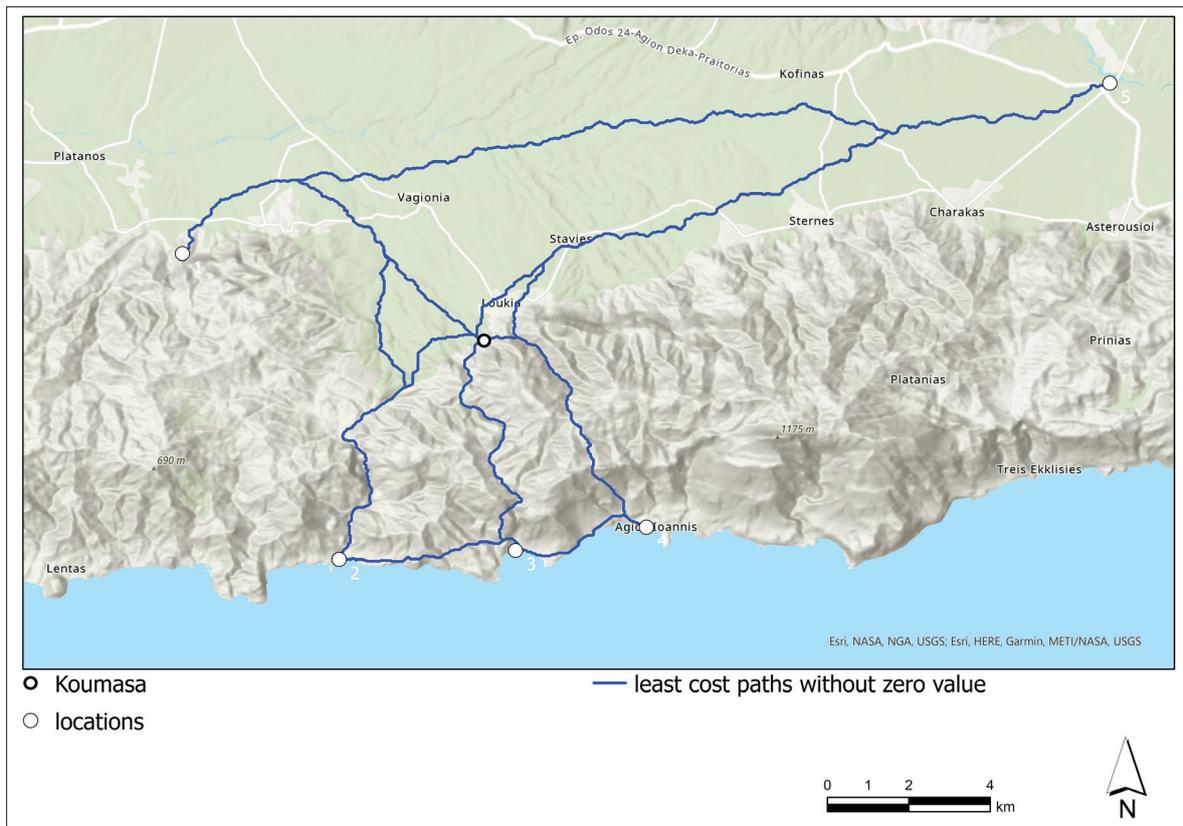


Figure 27: Cost Distance without the value 0.

the sea level. A new raster was obtained using the tool of “Extract by attributes” with the clause of all greater than zero.⁶¹³ Then, the slope in degrees is extracted, after which the steps for cost connectivity are repeated for the same six locations as before (see Figure 27). Again, the default classification was used.

The new network has some differences from the one produced in iteration 1, offering a new insight but also acting as a good demonstration of the algorithmic procedure. Those differences are explained through the removal of the zero value from the DEM, no longer offering the low-cost sea route as an option. Hence the route through Tris Ekklisies, which again was not used as a node, is absent. The details of the paths are given in Table 3.

The new Koumasa–Ayios Ioannis path is ca. 15 thousand more in cost units, which explains why it was discarded in the first iteration despite being 3.5 km. shorter. This new path branches before exiting the mountains to direct towards Dhamantri to the east and Koumasa to the west. Another new route is the one between Trypiti–Ape-sokari, which was suggested due to the absence of the sea connection west of Try-

613 This was done in ArcGIS. The same result can be obtained in QGIS through Raster Calculation tab, and applying (“DEM@1”)/ (“DEM@1”>0).

Table 3: Cost and distance of Routes calculated in iteration 2.

Route	Cost (in thousands)	Distance (km)	Comparisson with iteration 1
Koumasa–Apesokari	34,057	9,736	Same as in the first iteration
Koumasa–Ayios Ioannis	99,354	6,931	New. 15,0 more cost
Koumasa–Trypiti	68,971	8,36	Same as in the first iteration
Koumasa–Salamias	78,125	6,831	Same as in the first iteration
Koumasa–Dhamantri	35,481	17,67	Same as in the first iteration
Salamias–Ayios Ioannis	43,674	3,35	New
Salamias–Trypiti	50,582	4,24	New
Trypiti–Apesokari	86,533	16,1	Partially new
Apesokari–Dhamantri	45,327	23,65	Same as in the first iteration
Ayios Ioannis–Dhamantri	125,190	23,274	New

piti, bypassing the Trachoulas promontory. The route is slightly more costly, mainly through distance rather than slope.

The new land routes for the neighbouring Salamias and Ayios Ioannis are also of interest. While being of similar distance, even 400 meters less, the difficulty is 43.7 in comparison to the ca. 5.0 of the first iteration, showing the difficulty of the terrain caused in that area. The land connection of Salamias to Trypiti is represented with 15% more cost than the path to Ayios Ioannis.

Discussion

The first two iterations present a straightforward choice regarding the use of the sea. However, as discussed in Chapter 11, the second iteration aligns more closely with the actual experience of walking (with the exception of the path to Ayios Ioannis). The reality is seen to be a hybrid combination of both approaches.

The two most obvious differences are the appearance of a direct path between Ayios Ioannis and Koumasa, and the other is the disappearance of the route through Tris Ekklesies. Now the sea route to Dhamantri through Tris Ekklesies is no longer available from Ayios Ioannis, preferring a route through a path close to Koumasa. Also, since travel from Salamias to Ayios Ioannis is no longer possible through the sea level, another path was found by the algorithm, which in the first run was discarded, partially due to the high cost of the path segment between Ayios Ioannis and Salamias. However, this path is actually very close to the actual path connecting the two locations that was walked by the author (path 4, in Figure 92).

The path between Ayios Ioannis and Koumasa, however, traverses a significantly steep mountainside, passing not very far from the village of Kapetaniana. As will be

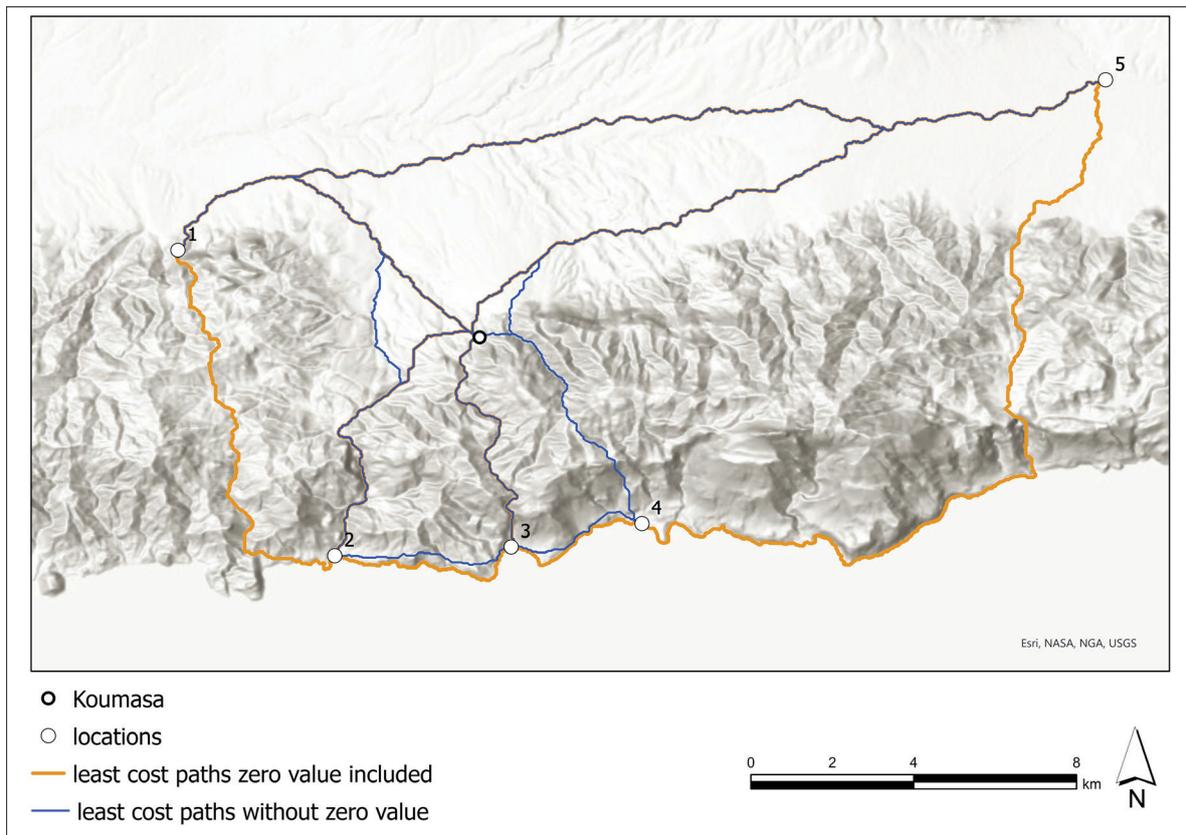


Figure 28: Overlapping two calculated least-cost paths showing the different paths from the two iterations.

discussed in Chapter 11.1.3, it is not practical for walking. However, it is close to the path proposed by the Ox-cart function (see Figure 22), which represents a difficult but walkable path.

When the two resulting datasets are compared (see Figure 28), it becomes obvious how the parameters influence the results. Both have merits, but they can be used only as indicators and not as proof.⁶¹⁴

Iteration 3: Cut-off slope

This iteration presents a cumulative analysis of two approaches that involve setting upper slope limits of 35 and 40 degrees, in contrast to the no cut-off method used in iteration 2, with removal of the sea level for all variations. Here, the focus is distinguishing movement patterns from those observed on relatively even terrain.

⁶¹⁴ As discussed at the beginning of this chapter, the function used here is not the optimal one; used here as a case-study of the steps for evaluation of the results. Even this function, is seen to provide some useful information when the results are approached critically.

As presented above, the accepted slope for trade routes is around 20 degrees.⁶¹⁵ Indicatively, for the network in Messara, Déderix applied a cut-off angle of 30 degrees. This approach follows established patterns indicating that movement along steeper slopes is considered impractical for trade routes and human walkers from a metabolic perspective.⁶¹⁶ However, trade and pastoral movement are prerequisites for any connections within the Asterousia. The feasibility of moving trade in mountainous terrain is studied in other parallels such as the Andes or South Africa, where the use of carrying animals was used, primarily the donkey (*Equus asinus*) discussed above or by parallels in modern Crete.⁶¹⁷ More crucially, however, the elements of raster imagery must be carefully examined, and as proven by the author's movement, single or a few pixels of slope value of 40 degrees or slightly more do not pose a hindrance in the movement through the terrain. For example, in the movement from the Trypiti shore towards the Trypiti EM settlement, which lies atop a hill, or walking on the Korakies hill of Koumasa, one passes through many pixels of elevation between 30 and 40 degrees (see e.g. Figure 64 in Chapter 6).⁶¹⁸ For example, using the 35-degree cut-off would render the Trypiti settlement or the 'sanctuary' at Koumasa less accessible, which is naturally not the case. Of course, assigning more cost to those pixels is in accordance with the reality of the movement, but as seen in Figure 29, cutting off all pixels with a value higher than 30 degrees removes pathways that could be assumed to be realistic, and after walking the terrain, were proven to be good indications of actual paths. So, for example, the Salamias–Koumasa route passes through 20 pixels with slope more than 20 degrees, with them not being consecutive but scattered through the whole path. Many of these points can be easily bypassed though, a fact that least-cost-path analysis has problems identifying. Thus, implementing various degrees of cut-off the resulting interpolation of paths can be used as an indication for the area. Having this caveat, the analysis below renders some insight and is therefore deemed useful.

Inserting the cut-off, the algorithm is forced to find different paths. Two different levels are presented, with a cut-off at 35 and 40 degrees, where the slope was used with the default values of manual intervals and 11 classes, based on the distribution of the degree values. A repetition of the steps with the use of the reclassification option did not produce any different results.⁶¹⁹ The easiest method for this step is by deleting the rows upon the wished threshold and applying the option of changing missing information

615 See Discussion on page 110.

616 Déderix (2016, 558) applied a virtual cut-off, by applying a very high cost to cells above 30 degrees, so as to force the software to bypass those areas, following Proffitt et al. 1995.

617 See discussion on pages 111ff.

618 The paths through these areas were walked by the author, noting that moving around the pixels with high degrees results in a more fatiguing climb. Of course, elements of zigzagging can be assumed, foremost for the movement within the settlement, but the result remains that cutting off these individual pixels leads to less realist movement overall.

619 Under spatial analyst tools in ArcGIS. The reassigned classes were experimented upon with steps of 1-, 3- and 5-degree steps, with no change in the outcome, as was expected.

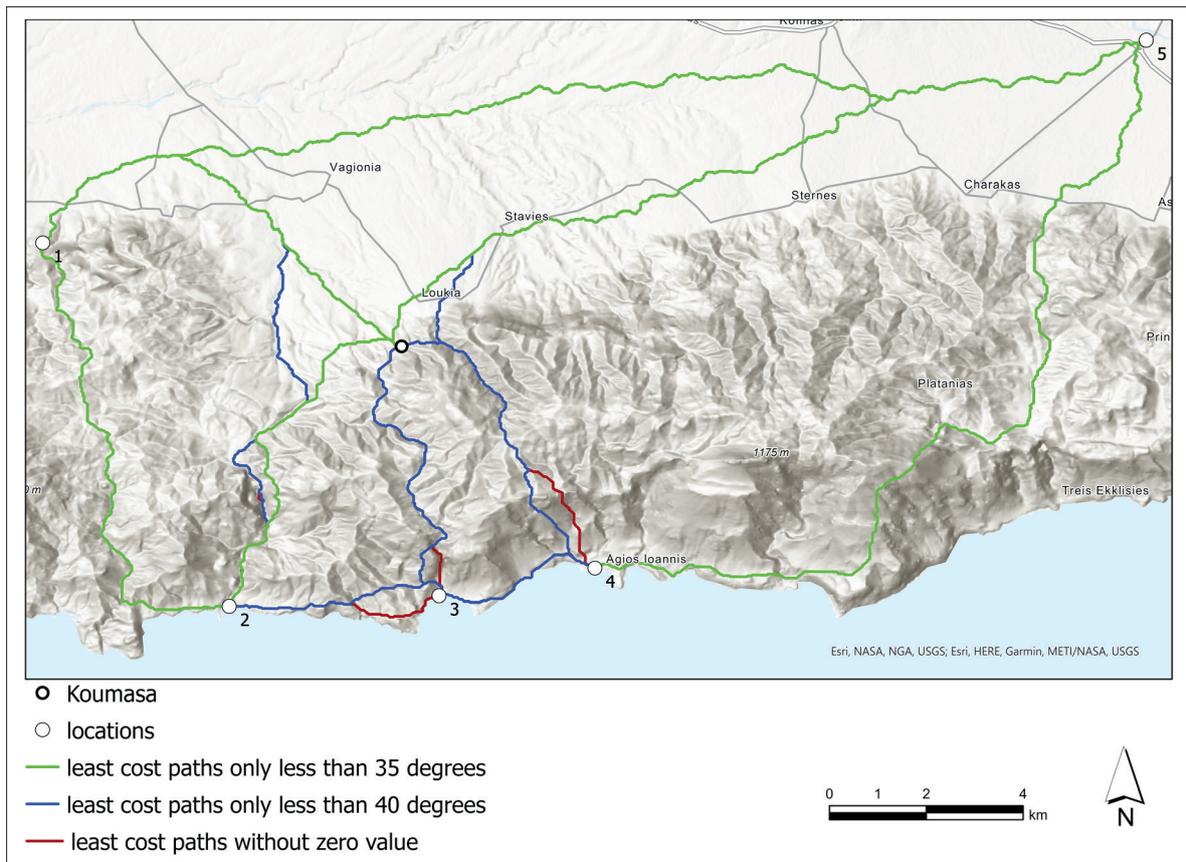


Figure 29: Implementing the cutting off of cells from the slope raster at different values.

to “Nodata”, since when just assigning a very high value (virtual cut-off) the algorithm will force the same connections as in iteration 2, when no other route is possible.⁶²⁰ Those paths are overlapped with the results of iteration 2 (i.e. without a cut-off) in red.

When the 35 and 40-degree cut-off are identical, only the green line appears, as it overlaps it. The overlapped result of iteration 2 is shown only where it differs from both cut-off implementations.

Discussion

From this iteration, it is noteworthy that in the 35-degree cut-off, the only three connections from the southern harbours are that of Trypiti to Koumasa, of Trypiti towards Apesokari, through Trachoulas towards Apesokari and the long connection from Ayios Ioannis towards Dhamantri, passing near the Treis Ekklesies point, thus bypassing the Kophinas peak through the extreme east and west of the study area. The other paths are rendered not accessible with this cut-off.

For movement allowed beneath the 40-degree limit, the same paths towards Koumasa and also between the southern points as in iteration 2 appear, including from

⁶²⁰ This refers to the virtual cut-off, as implemented elsewhere (see Footnote 616) is not practical here.

Salamias and Ayios Ioannis, with slight variations to their south in the areas where pixels with slope degree values between 35 and 40 appear. In the case of Salamias, the way through the Salamias gorge is, in actuality, bypassed, favouring a way to the west of the gorge.⁶²¹

The way from Koumasa to Trypiti remains as it was in iteration 2 when applying the 35-degree cut-off since the route does not showcase any pixels with a slope degree higher than 35. However, the routes to Salamias and Ayios Ioannis vanish completely at the 35-degree cut-off, where, as mentioned above, around 20 pixels have a value of more than 40. As discussed, this does not render this path unwalkable, but the *desideratum* of an on-site inquiry was made apparent. Evaluating these paths after walking to these locations will be discussed in Chapter 11.

Iteration 4: Scattered destinations around interest area

For this iteration, the goal was to observe the least-cost paths from Koumasa towards all directions by specifying 35 points around the area of interest surrounding the central Asterousia (Figures 30, 31). This method has been used to specify the main corridors leading to a specific area, such as by Efkleidou for Mycenae.⁶²² Another parallel example was performed for the Amanus mountains, where Schild used Tobler's hiking function.⁶²³

The resulting outcome illustrates groups of paths originating from Koumasa as the origin point in a *quasi-omnidirectional* least-cost-path module. While this approach may appear similar to the flow accumulation in Chapter 5.3.2, it remains distinct. Nevertheless, it serves as an approximation for it, with the evenly distributed points along the desired periphery emulating natural paths or free walking, akin to what flow accumulation represents (as seen in Chapter 5.3). Since the endpoints are semi-arbitrarily fixed, the resulting paths indicate the main arteries of communication, as opposed to the flow accumulation method, which indicates possible directions of movement based on the terrain. As expected, the paths crossing the mountain resemble those generated in iteration 2 for the non-reclassified slope (Figure 30). Paths based on the Ox-cart function are illustrated in Figure 31, chosen as this function was seen to emulate the natural walking on the mountains at a satisfying degree. In the latter case, which, as expected, yielded more natural results with a higher degree of branching, the five main path groups, or axes, are numbered and discussed below.

This summation illustrates the barrier that the central Asterousia poses. Further, for the coastal area until before Tris Ekklises, the paths favoured are through Ayios Ioannis, Salamias and Trypiti, while from Tris Ekklises and eastwards the paths are bypassing the mountain peak of Kophinas from the east, exiting the mountain in the area around

621 To be noted, that this path is not practical when walking with load, a fact that is missed by the algorithm due to the pixelation effect, discussed on page 291. However, it acts as an indication of possible paths, which proved to be true.

622 Such an example is Efkleidou 2019, Fig. 5.

623 Schild 2016.

5.2 Least-Cost Paths Between Defined Locations

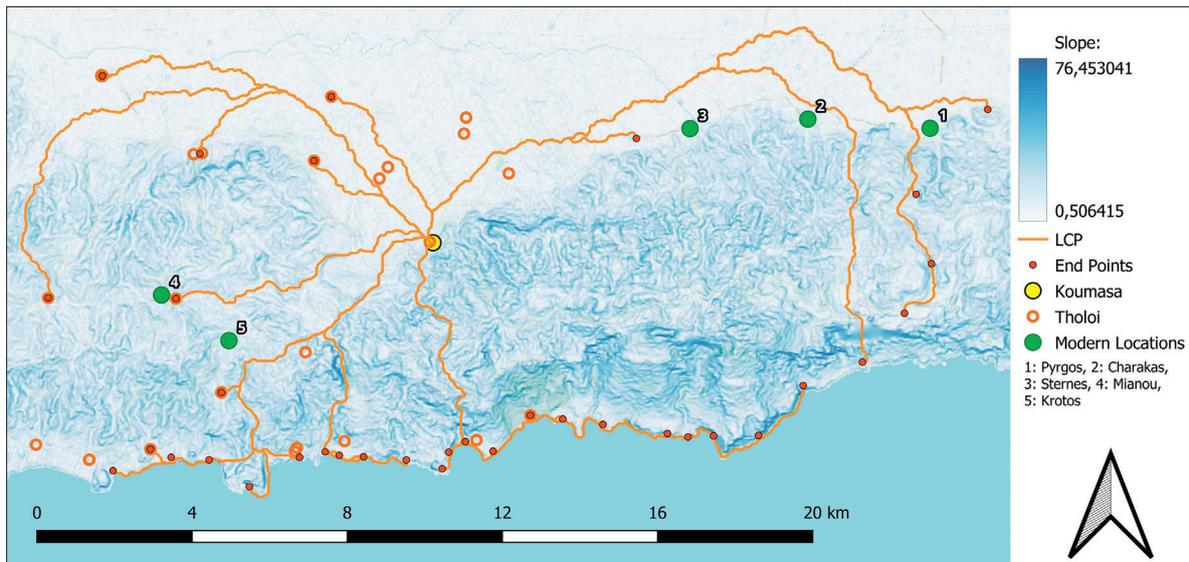


Figure 30: Least-cost paths from Koumasa to peripheral points, based on the slope raster.

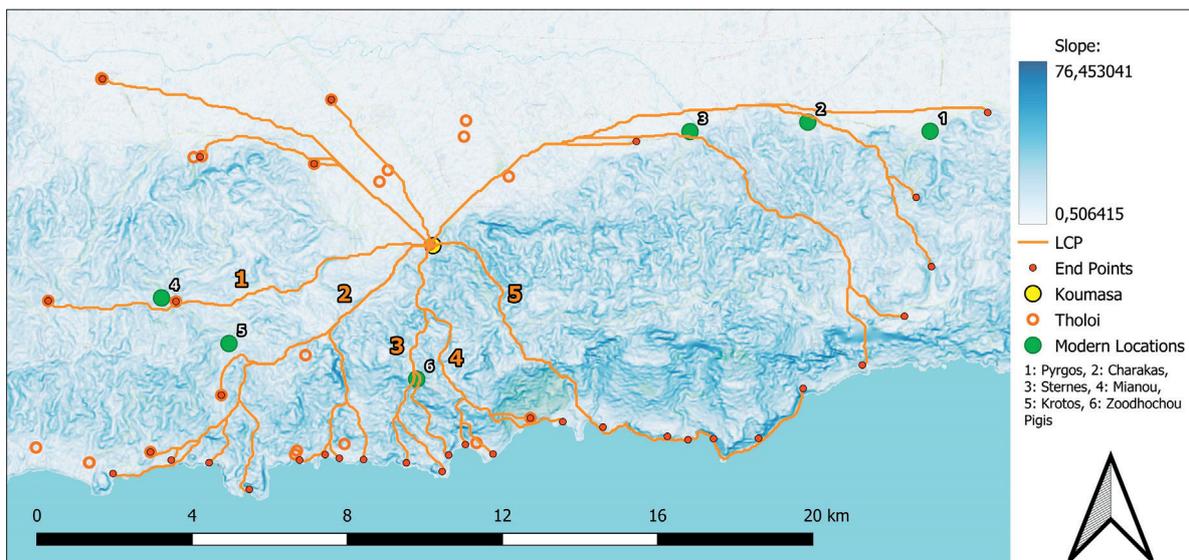


Figure 31: Least-cost paths from Koumasa to peripheral points, based on the Ox-cart function.

Pyrgos, Charakas and Sternes, adding to the reasons this area is seen as distinct, dubbed as eastern-central Asterousia.⁶²⁴ This would hint at the location of Koumasa as the access node from the Messara to the coastal areas up to Tris Ekklisies, in the area dubbed as central Asterousia. It is noteworthy that one of the two modern roads accessing the Kophinas peak sanctuary begins from Panayia/Sternes (the other being from Loukia passing through Kapetaniana). When the endpoints further to the east are assumed as targets, the areas of Rotasi and then those along the Anapodaris for the eastern Asterousia become clear as access points, as anticipated (no figure was included for this case).

Some of the endpoints were chosen near tholoi concentrations, such as Lebena and Trypiti, while some were directly on tholoi, such as Krotos, Ayios Kyrillos and Korakies, near Miamou. In the case of the second Figure (following the Ox-cart's parameterisation), the same direct path (path-group 1 in Figure 31) leads from Koumasa to the latter two tholoi, which are located in the western-central Asterousia; while in Figure 30 only Korakies is directly connected and Ayios Kyrillos is accessed through the valley from a path bypassing Apesokari and modern Plora before ascending, approximating thus the modern road. Again, the tendency of the exponential function (as also the Bell-Lock) to always favour the valley is demonstrated here. The connection to Koumasa could be seen in connection with observation, discussed in Chapter 5.4, that the Korakies tholos seems to have a direct eye-of-sight contact with Koumasa.

The next axis paths (path-group 2) lead to the area of the Christos tholos, where (as discussed by Pendlebury) the paths branch into one leading to Trypiti and another leading to Miamou and Krotos (Krotos being one of the target locations on the path group 2).⁶²⁵ This second branch eventually leads to Lebena. Most of the branches represent possible paths, as walked by the author.

Path-group 3 leads to the church of Zoodhochou Pigis, from whence they branch southward, under the effect of a rough gorge beginning directly south of Zoodhochou Pigis. The easternmost of these paths leading to Vourlidia is very close to the walked path.⁶²⁶

Path-group 4 leads to Ayios Ioannis and Salamias, alluding to the actual possibilities but disregarding some obstacles in the path towards Salamias through the Salamias gorge.

For the locations further east up to Tris Ekklisies, instead of passing through Ayios Ioannis, a direct path (path 5) passing to the north of Ayios Ioannis is proposed, that, although possible and partially walked by the author, this is not be considered as a valid option for a path considering load carrying.⁶²⁷ A qualitative discussion of the limitations of the GIS-produced paths in relation to the reality of walking will be further discussed in Chapter 11.1.

624 On the proposed regions of the Asterousia, see discussion on page 237 in Chapter 9.1, and Figure 78.

625 Pendlebury et al. 1935, 87. See also the discussion in Chapter 11.1.1.

626 See path 3 in Figure 92 and Chapter 11.1.2.

627 See path 5 in Figure 92 and Chapter 11.1.3.

5.3 Network Connectivity

5.3.1 Accumulation Cost Surface

In the studies of the examples above, optimal routes between a given set of places were produced. For the purpose of analysis of a location's potentiality, in terms of terrain accessibility, this method lacks some information; as, for example, not all possible destinations from a starting point are known. Without this *a priori* knowledge the methods described above will not provide a clear view of the role of a certain location within its landscape and focus on conditioned optimal routes.⁶²⁸ Therefore, the concept of moving without a destination was developed, where given one starting point, all optimal routes are calculated and guide the movement.⁶²⁹ Instead of channelling movement to specific locations, the most accessible natural parts of the terrain are made visible in an accumulated cost surface. Building on this, the most natural paths are obtained.

A method from the field of hydrology is used to accomplish this. The logical step behind this is that the flow of water in a region towards a basin is similar to the paths leading to a selected source, both following the slope, which can be parameterised or reclassified. In this way, the point of choice serves as the equivalent of the lowest point of a catchment, and the paths will be “pouring” into it branching out the further one goes from the starting point. The cost surface was used as an input raster for the calculation of the flow direction, so the flow from the locations of high-cost values, such as slopes, will flow downwards towards positions of lower cost value. This will not be only downwards, ie towards lower slopes, but also nearer to the starting point, because with these cost maps after this parameterisation, as the movement-direction-layer shows, the programme renders the map not as per their actual height, but relating to their distance/cost towards the point of origin, as distance or effort are the main cost factors for the cost map utilised.⁶³⁰

Utilising the 20m.-DEM, the following accumulated cost surface can be produced, indicating travel effort from Koumasa (Figures 32, 33).

Various modalities can be applied to extract valuable information from the DEM, such as the use of different bands.⁶³¹ Notably, however, the extraction of vector layers, such as paths (as discussed in the next chapter) or isochronous lines, is of significant importance for evaluations. Isochronous lines are algorithmically akin to contour lines on an elevation raster. The key distinction lies in applying this algorithm on the accumulation cost, illustrating equal cost-distance from the source (Figures 34, 35).

628 Iteration 4 of Study 3 was an effort to address this issue, but the downside of predetermining locations as well as the monosemantic solution of the least-cost-path method remains.

629 Fábrega-Álvarez 2006, 7.

630 Fábrega-Álvarez 2006, 8. In other words, the point of origin is artificially rendered as the basin where all paths gather.

631 Bevan 2010, Figs. 3–6; Casarotto 2018, 53–55.

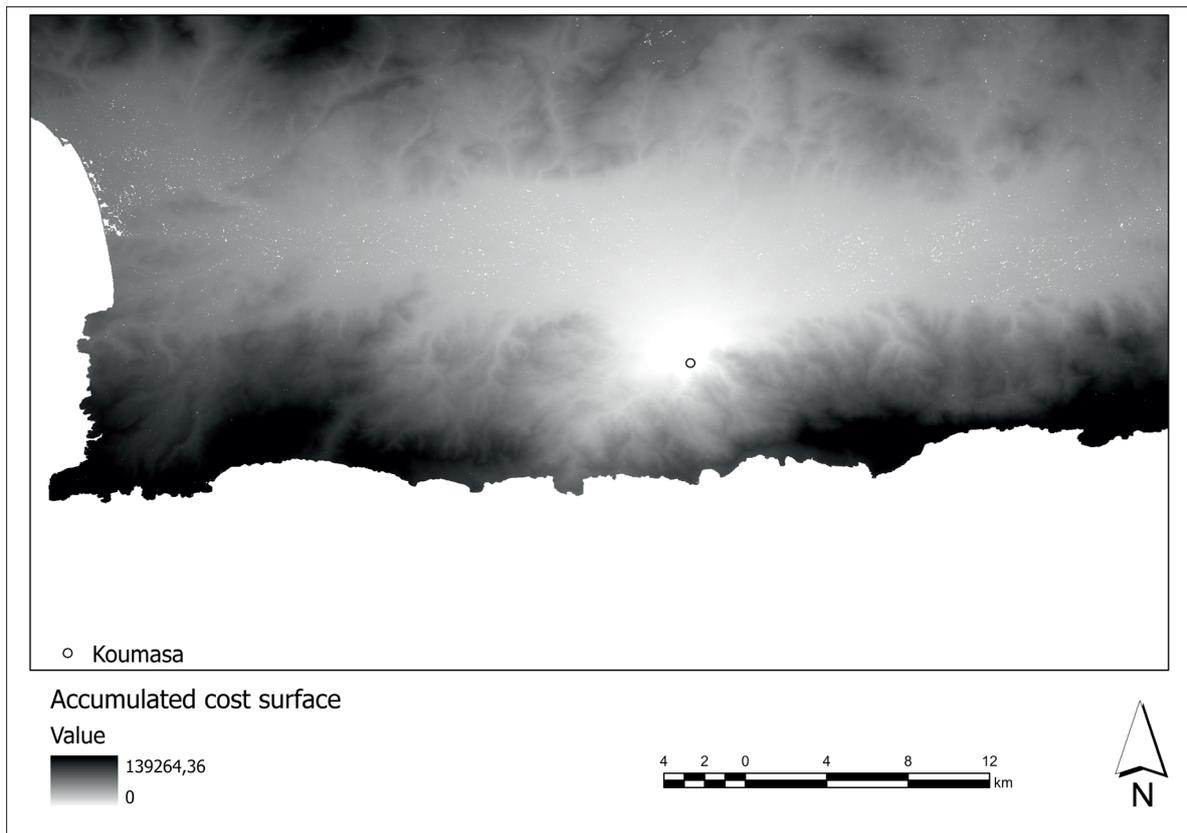


Figure 32: Accumulated cost surface for the Messara-Asterousia region of Koumasa on the 20m.-DEM. The dark and bright areas represent a scale for representing each cell, corresponding to the cost of traveling from each cell to Koumasa.

In the instance of a time currency for cost, as depicted in the first Figure 34, Tobler's function is implemented on the 20m.-DEM. Meanwhile, Figure 35 represents the outcome of the accumulation cost calculation of the not-reclassified 30m.-DEM, providing insights into metabolic effort considerations.⁶³² The isochronous lines in the second example are double the interval of those in the first, a choice made for better visualisation purposes.

A first observation concerns the difference in the portrayal of mountainous terrain compared to the valley due to the difference in the cost allocation and is irrelevant to the difference in the DEMs.⁶³³ In the time-dependent cost representation of Figure 34, Apesokari lies on the 4th time contour line, whereas locations in the Asterousia region are around the 6th time contour line, indicating a 1.5 times longer travel time to reach

⁶³² The r.walk Function of QGIS was utilised.

⁶³³ Both methods were implemented in both DEMs showing little dependance on the DEM used.

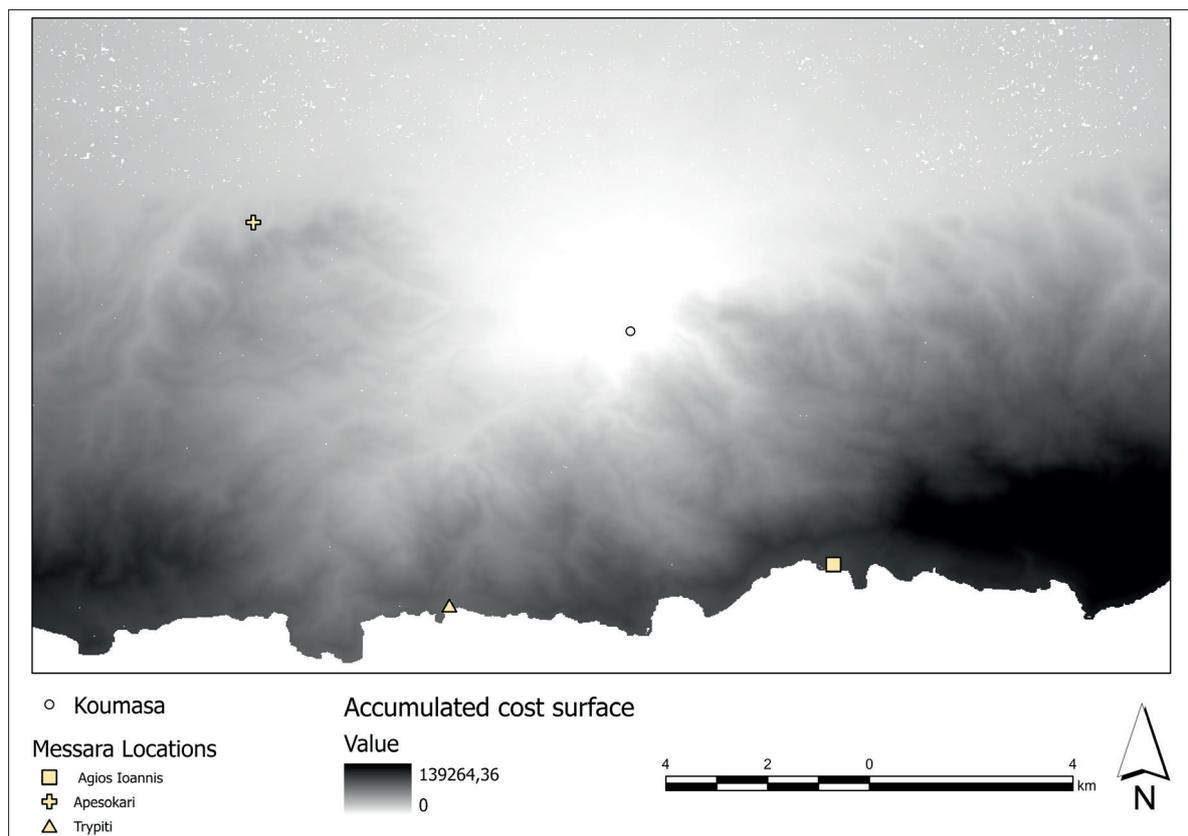


Figure 33: Accumulated cost surface for the region around Koumasa on the 20m.-DEM. The dark and bright areas represent a scale for representing each cell, corresponding to the cost of traveling from each cell to Koumasa.

these areas, in comparison with the time needed for Apesokari.⁶³⁴ Phaistos is more than twice the time required for Apesokari, falling between the 8th and 9th time contour line. In Figure 35 (where each isochronous line corresponds to two in Figure 34), Phaistos is 1.5 times farther than Apesokari (in terms of time), while reaching the Asterousia locations requires 2 to 3 times more time than reaching Apesokari. This results in a reversal of the finds from the first case.⁶³⁵

In the first scenario, the actual distance plays a more crucial role in the cost currency, whereas in the second scenario, the impact of mountainous slopes becomes more significant. Consequently, level areas appear closer in the second case, in contrast to the first, while mountainous locations seem farther due to the increased time and effort required to traverse the paths to them. Another notable observation is that in both cases, Dhamantri is situated nearly on the same isochronous line as that of Phaistos.

⁶³⁴ The reference to the time-distance to Apesokari serves as a normalisation factor in this discussion, facilitating the analysis without implying any particular significance of Apesokari in this context.

⁶³⁵ Refer to Study 1 in Chapter 5.2 and the discussion of the differences in the functions there.

5 Insight of GIS for the Mobility Networks around Koumasa to Messara

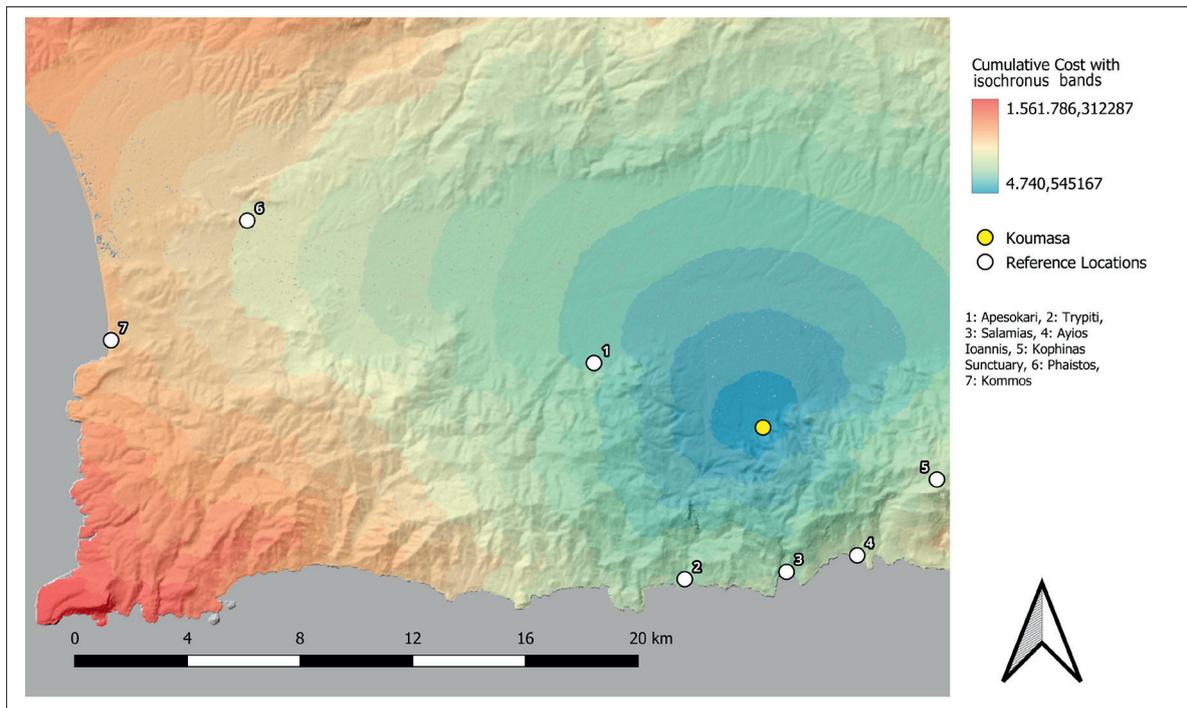


Figure 34: Isochronous bands on the accumulated cost surface of the 20m.-DEM.

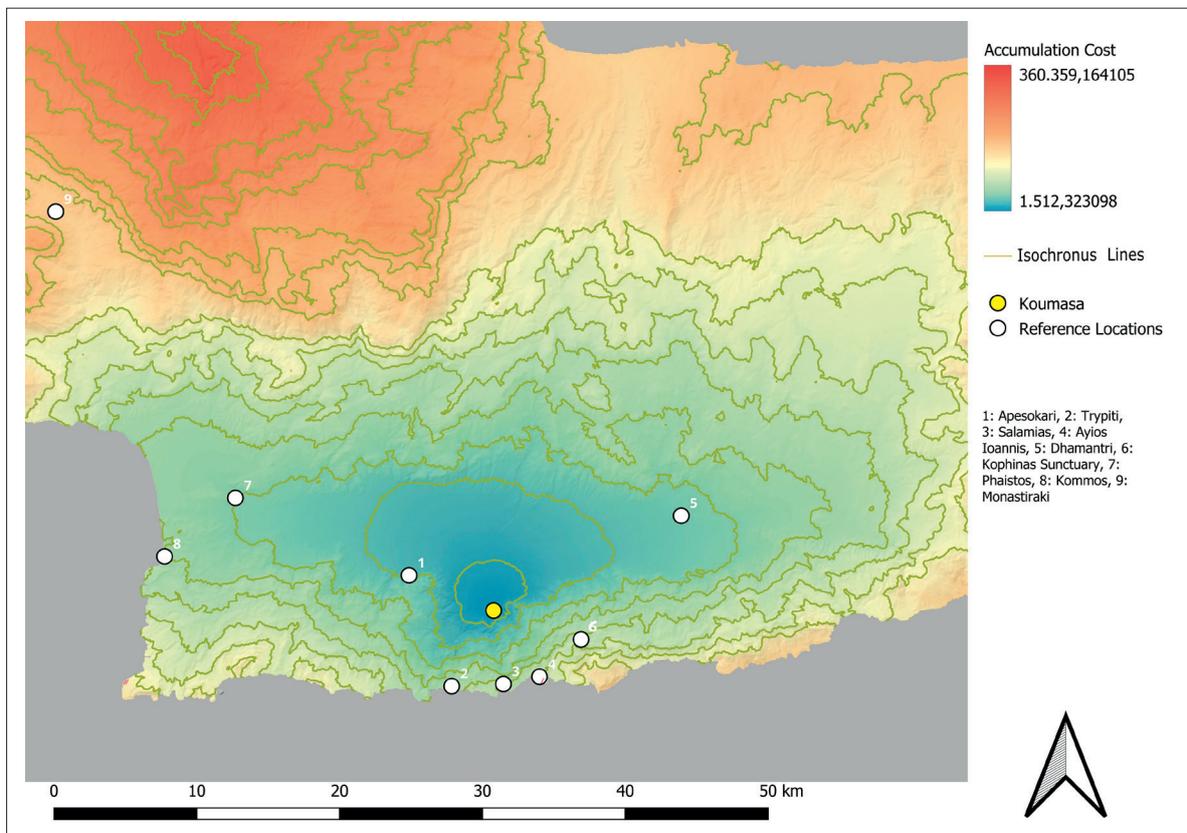


Figure 35: Isochronous lines on the accumulated cost surface of the 30m.-DEM.

This contrast should serve as yet another example that underscores the caution required when extracting information based on a single iteration or function.

5.3.2 Flow Accumulation

The cost raster is used as an input to the flow direction tool for the second step of extracting a vector layer of paths. It represents the direction of water flow by a slope raster, but since the reclassification enforces the programme to assume the origin of movement as the basin level (a fact that can be seen in the *Movement Direction Layer*), the paths originate from the origin point, adding to one another resulting in paths that split following the inverse of the Strahler principle as to form main paths and their tributaries.⁶³⁶ The main paths receive flow from various branches; the further one gets, the dimmer is the accumulation value. In the iteration below, the various paths were divided using different criteria, which essentially represent a visualisation choice. Mainly the Strahler classification is kept, indicating which Strahler values are excluded. These can be reclassified into groups, as was done in Figure 36, where paths were reclassified into nine distinct types based on the calculated accumulation. Similar paths were produced by Déderix in her study of Apesokari, which was an inspiration for this task performed in this work.⁶³⁷

The process is dubbed flow accumulation in ArcGIS's vocabulary; it can be retrieved from the Channel Network and Drainage Basins tool in QGIS. The two programmes yield identical results but with different initial parameterisations, which the user can influence.

Using the accumulation surface of the 30m.-DEM, the following paths are extracted:

Two paths are represented as class 9, one leading through Phaistos to Monastiraki and the other towards Pediada. The northern coast is accessed through paths with grade 8, passing near Dhamantri and west of Yuchtas. Dhamantri, Archanes and Knossos are directly accessed with paths of grades 5–7. Asterousia appears accessible beginning with grade 5, and the reference locations appear on the paths from grade 4. Lower grades are not represented, as they expand exponentially, making the map visually less helpful. It is noted that the locations were not inserted as targets, and their appearance on the various paths is only a result of their topographical location. Thus, the connection to Phaistos and Monastiraki is indicative of the positioning of these locations on optimal paths through the Messara, which express natural paths beginning from Koumasa.⁶³⁸

636 See Footnote 663.

637 Déderix 2016, Fig. 1; 2017, Figs. 3, 4. Here, as a gesture of gratitude to her kind advice, Déderix's explanation of these paths is cited: "Such a map records the accumulated flow to each cell and emphasizes areas of greater accumulation, which correspond to streams in the case of hydrological modelling and to optimal paths leading to the destination in focal mobility network." (Déderix 2016, 556).

638 It is to be noted that the grade as per Strahler is not indicative of difficulty of access. It merely represents the centrality of routes.

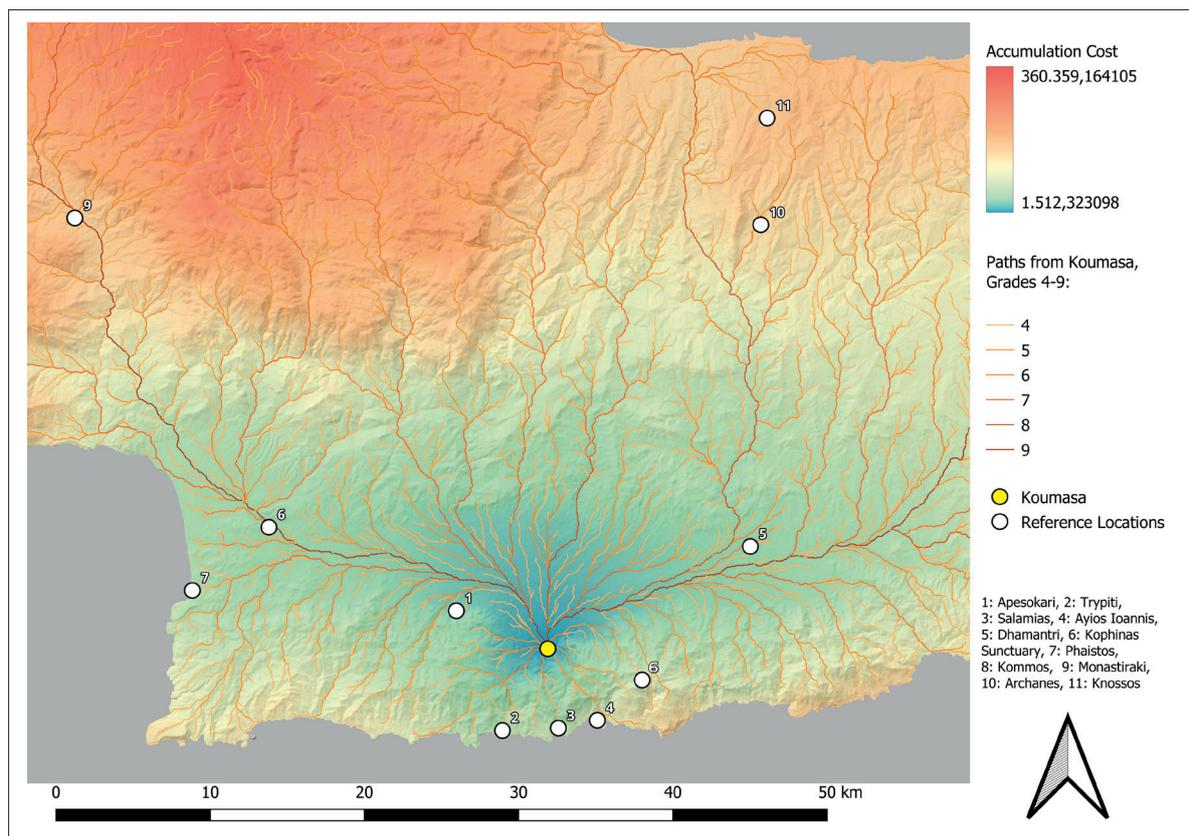


Figure 36: Flow accumulation from Koumasa, on cost raster based on 30m.-DEM.

A comparison with the paths in the Messara, computed as least-cost paths between defined locations by Siart – Eitel, shows compatibility with the paths in the direction of Galatas and further to Archanes and Knossos.⁶³⁹

The cost raster of Figure 36 is the same used in Figure 35 above. Despite the algorithm’s intrinsic difficulty regarding the mountainous paths, the Asterousia locations appear directly on the natural paths as relatively easy to access, albeit with values in the middle of the range 1–9.

Based on the 20m.-DEM, several iterations were executed to generate natural paths using accumulated cost rasters derived from the discussed functions. For the purpose of discussion, two of the results pertaining to the region closer to Koumasa region are initially considered (Figure 37, 38).

The primary distinction between the two lies in the fact that, in the iteration based on the Bell-Lock function, the treks within the valley exhibit *less natural* curvatures, tending to follow noticeably straighter lines compared to the more naturally shaped paths generated with the Tobler function. Conversely, in the mountainous regions, although there is a general similarity in the identification of movement channels, it is the

639 Siart – Eitel 2008, Fig. 1.

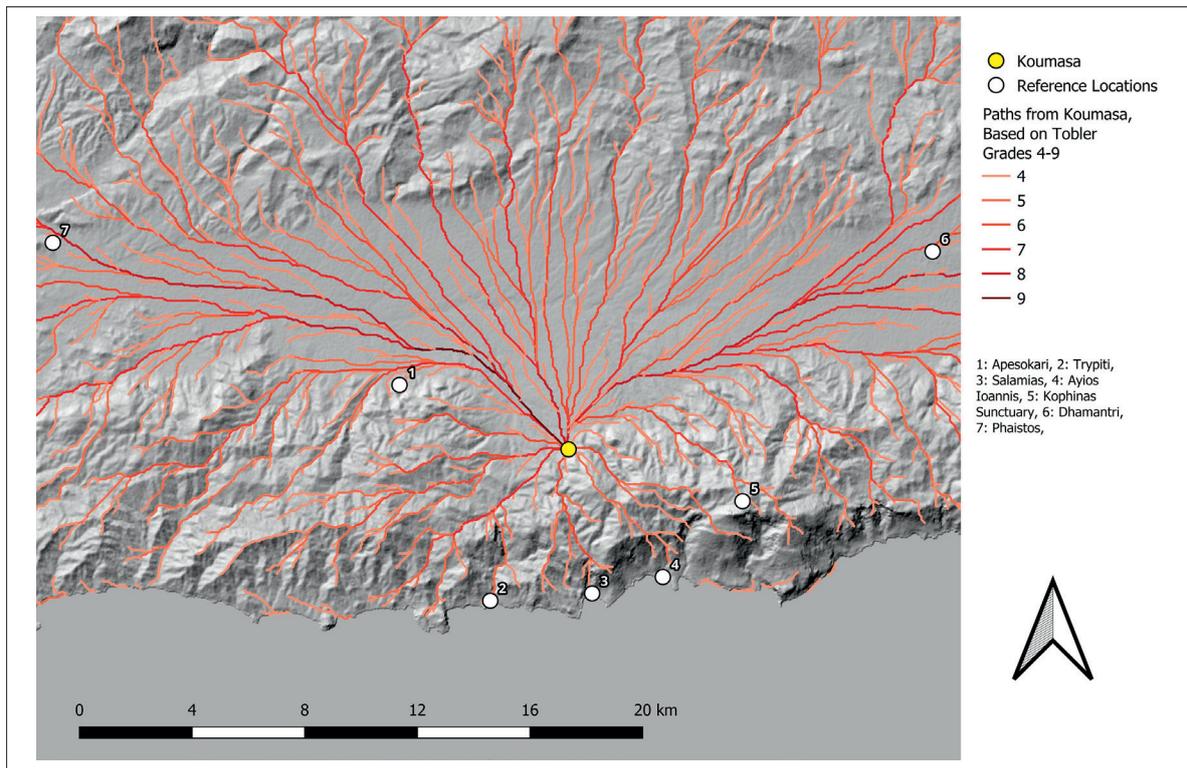


Figure 37: Flow zpaths, based on a cost raster defined with Tobler’s function.

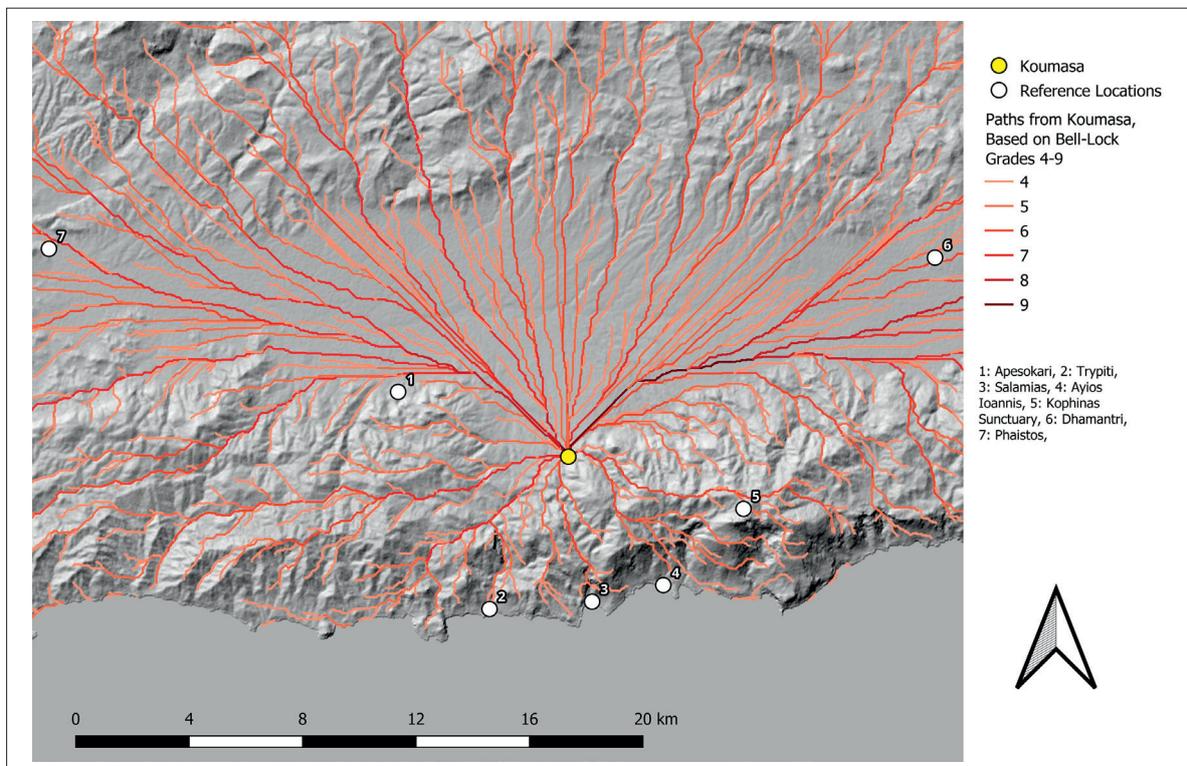


Figure 38: Flow accumulation paths, based on a cost raster defined with Bell-Lock’s function.

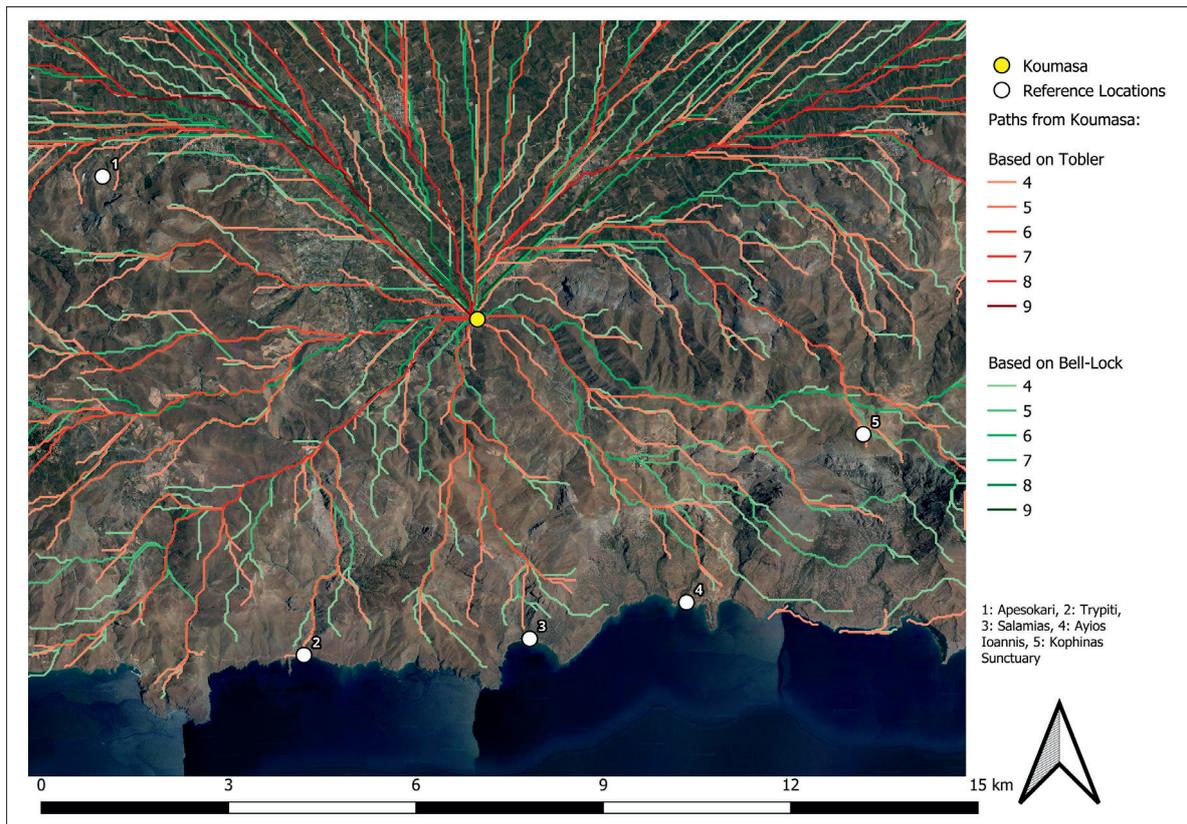


Figure 39: Interpolation of the two former iterations for the immediate vicinity of Koumasa.

Tobler function that yields paths appearing *less natural* with more straight lines. Simultaneously, the Bell-Lock function produces slightly more flexible path routes and exhibits more tributaries, providing a better depiction of possible movement on mountainous terrain. This distinction becomes more evident when interpolating the two results on a scale that focuses on the central Asterousia (Figure 39).

An additional iteration on the same area using the exponential function is illustrated in Figure 40 (not included in Figure 39 for visual clarity). Once again, based on the cost surface accumulation – this time approximating the second-degree polynomial – a flow accumulation was calculated. This depiction highlights how movement is channelled primarily along far-reaching solitary paths, excluding the tributary paths, and classified into three grades. These grades aggregate the flow of the furthest, least central paths.⁶⁴⁰

⁶⁴⁰ A separate iteration using the Ox-Cart function was performed which is not represented here, as the method yielded results comparable with those seen in the extended least-cost-path analysis seen in iteration 4 of Study 3 in Chapter 5.2 (Figure 30). Although not identical, it shows the potential and applicability of the method shown in iteration 4.

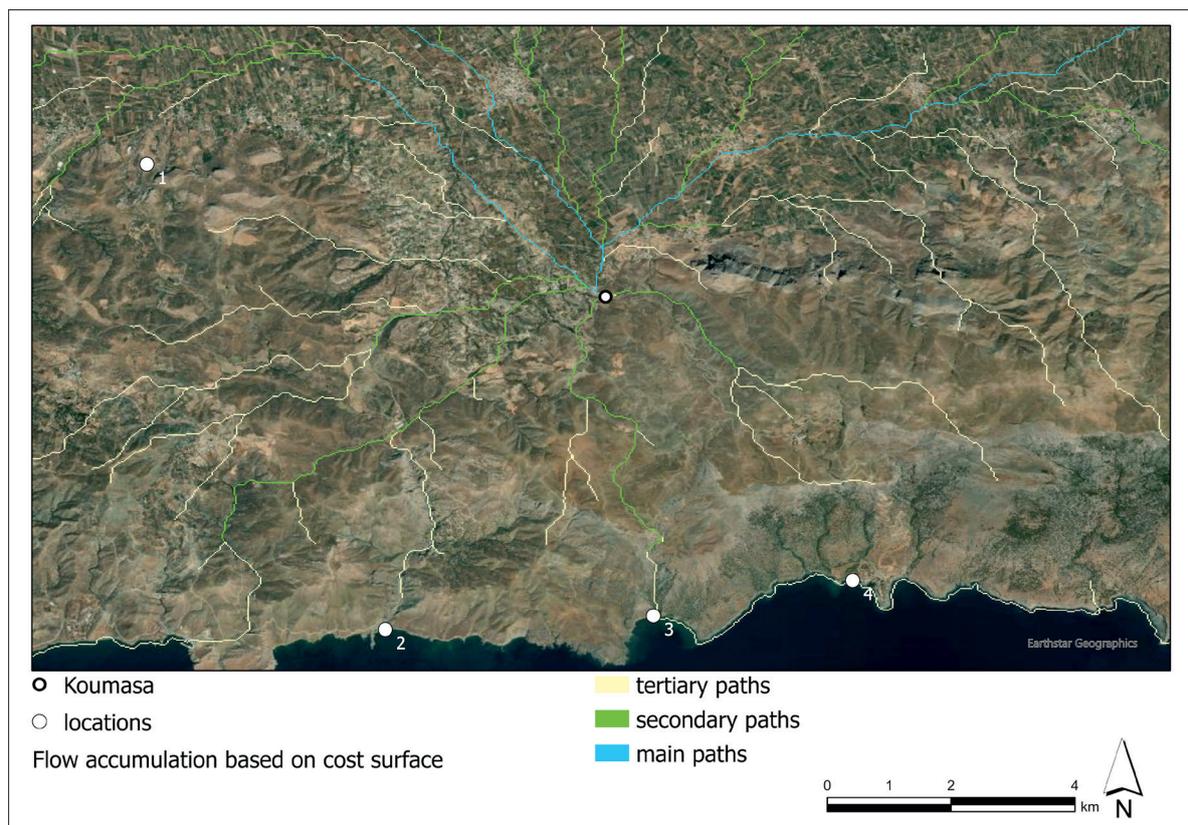


Figure 40: Flow accumulation paths based on the cost raster defined with the Exponential function.

When considering the locations of interest, it is notable that almost all are situated directly on natural paths, including Trypiti, Salamias, and Kophinas. Only Ayios Ioannis remains partially *shadowed*, a phenomenon attributed to the height of the mountain directly above it. Chapter 11 will discuss the evaluation of these paths in comparison to actual walking to these locations.

This methodology represents the initial step towards developing the focal mobility network.

5.3.3 Focal Mobility Network

In Chapter 5.2, both starting and ending points were defined. In Chapter 5.3.2, movement was explored without specifying target points, examining natural paths from a given starting point. Following the same logic, the third step is a further level of abstraction that illustrates the natural paths in a given area without considering starting or endpoints. This type of iteration provides the natural corridors of an area, thus being unrestrained from our perceived importance of locations. In the case of Minoan times, this methodology can levy the factor of unknown places or other latent factors. The

method acts as an impartial evaluation of the terrain, albeit with limitations imposed by the available DEM and the functions used for obtaining the results.⁶⁴¹

One major methodological issue in the two methods described above can be summarised in the inherent assumption of a direct route between individual points, which may not reflect reality. This concern was touched upon when discussing the implications of different routes imposed by our restrictions on the algorithm. The reality of roads often involves a system of paths and arteries of communication rather than a direct link between locations. These weaknesses have been recognised in the early stages of GIS methodology development.⁶⁴²

One way to approach the reality of paths is to investigate patterns of movements rather than individual cost paths. Then, the set of locations of interest is evaluated concerning their relation to the optimal paths.⁶⁴³ One of the most known algorithms was introduced by Llobera, which is an exhaustive methodology that forces a calculation of least-cost paths between all pixels of the study area and then combines the results.⁶⁴⁴ This methodology has been implemented to study the accessibility of ancient sites from various cultures⁶⁴⁵ and, more recently, in the Messara.⁶⁴⁶

The method, as initially proposed by Llobera, faces the issue of the computational intensity required and the redundancy in the calculation. Many pixels would exhibit similar behaviour, leading to redundant computations as the extrapolated flow of movement would stem from very small areas.⁶⁴⁷ Consolidating the two extreme methods – the monosemantic least-cost path analysis and the exhaustive point-to-point least-cost calculation – a proposed solution is using a grid of points.⁶⁴⁸ The denser the grid, the closer it aligns with the Llobera solution. Unlike the solutions above, where points are selected based on points of interest in the area of investigation, the origin points are randomly placed following the grid, approximating the physical characteristics of the terrain.⁶⁴⁹

The grid solution is preferable over one where chosen locations are inserted (say, all known sites in the Messara) as sites unknown to us are inherently not represented,

641 Fábrega-Álvarez 2006, 7.

642 Wheatley – Gillings 2002, 151–159.

643 Déderix 2016, 555. See also Vouzaxakis 2015.

644 Llobera 2000.

645 Llobera et al. 2011.

646 Déderix 2017.

647 Nevertheless, this approach is sometimes applied. Such as case is Verhagen 2013. Although it is to be noted that this example is applied on a plain surface with three types of friction movement, which reduces the overall computation needs (Verhagen 2013, 384–385). Such an implementation is not relevant for the mountainous Crete.

648 Déderix 2017, 13.

649 Other solutions implementing an intensive calculation of multiple least-cost paths include the use of natural entry points (Fáiren-Jimenez 2007, 290–2) and the use of points alongside the border (See also Whitley and Burns 2008). Iteration 4 in Study 3 above was an approximation of this method.

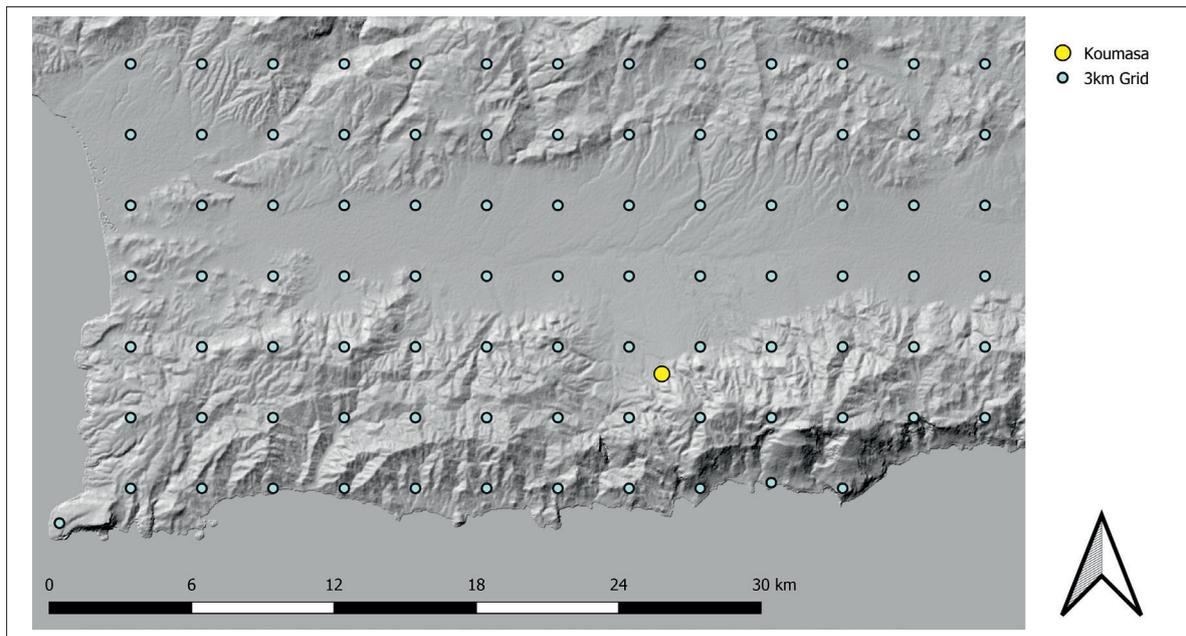


Figure 41: Grid points around the Messara.

and furthermore, the results will not represent the free movement of the focal mobility network proposed here.⁶⁵⁰

For the 20 m.-DEM, two iterations were made, one with a grid of 100 points spaced 2 km. apart and a smaller one concentrated around the Kophinas Peak and the slopes around them. The results are compatible with the focal mobility network that was performed for the western Messara by Déderix to produce a focal mobility network.⁶⁵¹ It is demonstrated that the presence of Koumasa at the edge of the DEM used by Déderix did not influence the overall result.⁶⁵² Rather, as also indicated in the main paths of the Messara in Chapter 5.3.2, Koumasa lies indeed peripheral to the main communication arteries through the Messara. It is this peripheral location, however, that requires an explanation for the development of this area, especially in the LM I period, as discussed above.⁶⁵³ In relation to the paths around the central Asterousia however, Koumasa has a rather central location.

For enhancing the approach, the steps were repeated on a cost raster based on Tobler's function, performed over a 3 km. grid (Figure 41). Again, as before, the main paths of the Messara do not pass near Koumasa, as around the central Asterousia, no

⁶⁵⁰ This approach was used by Déderix, assuming the tholoi as origin points (Déderix 2017, 17).

⁶⁵¹ Déderix 2016, 558–560; 2017, Fig. 7.

⁶⁵² In other words, the method is less prone to edge effects. Further, using tholoi instead of a grid (Déderix 2017, 17–18, Fig. 6) is seen as yielding similar results for the western Messara, with its dense coverage of tholoi, since the available tholoi locations are high.

⁶⁵³ See discussion on page 85ff.

5 Insight of GIS for the Mobility Networks around Koumasa to Messara

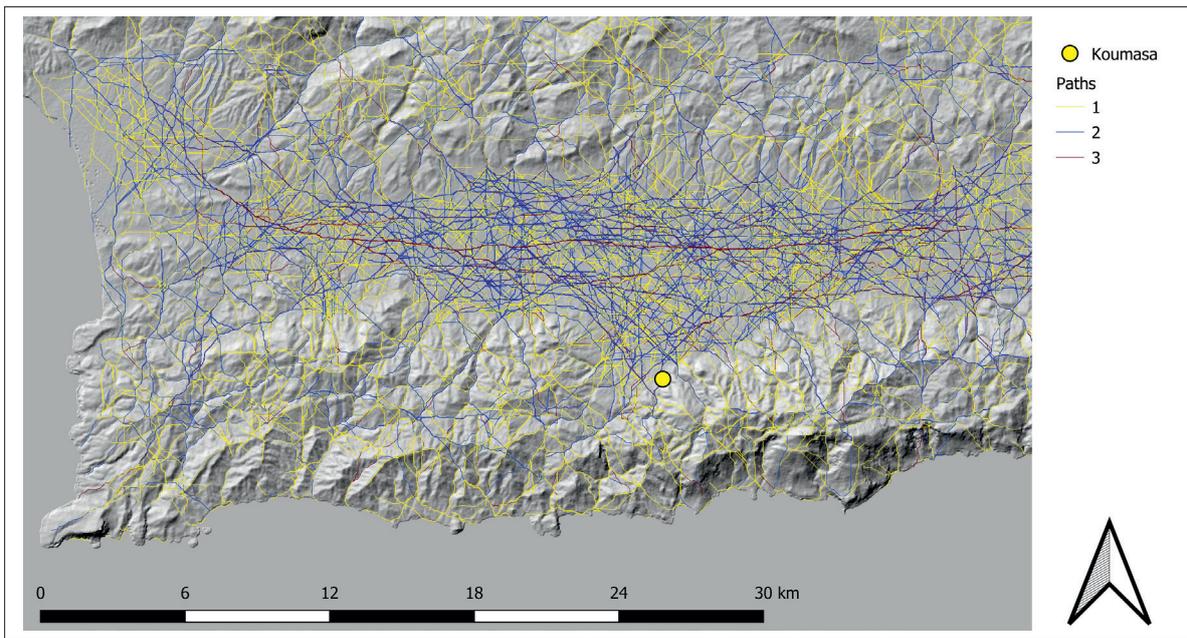


Figure 42: Network connectivity for the Messara area.

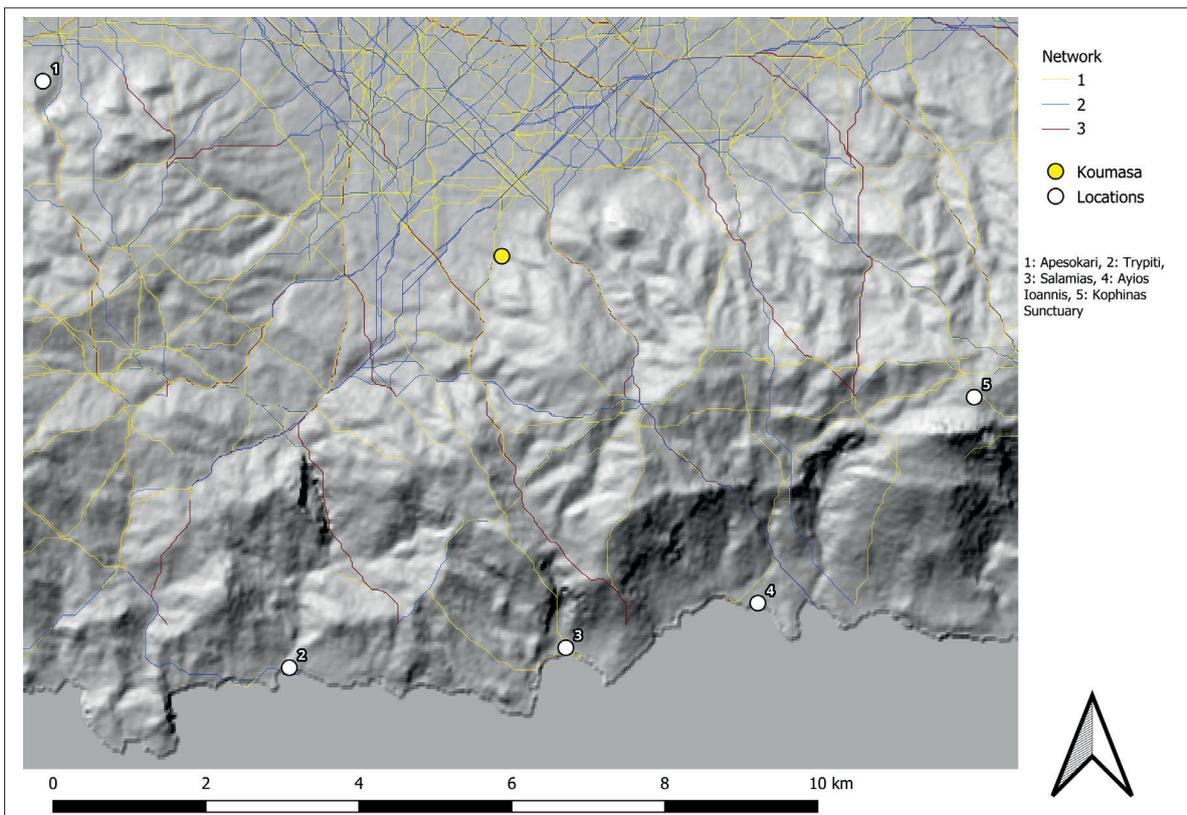


Figure 43: Network connectivity for the Koumasa area.

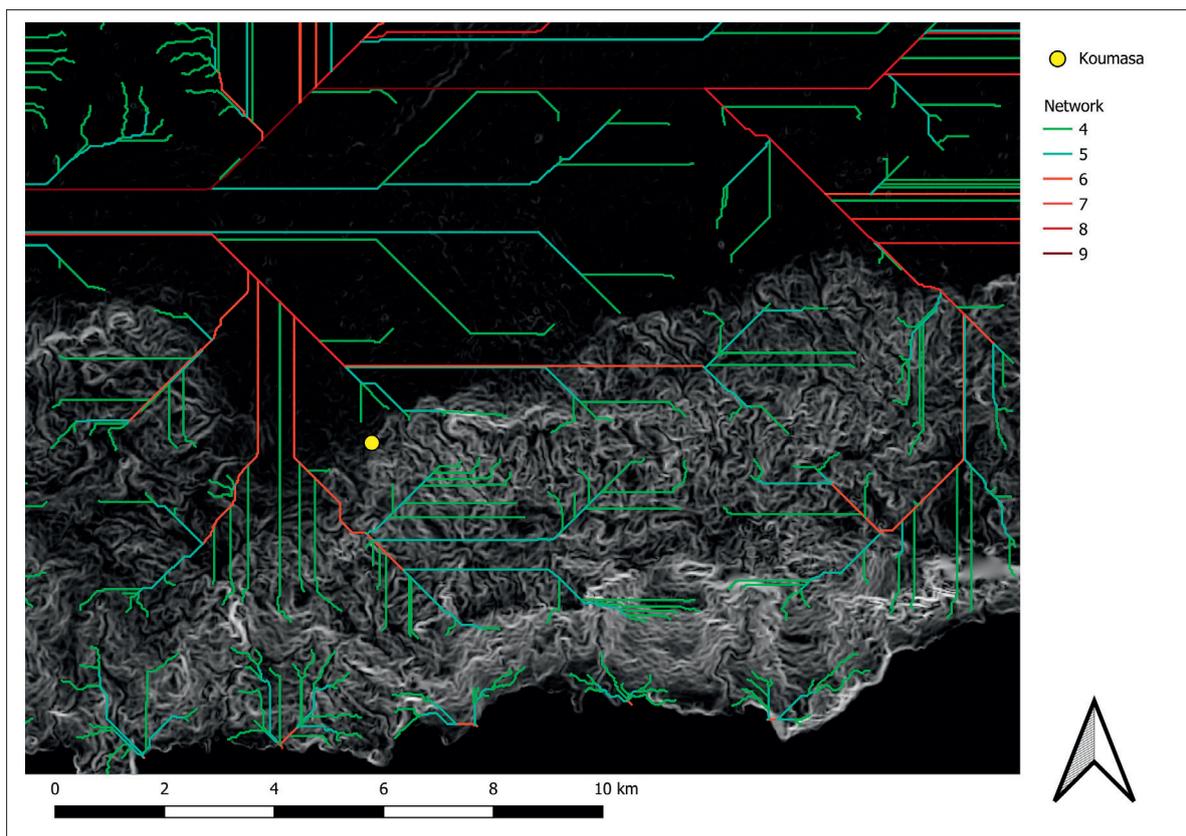


Figure 44: Schematic rendering of paths around central Asterousia.

paths of the Strahler order 8 and 9 appear, which correspond with the prime paths of type 3 in Figure 42. What distinguishes the region is the fair concentration of secondary paths near Koumasa, in comparison with the other locations around central Asterousia (Figure 43). Hence, no centrality is suggested in the Messara, but rather one in the central Asterousia becomes evident. Specifically, a strategic position near path networks crossing the mountain is apparent.

An artificial illustration of this result is seen in Figure 44, where the paths are quantified based on a cumulative accumulation map using the grid points, based on the Bell-Lock Function.⁶⁵⁴ Filling, flow direction and channel identification were performed, resulting in a pixellated path network bound by the grid points. This iteration serves as an easily readable alternative to the results of Figures 42 and 43. This image again shows the symmetry of paths as per the Kophinas peak, with an accumulation of main paths from the area of Koumasa and the semi-circled extension of the Messara of the region which ends at modern Vassiliki. The other access point to the central Asterousia is from the area of Charakas, to the right of the image; it approaches the area of Kophinas from the northeast and branches towards Tris Ekklesies. The access point to

⁶⁵⁴ Based on the *r.walk* function. Other functions not depicted here yield comparable results.

the coastline up to the point west of Tris Ekklisies is mainly facilitated from the area of Koumasa and modern Vassiliki.

As mentioned above, the topography around Koumasa is characterised by the dual nature of ragged mountainous terrain to its south and the smoother Messara plain to its north. This duality influences the efforts to establish models for the movement behaviour, as each of these two regions reacts differently to different parameterisation. So, some reclassifications, such as the Tobler, appear more nuanced in the flat terrain, while others, such as Bell-Lock or Ox-cart, yield more nuanced results for the mountainous region.⁶⁵⁵

The area of Koumasa is seen, as in the case of the least-cost-path analyses in Chapter 5.2, to be central as per its local environment, offering exclusivity to the central Asterousia and the shoreline south of it.

5.4 Viewsheds

Another important application of DEM analysis is the determination of viewsheds. This analytical tool helps establish the line of sight between observation points on the DEM, illustrating the extent of visibility. This technique has been used to determine the viewing coverage of towers and, concerning Crete, the sight coverage of peak sanctuaries and tholoi.⁶⁵⁶ Also innovative ideas could be explored such as the possibility for communication networks based on viewing posts in the Pediada region.⁶⁵⁷

For the application of the viewshed GIS methodology in this work, the observer's heights at both ends of the line of sight are set at 1.6 m. to closely simulate the lines of sight between standing individuals. This height was assumed as an acceptable median height of people of the Asterousia in the Bronze Age, with the mean height from Tholos B at Moni Odigitria being 160.79 cm, with a height distribution that is similar to that of other skeletal remains on Crete.⁶⁵⁸ This height also corresponds well with the assumed average height of Bronze-Age Europe and Egypt.⁶⁵⁹ So an assumed height of

655 The Bell-Lock function has the characteristic of being almost linear up to the level of 40 degrees, thus intrinsically favouring level areas, as discussed above.

656 Soetens et al. 2002; Soetens et al. 2008; and Déderix 2016 respectively.

657 Sarris et al. 2011, 507–509; Panagiotakis et al. 2013, Figs. 4, 7.

658 For the EM Tholos B of Moni Odigitria, the mean stature of the individuals is 165.4 cm. for men and 156.6 cm. for women, while the funeral sites of EM Ayios Charalampos and LM III Armeni, Mochlos and Khania yield comparable results (Triantafyllou 2010, 243, Table 140, Fig. 117).

659 In Egypt, based on femur and tibia lengths of 150 skeletons from across Egypt, the stature of the individuals was computed. From the Neolithic until the Middle Kingdom the average height was calculated at 167.9 cm. for males and 157.5 cm. for females. The period with maximum height was observed by the Early Dynastic period, where the height was calculated at 169.6 cm. for males and 159.5 cm. for females (Zakrzewski 2003, Table 3). Explanatory frameworks for the changes between the periods concentrate on social structures (Zakrzewski 2003, 228). In the European Neolithic of the Linear Band Pottery Culture onwards the average

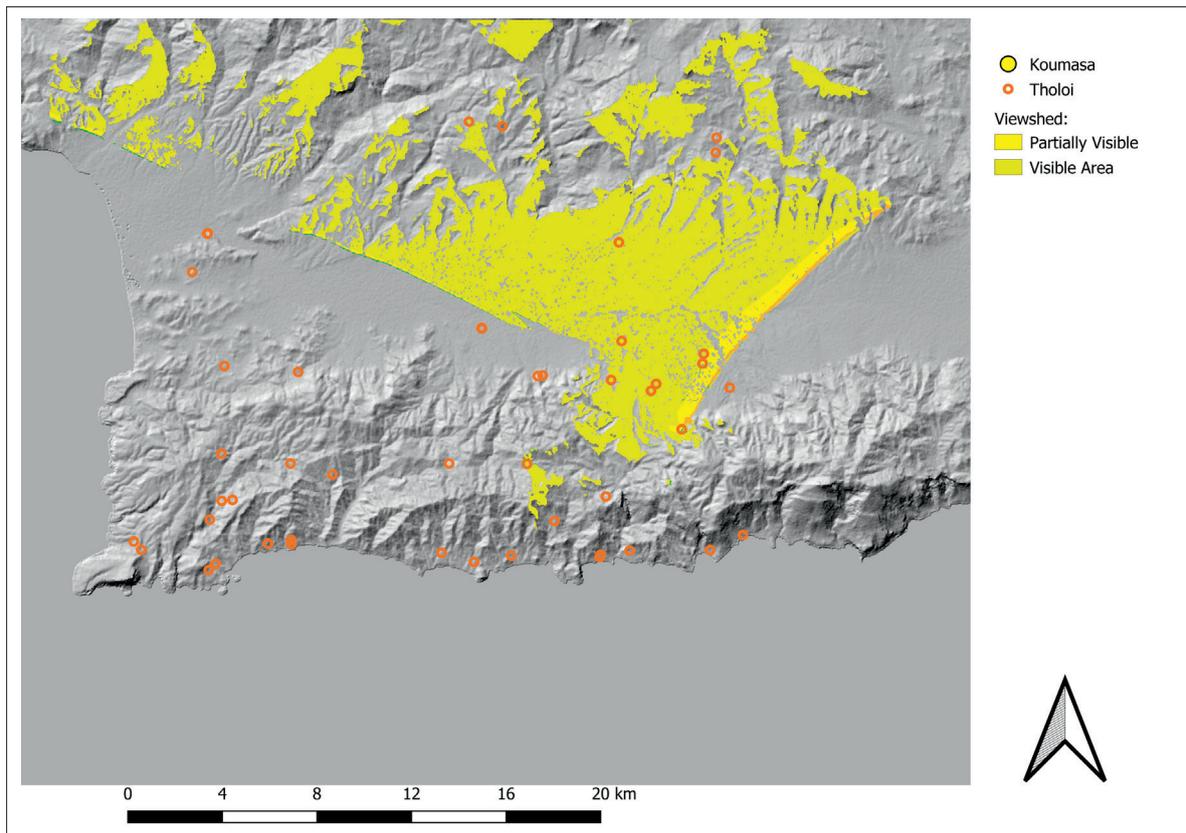


Figure 45: Viewshed of Koumasa, calculated on the 20m.-DEM.

160 cm. for applying the viewshed can be considered well within the anticipated individual heights.

Two iterations were performed on the 20m.-DEM, one from Koumasa and another from Apesokari (Figures 45, 46). For the first study, which is the determination of the viewshed from Koumasa, five points were defined on the settlement and the ‘sanctuary’, particularly around the peaks. The resulting viewsheds offer valuable insights into the visual coverage of the landscape from these vantage points.

The total area seen from Koumasa is 163.6 km², of which 99.9 km² in the Messara valley. The implications of this viewshed will be discussed in Chapter 9.2.

The total area of the Viewshed from Apesokari is 129.8 km², of which 93.9 km² on the Messara valley. It covers thus less area both in total as well in the valley, but the viewshed extends more to the west and east, compared with Koumasa, as seen in Figure 46.

An additional point of interest, emphasising the efficacy of visibility analysis, pertains to the viewshed from the summit of Kophinas. Illustrated in Figure 47, the view-

height for males was calculated to have been around 165 cm. for males to 150 cm. for females (Hermanussen 2003, 175).

5 Insight of GIS for the Mobility Networks around Koumasa to Messara

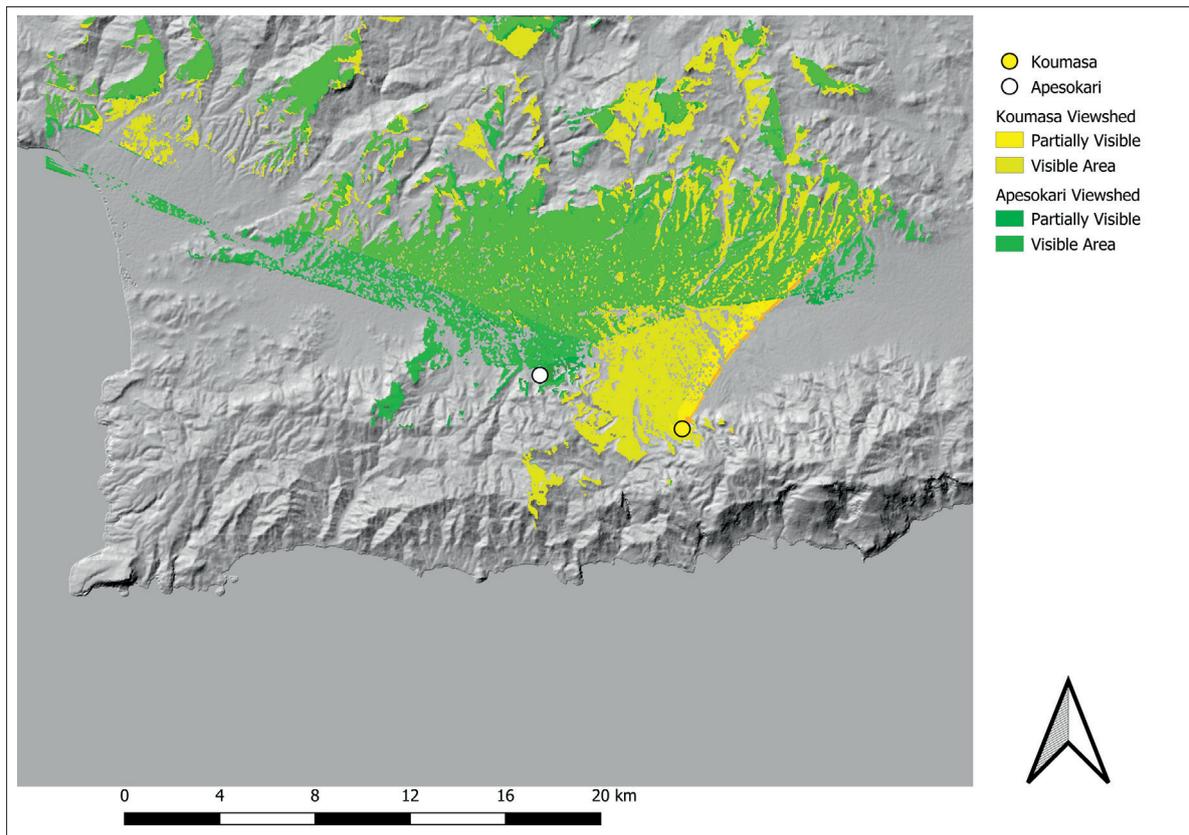


Figure 46: Viewsheds of Koumasa and Apesokari, calculated on the 20m.-DEM.

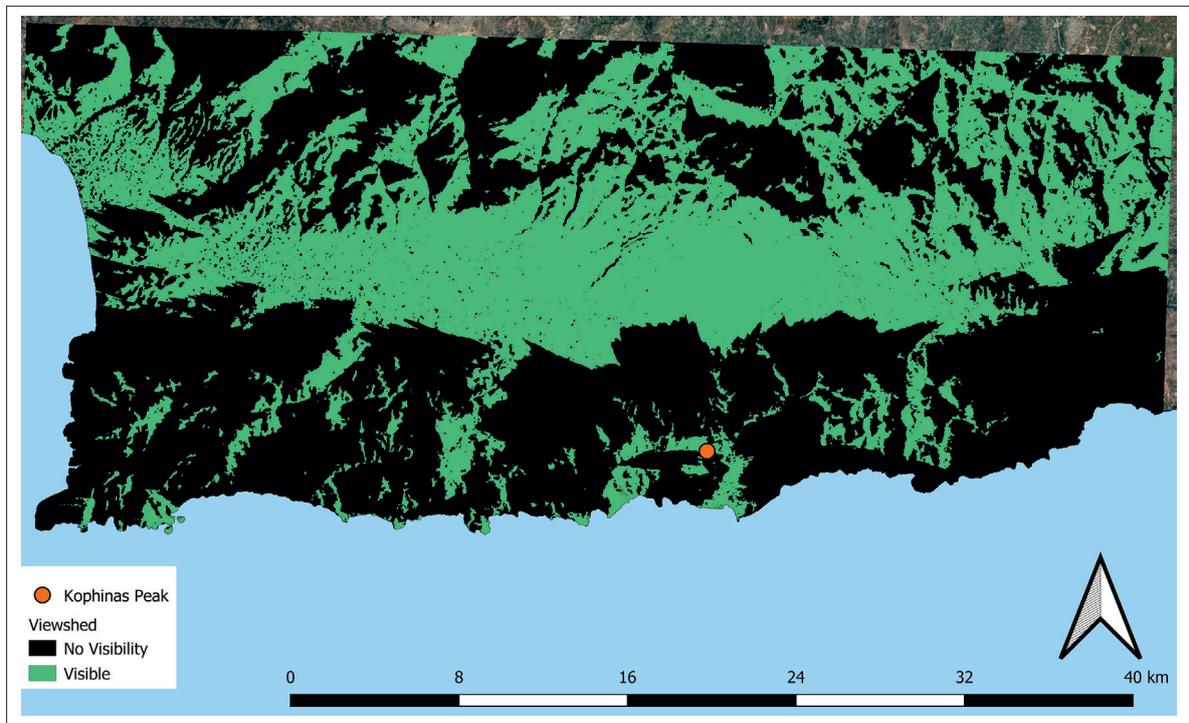


Figure 47: Viewshed from Kophinas, based on the 20m.-DEM.

shed from Kophinas encompasses a broad perspective of the Messara and the northern mountainous regions, which from experience extends from Psiloritis to Dikti. Notably, the distinctive silhouette of Kophinas is discernible on the southern skyline from locations in the Messara with significant or partial visibility, which is verified when walking in the Messara. This feature establishes Kophinas as a prominent reference point for the region's inhabitants. The significant meaning that this line of sight held is further underscored by the deliberate alignment of the entrance of the Tomb of Korakies with the peak of Kophinas.

Consequently, when positioned within the tholos, the peak becomes centrally visible through the tomb's entrance.⁶⁶⁰ The assumption may be posited that the constructors of the Korakies tholos deliberately incorporated a topographical feature, using it as a statement of the quasi-unique local skyline, which is integrated into the architectural design. Alternatively, it is plausible that the peak held inherent significance that the builders sought to honour. It is noted that none of the other tholoi located on the central and western-central Asterousia or at the coastline have this possibility, with the exception of the tholos at Ayios Ioannis, where a possible orientation of its entrance to the peak can also be seen. For the Korakies tholos, situated on the mountain, the peak transcends being a mere distant feature on the horizon, as is the case with other tholoi in the Messara that have a line of sight connection with Kophinas, such as Kamilari or Platanos, where the Kophinas peak is a distant point; for the dweller or walker of the mountain, the peak exerts a tangible influence and dominance over the surroundings.⁶⁶¹

From the Asterousia, numerous locations in close proximity lack a line of sight to the peak, including Koumasa, as seen in Figure 47. However, the visibility range extends extensively to the direct west of the peak, encompassing Kapetaniana and extending 4 km. along the path leading to the peak from the direction of Kapetaniana and Koumasa. Further westwards, another area with substantial visibility coverage is that which includes the Korakies tholos.

When observing from Kophinas towards the south, all promontories are visible up to Cape Lithino. Figure 48 illustrates the reciprocity of this visibility.⁶⁶² Not only is the view commanding, but those turning on a boat from Cape Lithino face a skyline dominated (or, alliteratively, blocked) by the Kophinas peak.

660 Goodisson 2018, 280, Fig. 1a.

661 On the influence of the peak, see Chapter 11.4.

662 The photograph from the sea was taken by Stylianos Perrakis from a boat. The photograph from the Kophinas peak is taken by Olympia Makri. The small promontory of Akra Trachili at Gerokampos between Leben and Megalonisi is not denoted in the Figure 48.

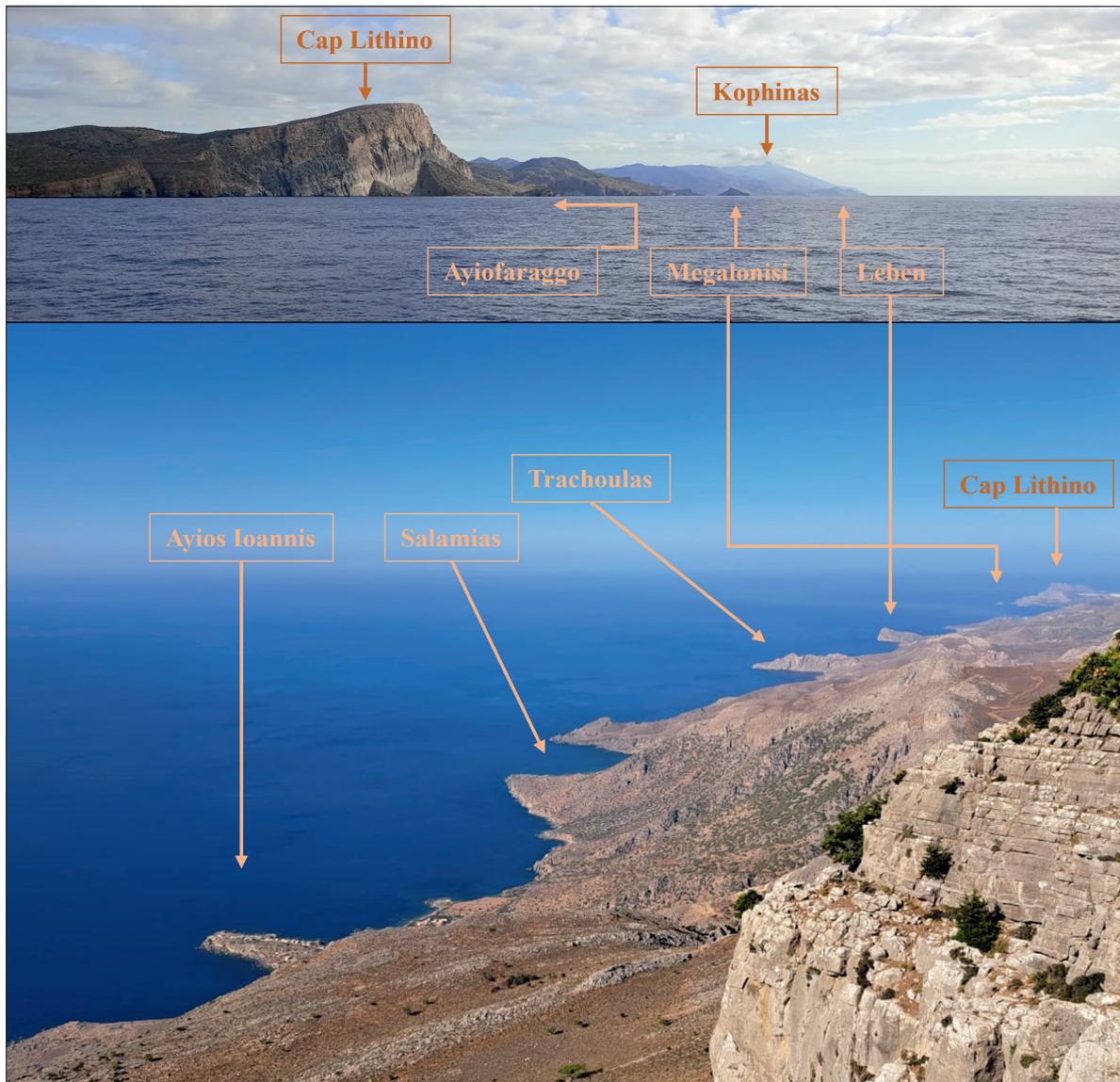


Figure 48: Reciprocity of the visibility between Kophinas and the sea level at Cape Lithino.

5.5 Watershed

On the 30m.-DEM, the process of filling sinks was executed, which calculates the flow of water downwards, enabling the representation of catchments. It's important to note that this method is susceptible to the edge effect, meaning that more sink catchments will be represented at the edges of the DEM due to the cut-off of the DEM's edge. This accurately reflects reality only when the cutoff occurs at the seashore. The drainage basins and channels were then calculated on the filled DEM, resulting in streams ordered according to Strahler and the fill basins functionality in GIS.

The stream order indicates the level of branching, following a top-down approach. If two streams of the same order merge, the resulting stream is given a number that is

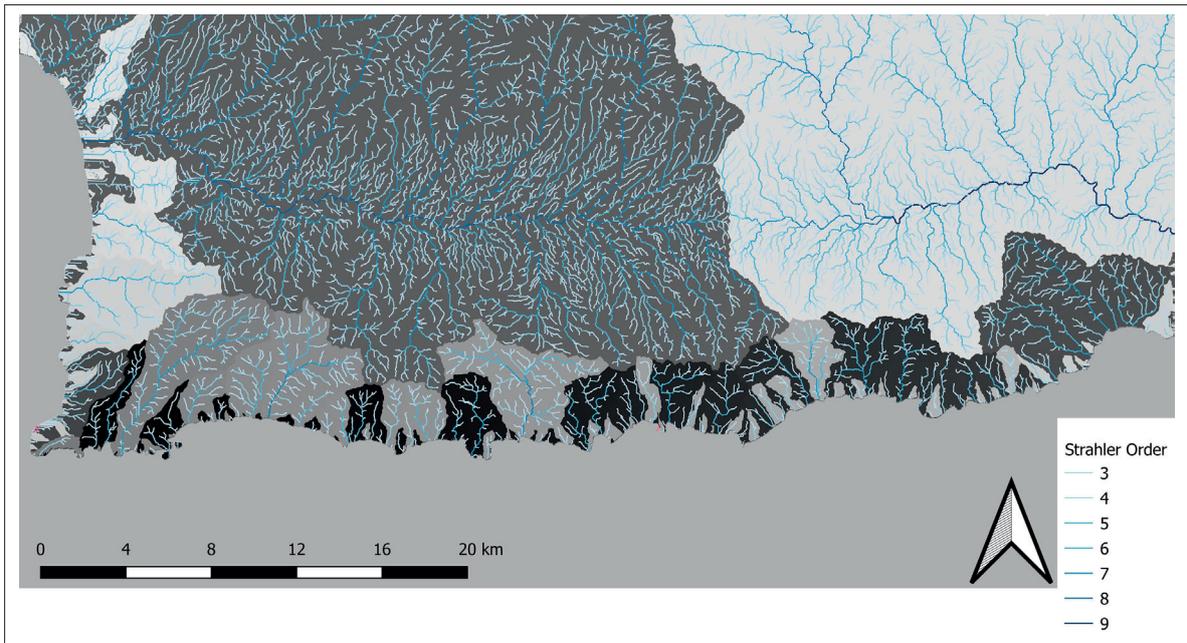


Figure 49: Water drainage basins of the Messara, with Strahler Order 3 and above. Computed on the 30m.-DEM.

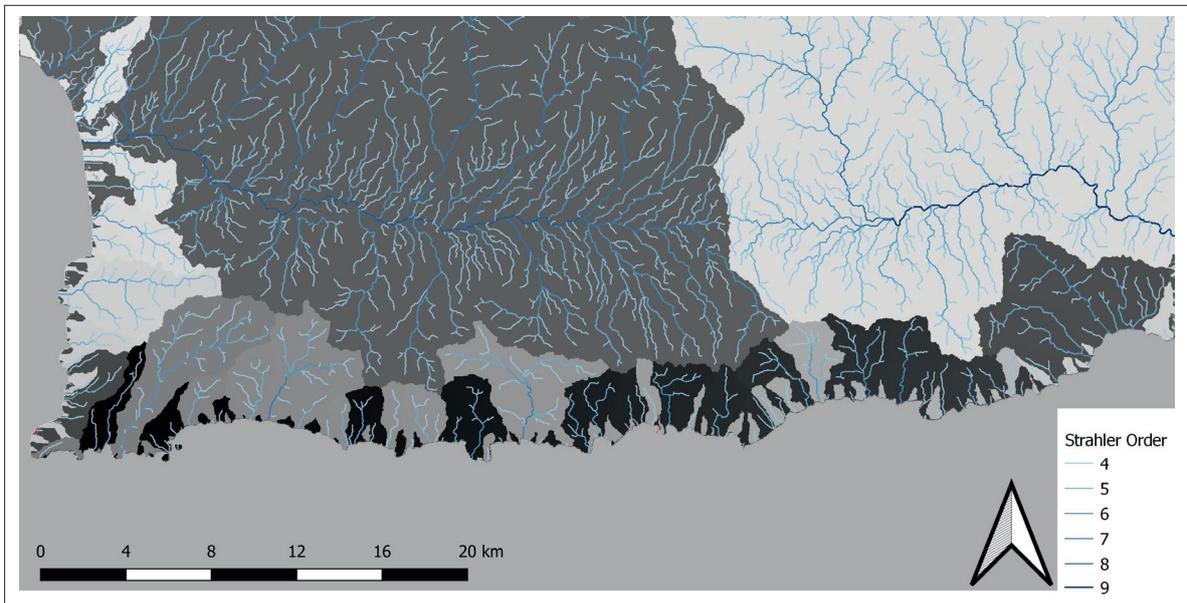


Figure 50: Water drainage basins of the Messara, with Strahler Order 4 and above. Computed on the 30m.-DEM.

5 Insight of GIS for the Mobility Networks around Koumasa to Messara

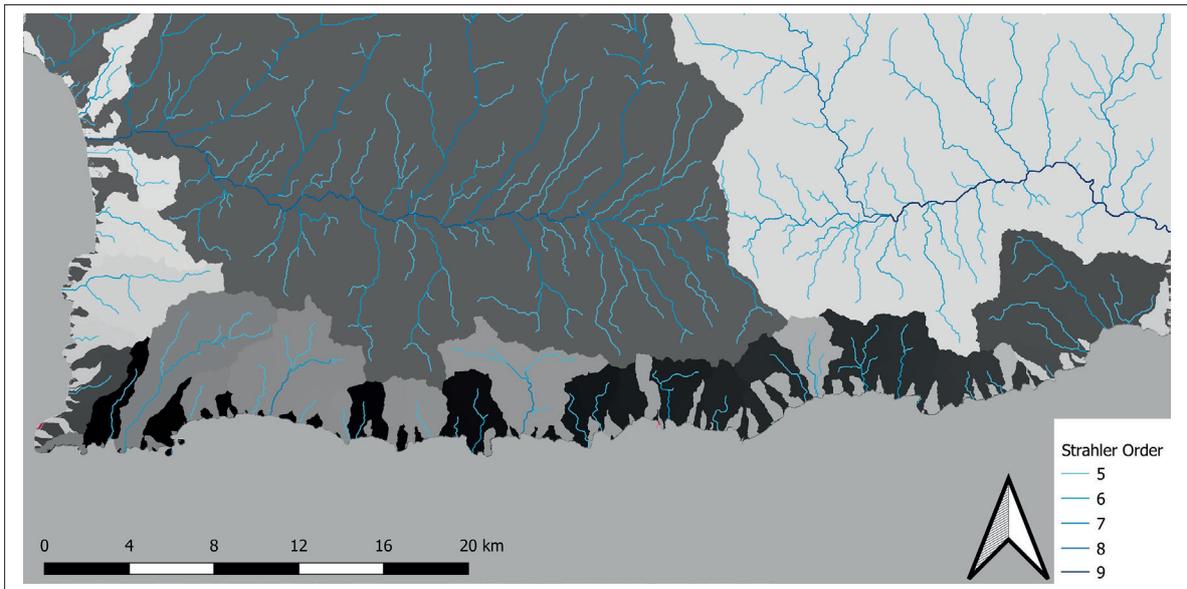


Figure 51: Water drainage basins of the Messara, with Strahler Order 5 and above. Computed on the 30m.-DEM.

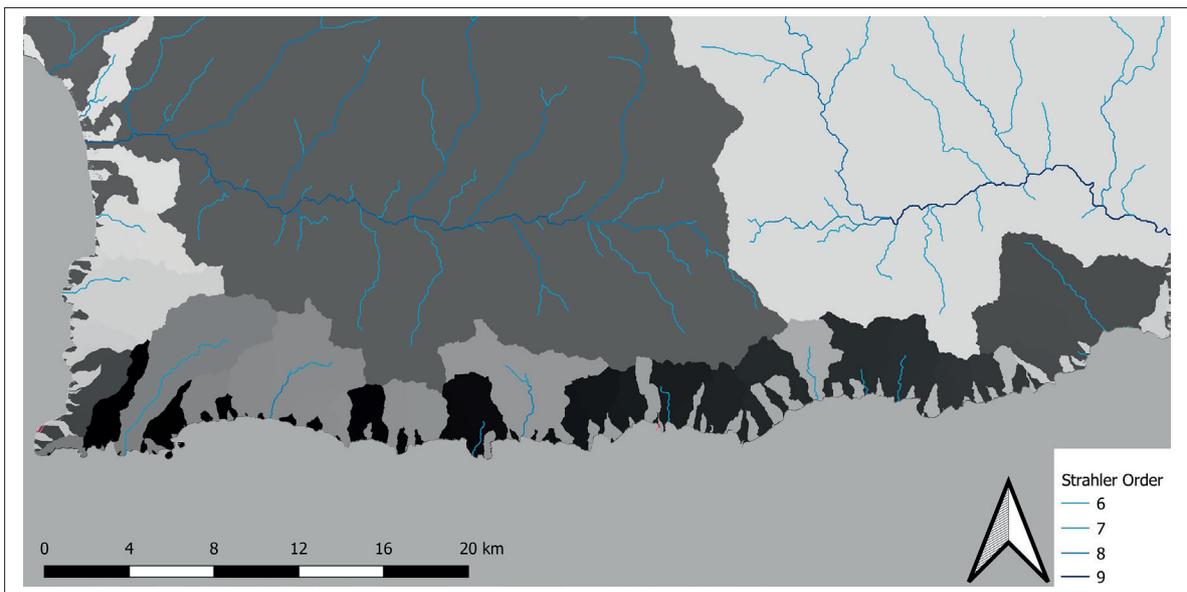


Figure 52: Water drainage basins of the Messara, with Strahler Order 6 and above. Computed on the 30m.-DEM.

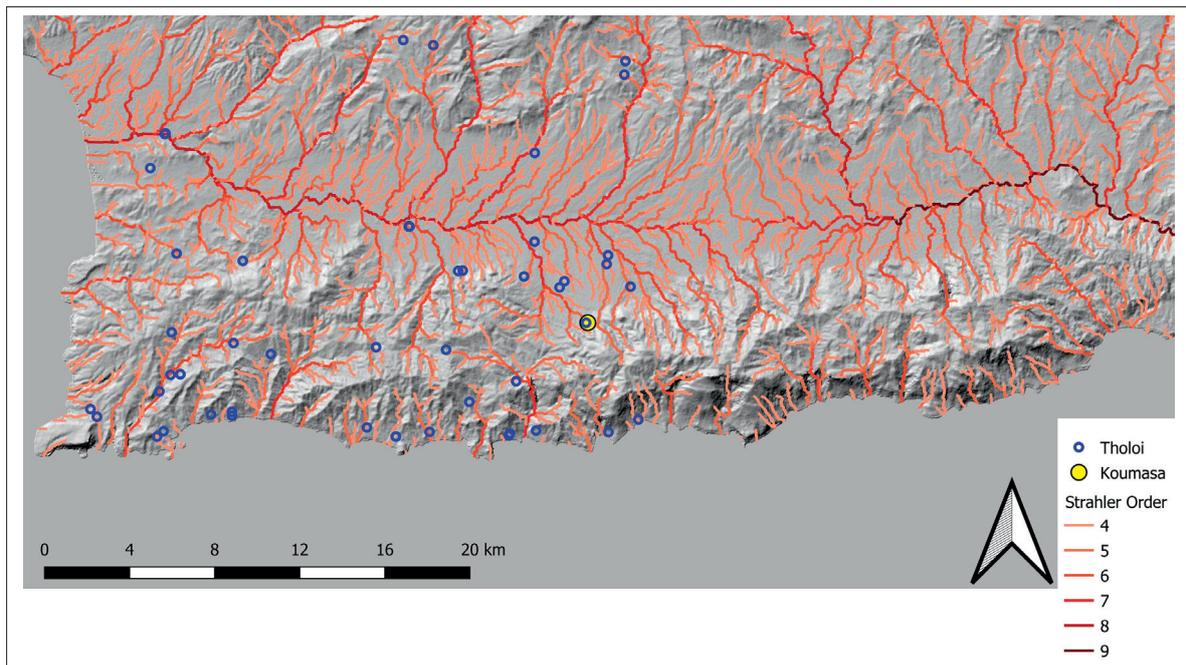


Figure 53: Water drainage basins of the Messara as in Figure 50, including locations of tholoi.

one higher. Streams with no tributaries have the Strahler order 1, those with one tributary the number 2 etc.⁶⁶³ For visualisation purposes, Figures 49, 50, 51 and 52 show the catchment area of the Messara and Asterousia, with four different visualisations of the streams, beginning with Strahler Order above 3 and extending to Strahler Order 6 and above. The lower the Strahler order shown, the more complicated the resulting image is, as the number of tributaries tends to grow exponentially. The basins have also been calculated elsewhere, showing results that are compatible with those calculated here.⁶⁶⁴

Choosing the visualisation of Strahler order 4 and above (Figure 53) and then 5 and above (Figures 54, 55, 56), the tholoi and the location of Koumasa were interpolated with the waterways, showing these locations in correlation with water paths. In Figure 56, the reference locations were also included. It is immediately noticed, that all of the tholoi in the valley are located on these waterways or very close to them.

Or otherwise formulated: the distribution of the tholoi is highly dependent on the main waterways crossing the Messara.

It is noted that this also applies to tholoi in the coastal area in the southern part of Asterousia. To substantiate the non-random nature of the proximity of tholoi to the water channels, a two-dimensional normal distribution analysis was conducted for the tholoi locations. This analysis was then compared with the distances of randomly se-

⁶⁶³ See Strahler 1964.

⁶⁶⁴ Daliakopoulos – Tsanis 2014, Figs. 1–5; Malagò et al. 2016, Fig. 4.

5 Insight of GIS for the Mobility Networks around Koumasa to Messara

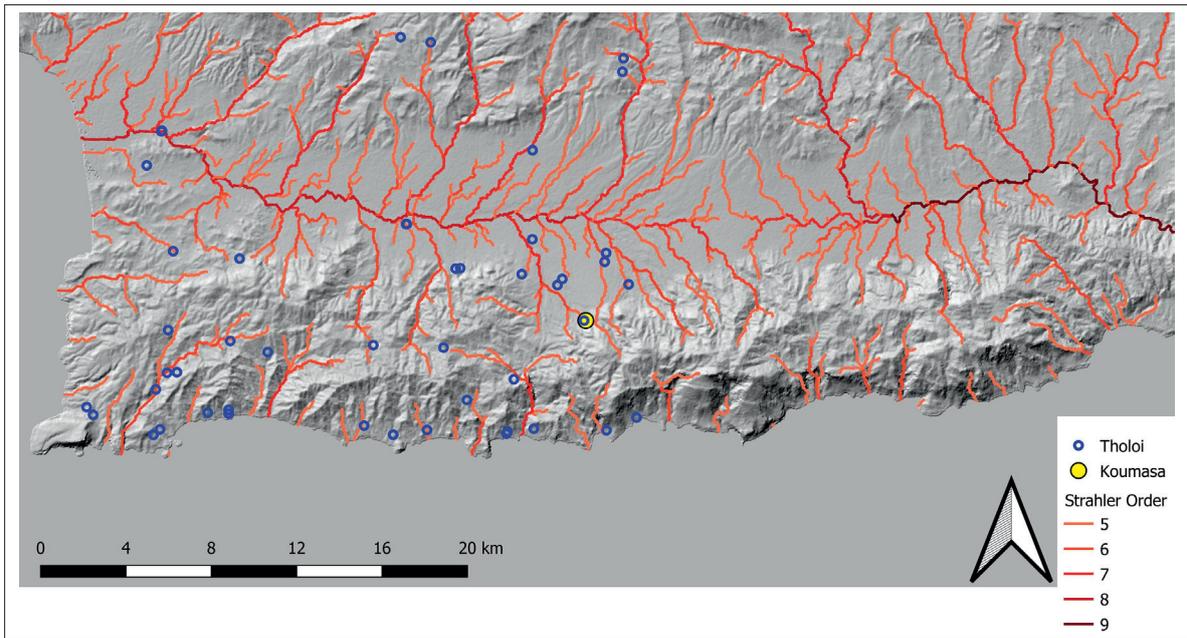


Figure 54: Water drainage basins of the Messara as in Figure 51, including locations of tholoi.

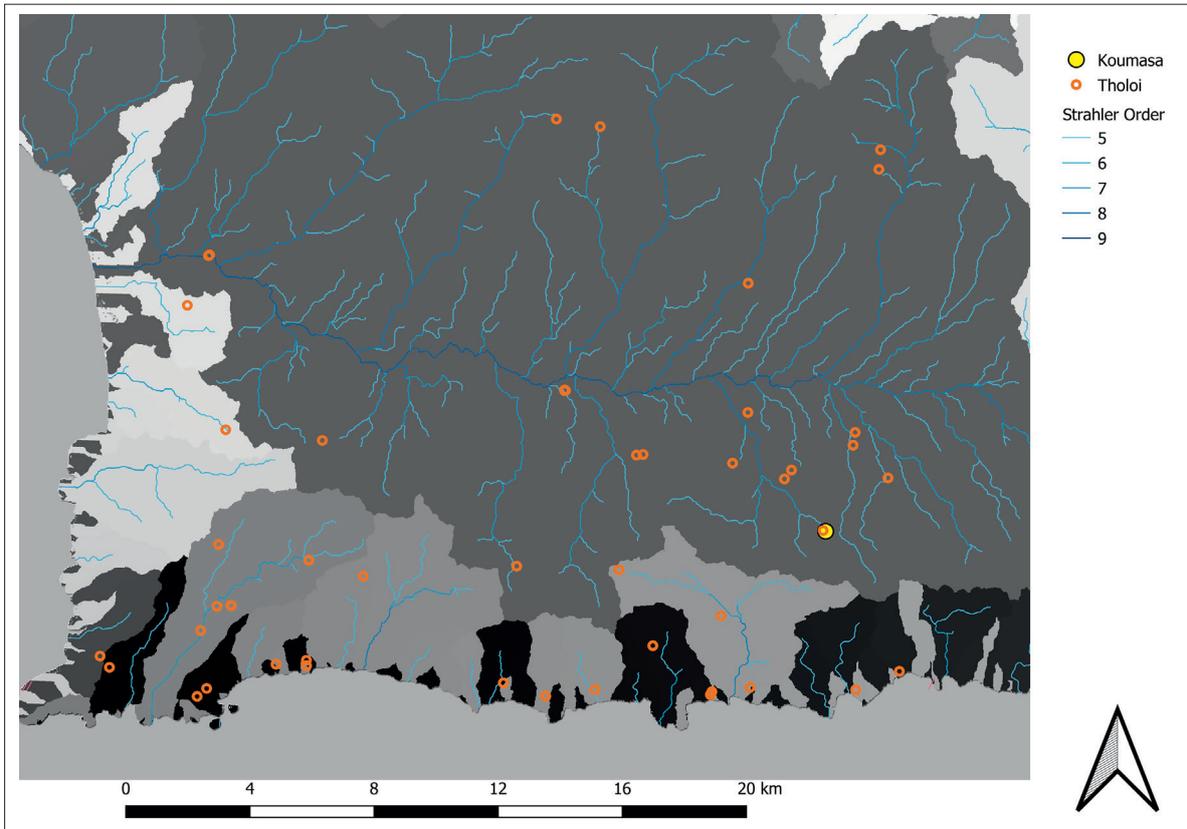


Figure 55: Water drainage basins of the Messara as in Figure 54, concentrating on the Geropotamos catchment.

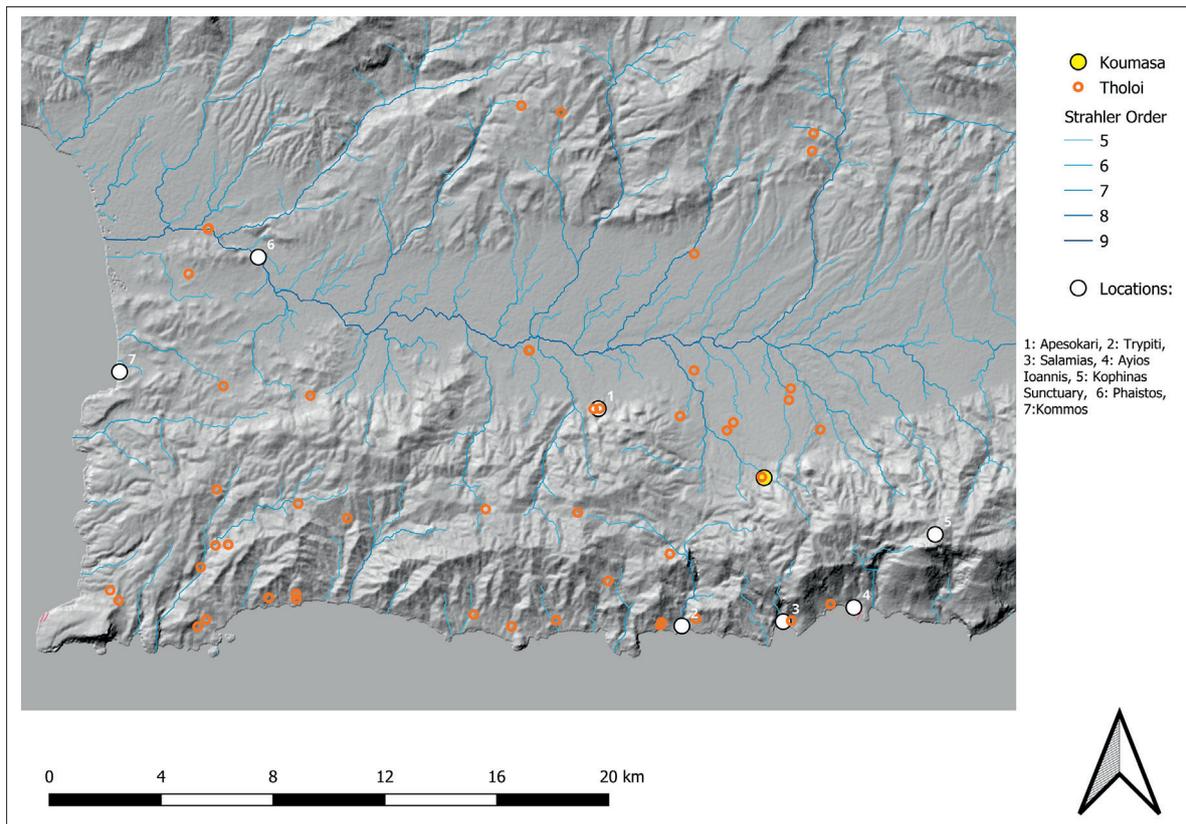


Figure 56: Water drainage basins of the Messara, as in Figure 54, including reference locations.

lected points to the nearest channel. The outcomes of this examination confirm the statistically significant correlation between tholoi distribution and water channels of both Order 4 and Order 5, as indicated by the results of the normal distribution analysis.⁶⁶⁵

Examining the streams categorised with Strahler Order 5 (depicted in Figures 54, 55, and 56), it becomes evident that several tholoi are situated at the inception of this category of streams, including Vorou A, Vorou B, Marathokephalo, Kalathiana, Korakies, Ayios Kyrillos, and Koumasa. These streams receive additional tributaries as they flow towards their respective basins, specifically the Geropotamos in this context. They exhibit a relative weakness in terms of water volume at their initial stages. However, the mentioned tholoi were established at these locations that would have water access above the average of the region, although not in the maximum possible amounts. This suggests that while access to water is essential, an excessive abundance may not be a determining factor in tholoi placement.⁶⁶⁶

⁶⁶⁵ See analysis on pages 256ff. For a more in-depth evaluation of the Strahler order and watershed analysis on the valley basin versus the steeper southern side of the Asterousia, see Ayash 2025.

⁶⁶⁶ Ayash 2025.

This outcome serves as a foundational point for further investigation into the rationale behind the chosen locations for tholoi, a subject revisited in Chapter 9.3.⁶⁶⁷

5.6 Conclusion

The main objective of the analysis in this Chapter was to investigate the geographical context of Koumasa within the broader topographical landscape of the Messara-Asterousia region. The analysis primarily involved examining the relationships between key landmarks in the region, considering factors such as terrain influence on walking routes, visibility, and the impact of water streams. The study also aimed to discern general topographic characteristics that offer insights into understanding the area unrelated to any given location (focal mobility network, watershed). The focus on analysing different methodologies and functions, aimed at a broader understanding of the methods used and gaining the most from them.

The approach in Chapter 5.2 encompassed utilising least-cost-path methods, incorporating slope data and predefined locations to identify feasible paths. Subsequently (in Chapter 5.3.2), the flow direction methodology was employed to reveal *natural paths* originating from specific locations. Finally, a network connectivity perspective was adopted to explore free movement influenced by the landscape, utilising a surface accumulation approach (Chapter 5.3.3).

Various iterations were conducted, with experimentation involving different threshold values for slope cut-offs and the utilisation of diverse functions, as detailed in Chapter 4. These iterations ensured the accuracy of the results, offered a framework for evaluating said methods and functions, and extracted the maximum amount of information, given an understanding of the used functions. The analyses contribute to a comprehensive understanding of the methods' limitations and facilitate a critical evaluation of their effectiveness to optimise their utilisation.

It is important to stress that the aforementioned GIS-based procedures were executed with an awareness of the method's limitations. It was acknowledged that these tools serve to contribute to the prediction of areas where movement patterns may have concentrated or where they could have concentrated during the Minoan era, as well as evaluating areas on the basis of lines of sight and water availability. Importantly, however, it was also seen that the results should not be regarded as monosemantic, but rather as a part of a broader analytical framework.⁶⁶⁸ GIS can be a very useful tool, but completely replacing the actual pathfinding could prove misleading. After all, even if belonging to different cultures, aspects of pathfinding and navigating the terrain remain an intrinsic characteristic of human behaviour, encoded in the genes of our species, so

⁶⁶⁷ A tentative proposition is that the branches of these waterways, especially those currently lacking identified tholoi, might serve as potential areas for discovering yet-unidentified tholoi.

⁶⁶⁸ Verhagen 2013, 383.

that the modern walker may share more with the ancient counterpart than one would assume.⁶⁶⁹

Despite their inherent distinctions, these methodologies exhibit a convergence in highlighting natural movement patterns. While the route toward Trypiti was anticipated to be validated by the flow accumulation, the emergence of a direct connection to Salamias and Ayios Ioannis through the flow accumulation was somewhat unexpected yet promising. This result served as an inspiration for the subsequent on-site exploration. Although the identified paths do not perfectly align with the nuances of actual walking (refer to Chapter 11.1), they provided a valuable estimation and served as an initial qualitative assessment of the terrain under investigation. Their usefulness is therefore assessed as positive both before embarking on the walking expedition and also afterwards for furthering the understanding of the terrain.

To this effect, aspects of the viewshed (Chapter 5.4) and watershed (Chapter 5.5) aided in quantifying further aspects of the terrain.

The position of Koumasa is verified to be peripheral in the macroscale of movement channels in the Messara and beyond, but at the same time nodal in the connections within the area of its mesoscale, presiding over pathways around the central and western-central Asterousia to the south and the valley to the north. Otherwise formulated, the cumulative results affirm the presence of an attractive force for natural pathways around the Asterousia converging toward the site of Koumasa. This phenomenon can be likened to that of a “gravitational pull”.⁶⁷⁰ This renders some locations central, which, as per the definition provided by Mills et al. ascribes to some nodes within a structured system with a certain prominence.⁶⁷¹

Koumasa therefore is seen to play a pivotal role as a local node, facilitating movement from the valley to the mountainous central Asterousia, exhibiting a considerable degree of exclusivity towards some locations, particularly concerning the harbours of Ayios Ioannis, Salamias, and, to a lesser extent, Trypiti and Kophinas. This exclusivity in the latter two is shared with Apesokari and the broader region of Rotasi, respectively.

Additionally, Koumasa boasts extensive visibility and, in respect to the watershed, aligns with other locations featuring tholoi in access to important water sources.

The techniques implemented here in the large-scale 20m.-DEM and 30.-DEM are also applied in the case of a local DEM for Koumasa in Part III, Chapter 6, so that the effects of the topography’s influence over the microscale can be examined, followed by the analysis of the architectural implementation on the ‘sanctuary’, in Chapters 7 and 8.

669 David – Thomas 2008, 113–115. For aspects of evolutionary psychology, see also Chapter 12.

670 Rivers et al. 2013, 136; see also Renfrew’s discussion of gravity in determining the directionality of distribution patterns (Renfrew 1977, 87).

671 Mills et al. 2013, 186–187.

Part III

Topography and Representation in the Microscale of Koumasa and Korakies Hill

Introduction

The architectural remains of Koumasa, beside the tholoi, primarily date to one phase, with the destruction level within this phase corresponding to LM I. As discussed in Chapter 2.3.1, the main buildings excavated are concentrated on the settlement plateau, but the building activity extends on the slopes, as evident from surveys and the identification of the LM building at the northern slope of the Korakies hill.⁶⁷² The slope is seen as the main reason for the bad preservation of buildings on it. The structures on the plateau seem to have been built within a unified masterplan, as the walls follow a grid (35° on a southwest-to-northeast axis on the plateau, with a slight deviation on the ‘sanctuary’, whose grid is at 45°). This fact will be further demonstrated in future excavations.⁶⁷³ Up to date, the total number of excavated walls is 73, with a total length of 466 m.

In certain areas, such as the magazines and parts of the ‘sanctuary’, construction partially incorporates Protopalatial structures or reuses older walls. At the same time, other sections are built directly on the bedrock during the LM I period. The area was abandoned simultaneously during the LM I period, after which no evidence of construction activity was observed until the Hellenistic period.⁶⁷⁴ The dating of the mostly undecorated ceramic of this phase, pending a study of the material, has been consistent with LM I, without clear differentiation between LM IA and B. However, a hemispherical cup with a painted spiral decoration on the floor of the building in Trench 16 offers a dating possibility.⁶⁷⁵ This hemispherical cup finds comparison in the LM IB of the Knossos area and, therefore, represents a point of reference for the chronology not only for the room but also for the entire LM I phase of Koumasa, due to the simultaneous abandonment of it.⁶⁷⁶ Another object that could be dated to LM IB is a conical cup Rhyton from the ‘sanctuary’ area which affirms this result.⁶⁷⁷

The hill slopes also show architectural elements that are still not excavated. To be mentioned is a square building of Neopalatial dating, with dimensions 13.5 m. and

672 Pfeiffer et al. 2015, Fig. 13.

673 Panagiotopoulos 2019b, 455.

674 Panagiotopoulos 2019b, 455; Panagiotopoulos 2023a, 197.

675 For the location of this trench within the settlement, see Panagiotopoulos 2024, Fig. 27.5.

676 Panagiotopoulos 2022a, 50; Panagiotopoulos 2022b, 333, Fig. 24.

677 See Footnote 747.

12.5 m. and a total area 170 m², situated at the base of the hill, 90 m. NE of Tholos E (see Figure 4).

Since ragged terrain defines the Koumasa settlement, insight into the three dimensions is possible with the use of GIS and DEM methods for definitions of routes and viewshed, following a trend of research that has already appeared in Aegean archaeology, as presented in Chapters 4, 5.⁶⁷⁸

Beyond the built structures, the microscale of Koumasa is analysed here using these methodologies as a collection of overlapping layers of everyday experiences. This approach extends the traditional definition based on movement within the settlement to encompass viewing, hearing, and all interactions shaped by the area's topography and constructed edifices.

The settlement is then approached as part of the landscape and subject to the techniques of landscape archaeology. The study of the microscale of the settlement correlates first with the traditional practice of the archaeological study of a certain region, and it is a much-needed action as the three waves of excavations and cleanings have unearthed a large amount of information, which will aid the analysis in this part of the study. The topographical importance of the area of the 'sanctuary', as Chapter 6 shows, is predominant. For this reason, in Chapter 7, a preliminary evaluation of the archaeological data from the old and new excavations of the 'sanctuary' area will be undertaken to elucidate the results of this Chapter further. These results are part of the preparation for a systematic publication of the archaeological finds. The documentation and analytical presentation of the results rely on the thorough examination of the excavation notebooks, a systematic analysis of the architectural remains and movable finds and last but not least, the results of micromorphological and material analyses.

On the basis of these data, previous interpretations of the 'sanctuary' have already been critically presented (in Chapter 1.2), and recent theoretical models will be implemented in Chapter 8, attempting a structured approach. Here, space syntax and architectural liminality serve as useful tools for addressing this subject, complemented by elements of architectural theory. Space syntax analysis will be employed as part of the broader analytical framework.⁶⁷⁹ Furthermore, as a second step, the utilisation of the phenomenological approach as introduced by Norberg-Schulz in architecture will be useful. This approach does not rely solely on the quantitative aspects of the data gathered per se but facilitates a secondary level of analysis, in which the liminal nature and potential of the architectural elements are incorporated.⁶⁸⁰ The use of this method in Minoan archaeology is a relatively recent trend and is considered essential for approaching architectural elements as *Things*.

678 Refer to such a study in the case of the visibility ranges of the Apesokari tholoi in Déderix 2019.

679 Hillier – Hanson 1984, 147–155.

680 Palyvou 2018, 3–5.

6 Microscale of Koumasa. Settlement Movability and Visibility Analysis with a Local DEM

Preparation

Utilising drone images, a .obj model was generated with Agisoft, which underwent georeferencing and was subsequently exported as DEM models of various resolutions that were further analysed in GIS programmes. The analyses in this Chapter were conducted based on a 1-meter pixel DEM. Higher resolution DEMs were also produced, with 50 cm. and 28 cm. resolution, whose implementation did not cause significant differences in the results but were helpful in the cross-sections.

The total area of the DEM encompasses 10.76 ha. Figures 57 and 58 illustrate the extent of the DEM-covered area, encompassing the settlement plateau to the east of Peaks 1 and 2 and Peak 3 to the north. Peak 3 pertains to a secondary hill distinct from



Figure 57: Watershed of the area of Koumasa, computed on a 28cm.-DEM.

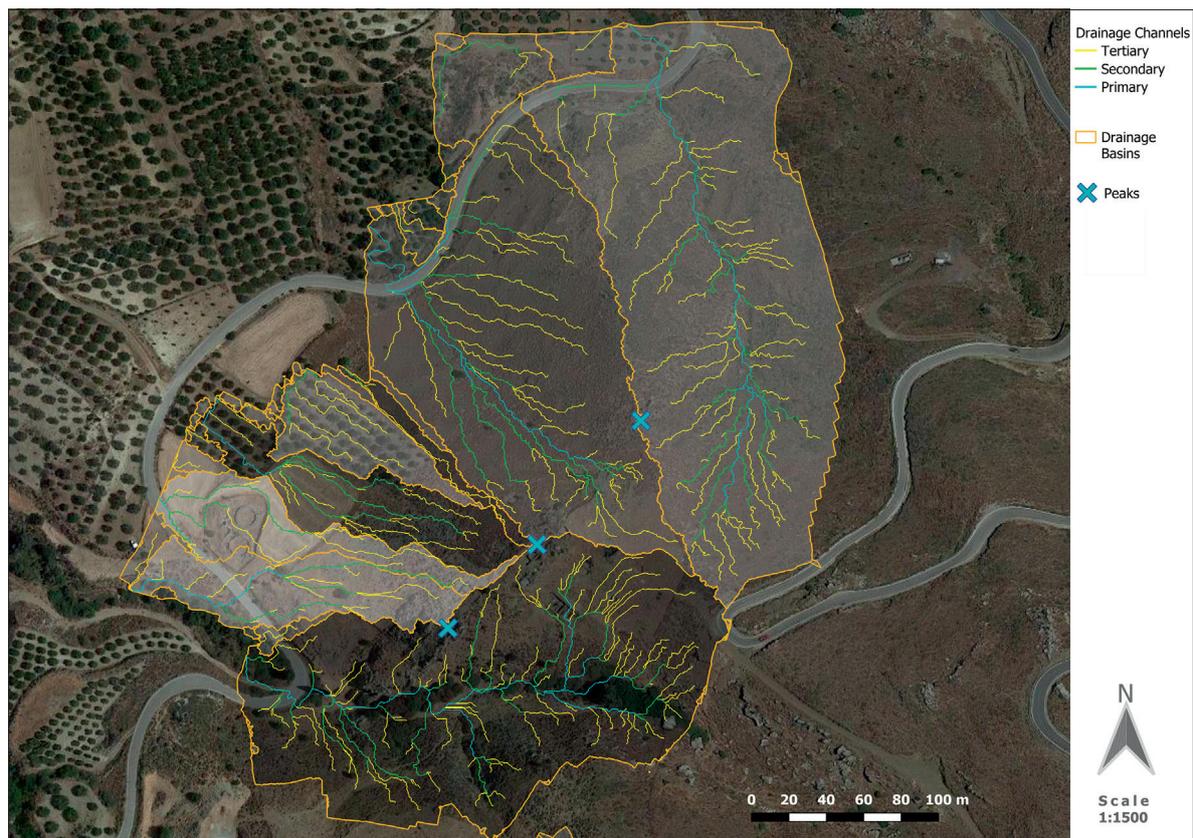


Figure 58: Watershed of the area of Koumasa, computed on a 28cm.-DEM.

Korakies hill and separated by a small ravine. The hill's topography, slope, and contour lines are illustrated in Figures 3 and 4 in Chapter 1.1.

Figures 57 and 58 show the drainage catchment based on the methodology of the watershed in GIS, as presented in Chapter 5.5. The effect of the slope in defining the regions of Koumasa is illustrated.⁶⁸¹

6.1 Viewshed

Viewshed can be used in a more local extent than the wider utilisation seen in Chapter 5.4.⁶⁸² The viewshed analysis above illustrates the observable terrain based on observation points, with definable observer and target heights. As in the case above, both the observer's and target's heights are set at 1.6 m., corresponding to an average height of a

⁶⁸¹ Only in this case, the DEM with 28 cm. accuracy was used, as it yielded more accurate results than the 1 m.-DEM. To be noted, that the watershed analysis is subject to the edge effect, so that at the edges of the DEM smaller catchments appear, that are to be considered virtual, due to the limited area of the DEM.

⁶⁸² Déderix 2019; 2023, 12–13, 23–29, Figs.5–9.

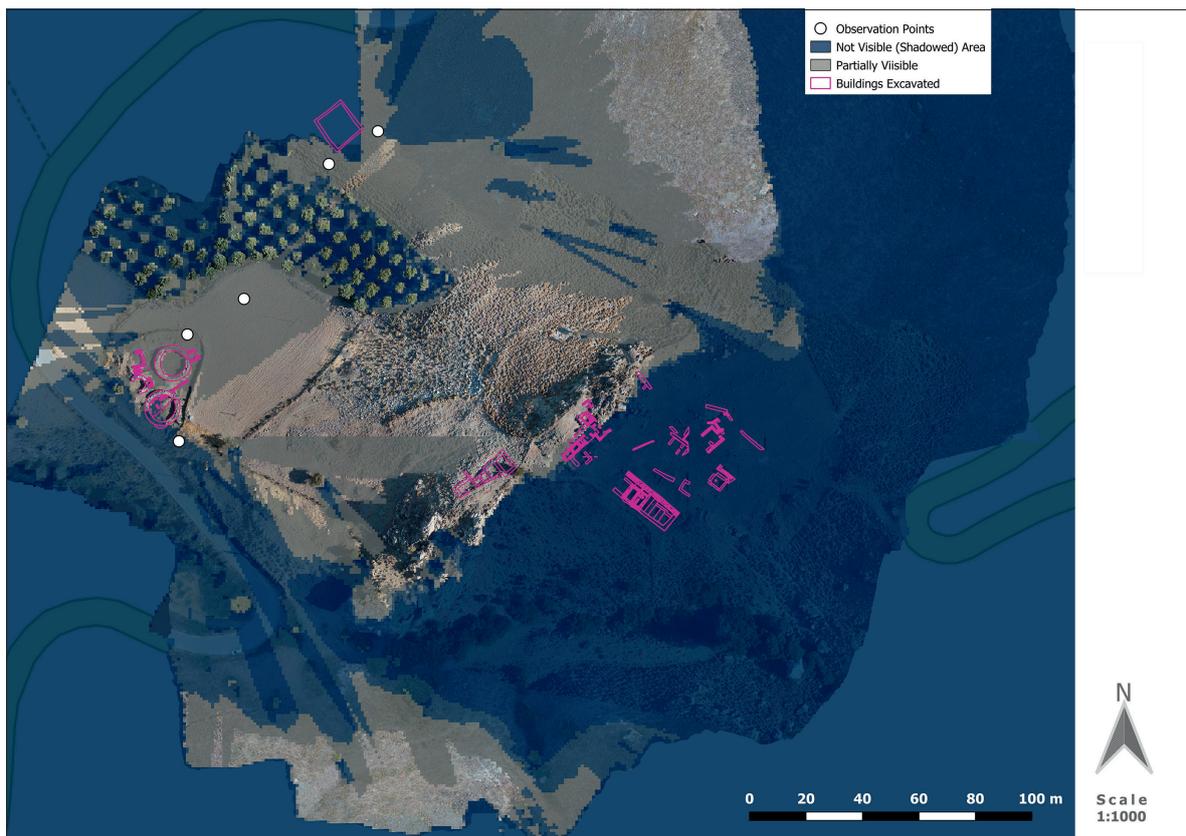


Figure 59: Iteration 1. Viewshed from points to the immediate west of the Korakies hill.

premodern individual.⁶⁸³ The maps depict the lines of sight or visibility from observers to observation points to standing individuals across the landscape within the limits of the DEM.

In the iterations below, the viewshed is shown in grades of visibility, with full visibility rendered as completely transparent and the other degrees shown in shades of yellow and grey for partial visibility and black for non-visible areas. The 1m.-DEM was used, as the higher resolution does not add more information while adding an unnecessary computational effort.

In the initial iteration (Figure 59), five observation points were defined alongside the start of the hill's slope along the same contour line of 380 m. (which passes through the tholoi in their excavated state).

As seen in the image above, the plateau remains invisible. The area between Peaks 1 and 2, where the 'sanctuary' is located, is the frontal scene for the observation points, especially in the terrace area. This area, with partial visibility for targets with 1.6 m. of height, is the only area of the plateau with direct frontal visibility of the valley below.

683 See Footnotes 658, 659.

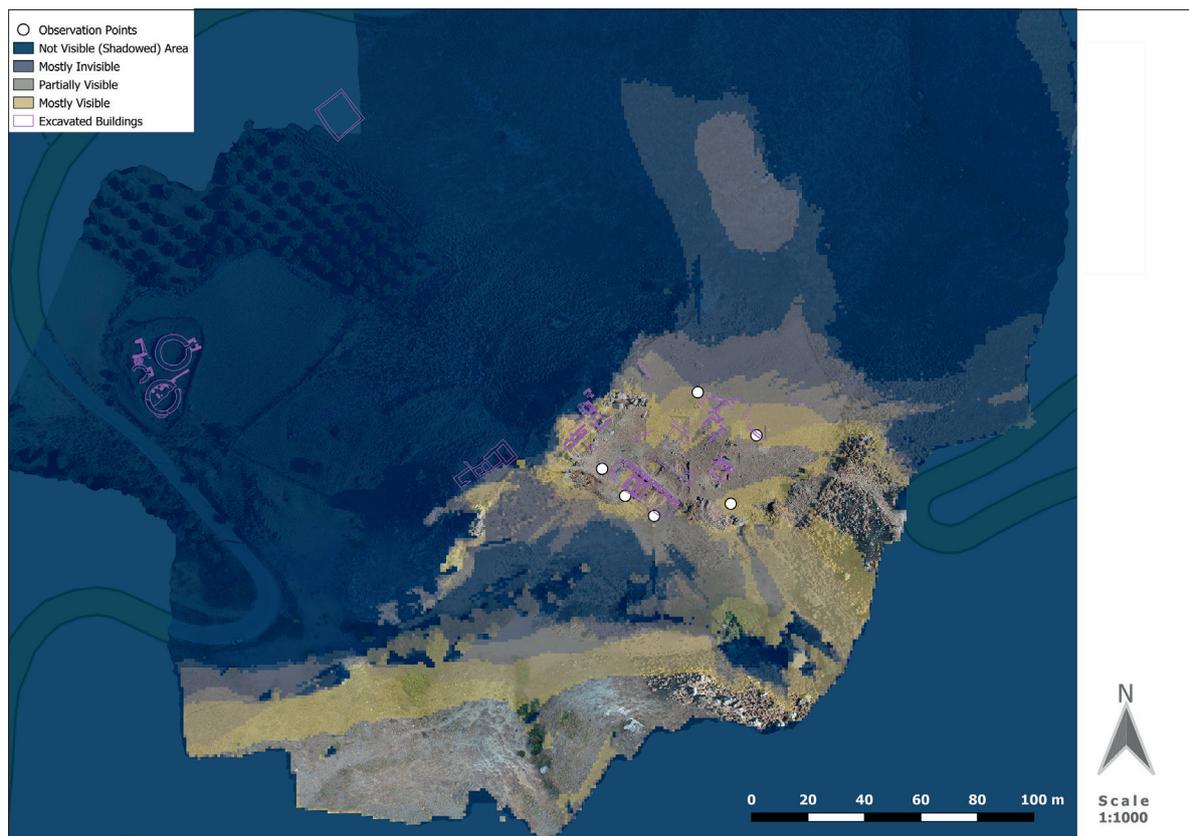


Figure 60: Iteration 2. Viewshed from points on the settlement's plateau.

The second iteration makes the optical seclusion of the plateau clear, as six points were set along its surface, as can be seen in Figure 60.

As it can be seen, the western and northern slopes are mostly shadowed, as is part of the 'sanctuary'. The visibility of part of the 'sanctuary' is attributed to the two easternmost observation points, located along the 420 m. and 424 m. contour lines. Also, built structures on the 'sanctuary', especially those at Rooms 3 and 4, would add a further optical block to the view from the Plateau (see fourth iteration below).⁶⁸⁴ It is to be noted that from the northern observation points, the greater Messara valley is visible (a fact not captured in this local DEM), and the restriction concerns only the descending north slope, which becomes partially visible only if one stands at the northern edge of the Plateau.

As demonstrated in Iteration 1, accessing the terrace – the westernmost part of the 'sanctuary' – is necessary to explore the optical connection with the descending slopes, where the two viewsheds discussed above partially overlap. Therefore, in the third iteration, the observation points are positioned along the western side of the terrace of

⁶⁸⁴ Rooms 3 and 4, especially when considering built structures, form the eastern front of the 'sanctuary' (see discussion in Chapter 8.3 and Figure 76).

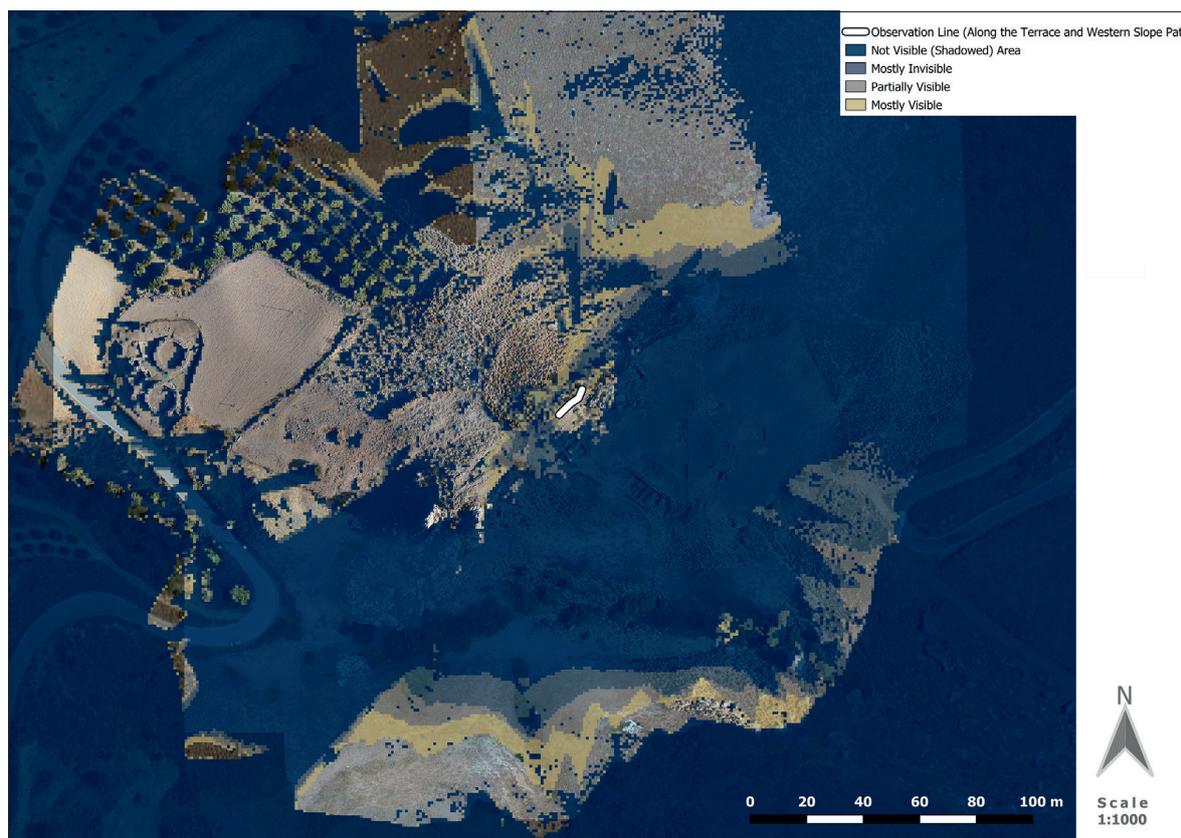


Figure 61: Iteration 3. Viewshed from points along the western path (western corridor).

the ‘sanctuary’ and the last part of the western path leading to it on the slope of the hill (Figure 61).⁶⁸⁵

As shown in the image above, the view of the western slope, including the tholoi, is prominent and aligns with empirical observations. As is logical, in the west slope, it reproduces the visibility map seen in the first iteration. Still, the areas that were partially visible from below are now well-seen, as the high ground of the terrace offers a good viewing position. In simpler terms, the viewer from the terrace sees everything below, but not all from below see each other. However, the settlement plateau is not visible to the east of the terrace, as it is obstructed by Peak 1 and Rooms 1 and 2.

The restricted visibility of the terrace itself would be even more constrained when accounting for potential structures alongside Walls a, b, and the height in Rooms 3, 4 (as discussed in Chapter 7.2). Topographically, the terrace of the ‘sanctuary’ is part of the hill and the plateau; however, in terms of visibility, it is connected with the area at the foot of the slope. This distinction would have been more pronounced if the structures in the ‘sanctuary’ were considered. A similar observation applies to acoustics, as the area of the terrace is acoustically more connected to the western slope than to the plateau, as

⁶⁸⁵ For more on this assumed western corridor, see Chapter 7.2.4.

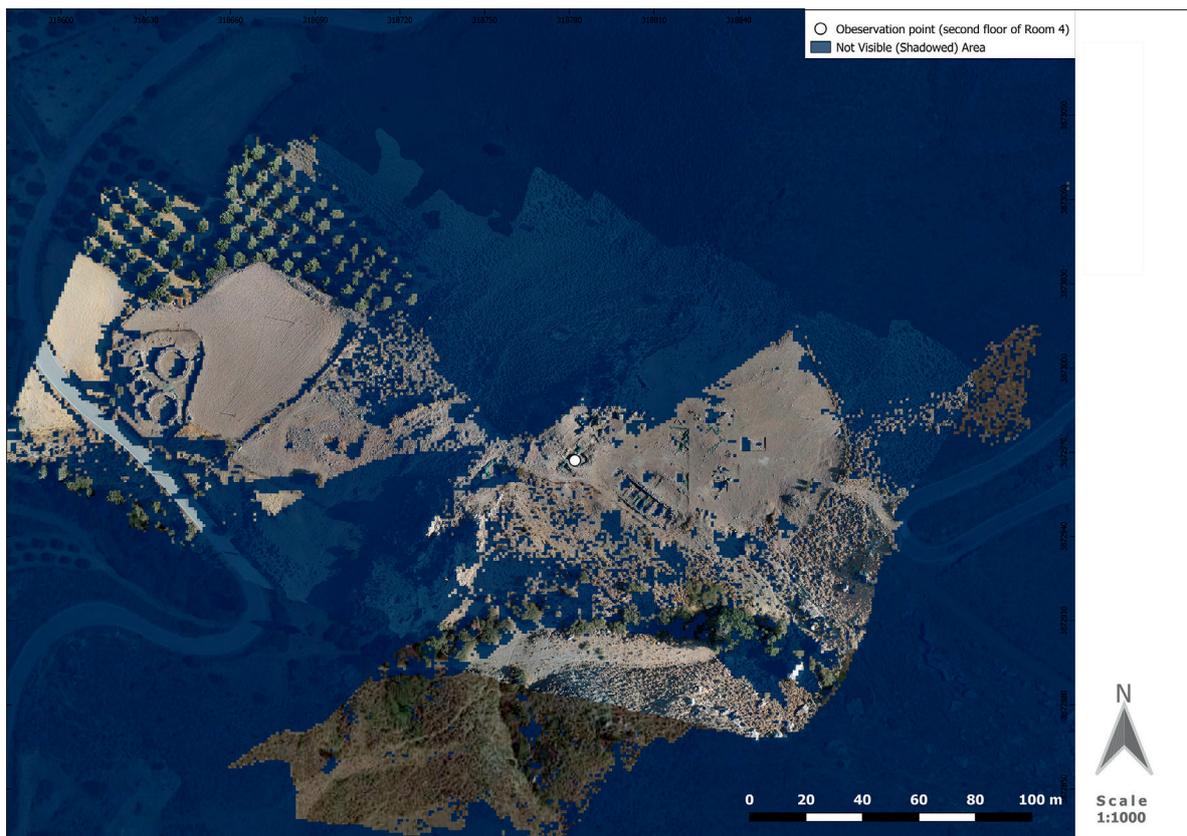


Figure 62: Iteration 4. Viewshed from the point of an observer standing 3 m. above the column base of Room 4, approximating standing observers on the roof of the building in Room 4.

empirical observation has shown. This is attributed to the topography of the descending southern slope, which focuses sound waves. The presence of buildings in the area of Rooms 1, 3 and 4 would have added to the dimming of the acoustic connection between the plateau and the terrace further. Thus, the modalities of visibility and acoustic range place the terrace into the sensory environment of the slope and the tholoi area, diverging from its geographical categorisation.⁶⁸⁶

A detailed examination of the ‘sanctuary’ area, coupled with a preliminary analysis of its layout and finds, is essential for understanding the interplay of visibility and design in this topographically prominent feature of the Korakies hill.

The nodal position of the ‘sanctuary’ between the plateau and the area below is emphasised in the fourth iteration, which takes into consideration the architectural layout in Room 4 of the ‘sanctuary’. There, a column base, as well as the archaeological finds, indicate a second floor (See Chapter 7.2). Taking the conservative view that the roof of the second storey was not walkable, the viewer position is considered on the roof of the first storey, taken here as 3 m. from the floor level of Room 4 (Figure 62).

⁶⁸⁶ For the sensory aspects of a place, see Feld 2005, 182–185. See also discussion on page 216.

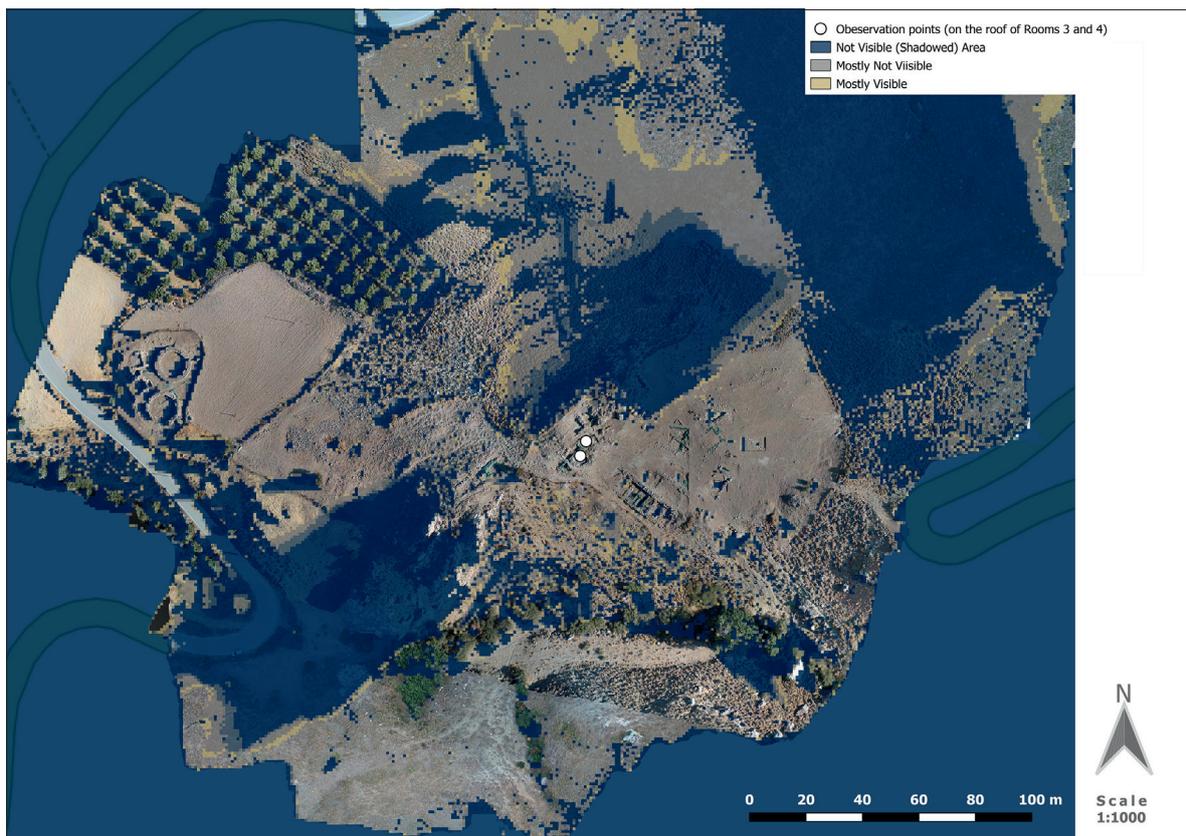


Figure 63: Iteration 5. Viewshed from the point of observers standing on the roof of the second floor of Rooms 3 and 4.

As seen in the image above, a viewer on the top of the roof of Room 4 would have an optical connection to a large part of the slope reaching from the valley to the area of the tholoi and both the plateau and the tholoi area. Interestingly, the path from the valley through the western slope discussed in the Chapter on least-cost-path analysis below (Figures 66 and 67) would be fully visible from that position. However, an approach from the northern slope paths is not visible.

Further, the viewshed extends to the plateau, as is logical; hence, the viewshed coincides with the two fairly level areas of the Koumasa area, best illustrated in Figures 5 and 64.

A similar, and more pronounced visibility coverage is accomplished in the fifth iteration, where the viewer position is considered to be the roof of the second storey of Rooms 3 and 4, the two rooms that had column bases, as discussed in Chapter 7 (Figure 63).

In this case, the invisible areas are minimal and concentrated southwest of Peak 2, northeast of Peak 1, and the northeastern gorge beyond Peak 3.

6.2 Least-Cost Paths

The second phase of the DEM analysis involves illustrating the influence of topography on pedestrian movement. The methodology employed for this purpose is the least-cost-path analysis, which includes generating a slope map and subsequently reclassifying it, as seen in Chapter 5.2. The rationale behind reclassification is to enhance the slope data with parameters that account for the natural patterns of human mobility, as expounded upon in Chapter 4. This involves primarily the slope's influence rather than time in these generally short distances.

The reclassification process utilised cost values based on the approximation of the second-degree polynomial in 5-degree steps. This approach was chosen as more granular classifications tend to yield comparable outcomes, as elucidated earlier.⁶⁸⁷ Figure 64 shows the resulting reclassified cost map.

Illustrated in this image are the level areas (depicted in yellow and dark yellow shading, featuring slopes ranging from zero to 10 degrees) situated (1) west of Korakies hill around the tholoi area (also extending to the region covered by olive trees in the DEM, where the elevation noise due to the trees can be disregarded for this analysis); (2) on the settlement plateau; (3) to the south in the ravine south of the plateau, bordered by steep slopes on both sides (indicated by the purple and black shading, corresponding to 30 degrees and more); (4) and to the north, where the modern road flanks the northern part of the hill and extends further north at the edges of the DEM.⁶⁸⁸

Additionally, the secondary hill of the Korakies, with its summit marked as Peak 3 (see Figures 57 and 58 above), is highlighted, showcasing steep slopes flanking it from the west and east. To its east, the northward ravine is also depicted as highly steep, aligning with on-site experiences of the terrain and fitting with the watershed basins presented above. The west and northwest slopes of the Korakies hill are presented as mildly steep, suggesting the relatively more straightforward connection of the settlement plateau to the valley from these directions.

In the first iteration of the least-cost-path analysis, using the 1m.-DEM, a starting point in the valley to the west of the tholoi area is assumed, and four destination points are identified: one in the gorge south of the settlement, two on the plateau (one on its southern edge and one on the northern edge), and a fourth point east of the northeastern ravine. Least-cost paths were generated towards these points, that highlight the topographical characteristics of the area, as seen in Figure 65.

⁶⁸⁷ See above, Footnote 619.

⁶⁸⁸ The yellow colour of the road itself corresponds to an induced error, as it is shaded thusly due to the artificial pavement of the street and should not be taken into consideration. It being peripheral, further coding to exclude it was not deemed necessary.

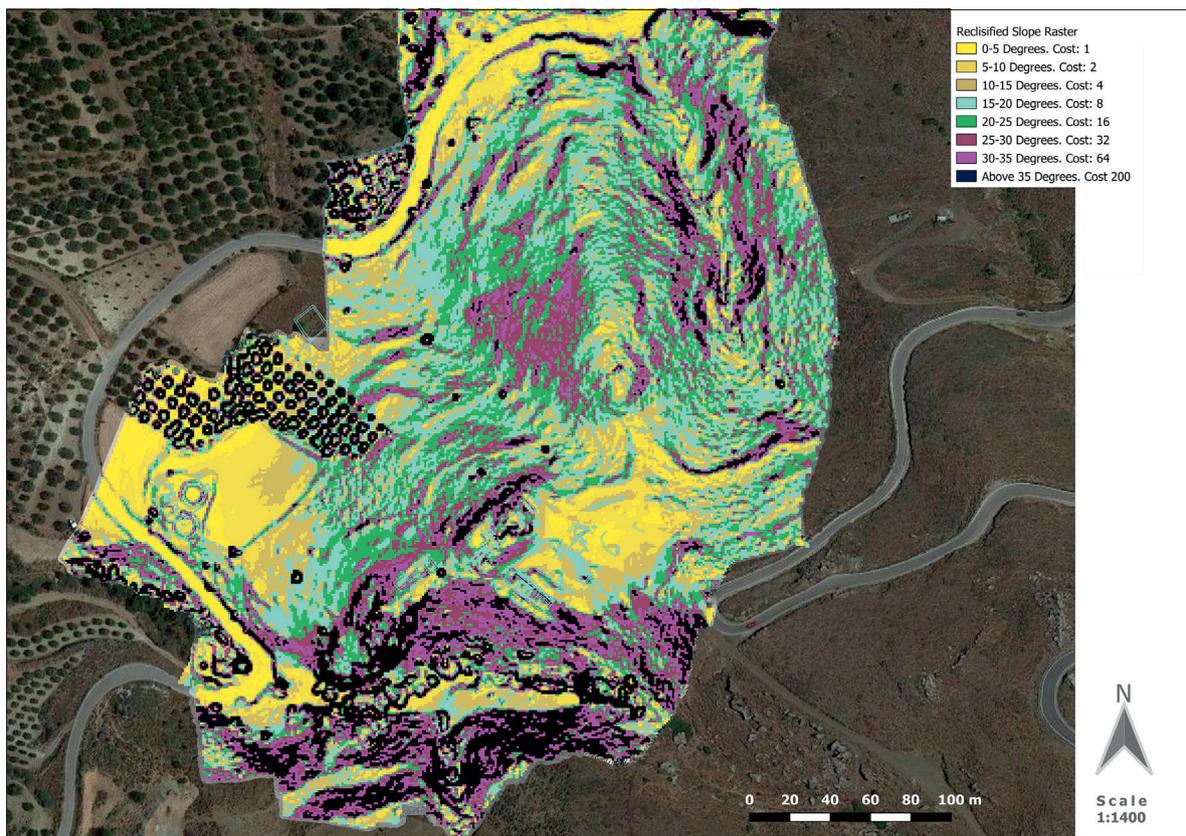


Figure 64: Reclassified slope of the 1m-DEM.

The slope raster was used here as the background image to the extent of the DEM, which demonstrates the relatively flat areas of the valley below, the southern gorge and the settlement plateau with darker colours.

The paths towards the southern gorge and the point east of the northeastern ravine, as logical, bypass the Korakies hill entirely. Both paths make use of the modern road, and while it is paved on the natural earth, it nevertheless causes minimal disruption to the terrain so that the induced error is considered minimal. The paths to the two points on the plateau ascend the hill, bypassing Peak 1 and the ‘sanctuary’. One path bypasses it to the north, while the other goes south of it. Further iterations (not shown here) indicate that these two access paths are chosen based on the destination point to the north or south part of the plateau, respectively. It is noteworthy that the southern path does not change and consistently passes near the tree between Peaks 1 and 2 in all iterations, corresponding to empirical data indicating the bottleneck observed empirically, restricting movement there. The exact trace of the northern path varies slightly in the various iterations (not shown here).

The second and final iteration involves a starting point at the terrace of the ‘sanctuary’, specifically from the point where the wall separating Rooms 1 and 2 ends. Four destination points were defined, including one deep in the southern gorge, one at its

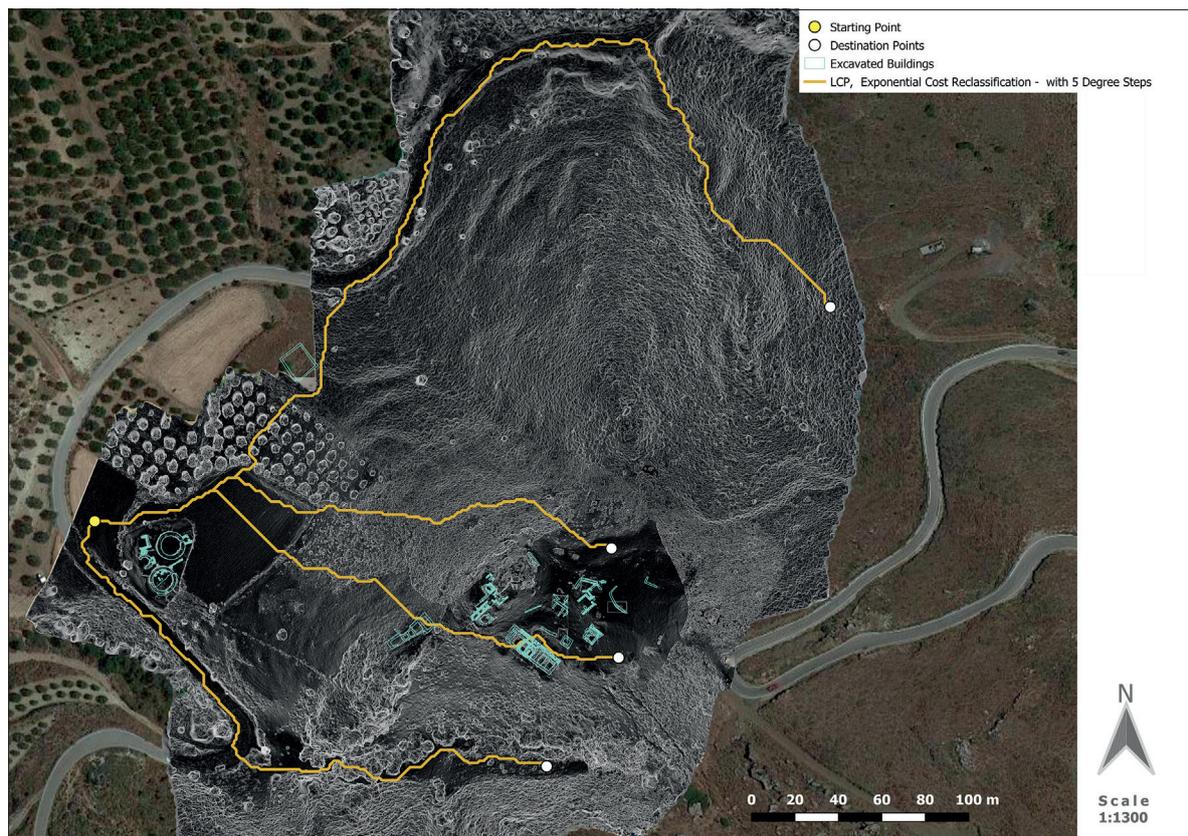


Figure 65: Iteration 1 of least-cost-path analysis on the 1m.-DEM.

entrance, one to the north-west of the tholoi and south of the olive grove, and the last to the north of the hill at the position of the Neopalatial building identified there. The results are shown in Figure 66.

The path leading downhill to the west is strongly linked with the path towards the entrance to the southern ravine. This access route is very close to the one used today as the main access point from the west (a discrepancy at the beginning of the hill is due to the fence surrounding the field east of the tholoi). The path to the areas to the north, leading to the Neopalatial building, follows the natural shallow ravine and should be considered secondary, as these natural paths often are. The way to the eastern part of the southern ravine passes near the magazine building. It is a very steep path and is not shown if a cut-off is inserted for slopes greater than 30 degrees (not illustrated here). It is walkable through zigzagging, as empirical walking has shown from that area downhill.

The results of this final iteration should be seen in combination with the viewsheds that stress the 'sanctuary's' strategic position, denoting it as the focal area of the microscale of Korakies hill and the surrounding areas.

Further refining of the algorithm, such as inserting a possibility for zigzagging would produce different results, better fitting the reality of human movement, but here

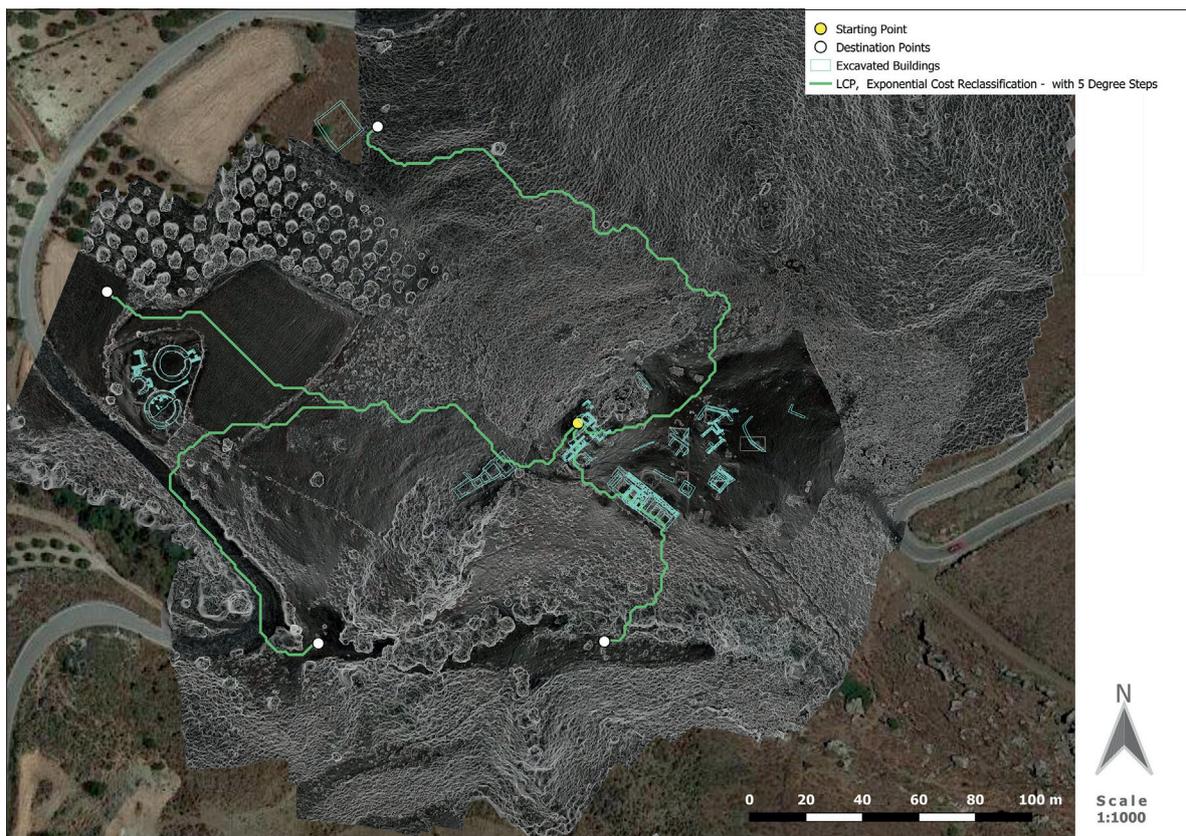


Figure 66: Iteration 2 of least-cost-path analysis on the 1m-DEM.

this is deemed as redundant, as the paths shown satisfy to a great degree the reality of walking around and on the Korakies hill.

The last point in this Chapter is to stress the need for reclassification, which is demonstrated in the image below. Paths from the ‘sanctuary’ (with the same targets as in the second iteration) are calculated based on the slope raster as a cost raster, i.e., without reclassification. The resulting paths are interlaid with the paths from the iteration above to make the difference clearer (Figure 67).

It is clear that no reclassification produces paths that do not correlate with human walking patterns (yellow lines) and are, therefore, unusable.

Discussion

In conclusion, the strict definition of the archaeological site of Koumasa as uphill and downhill lacks the input of sensory archaeology. Seeing and acoustics show a relative seclusion of the main area of the plateau from the immediate slopes to the west and north. The merging characteristics of the up and downhill areas are seen around Peaks 1 and 2. These become more pronounced through the architectural layout of the ‘sanctuary’ complex.

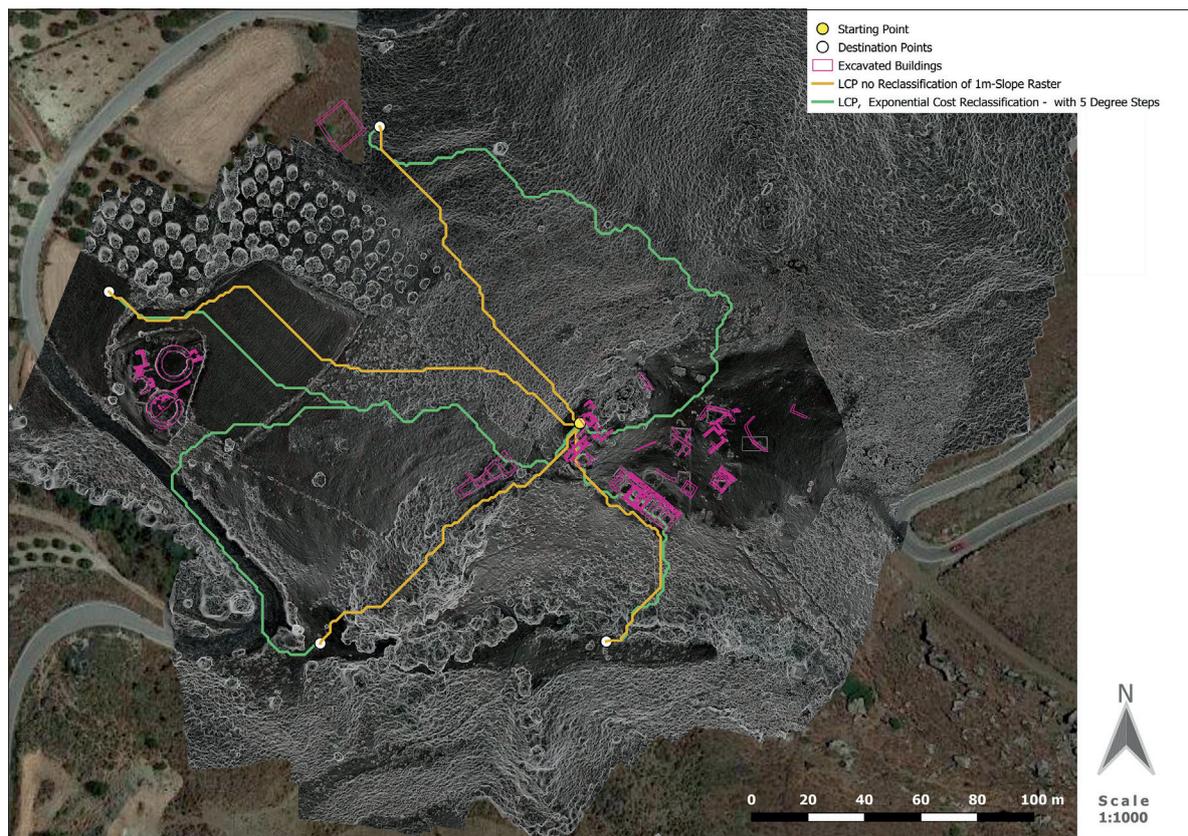


Figure 67: Interpolation of iteration 2, with and without reclassification.

The results of the least-cost-path analysis indicate the northern slope as a possible main access point to the plateau from the valley, as proposed by Pfeiffer et al.⁶⁸⁹ This possibility also fits with the relative abandonment of the area of the tholoi after the end of their use.⁶⁹⁰ However, different access points from the route between Peaks 1 and 2, or even from the south (with the latter being significantly more difficult), would act as part of a constructed exclusivity in approaching the plateau. Again, the area of the ‘sanctuary’ is seen to represent the focal point of the whole area.

A final observation arises from an analogy with topographical analysis employing fractals. The concept of fractals, increasingly utilised in landscape characterisation, is defined by the self-similarity between the broader context and its individual components. This mathematical principle has been seen to capture the “essence of a landscape”.⁶⁹¹ Indeed, a mountain is not only perceived as a collection of ragged shapes, being codified in a triangle surface (referring to the meshing during the production

689 Pfeiffer et al. 2015, Fig. 13.

690 See discussion page 48f.

691 Xu et al. 1993, 245–248, 253.

of the DEM model) but also includes a level of internal repetition. This alludes to the fractal characteristics (most commonly encountered in the problem of estimations of shoreline lengths) that also extend on a psychological level.⁶⁹² This somewhat abstract concept holds tangible significance for those walking and moving in any given area.

Positioned at the transition from the settlement to the western slope, topographically, the area of the ‘sanctuary’ functions as a fractal second factor, mirroring the broader image of Koumasa in the transition between the Asterousia and Messara, being the fractal factor 1, if this mathematical model is followed. Moreover, the architecture in this area adapts to and leverages the location’s features, such as its exposed bedrock and abrupt drops. This adaptation imparts a tangible, material dimension to the concept of an *integrated landscape* – a notion that Minoan architecture sought to emulate in palatial centres or to accentuate in sanctuaries.⁶⁹³

For these reasons, archaeological evidence from the only fully excavated settlement area, the so-called ‘sanctuary’, will be elucidated in Chapter 7 to showcase the motifs emerging from the analysis in this Chapter, which will be further evaluated in Chapter 8.

692 In a fractal, a geometric allocation repeats itself so that the smaller part repeats and contains the entire pattern. The more one enlarges (“zooms in”), the more the whole repeats itself in an endless series. Mathematically: The more one increases the fractal factor or iteration step, the more repetitions appear. Or to better describe the narrative: The closer one looks, the more the picture enlarges and the more similar subcategories appear. This is an effect demonstrated in the mountains and is applicable to the location of Koumasa, which includes in its inner structure (with the transition from the plateau and the peaks to the valley beneath) the macroscopic structure of transitioning from the mountain to the valley, as seen in Chapter 1.1. For considerations of fractals in the perception of the mountains, see Joshi 2019.

693 Hitchcock 2007.

7 Insights of the Archaeological Research of the ‘Sanctuary’

The archaeological finds from the ‘sanctuary’ will be presented here in a preliminary summary, emphasising topographical features rather than individual finds. This focus is considered appropriate, as the site’s topographical characteristics offer significant insights into the symbolic significance and spatial utilisation of the mountainous region – one of the central themes of this study. Figures have been selected accordingly to highlight these aspects, while a more detailed presentation will occur within the Koumasa Project in the future.

Finally, the ‘sanctuary’ is the only region of the settlement that has been mostly fully excavated, allowing for a well-based discussion of this specific unit. The results will be presented based on the notebooks of the current excavation and their summaries.⁶⁹⁴

7.1 Layout of the ‘Sanctuary’

Although it is perceived as a whole, the ‘sanctuary’ complex can be divided into two parts.

The northern area includes the top of the hill, which provides a view of the Messara plain. Peak 1 itself is characterised by barren, uneven, harsh rock with an area of ca. 175 m², which does not offer any possibility for building activity. To its northeast, a monumental wall 1 m. wide and 7.7 m. long was found,⁶⁹⁵ without indications of interlocking with the rock. Its function seems, therefore, not to be that of a retaining wall but as a separation of the area to its east from the rocks above. It has two phases; the earlier is dated to MM II at the latest – based, amongst others, on a cup found within its base.⁶⁹⁶ This phase was followed by erecting a retaining or, rather, a separating wall in or post-MM III, after which the area between the wall and the bedrock continues to be used, forming small spaces that produce evidence of a magazine function.⁶⁹⁷ These are

694 Panagiotopoulos 2012a, 213–215; 2013, 316–322; 2014, 428–29; 2015b, 531–33; 2018, 483–85; 2019, 447–451.

695 In Trench 17, as seen in Panagiotopoulos 2024, Figs. 27.2, 27.5a.

696 For this cup, a wheel-thrown plain handleless cup with a curvilinear profile, see Panagiotopoulos 2024, 450, Fig. 27.5b.

697 For this area, see Panagiotopoulos 2018, 487–489; trench 17 in Panagiotopoulos 2024, Fig. 27.5a.

defined by three walls vertical to the monumental wall, of less than 2 m. in length and situated less than 3 m. apart.

The southern area includes the main ‘sanctuary’ area with its main rooms (see Figure 68). To the southwest of the peak, there is an abrupt elevation drop in the rock of ca. 3 m. at the base of which the northeastern side of Room 1 and the Corridor are located (see cross-sections in Figure 69). It is the main area excavated by Xanthoudides.⁶⁹⁸ There, Rutkowski identified 6 to 8 rooms, of which a preliminary plan was produced. He correctly spotted that more structures would appear to the south of Room 2.⁶⁹⁹ To their west, Rooms 1 and 2 open up to an exposed area, where traces of plaster could be identified on the otherwise barren bedrock. From this area, already referred to as the Terrace, a clear view of the western hillside up to the tholoi and a significant part of the Messara is available (see Chapter 6). Behind these two rooms to the east, a small narrow path can be seen, dubbed as the Corridor, which is adjacent to architectural remains that extend up to the peak rock. It represents the main artery of the ‘sanctuary’ as it is positioned between axes 1 and 2 (see below). These areas are where mainly Xanthoudides, as well as Kanta and Karetsoy, were partially excavated and cleaned and where the ongoing excavation programme under Panagiotopoulos commenced.⁷⁰⁰ The initial finds – which cover the period from MM II to LM III, and sporadically Post-Minoan – are, as previously mentioned, without clear context, making the formation of secure suggestions regarding the nature of activity in this area difficult, as has been presented by Georgoulaki in her study.⁷⁰¹

The architectural remains in this area were primarily uncovered during the three distinct archaeological campaigns, with the publication of finds pending. Although the excavation is largely complete, a comprehensive study of this area remains both challenging and essential. This complexity stems from the complex excavation history and the site’s prominence as a primary source and focal point in the ongoing discourse surrounding the Koumasa ‘sanctuary’. As discussed in the previous Chapter, this area serves as a pivotal element within the broader landscape.

The south-western part of the main area of the ‘sanctuary’ lies lower than the north-eastern area. Southwest of Room 2, the Corridor, and Room 3, the ever slightly decreasing slope becomes noticeable. This area is undoubtedly connected with the one above and must have constituted one access point towards it. It also connects the plateau of the settlement with the slope leading westwards towards the tholoi. This area comprises a number of walls and rooms, alluding either to a complex area or a densely built one. Of the rooms, some were possibly two-storied, a fact that was proven with certainty for Room 4.

698 See Panagiotopoulos 2013, 317, and discussion in Chapter 1.2. This observation derives from the descriptions of Xanthoudides and from the filling found in a lower area, which is attributed to previous excavations.

699 Rutkowski 1989, 48–49, Fig. 1. The naming of the room was kept in all subsequent excavations.

700 Panagiotopoulos 2013, 317.

701 Georgoulaki 1990, 21–22.

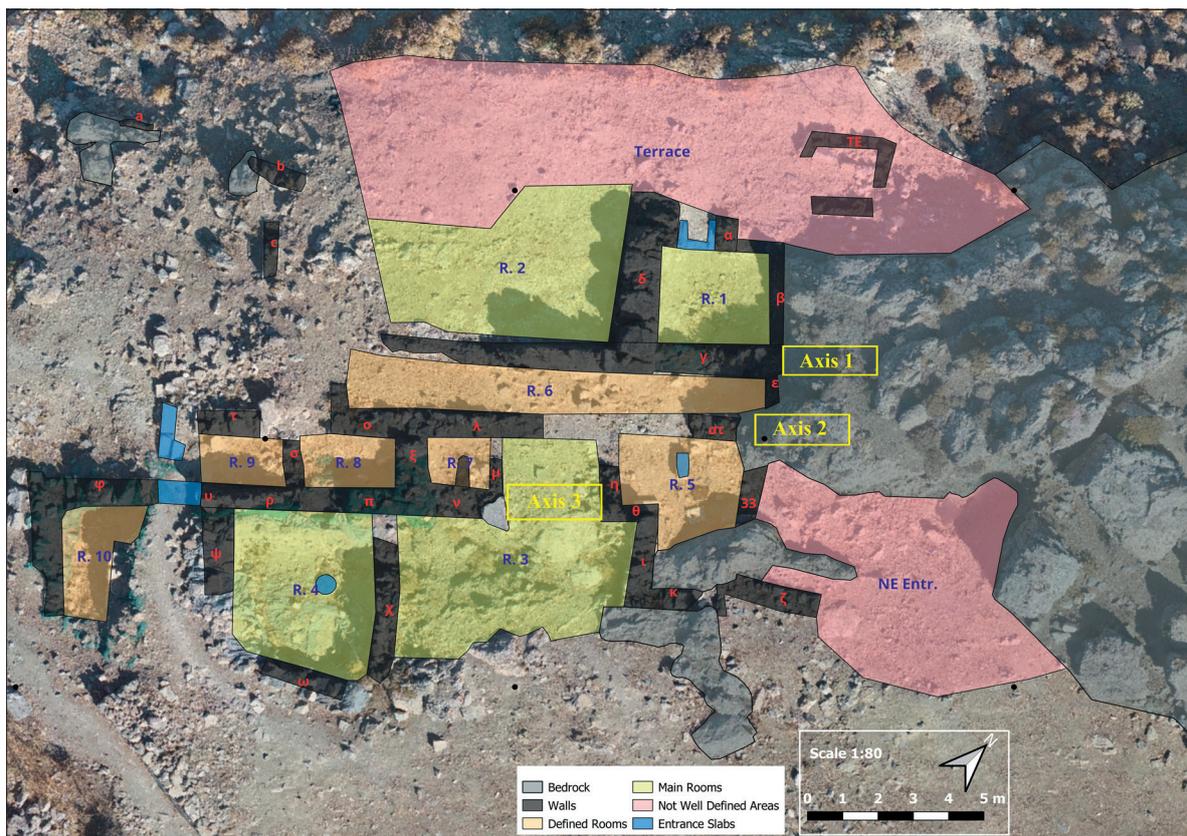


Figure 68: The main area of the 'sanctuary'.

In general, the majority of finds and pottery from the ongoing excavation in the southern area 'sanctuary' date to the early LM period, corresponding to the final layout of the area during LM I. However, there are finds stretching from the MM to LM III, as well as Post-Minoan ones on the surface areas (see Chapter 2.4 and 2.5.1). The proposed reuse of certain rooms further complicates the interpretation of the architectural layout.⁷⁰² The excavation of this part of this main part of the 'sanctuary' has nevertheless yielded results that are helpful in clarifying the layout (such as the suggestion regarding the plan of the rooms, their entrances and accessibility) and in determining its boundaries.

The structures follow a grid that is defined by three partially continuous walls, partially using the naked bedrock, worked with chisel to fit the layout. These walls have 2 m. distance between them, and although none of them exceeds 15 m. in length, the total distance from the beginning of the first until the end of the third to the southwest is 22 m. (see Figure 68). These three walls will be referred to as the axes of the 'sanctuary'. They have a northeast to southwest orientation at an angle of 45°. This grid is generally noticeable for the whole settlement, but within the 'sanctuary', there is a slight deviation from the grid used in the rest of the settlement, which can be measured to be

⁷⁰² Kanta – Karetsou 1991, 94–99.

7 Insights of the Archaeological Research of the 'Sanctuary'

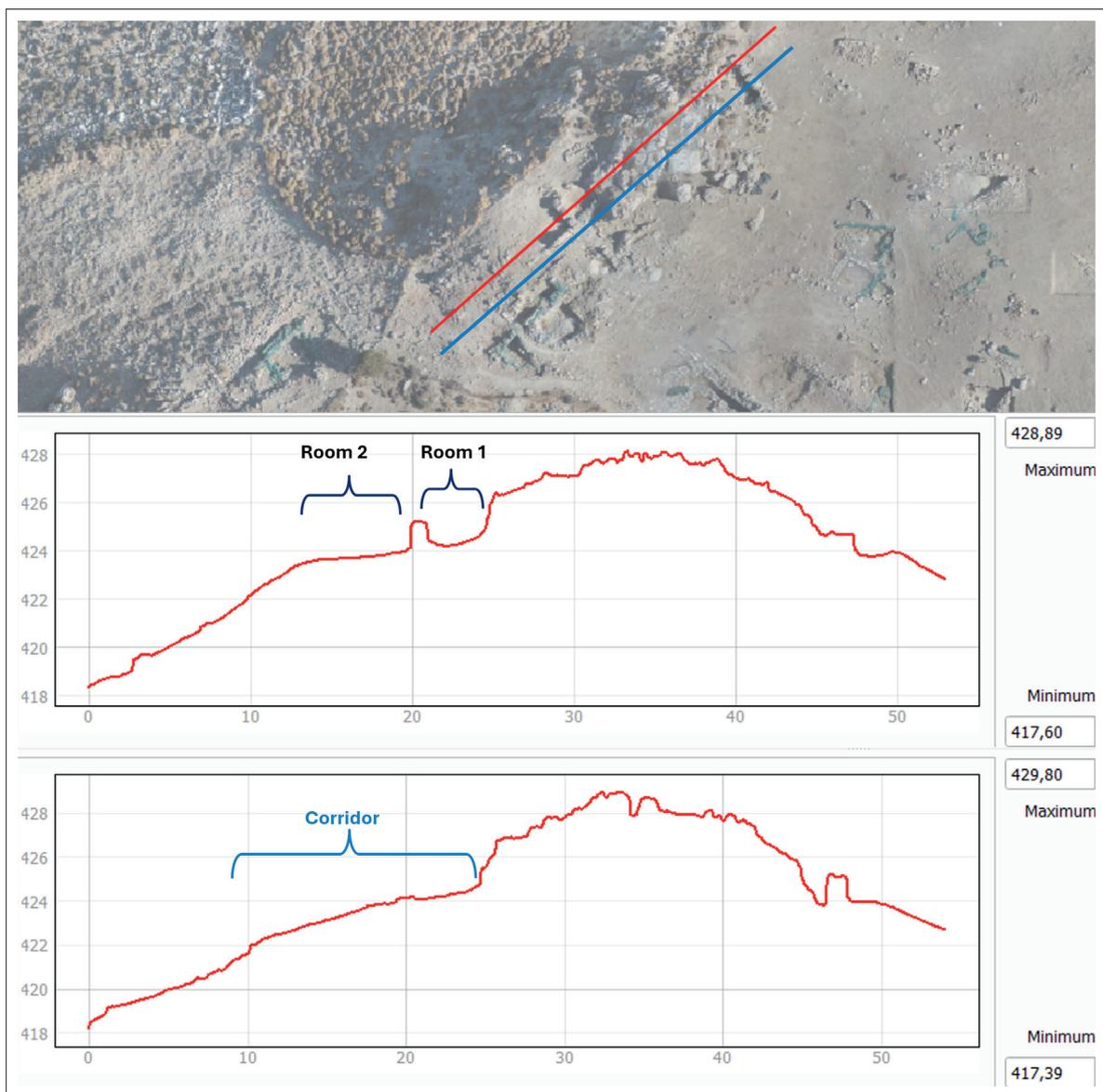


Figure 69: Two horizontal section cuts: the northwestern one (red in the overview on the top) crosses Rooms 1 and 2 and the main rock formation on the summit; the southeastern one (in blue) follows the corridor and cuts wall the northeastern wall.

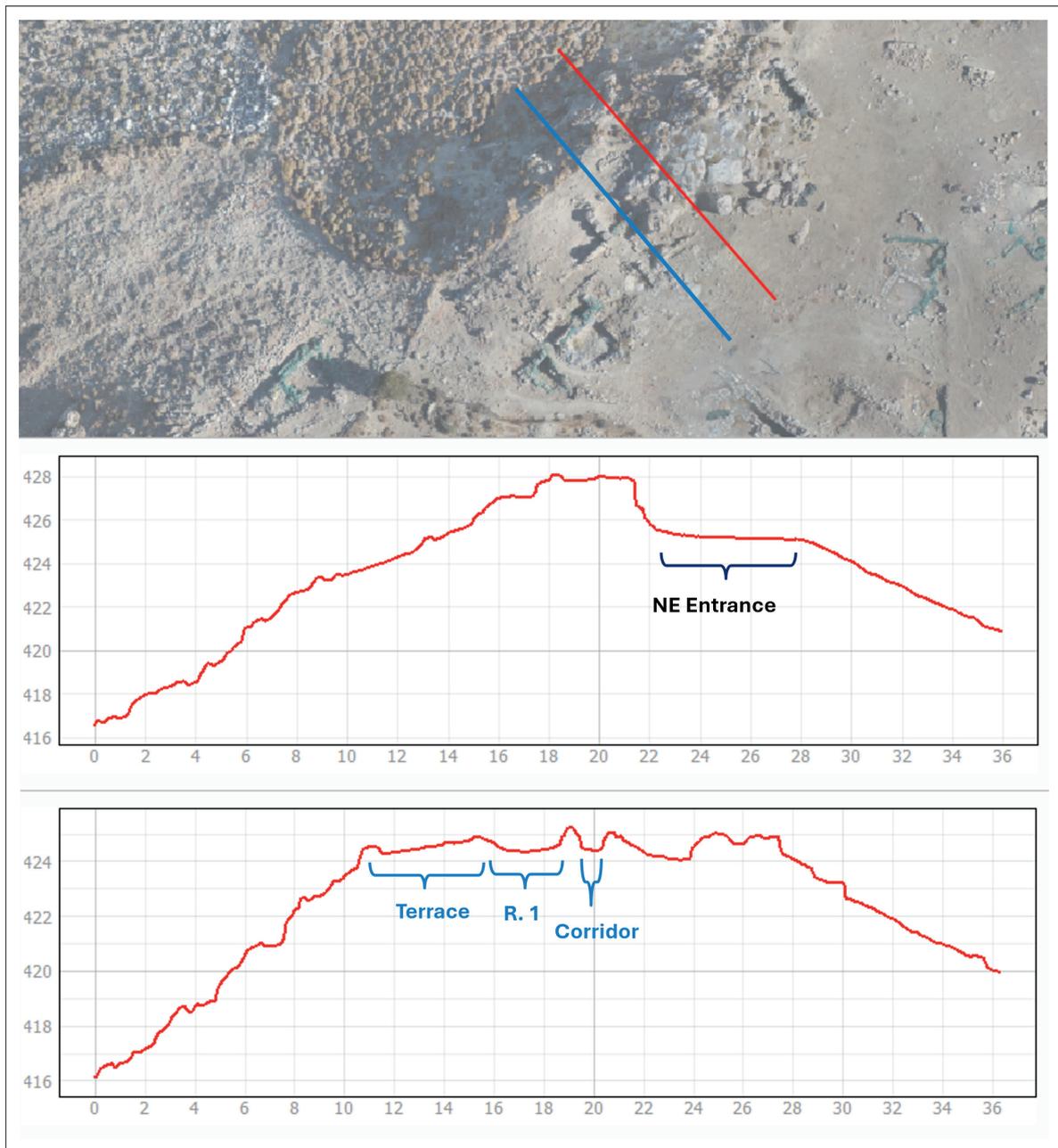


Figure 70: Two vertical section cuts: the northwestern one (red in the overview on the top) crosses Rooms 1 and 2, the main rock formation on the summit; the southeastern one (in blue) follows the corridor and cuts wall X to the north.

ca. 35°. The discrepancy noted could be ascribed to planning inaccuracies induced by the elevated terrain. However, a more plausible explanation is that the grid adheres to the natural slope, which often dictates the overall design, as elaborated below.

The region, delineated by the three axes that serve as its architectural backbone, encompasses approximately 770 m², with the uneven rock terrain around the peak covering 175 m². It has two clear entry points, one from the settlement plateau to the north-east of the complex and one from the southeast at the point where the path from the western slope reaches the plateau. These two access points can be seen in correlation with the two main ways of accessing the plateau from the valley below.⁷⁰³ A third access point, this time linked with the main plateau, is from the SE of the complex, from the area of Room 10.

Cross-sections of the ‘sanctuary’ area, derived from the locally produced 28cm.-DEM, reveal the slopes on all four sides of the ‘sanctuary’, highlighting its character as a raised terrace. These sections also provide insight into the inner topography of the ‘sanctuary’.

Figure 69 illustrates two 55 m. cross-sections, taken parallel to the primary grid, crossing the southern area of the ‘sanctuary’ and the primary rock formation at the summit. Notably, the even ground level in Rooms 1 and 2 is evident, as is the case for the Terrace located to their west. Additionally, the wall situated to the northeast of the summit is discernible in the second (blue) cross-section.

Two 36 m.-long sections were conducted perpendicular to the grid (Figure 70), highlighting the level terrain at the northeastern entrance area, Room 1, and the Terrace. The second section (depicted in blue) traverses the rock formation associated with Wall κ.

7.2 Main Areas

7.2.1 NE Entrance Area

One entry point to the ‘sanctuary’ is located in the northeast, positioned between the rising bedrock to the northwest and the diminishing slope toward the settlement to the south. At this location, a relatively smooth incline extends from the northeastern wall’s corner, running alongside the main rock formation to an open area measuring 37 m².⁷⁰⁴ Especially to its south, it was much disrupted, with evidence of previous activities and the presence of modern disturbances. Its interpretation as part of the ‘sanctuary’ for the entirety of its use has been the most problematic.

703 See iterations of least-cost paths of Chapter 6, pages 179f.

704 Exc. Notebook 2013; 2014; Units 31, 33, 34, 36, 37, 38.

It holds a central position, aligning with the Rutkowski plans,⁷⁰⁵ and Wall 33 could be interpreted as situated behind and northeast of the wall documented in the 1909 photographic documentation (see below). Rutkowski positioned the now missing wall, or more accurately, the stone layers beneath it, to its currently reconstructed location.⁷⁰⁶ If this interpretation is correct, the entrance plateau had a wall defining it in relation to the main area of the ‘sanctuary’ to its south. However, this wall does not appear to function as a strict barrier, as access seems to have been possible, as evidenced by the old photographs (discussed further in relation to Room 3 below). Wall 33, if originally taller, could have potentially blocked this area, as it is positioned in a bottleneck between two rises of the bedrock. It could be part of the LM I phase, or it could well belong to a later repurposing of the area, but unfortunately, secure dating of this wall has not been established, and while its use as a threshold cannot be ruled out, it remains a matter of speculation. However, a similar threshold function of a small wall is assumed for the Corridor area in the interpretation of the old photographic documentation, allowing for this possibility.

The NE Entrance area was filled with many stones, many of which slab stones, which might be reminiscent of the well-dressed floor seen in the photograph of 1909 for Room 3, as a reminder of what has sadly been lost. To its immediate southeast, three remaining stones are formed to simulate an entrance threshold or slab.⁷⁰⁷

The NNW part of this plateau produced conical cups and coarse pottery, indicating a secondary room within the ‘sanctuary’. The finds show a less well-dressed room with no presence of plastered surfaces or indicative pottery sherds.⁷⁰⁸ Grinding stones were found near Wall ζ, whose edges fuse with the rock to its south.⁷⁰⁹ These indicate workshop activity there, the dating of which, however, cannot be secured. Such grinding stones were also found more centrally, adjacent to the eastern wall of Room 1.⁷¹⁰ The even distribution of such tools alongside the edge of the rock, disregarding the architectural elements, suggests a potential Postpalatial use of the area directly beneath the central rock as a grinding workshop. It must be stressed that the layers were disturbed. Debris and rocks fallen from above have made the situation even more uncertain.

705 Two walls from rooms 4 and 5, as dubbed by Rutkowski (plan in Rutkowski 1989, 49, Fig. 1), correspond to the NE entrance area and Room 3.

706 For the reconstruction of the walls, see Chapter 7.2.6.

707 This remnant interpreted as a slab is located in Room 5.

708 Exc. Notebook, Unit 36.

709 Exc. Notebook, Unit 37.

710 Exc. Notebook, Unit 32.

7.2.2 Room 1

The small room encompasses an area of 8.5 m². Its northeastern (NE) boundary is formed by the smoothed natural rock on the northeast side, which is dressed with a double row of small stones (Wall β). During the documentation of Kanta – Karetsou, it was observed that the upper part of the rows had collapsed, exposing the bare rock that continues upwards for 1.6 m. The lower part of the second row had nearly disappeared.

The SW side (Wall δ), which separates Rooms 1 and 2, is formed in its SE part by a built wall composed of large stones, 1.05 meters in width. Its continuation to the NW utilises the natural rock, which is 1.5 m. wide and extends beyond the room to the west.

The NW side of Room 1 (Wall α) forms a corner with the rock on the SW part. The rock, which extends northwards, has been chiselled to accommodate the NW entrance, which is 1m wide. The NW side of the Wall α north of the entrance is also formed of rock, which is covered with small and middle stones on its inner (SE) side. This wall survives at a lower height in comparison to the SW wall.

The SE side (Wall γ) is constructed from layered stones, measuring 0.9–1 m in width. This wall was added during a later phase of the area’s use, which initially comprised the northern part of the Corridor (Room 6). The wall’s northern side, adjusted to the main northern rock, seems damaged. To the southwest the wall continues in Room 2, forming its SE side.

Already in the first levels, as noted by Kanta – Karetsou, the plaster covering the inner side was noted in all the walls, including red, blue and white plaster. This room, alongside Room 4, proved to be the richest in plaster fragments. The lower parts of the walls contain white plaster in situ. The amounts of red plaster would indicate its usage in the upper part of the room (see Room 4 and discussion in Chapter 7.3.1). The soil on the sides of the room had a different, harder consistency than that in the middle, indicating that it was not excavated by Xanthoudides.⁷¹¹

The finds included pottery, loom weights, grinding stones, wall appliques, and some obsidian pieces. During the cleaning of the area beneath the slabs, a lid of a stone vessel, probably Neopalatial, was found, as well as murex shells.⁷¹²

Floor slabs were distributed nearly all over this room. Unfortunately, those in the centre were removed by illicit excavations before the start of the modern campaigns but were fortunately described and sketched by Kanta – Karetsou.⁷¹³ Several floor-slabs carried tool markings and grooves. Between the slabs, red plaster was found, which shows parallels in other Neopalatial buildings.⁷¹⁴

711 Kanta – Karetsou 1992, 88. This observation would be yet another indication that the ‘sanctuary’ room Xanthoudides mentioned would not be this room, as he described it as a dressed room. This would correspond to the area with the column base (Room 3).

712 Exc. Notebook, Unit 30; Unit 25.

713 Kanta – Karetsou 1992, 88; Panagiotopoulos 2012, 214–215; 2015a, 938, Fig. 5.

714 Panagiotopoulos 2012a, 214–15, Pl. 146a; 2013, Table 183b; 2015a, 937–938.

While lowering the levels adjacent to the looters' hole, the soil beneath the removed slabs was notably harder, suggesting that the area had remained undisturbed. An older floor was revealed at a depth of 20 cm below the slabs, consisting of two plaster layers: a lower white layer and an upper blue layer, extending up to 40 cm. from the NW wall, indicating a curtain construction there.⁷¹⁵ These finds have helped determine at least three phases for this area.⁷¹⁶

The first building phase contains the SW-wall including the bedrock around it, the NW and the NE-wall. The floor and the walls seemed to have been covered with blue plaster.

The second building phase contains all the walls of the first building phase with the addition of the SE wall, separating it from the Corridor. This wall was built at a right angle to the NE wall, showing another building joint in its SW edge. In its first phase, an approximately 90 cm. wide entrance with a red plastered doorframe is seen in the SE wall. The installation of the southeastern wall preserved beneath it, as well as at the joints with the rock, a blue plaster surface that was otherwise removed during the later installation of the slabs.⁷¹⁷

Within the third building phase, the entrance in the SE wall was closed so that the room could be accessed only from the Terrace (in the Figures of this Chapter, Wall γ is indicated in this phase). This entrance along Wall α was expanded into its northwestern direction.⁷¹⁸ A possible new level, evident only from the northern corner of the room, shows a plastered floor above the slabs that shows bands of red plaster on white plaster. It is not clear if this would indicate a fourth phase.⁷¹⁹

7.2.3 Room 2

The NE wall separates Room 2 from Room 1 (Wall δ). It extends for 4.6 m. and is partially chiselled on the bedrock and completed with very large stones that can cover the wall's entire width, reaching up to 1.05 m. The SE wall of Room 2, in its northern part, is a continuation of the SE wall of Room 1 (Wall γ), and in its southern part, it constitutes chiselled bedrock. It extends for a total of 8 m. along Axis 1, of which 4 m. are conserved at some height. The SW and NW corners of the room could not be defined, as the area is poorly preserved.⁷²⁰

715 Panagiotopoulos 2013, 320; Fig. 5.

716 Panagiotopoulos 2013, 320–322; 2015a.

717 Exc. Notebook 24.09.2013; 26.09.2013; Profile 2013,3.

718 Exc. Notebook 25.09.2013.

719 Panagiotopoulos 2013, 321.

720 Kanta 1992, 81–84; Exc. Notebook 2013; 2014.

The floor has also been carved in stone, and its SE side is seen to be a continuation of the wall formed by natural rock at a convex angle. The extension of this floor is 25 m² and is quite smooth and level,⁷²¹ with evidence of chiselling that was done to accomplish this level area. The smoothness of the floor would not have required plastering for its surface, a conclusion supported by the lack of plaster in this area.

At the northeastern corner, which corresponds to the SE edge of Wall δ , a small bench was found with several bones within it.⁷²² Other finds include pebbles, obsidian, and pottery fragments.

7.2.4 Open area – Terrace

A plateau is formed to the west of Rooms 1 and 2, which is also flanked by the rising rock to the northeast and the sudden sinking slope to the west (Figures 64, 70). This 75 m² area is badly preserved and has very few architectural remains. To its north, elements of a badly preserved structure (Wall TE) are unclear if it encloses a room or demarks the open space. A structure alongside the rock to the direct NE of this wall alongside the rock could indicate a bench.⁷²³ In this area, a concentration of plastered floor was observed, a treatment that extends to the entrance of Room 1, which indicates at least partial plastering of the terrace.⁷²⁴ The plaster sherds, including coloured plaster, extend in the NE part of the terrace up to the point where the slope begins.⁷²⁵

The space in front of Rooms 1 and 2 serves as a physical terrace, offering a panoramic view of the Messara and the surrounding mountains due to the descending slope. The wide-angle view also encompasses the tholoi-area and the western slope of Korakies (see discussion in Chapter 6.1).

Access to this terrace from Room 1 is facilitated by a roughly 90 cm. opening marked by slabs, and Room 2 seamlessly continues to this terrace. While it is connected to these two rooms, the terrace appears to be isolated from the rest of the building complex. To the southeast, the view is obstructed by Rooms 1 and 2, and potentially the second floor of Rooms 3 and 4 to the southeast, which would have been visible. The rock around the peak of the hill limits the perspective to the northeast. In this latter area, the terrace

721 423.3 m. with 5 cm. deviation.

722 Exc. Notebook 25.09.13.

723 Panagiotopoulos 2014, 428. This could also form the lower surviving part of the dressed rock, similar to the NE wall of Room 1.

724 The modern excavation campaign expanded the documentation of plastered floor outside of Room 1, the eastern part of which Kanta – Karetsou already sketched in '92. It was seen to extend mainly to the direction of the NW-wall outside of Room 1 (see Exc. Notebook 25.09.2013).

725 Exc. Notebook 18.09.2014.

meets the physical rock, which rises from the terrace's level (at approximately 424 m. of height) for 4 m., reaching a height of 427.9 m., constituting Peak 1 of the Korakies hill.⁷²⁶

The archaeological investigation suggests a terracing effort to create a level floor amidst the uneven rock surface, distinct from the work done on the floor of Room 2.⁷²⁷ This terracing aligns with the plastered floor found to the east of the stone-built structure (Wall TE). Remnants of arranged stones near the bedrock, forming a wall in continuation of the plastered wall north of Wall α , were also identified. While the possibility that this was a plastered wall remains open, exposure to the elements would have removed this evidence. White stucco in the area would allow for this assumption. The architectural style, resembling Room 1, involves building a wall in front of the rock rather than integrating it into the structure (as in Rooms 2, 4). This arrangement would form a continuous front northeast of the entrance of Room 1, as an effort to showcase splendour.

Regarding the nature of this area as either a closed room or an open space, conclusive evidence was hindered by the situation on the west side of the terrace. However, the likelihood of it being an open space is higher. To the west, the steepness of the hill hinders easy access. After a sudden drop in elevation, built structures are observable on the slope, indicating minimal alterations caused by earthquakes. This suggests that the plateau likely ended naturally at this point, creating an open terrace during Minoan times.

To the SW of Room 2, the gradually descending slope would allow direct access to the terrace from outside the complex. Though built elements might block free movement in this southern slope, a narrow passage of approximately 20 m., the total distance of the path alongside the current edge of the slope, could provide access. The existence of such a corridor (dubbed henceforth as the western corridor), which would have been dominated or restricted by the western walls of the 'sanctuary' complex on the one side, and the cliff on the other, cannot be conclusively verified. The poor preservation of walled structures in this area could be attributed to the proximity of the slope. However, a relatively consistent width of approximately 2 m. along the assumed corridor can be observed, which would accommodate such an arrangement, further suggested by the presence of Walls a and b. Especially, Wall a uses the bedrock as a support, which seems also partially chiselled and follows an orientation with a light angle to the grid, but which respects the slope and seems to denote the aforementioned corridor. The existence of such a corridor would offer access to the Terrace with a wide visibility of the western slope and to the valley beyond, as seen in the viewshed from this area above.⁷²⁸

The Terrace area has yielded only a few finds, primarily surface-level, as the fill in this location was not particularly thick. This scarcity may correlate with the Terrace

726 In the schisms of the rock four concentrations of pottery were identified, containing coarse pottery and pithoi fragments (Exc. Notebook 26. 09. 2012).

727 Exc. Notebook 25. 09. 2013; 26. 09. 2013; 09. 09. 2014; 22. 09. 2014.

728 See iteration 3 of the viewshed, page 175, with the observation line there following this corridor.

being the obvious destination for visitors to Korakies hill, drawn by its panoramic view, making it particularly vulnerable to looting. Alternatively, the area may have been deliberately kept free, serving as a performative space. For the implications, see the discussion in Chapter 8.2.

After this examination, It seems that the terrace provided an open space, naturally secluded by the hill’s geological features and further emphasised by the surrounding building arrangement. Thus, offering an open space with a high degree of visibility amidst an otherwise closed arrangement.

7.2.5 Corridor (Room 6)

To the direct east of Rooms 1 and 2 and to the direct west of Rooms 3, 5, 7, and 8, a continuous room has been identified, referred to as a corridor. This area spans at least 13 m. in length, maintaining a consistent width of approximately 1.3–1.4 m, with a total area of 15 m². It is flanked by Axes 1 and 2, which form the backbone of the architectural layout of the ‘sanctuary’. Observed during the Kanta – Karetso cleaning and subsequently confirmed in the 2013 campaign, this area appears to have been excavated by Xanthoudides. It is very likely that Xanthoudides’ mentioned corridor corresponds to this space.⁷²⁹ The corridor is depicted in the figures of this chapter in its final architectural phase, following the separation of its northern section from Room 1 and the closure of its entrance there.⁷³⁰

Access from the Terrace to the area of the Corridor would be possible through Room 1 before its eastern opening was closed and from the eastern side of Room 2, where the natural rock descends, at the 4 m. mark of that wall (see dashed lines in Figure 73) or at the end of this wall (solid line in Figure 73). The existence of a threshold-like structure in the corridor at that position would strengthen this assumption (see below).

The corridor is, among other finds,⁷³¹ the possible location where the offering table discovered by Xanthoudides was found.⁷³² Most of the finds in this area were located along the sides of the corridor, which are disturbed contexts. These may represent remnants left by Xanthoudides or subsequent activities on the site, especially when the looting of the adjacent Room 3 is considered.

729 Panagiotopoulos 2013, 317.

730 The northeastern part of the corridor, now adjacent to Room 1, was initially part of Room 1 before the erection of the SE wall of Room 1. This is also evident in the stratigraphy and the floor, which shows dressing with blue plaster, which is a continuation of the same arrangement in Room 1. See Footnote 717; Panagiotopoulos 2014, 428; Exc. Notebook 23.09.2013, Unit 24.

731 Other finds include pottery, coal concentration near wall λ, stone tools, white, red, and blue plaster, as well as sea shells and obsidian located on the eastern side of the wall that separates Rooms 2 and the corridor (Exc. Notebook 2013; Kanta – Karetso 1992, 78, 86).

732 Panagiotopoulos 2013, 317; Georgoulaki 1990, 7, 13.

7.2.6 1909 Photographs and their Reconstruction

The analysis of two photographs submitted to the German Archaeological Institute of Athens in 1909⁷³³ provides valuable insights into the layout of the area, particularly rooms 3, 5, and 6. The general location of the photographer and the orientation of the two photographs are discernible. Features such as sections of the physical rock comprising Wall γ and the natural peak are identifiable, along with horizon elements like the peak of Kalamaki Hill near Fournofarango. Based on these visual cues, on a first analysis level, the photographs can be determined to have been taken from the general vicinity of the southwestern part of the Corridor and Room 7, facing northeast (Figure 71) and eastwards (Figure 72).

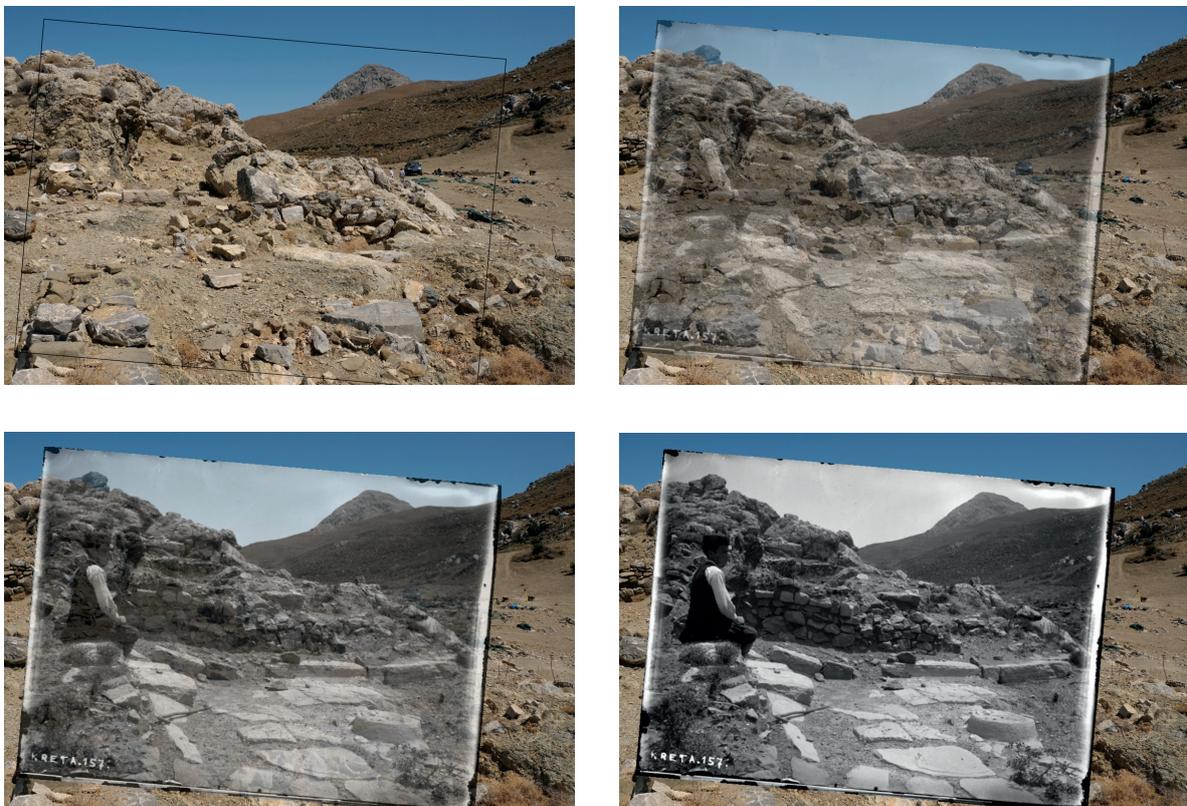


Figure 71: Interpolation of the modern landscape and photograph D-DAI-ATH-Kreta-0157, with 0%, 50%, 75% and 100% transparency of the original image.

733 Archive numbers: D-DAI-ATH-Kreta-0157, D-DAI-ATH-Kreta-0158. See Footnote 55.

7 Insights of the Archaeological Research of the ‘Sanctuary’

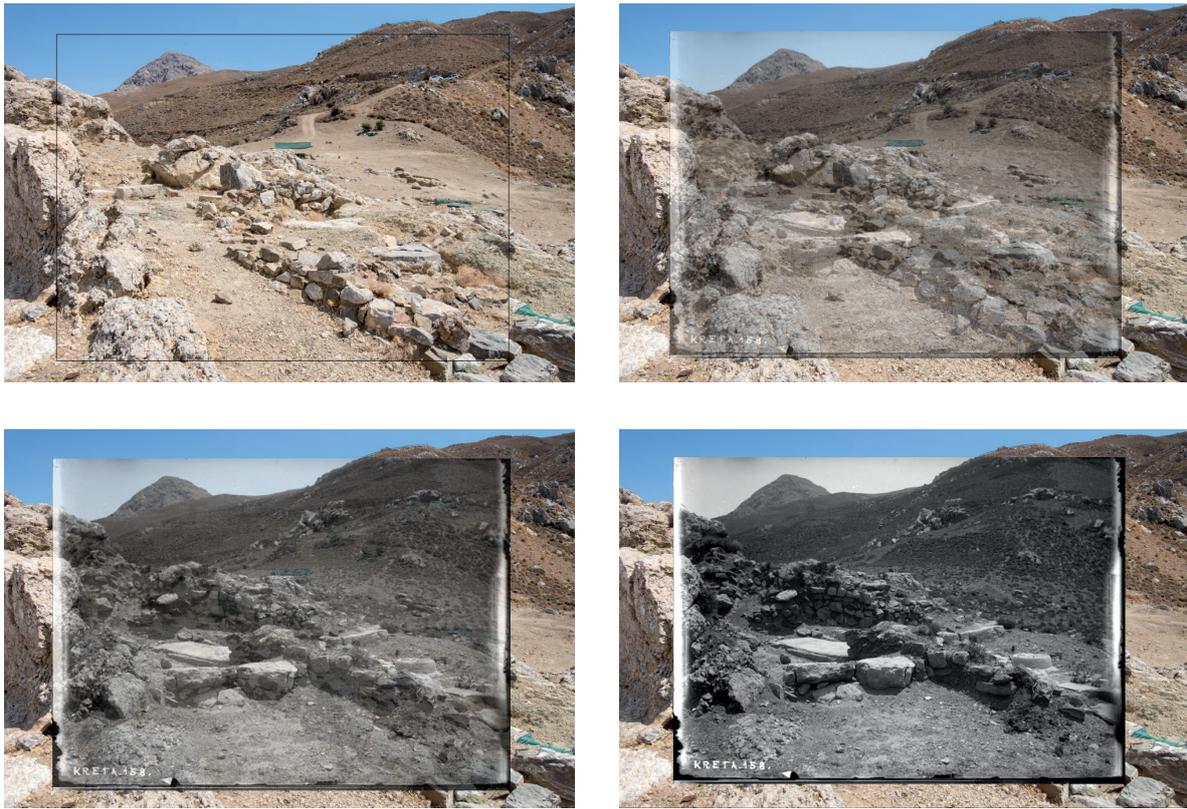


Figure 72: Interpolation of the modern landscape and photograph D-DAI-ATH-Kreta-0158, with 0%, 50%, 75% and 100% transparency of the original image

Unfortunately, as mentioned above, the site has suffered from looting, with built materials being repurposed by locals, resulting in the disappearance of *all* stone structures visible in the photographs taken a century ago. To reconstruct the lost walls and stones, a photographic approach was employed.⁷³⁴ The goal was to identify the exact location where the old photographs were taken, using elements of the horizon, background mountains, and foreground rocks.⁷³⁵ The focal length of the lens was adjusted to match the one used in the original photographs. The results are presented in Figures 71 and 72. By overlapping the old photographs with the current landscape, the positions of the vanished walls and stones were pinpointed as precisely as possible. The results of this reconstruction are discussed below and are illustrated in Figure 73.

In the analysis of the images, a slab is visible along the continuation of Wall λ . Furthermore, the northeastern wall of Room 5 can be generally identified, with its termination securely aligned with the axis defined by Wall λ and the slab. In D-DAI-ATH-Kreta-0158 (Figure 72), a vertical separation is observed in the Corridor between Walls γ

⁷³⁴ This project was possible with the help of the archaeologist and photographer Anton Ritzhaupt and architect Mario Carvalho, under the direction of Prof. Diamantis Panagiotopoulos.

⁷³⁵ This methodology has been used for historical photographs on Crete by Valasiadis 2008–2021.

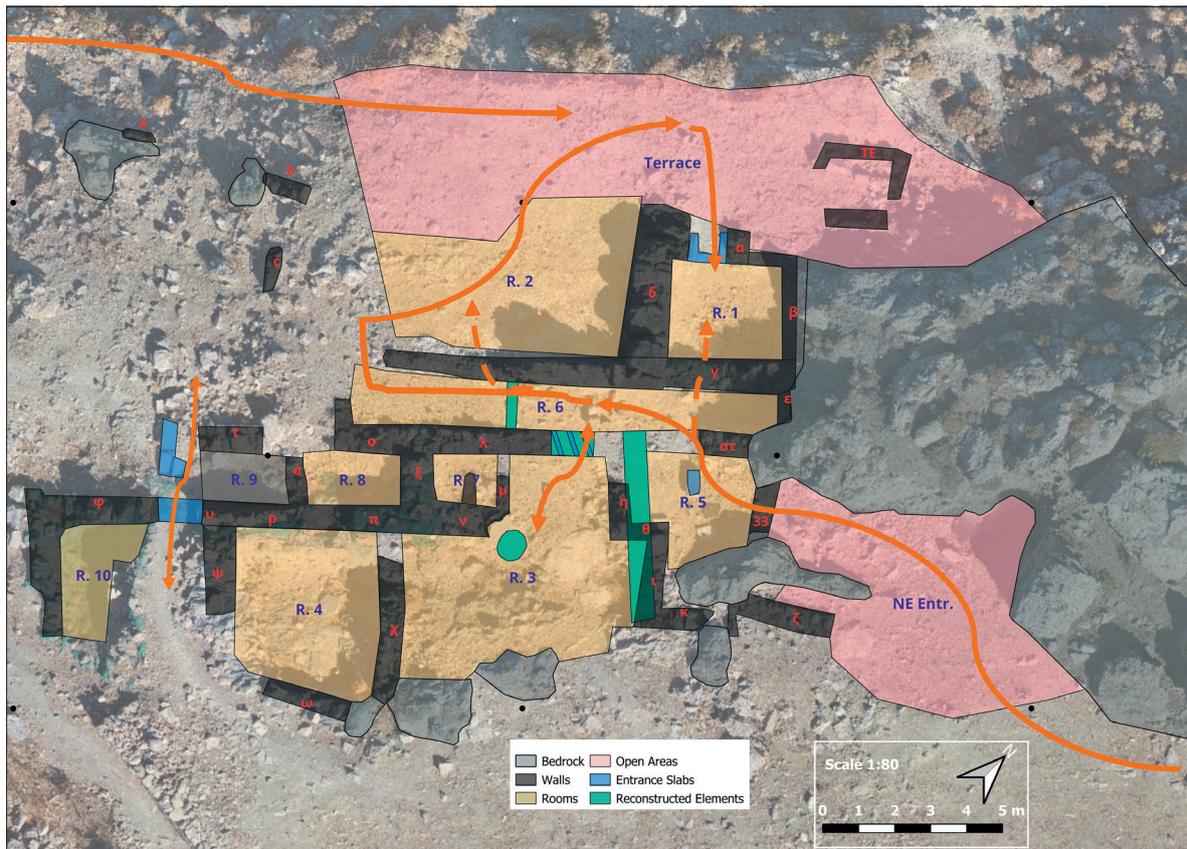


Figure 73: The main area of the ‘sanctuary’ and access possibilities to Room 1.

and λ . Interestingly, the two long stones appear to function not as the lower part of a wall but as an entrance threshold, signifying the entrance to a more significant part of the ‘sanctuary’. This threshold aligns with the SW extent of Wall γ (Axis₁) at the end of the section consisting of chiselled rock. The reconstructed elements, including the position of the column base of Room 3, are depicted in Figure 73.

Therefore, the suggested path leading to Room 1 (the most secluded room of the ‘sanctuary’) from the settlement passes through the NE Entrance area, and from there through a narrowing by the physical rock, enforced by the built structures, leading to the northern part of the corridor through Room 5. The walker would then have to their left the now lost threshold slab, marking the entrance to Room 3, where the column base was located. After walking in the corridor for 4 m., the walker would first pass by the assumed threshold, and immediately to their right, Room 2 would be accessible after turning around the end of the part of Wall γ consisting of physical rock (dashed line), or if this entrance was actually built, the walker could turn to Room 2 at the end of Wall γ (solid line of Figure 73). From there, the walker can walk to the main area of the Terrace, where they would have access to Room 1.

The architectural layout includes a small maze-like layout and indirect walking paths. These increase the effective distance from the beginning of the corridor to the

centre of Room 1. Although this space is only 3 m. apart – originally accessible before the sealing of the southeast wall entrance of Room 1 – the total distance traversed becomes 20 m. due to this design.

7.2.7 Rooms 3, 5

Room 3 was dressed with slabs with a column base in the middle and flanked by walls, as seen in the photographs submitted in 1909. The methodology mentioned above can be applied to better understand the area of Room 3, which was the main focus of the images of 1909. The NW wall, separating the room from the Corridor, has two rows of stone and is identified as the northeastern extent of Wall λ. Along its course, which is along Axis 2, it accommodated the entrance slab, forming a threshold. Its exact dimensions could not be determined from the reconstruction; for reference, the other known slab from Koumasa lies in the extension of Wall υ and is 1.3 m. in length.⁷³⁶ The northeastern side of Room 3 is seen to have been defined by a wall, which extends from roughly on the course of Walls η, θ, ι, which would constitute the basis or part of previous phases of this now lost wall. The proposed reconstruction of the elements based on the two photographs can be seen in Figure 73. It remains uncertain whether the SE side of Room 3 was enclosed by a wall. If it were partially open, the column within the room would have been visible from the settlement plateau.⁷³⁷ The lower level at the basis of the still-standing walls at the NE yielded finds of LM dating, so there is no indication that the now-lost wall in the old photograph is a later instalment. The excavation produced finds, including pottery sherds (fine and coarse ware, including a handle broken in two), pieces of plaster (blue and white colour) and many fragments of bones.⁷³⁸

Within the area of the room, the layer between the surface level and the bedrock was quite thick, and the bedrock was quite coarse without levelling noted in Room 2. Some of the scattered stones resemble sherds of stone slabs, possibly part of the original floor of the room, which was covered with slabs. From other examples of paved floors, the slabs were levelled with soil beneath the slabs.⁷³⁹ This would explain the absence of any finds, indicating this layer to be a fill layer for the slabs, which remained exposed after the modern removal of the slabs.

It is to be seen that the area of Room 5 would be partially blocked due to the wall separating it from Room 3, allowing only a small entrance to the northern side of the corridor. In this respect, Room 5 functions as a continuation of the NE Entrance area and, at the same time, as a second anteroom to the main part of the ‘sanctuary’.

736 1.3 m. × 0.7 m. × 0.23 m. (Panagiotopoulos 2014, 429).

737 On the visual impact of the assumed eastern wall of Room 3, for which only weak indication remains, as well as the walls towards the plateau, as seen from it, see Figure 73 in Chapter 8.3.

738 The area was excavated under Units 7, 9. See Exc. Notebook 2013; 2014.

739 Compare with the situation in the portico of Skinias, in Mandalaki 2011, 384.

At the eastern side of this area, at the point that separates the NE plateau from the slope, a 2.5 m.-long wall was erected (Wall ζ), unifying two elevations of the bedrock, forming a front of 5.5 m. as seen from the rest of the settlement looking west. Wall ζ is depicted as longer in Rutkowski's plan, which may indicate additional stone removals from that area in the intervening period. This front is extended with elements of the natural rock combined with walls, forming Rooms 3 and 5, which most likely included the column base observed in the 1909 image (Walls η, θ, ι, κ).⁷⁴⁰ Considering a second floor, based on the now lost column base, the front towards the east extends continually for ca. 11 m., and if Room 4, as well as the area between them, is included, then the front is at 18 m. of length. The slope eastward towards the Plateau increases along the access area and is more than 30 degrees to the immediate east of Wall ζ, as can be seen in Figures 64 and 70 above, which would increase the perceived monumentality of the discussed eastern front. Wall ζ, along with built elements of Rooms 3 and 4 would add on the ca. 4 m. elevation difference between the plateau and the eastern 'sanctuary' front, forming a continuous front of ca. 20 m. (see Figure 76).⁷⁴¹

7.2.8 Rooms 7–10

Rooms 7, 8, and 9 are consequent rooms to the SW of Room 3, between the second and third Axes of the 'sanctuary'.⁷⁴² The rooms follow the inclination of the slope that begins from southwest of Room 3 so that the median floor level of Room 7 is 1 m. higher than that of Room 8, and Room 8 is 0.5 m. higher than that of Room 9.⁷⁴³

To its SW side, Room 9 opens to a corridor running vertically to the axes of the 'sanctuary', which is partially decorated with slabs and where the limestone threshold is located perpendicular to it along the course of Axis 3.⁷⁴⁴ At this area, 1.3 m. SW of Wall τ a pithos rim was found. From this part of the 'sanctuary', flanked by Rooms 7 and 8 to the SE, the Corridor, Room 2 and the Terrace to the northeast and the slope to the west and south, the sporadic architectural elements directly built on the bedrock are in bad condition. Wall c, however, could constitute part of this vertical corridor.

740 Exc. Notebook, Units 39; 41; 44; 46; 48.

741 For the role of this front in manufacturing monumentality, and usage of the natural rock in the architectural layout, see Chapter 8.3.

742 Panagiotopoulos 2014, 443, Fig. 8. Room 7 is encircled by Walls λ, μ, ν, ξ and is 2.4 m². Right in the middle of the room-like structure, burn traces were visible. (Exc. Notebook 11.09.2013; Unit 8). Room 8 is encircled by Walls ο, π, ξ, σ (Units 10, 11, 47) and is 3.9 m². Room 9 is encircled by Walls τ, σ, ρ, υ and is 3.3 m². For a summary, see Panagiotopoulos 2014, 429.

743 The median heights of the room levels are 422.8 m. for Room 7, 421.7 m. for Room 8 and 421.4 m. for Room 9.

744 Panagiotopoulos 2014, 429; 2015b, Fig. 9. For the threshold, see above, Footnote 736.

Other finds from these three Rooms include pottery and a large concentration of plaster, especially in the vicinity of the third Axis, which is to be seen in correlation with second floor of Room 4.

Room 10 is to the southwest of Room 4, east of Wall φ ; its uncovered surface is 5.2 m². Its northern part, until Room 4, is subject to a significant geological collapse that has not yet been cleared. Amongst other finds, a plaster piece shows light red stripes, 5 mm wide, on an ochre background.⁷⁴⁵

7.2.9 Room 4

Room 4 is encircled by Walls ρ , π , χ , ψ , ω and comprises an area of 17.4 m².⁷⁴⁶ In the centre of the room, the surface finds produced LM finds, including a small rhyton consisting of a conical cup pierced before firing. This could be seen associated with the type IV-Bowl-Conical in the rhyton-catalogue of Koel, which is to be dated in LM IB, although it is without decoration and much plainer than these two examples.⁷⁴⁷ Similar pierced conical cups were also found in Zakros, in a possible LM IB context.⁷⁴⁸ In addition, a piece of gold foil was discovered amongst stone heaps indicating wall collapse.⁷⁴⁹ However, many of the finds, especially to the north of the room, in its upper levels, must be assumed to have originated from excavations in upper parts of the area of the ‘sanctuary’ or from an ancient filling.⁷⁵⁰ Some pottery examples seem to originate from LM III, and the Hellenistic-Roman periods are more densely represented. This is not surprising for a surface level, but it should be mentioned that the depth that produces Post-Minoan artefacts exceeds 20 cm. This could indicate the use of this area as a fill, either modern or ancient. The nature of the excavated area, with soft soil amongst medium-small stones, made it hard to securely determining the date of the fill.

A column base was revealed near the northwestern corner of the room at an excavation depth of 130 cm. Measurements from its centre to the perceived edges of the walls based on their lower stone row gave a distance of 2.4 m. to the south-western wall, to the southeastern 2.4 m., to the northeastern wall 0.13 m., and to Walls φ and ρ to the northwest 1.87 m. Those measurements place the column slightly non-central within

745 Exc. Notebook 2015, Unit 53; 2015-08-53-OB05.

746 For Room 4, see Exc. Notebook 17.–18.09.2015; 2018; 2019.

747 Koel 2006, 235–236. This type consisting only of two examples, from Psychro cave and Kastelli Vryses near Chania, is dated in LM IB, further helping the chronology of the settlement’s LM activity in this period.

748 A maximum number of 10 cups, where the hole was made post-firing after oral communication with Stelios Perrakis. Further, ca. 30 pierced cups are recorded, most of which concentrate in the LM I period Gillis (1990, 29). Gillis interprets them as funnels (Gillis 1990, 39). An argument for the cultic or symbolic usage rather than the practical is that the latter would show more continuity.

749 Panagiotopoulos 2015b, 531–532. An origin from the second storey of Room 4 is possible.

750 Exc. Notebook 2015, Units 55; 58; 59.

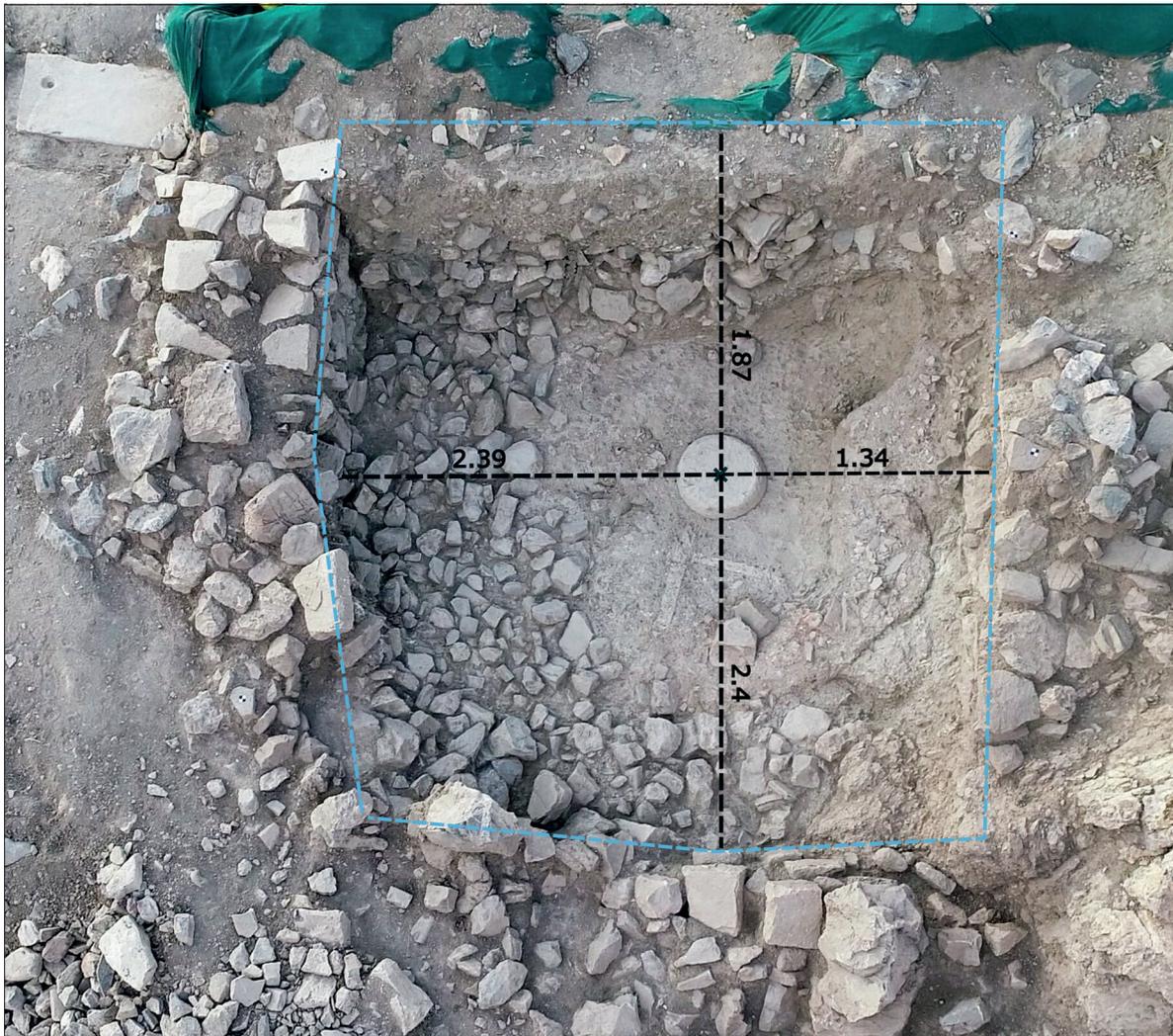


Figure 74: Room 4 with the distances of the column base to the walls.

the perceived room, by a distance of 55 cm. from the hypothetical centre of the room enclosed by four walls in the manner described.⁷⁵¹

Layers corresponding to the second storey

A profile was established beginning 60 cm. east of the eastern side of Wall ϕ , with distinctive layers for a depth of 135 cm.⁷⁵² They form an “S” shape as the northern part of the layers is at a higher elevation. This is understood to be due to the way the upper floor collapsed, as the column fell to the northern direction, as indicated by the large amount of charcoal in this direction.

⁷⁵¹ Panagiotopoulos 2019b, Fig. 14. The room would have an area of ca. 16 m².

⁷⁵² See Panagiotopoulos 2019b, 465, Fig. 12.

The layers could be described as follows⁷⁵³: The first layer includes soil mixed with stone heaps and pottery fragments. It can be divided into two sublayers, one with surface characteristics and softer soil, that is interpreted as the fill of the Xanthoudides excavation, and one denser beneath it, part of an older fill. The second layer is defined by small to medium-sized stones with no soil between them. There are noticeable cavities, especially between the upper stones of this layer, which average a width of 50 cm and are interpreted as the result of the fallen walls of the building. The large plaster concentration, especially near the edges of the room, indicates a plastered decoration of the upper floor. The third layer, with a mean width of 10 cm, shows dense soil hardened with plaster pieces. The soil of this layer was analysed by the team of Yuval Goran.⁷⁵⁴ Its analysis shows that it has alluvial properties and is, therefore, to be understood atop the fallen floor level before the collapse of the side walls and the subsequent fill, forming levels 1 and 2.

Beneath these layers, the mud clay brick, usually found in combination with white plaster, first observed as a line in the western profile, extends to the rest of the room and is often found in big blocks in various corners of the room. These are normally below a layer of big stones that correspond with the fallen stones layer of the profile. In most cases below the red brick concentration, a level filled with pottery sherds was encountered. Beneath the pottery concentration, at least three parallel logs were found beneath this layer, measuring up to 2 m. Between each of them, there is a distance observable now which spans between 30 and 50 cm. Adding to this, the presence of the red clay or brick layer measuring between 2 and 10 cm. and mostly found directly above it can be assumed to have been part of a structure. The two possibilities for the logs would be either as part of the ceiling of the lower storey or possibly the floor level of the upper storey.

First storey

The ground floor of Room 4, is characterised by a column base of 51cm. in diameter situated asymmetrically in the room, as discussed above. The distances measured from the sides of the base towards the walls are 130 cm. from Wall χ cm. and ca. 150 cm. from Walls φ , ρ . Taking into consideration that the distance of the inner sides of Wall χ (the northern wall) and Wall ω (the southern wall) is 4 m., and the distance of Walls φ , ρ (the western wall) and wall ψ (the eastern wall) is 4.8 m., it becomes again clear that the column base is at the corner of Room 4 rather than the centre (further on the column base, see Chapter 8.3.1).

The floor of this storey had two phases. The first phase of the floor consisted of a plaster layer, which, if continuous, would reach the column base 27 cm. below its top, and ca. 10 cm. below the part of the column base where it begins to be less finely

753 Panagiotopoulos 2018, 483–485; 2019, 447–451.

754 The results of this analysis were provided in personal communication with Yuval Goren and Diamantis Panagiotopoulos, for whose input I am grateful.

chiselled and a bit wider, but still above the deepest parts of it where the stone loses its rounded quality due to non-chiselled spikes in the stone.

The column base itself is most probably of Protopalatial dating, as indicated by a few sherds, including barbotine sherd, and the plastered floor probably belongs to this first usage.⁷⁵⁵ Exposed rounded tops of column bases are typical in Protopalatial architecture⁷⁵⁶ (see discussion in chapter 8.3.1). The second phase of the floor is only a few cm. below the top of the column base, as is typical in Neopalatial architecture. This floor level was 1.73 m. lower than the current height of Wall χ , and was covered with pottery. This pottery layer extended to the bench south of Wall χ , indicating that this bedrock was considered part of the room. This bench consists of bedrock extending to 1.4 m² at the top of which Wall χ was situated, reaching up to 50 cm. from the upper level of the column base. The bench can be viewed as an integral part of the inner decoration of the room.⁷⁵⁷ It is rather smooth, with elements of plastering along its surface being observed for smoothening its surface, and it was covered with pottery, in continuation of the second floor.

A row of two long mudbricks reaching almost to the column base was discovered at the level of the second floor. Their functionality is difficult to ascertain; they show a similarity with those mudbricks used in Zakros, in the rooms of the ceremonies and the Banquet room for which Platon assumed a decorative function for the floor.⁷⁵⁸ In contrast to these, however, not a great surface area is covered, nor is a geometrical symmetry observed.

Finds include a large amount of pottery, mostly undecorated conical cups, cooking ware as well as finer pouring vessels, miniature vessels, stone tools, murex shells, and plastered surfaces of all typical colours. Seven plaster pieces of plaster were found showing a white and red-painted surface divided by the impression of a straight string line. These were unearthed near all walls encasing Room 4, therefore strongly indicating a continuous decorative motive.⁷⁵⁹

The presentation above should make it clear that the area of the ‘sanctuary’, is not a typical cultic local, as originally assumed. Although aspects of cult cannot be excluded, especially in Room 1, the main image is that of an elevated part of a generally continuous complex of rooms of the LM I phase of Koumasa, with a possible ceremonial quality. The functions of the rooms are less connected with magazine structure, with the exception of Rooms 7, 8, 9, and 10.

755 Exc. Notebook 31.07.2019.

756 See discussion in Chapter 8.3.2 on pages 227ff.

757 The workers’ instinct to use this extension of the bedrock as a bench should be noted.

758 Platon 1964, 148, Pl. 146b; 1974, 141–142, 157–158, Figs. 9, 10.

759 Regarding the red decorative plaster, possibly arranged in a zone as the continuous line suggests, is most probable to have been used in the upper parts of the first storey and the second storey, as the red plaster pieces are generally smaller than the white plaster pieces, indicating a fall from a higher altitude. This arrangement was also observed in Room 1. See Panagiotopoulos 2018, 484–485.

7.3 Representative Finds

7.3.1 Plaster

Plaster decoration was used in the whole settlement sporadically, with the exception of the ‘sanctuary’. There, as already mentioned, it was used predominantly in Room 1, at least partially in the Terrace and then mainly in Room 4, exhibiting a variety of colours. Some pieces of two-coloured decoration (white-red) and a line in the middle allude to the utilisation of dichromatic decoration in the room. This, as well as other techniques, show similarities of decoration with other areas of the Minoan world.⁷⁶⁰ Micromorphological analyses have shown the usage of specific rocks for the production of plaster, which required not only time and investment but also a degree of experience and expertise.⁷⁶¹

The matter of specialised workers raises the question of local workshops or travelling artisans. In the case of the latter, the matter of the absence of certain pigments for the production of blue plaster, otherwise widely used in the Messara at the time such as the Egyptian blue, could indicate a local preference or lack of these materials.⁷⁶²

7.3.2 Pottery

The preliminary analysis of the pottery shows some concentration of LM III pottery and a significant amount of Hellenistic pottery at the surface levels. The LM I contexts show both coarse ware, including cooking jars and pithoi fragments, as well as an amount of finer pottery. Of the vessels unearthed, a consistent find was conical cups, some of which were whole, but most were recognisable from parts of the bases. Their maximum number is 786. More than half of these are from the area of Room 4, amounting to 471. Similarly, of the total amount of 42 miniature vessels from the ‘sanctuary’, a quarter are from Room 4 (11). The proportionality of these finds in Room 4 could partially be due to the fact that this is the only deep level not disturbed by the previous excavations, especially if one considers the amount of material and earth lost between the old and the modern excavations, as indicated by the photographic comparison.⁷⁶³ Nevertheless, the evidence suggests the storage and usage of these cups on both floors of Room 4.

Of the LM I pottery of Koumasa, most is undecorated. A few examples include leaf decoration, possibly olive-leaf on two sherds from the southern part of the ‘sanctuary’ and from the middle of the settlement. The olive leaves belong to the typical motifs of

⁷⁶⁰ For the red and white plaster, compare Panagiotopoulos 2018, Fig. 13, with a piece from Monastiraki (Kanta 2006, Tab. 13.b). As per the red plaster between the slabs in Room 1, see Footnote 714 above.

⁷⁶¹ Boness et al. 2017, 406.

⁷⁶² Boness et al. 2017, 406.

⁷⁶³ See page 197.

the period, such as lilies and olive sprays, and can be compared with the olive-spray-group decoration of LM I, where spirals occur more frequently than before, and they are better executed.⁷⁶⁴ The search for similarities is not only related to matters of chronology but also to the question of the influence spheres.⁷⁶⁵

7.3.3 Obsidian

Obsidian finds are scarce in the settlement, in comparison with the tholoi. Furthermore, as with the cases above, many of them are in disturbed contexts, making the effort of extracting useful information from this very small number problematic. It was observed, however, that most of the pieces were near the edge of a wall or directly on bedrock. Simultaneously, the few clearly LM I contexts were fully void of obsidian. This would enhance the suggestion of the obsidian blades belonging to the Protopalatial phase of the ‘sanctuary’, with many pieces being swept to the corners in later usage. A noticeable surface example from the corridor area is a worked obsidian core, suggesting local production of obsidian blades.

On Crete, obsidian is present from the Neolithic to LM III, serving diverse purposes such as sharpening tools, incising decoration, and food preparation. Although its arrival on Crete after the end of the EM period appears to be as secondary cargo and its use generally declines,⁷⁶⁶ its status as an exotic material continues to hold significance. This role comes in relation to the waning practicality of the chipped stones, with the waxing use of metal cutting tools.⁷⁶⁷ One argument for the assumption of metal use as the reason behind the decline in chipped stone use (obsidian and local chert) is the absence of denticulated flakes for use in sickles and similar tools, while these finds are observed in the mainland.⁷⁶⁸ With the decline of its use as a universal tool, its role as a ceremonial object becomes more apparent sometime during the MM, rendering all those connected with its use and consumption socially segregated.⁷⁶⁹

In the topic of the symbolic aspect attributed to obsidian, during her discussion of the funerary use of obsidian, Moundrea-Agrafioti stresses the symbolic use as a prestige

764 As seen in two Rhyta from Galatas (Rethemiotakis – Christakis 2011b, Fig. 34) and a cup from Skinias (Mandalaki 2011, 388). See also Popham 1967, 341; Figs. 2.7–8, Pl. 76–81.

765 See discussion on pages 265ff.

766 As mentioned in (Carter – Kilikoglou 2006, 134–135), the obsidian trade seems to be subdued to a metal-driven interconnectivity, as the obsidian finds from Anatolia indicate. As per the Melian Obsidian, Malia’s access to it is likely to have occurred in the process of procuring metals from Lavrion in southern Attica (See also Carter 2004, 101–102).

767 D’Annibale 2006, 334.

768 Blitzer 1995, 488–489.

769 D’Annibale 2006, 340.

object over its functional character.⁷⁷⁰ Of course, at the centre of her essay are the nodules and cores, in contrast to the 3–5 cm. blades found in the settlement. It is noted, however, that this length is within the expected length on Crete.⁷⁷¹

If one concentrates on LM IB, in the contexts of which Koumasa is virtually bare of obsidian, in other places on Crete the presence of obsidian endures. The mention of D’Annibale that the level of consumption remains constant in rural areas (an observation stemming from a concentration of 87 pieces in LM IA house in Petras) is an interesting point.⁷⁷² Although for the bigger picture, it is indicative that there is a scarcity of Minoan production centres in LM IB, the brief list of which includes Zakros, Mochlos, and perhaps Pseira is a candidate, based on the number of cores as indicators for knappers’ work. In Mochlos, besides the possibility of an obsidian workshop in the artisan’s quarters and Chalinomouri, contexts with obsidian pieces include houses and buildings which produced hundreds of obsidian pieces. No dedicated consumption of obsidian in any craft could be secured other than perhaps food preparation.⁷⁷³ Regarding the bigger picture, however, worn obsidian still appears in LM I, II and III contexts, although the main period of obsidian use seems to be the MM period, due to the replacement of metal tools.⁷⁷⁴

As per Koumasa, the scarce examples allude to the assumption that the pieces are associated with the earlier Protopalatial phases of the settlement. While the presence of obsidian in the EM Messara is undisputedly common, the scarce presence of obsidian in MM levels and its almost complete absence in the LM contexts might indicate that this area of the Messara was not located along the obsidian networks of the MM and LM periods. At the same time, the scarcity of their finds does not allow the assumption of any consistent craft in the area, and is certainly not associated with the presence of grinding stones in the north of the ‘sanctuary’ assumed in the LM III phase, for mainly two reasons: first the amount of blades is very small, especially comparing with the number of the grinding stones found, and secondly, if the area of the ‘sanctuary’ is observed, while the grinding stones are concentrated to the area south of the central rock, the blades are distributed evenly in a larger area. This leaves the possibility of interpreting the few pieces as part of the exotica associated with the symbolic role of the ‘sanctuary’. Another argument for the early dating of the obsidian is the presence of denticulated flakes, which is more *en par* with earlier use.⁷⁷⁵

770 In Moundrea-Agrafioti 2008, 177–178.

771 Cretan MBA and LBA tend to be 3–5 cm. Carter 2004, 102.

772 D’Annibale 2006, 339.

773 Carter 2004, 102–103; Table 16.

774 D’Annibale 2006, 339. Also, Blitzer’s account of the results of a survey around Kommos serves as representative of the western Messara (Blitzer 1995).

775 Blitzer 2015, 489.

This is tied with the observation mentioned above of the relative lack of knapping centres on Crete, with most obsidian blades delivered on the island being ready for use or in need of only minimal working.⁷⁷⁶ To this, the obsidian core found is an exception.

7.3.4 Pebbles and Finds Brought from the Sea

Sea pebbles constitute a recurring find across all the Koumasa trenches, ranging from the Prepalatial tholoi to the LM contexts of the settlement plateau. While in most cases their distribution appears incidental, certain instances suggest deliberate placement.

In his discussion of pebbles, Peatfield identifies their use as reflecting an aspect of an offering process, emphasising the significance of their transportation from distant locations.⁷⁷⁷ In some cases, pebbles helped identify a special liturgical zone in peak sanctuaries, such as at the focus of ritual activity in the area between the two terraces of Atsipades Korakias,⁷⁷⁸ and less pronounced in Youktas, Spili, Vorizi and Keria.⁷⁷⁹ Looking earlier, pebbles were found in Ayia Triada amidst other items in an EM I deposit that denote it as a sacred area, that was further marked with a retaining wall.⁷⁸⁰

The surface of the pebbles is water-worn, but upon surveying the waterbeds near Koumasa, including the Geropotamos, no such pebbles were found. This would allude to the sea as their main source which would emphasise the link of this area with the marine world. As typical in other Minoan sites, triton shells were found, one in a Proto-palatial context⁷⁸¹ and two others in the trenches on the central plateau, one of which was located on the LM I floor level of a room of the central Plateau, amongst a number of 103 vessels.⁷⁸² In the same room, a worked fossil of 6–7 million years old starfish was found. The worked marine fossil and the triton stresses a certain will to project a connection with the sea.⁷⁸³

Contexts with triton shells have been found to span the whole Minoan chronology, with no clear concentration in one of them.⁷⁸⁴ Their presence is first documented in the Neolithic, with parallels being observed in other areas of the Mediterranean, such as the funerary context in Italy.⁷⁸⁵ In many instances, these artefacts held a distinct

776 Carter 2004, 103.

777 Peatfield 1992, 80; Peatfield – Morris 2012, 235.

778 Peatfield 1992, 68; 1994, 22–23.

779 Peatfield 1992, 76.

780 Todaro 2011, 62.

781 Panagiotopoulos 2023b, 305, Fig. 11.

782 Panagiotopoulos 2019b, 452, Fig. 22.

783 Panagiotopoulos 2022a, 50; Panagiotopoulos 2022b, 332–333, Fig. 23.

784 Binnberg 2013, Table 1.

785 Binnberg 2013, 7.

ritual significance and were consequently considered components of shrine inventories. However, this is not a universal trend as the triton shells likely served diverse purposes, contingent upon the specific context, material, or shape. Their analysis, as Binnberg summarises, indicates that these shells were employed as amulets, offerings made in a sacred context, rhytons, or functional household containers. However, their presence indicates an effort to denote a certain status, especially in the Protopalatial and Neopalatial periods, where triton shells replicas made of various materials were found in rooms that constituted central in the palatial complexes they were found in.⁷⁸⁶

In summation, the sea elements found in Koumasa include pebbles, sea-stones as well as seashells and fishbones.⁷⁸⁷ Although not surprising for a Minoan context, an accumulation of evidence of the marine type alludes to a certain connection to the sea. Besides these elements in the MM and LM, a further indication derives from the newly ascertained dietary behaviour of those buried in the tholoi in the EM period, indicating a diet based on fish.⁷⁸⁸ These elements emphasise the connection of Koumasa with the sea, with the southern seacoast of the Asterousia and the harbours located there regarded as the primary contact points.

As per the influences from the rest of the island, the material gathered offers a possibility for a first step of evaluation, the possibilities of which are further discussed in Chapter 10.

The central theme of this study is the local topography, which in this Chapter was primarily explored through the lens of architectural layout. The next chapter will delve into the analysis of the topographical centre of Koumasa around Peak 1 and the ‘sanctuary’ and the adaptation of the architecture around it. In this regard, an examination of architectural theory will prove instrumental in shedding light on this subject matter.

786 Binnberg 2013, 11. Such an example in Arkhanes Halls 10 and 11 of the eastern sector.

787 Exc. Notebooks 2022, 204.

788 See the discussion of the Strontium analysis, see Footnote 407 in Chapter 2.3.

8 Analysis of the Architecture and Microscale

In this chapter, various theoretical approaches to architecture and landscape will first be presented (Chapter 8.1). These theoretical frameworks will then be applied in Chapters 8.2 and 8.3 to analyse the area surrounding the ‘sanctuary’, the only area for which such an analytical discussion can be made. This analytical discussion will be based on the layout and fundamental discoveries outlined in Chapter 7.

8.1 Theoretical Approaches to the Interaction of the *Locus* with Architecture

The emphasis on ritual as an integral aspect of interpreting architectural elements in historical contexts represents a growing trend,⁷⁸⁹ incorporating sociological perspectives into the analysis.⁷⁹⁰ This methodological approach brings architecture closer to anthropological ritual studies and art history, relying less on stylistic formalism.⁷⁹¹ This can only benefit Minoan archaeology, which is known for its lack of formalism in the architecture.⁷⁹²

One aspect that has come to the foreground is the interaction with and integration in the landscape.⁷⁹³ The experience of a place is increasingly regarded across various related fields as more than merely a physical location, encompassing a broader set of useful information.⁷⁹⁴ This set can include, beyond its coordinates and its physical characteristics such as contour lines, various diverse elements like light, colour, dimensions, and visibility, which together denote a distinct life cycle and an experience unique to that place.⁷⁹⁵ In this approach, the *genius loci* of a place is in constant dialogue with the

789 Renfrew 1985; 1994; Jones 2016.

790 Miller – Tilley, 1984; Tilley 1993.

791 Elsner 2012, 3–4.

792 McEnroe 1982, 3; McEnroe 2010.

793 Tilley 1994; Papantoniou et al. 2019.

794 Norberg-Schulz 1980, 6. His work of incorporating phenomenological work into architecture has helped bring archaeology closer to architecture and anthropology.

795 Leatherbarrow 2015, 30–31.

building activity of humans, influencing the architects and the builders at a fundamental level.⁷⁹⁶ On the one hand, the practical aspects of housing and dwelling adapt to the resources and characteristics of the environment. On the other hand, the *locus*, a term comprising the general characteristics of a place, is the one hosting the building activity but also influencing it.

In the case of the Classical Greek temples, it has been argued that they emerge from the place, brought forth seemingly by the landscape rather than by a conscious designer.⁷⁹⁷ Adapting this notion to the phenomenological perspective stated here, it may have seemed fitting to proceed with the building based on the perception of – and interaction with – the *locus*. In contrast to Greek architecture, however, which appreciated symmetry, the Minoan architecture favoured asymmetry on the large scale, especially observed in Minoan complexes. Scholars have linked this apparent “rejection” to a conscious effort to imitate the natural landscape, which is asymmetrical. The intricate architecture of Minoan structures is seen as a symbol of integration with – and embodiment of – nature, privileging alterity as a defining aesthetic element over balance and order.⁷⁹⁸ For instance, Driessen proposed an interpretation of the large palatial court, with its surrounding maze of corridors, as an evocation of the Cretan plain surrounded by mountains.⁷⁹⁹ However, in making such observations, there is a growing recognition of the need to value the lived experience of the architects and consider the involuntary, subconscious elements in the development of these designs rather than attributing their choices to a conscious imitation of the surrounding environment, a perspective that aligns with modern sensitivities. Evident for this view in the research is the assertion that Minoans deliberately *reject* bilateral symmetry, as if this supposed bilaterality is a given.⁸⁰⁰

Going beyond these *a posteriori* assumptions, the experiential consciousness of the *locus* can be found in many cultures, signifying a pananthropic view of how humans perceive the power of a location, which acts as if dictating the terms of habitation on them. The mythical origins of mountains and trees in various cultures can be seen as related to this phenomenon. These were seen created from the body of a primordial being, Pangu (P’an-Ku) in Chinese mythology, Ymir in the Nordic and Tiamat in some versions of the early Mesopotamian cultures.⁸⁰¹ In this sense, the landscape is not merely

796 Norberg-Schulz 1980, 23; Leatherbarrow 2015, 30.

797 Scully 1962, 4.

798 Hitchcock 1996–1997; 2007.

799 Driessen 2004.

800 In turn, this asymmetry is a main factor that led early scholars to characterise the Minoan planners as disorderly in comparison with the logic of the Greeks. Lawrence evaluates Minoan architecture as having no sense of form and emphasises their “love of picturesque at all costs”. Furthermore, he adds that even the contact with Egypt did not have a “sobering” effect on their architectural preferences (Lawrence 1973, 34).

801 Kleeman 1994; McLean 2017. The pananthropic analysis of this phenomenon would also comprise other deities, such as the rock-birth of Mithras, Vulcan and Enceladus from the Graeco-Roman religion.

constructed but is imbued with a life force, functioning not as a passive element but as an entity possessing its own agency.

The impact of the landscape was decoded in art, as many features of Minoan art in the layout of palaces and villas use symbolic or associative references from the landscape.⁸⁰² This is seen in decorative arts, such as wall painting and seals-engraving.⁸⁰³ In architecture, this tendency is fused with the interaction of the landscape itself. It has been suggested that these appropriations of the landscape served an ideological function in art, often restricted and with a degree of exclusivity, either through frescoes decorating the interiors of private rooms or on private seals.⁸⁰⁴ This ideology establishes, then maintains, negotiates and reinforces power.⁸⁰⁵ Hence, the elite endeavours to evoke a profound presence in the landscape – a presence rooted in its history yet dynamically projected as an enduring connection with, and sovereignty over it.

As for the more direct references to mountains and caves in art, one framework for explaining the emergence of the tradition of cave worship and peak sanctuaries is the climatic changes at the beginning of the Protopalatial period.⁸⁰⁶ This is seen within the assumptions of architectural theorists of the 20th century that architecture can serve as a testimony to the latent mythology of society.⁸⁰⁷ This phenomenon draws a parallel with Greek elites who, amidst the wave of urbanisation, strive to forge a direct link with the land, often idealising a bucolic essence with which they may no longer intimately engage.⁸⁰⁸

For Koumasa, situated as a peripheral centre, severing ties with the pastoral cannot be assumed. Its emulation of palatial ideology can be construed as an endeavour to replicate the refined characteristics of more central and sophisticated domains. Understanding of these principles can be assumed, however, especially considering the fact that the fairly palatial architectural layout must have required the presence of palatial technicians, if not officials, for designing and carrying out the extensive and homogeneous building programme.⁸⁰⁹

The extension of this new understanding of architecture, which can be dubbed natural architecture, has led architects to lay more weight on the idea of ancient architecture

802 Hitchcock 2007, 91; Palyvou 2023, 149–150.

803 Regarding the landscape representation in palatial sealings, see Krzyszkowska, 2010, 170–177.

804 Miller – Tilley 1984; Chapin 2004, 60–62.

805 Hitchcock 2007, 91.

806 See Footnote 494.

807 Tausch 2006, 149.

808 For Archaic Greece, this can be argued for the portrayal of the bucolic in the decorative aspects of Achilles' shield (Hubbard 1992, 27–32). For the urbanising centres of early Hellenistic poetry, this is one of the interpretive approaches to bucolic literature, as introduced by Theocritus (Fantuzzi 2004).

809 See discussion on page 45ff.

as an extension of nature or a continuation of it into the built environment.⁸¹⁰ Despite being strictly viewed as part of the exterior environment, it interacts with the interior and overlaps with open roads, semi-open areas, and enclosures through entrances.⁸¹¹ It can even find expression in using natural bedrock as an architectural element with no effort in covering it, but as an essential aspect of the design, already appearing in Prepalatial funerary architecture.⁸¹²

In Koumasa, the architecture builds upon the topographical features, enhancing their particularities in isolating and connecting areas so that it renders it an artistic product. This can be seen in the use of natural rock in the architectural layout of the rooms, especially in Room 2, the Corridor and Room 4, as well as the impact of the ‘sanctuary’ with its built elements on its surroundings, both on the settlement plateau as well as on the base of the Korakies hill. Perceived from the north, any buildings on Koumasa would have the mountain in the background, while from the west and the area of the tholoi, the peak with its buildings, especially their second storey, will form the skyline. Also, from the hill settlement plateau, looking towards the west, the ‘sanctuary’ forms part of the local skyline. This arrangement fits Palyvou’s description of skylines as borders of materiality and a threshold to heaven.⁸¹³

Doxiadis’ least effort principle emphasises the preference for flat terrain to minimise the difficulty of movement. The opposite vector, the pull towards rough terrain – often attributed solely to defensive reasons – could also encompass other considerations.⁸¹⁴ These include the visibility lines within and outward from a building complex, acoustic perception, and, ultimately, the unfolding of the web of meaning that the *locus* entails, as described above.⁸¹⁵

The plan of the plateau, at least, despite the conversation above about the asymmetry, is characterised by an order in the layout of the parallel walls. This also extends in the more ragged ‘sanctuary’ area and buildings under Peak 2, albeit with a small discrepancy, which can be attributed to the limitations on rough terrain (see Chapter 7.1). The general plan, however, adheres to the typical asymmetry observed in Minoan complexes that typically reject bilateral symmetry, as discussed above in this chapter. Whether the complex is to be perceived as a palatial centre or bearing traits of a villa, the topographical features of its central region at the ‘sanctuary’ area provide a natural setting to manifest these ideologies *in situ*, transcending the symbolic realm limited by the predominantly flat terrains of many palaces and villas. Here, the landscape

810 Amongst the earliest architecture theorists in this direction, Pikionis insisted on the interdependence of cultural phenomena and nature (Pikioni – Parousis 1985, 65).

811 Norberg-Schulz 1980, 6.

812 Vavouranakis 2002, 39–40.

813 Lecture series November 2023: A Timeless Guide to Architecture: 101 Tips for Archaeologists. A Three-day Online Seminar with Clair Palyvou. November 10, 15, and 17 (INSTAP SCEC).

814 Kyrtsis 2006, 149–153.

815 Studies by Doxiadis for Classical Greek Temples (Doxiadis 1972, 1–24).

functions not merely as a canvas but as a palette with reliefs, asserting its own influence in realising the palatial landscape-centric ideology. It's important to note that Koumasa is not an isolated case in this regard.⁸¹⁶

In Tilley's discussion of the landscape as a "spatial text", space can be seen as socially constructed; therefore, the monuments within it are the building blocks for creating a new landscape.⁸¹⁷ As Richard expressed it, the landscape and the monuments can "become fused and join in union to become a central point, an axis mundi".⁸¹⁸

8.1.1 Staging Exclusivity

The background for this approach correlates with modern archaeological methods aiming to evaluate the implications of an observable characteristic through the scope of human agency. In this case, the issue under examination is the concept of centrality, both in theory as well as in examples from within the same grid in which Koumasa lies. Here, the term centrality refers to the focal point of a settlement, which often combines aspects of prominence, controlling movement and with visual accessibility and that of elevation, such as a hill summit.

In conjunction with the analytical archaeological study outlined in Chapter 7, investigating the 'sanctuary' area can be enriched by considering agency and the interpretation of space. To this end, both phenomenological approaches and space syntax analysis tools prove useful. The 'sanctuary', alongside the broader Koumasa settlement, exhibits all the necessary components to serve as a compelling case study for understanding how the physical landscape influences and is influenced by architectural design, both as an active and passive element in spatial dynamics.

The Koumasa 'sanctuary' takes up an eminent position within its settlement in terms of (1) centrality and elevation, (2) the quality and density of the building activity there, and also (3) serving as a pivotal element in the spatial configuration, projecting outwards as an interface between the broader Messara valley with that of the settlement.⁸¹⁹ As for (4) the role within the settlement, from a topographical point of view – besides the wide outlook over the Messara plain – the 'sanctuary' forms the focal point of the settlement, as demonstrated in Chapter 6.

Situated along the main route traversing the settlement from east to west, it would have been a conspicuous point of reference for both travellers from afar and locals. Moreover, the strategic placement of the 'sanctuary' atop a hill amidst a backdrop of surrounding houses conveys a potent message of authority and significance. Beyond its

816 Especially for the Protopalatial period, the central area of Monastiraki acts as an adequate example of the use of the prominent geological feature within a settlement. See Chapter 10.

817 Tilley 1993.

818 See Footnote 336.

819 For this term, see Hillier – Hanson 1984, 82.

physical attributes, the ‘sanctuary’s’ role extends to the visual transmission of a unifying social message, exemplifying a form of material behaviour that underscores its importance within the societal framework.⁸²⁰

Therefore, the approach implemented in this chapter can be seen in relation to the research tendency of looking beyond the quantifiable aspects of the architectural design and regarding the buildings as things conveying meaning, seen here through the prism of Tilley’s argumentation: “Material forms are essential vehicles for the self-realisation of identities of individuals or groups because they provide a fundamental, non-discursive way of communication. We ‘talk’ and ‘think’ about ourselves through things”.⁸²¹ In this approach, the role of defensibility, for example, is not seen as essential as the role of visibility when dealing with an elevated feature. However, within this discussion, the interaction with the natural environment is also an issue to be considered. One reason this has eluded the focus of study in the past was the perceived dichotomy of man and nature environments in previous research.⁸²² Thus, the emphasis given to viewshed in Chapter 6 does not deflect from its study but rather enriches it.

By adding these aspects, many standing questions of the past, such as that of cult practice in the ‘sanctuary’, can be approached through the archaeological material and also enhanced with a more holistic view, which includes the relational space approach and the sociology of space.⁸²³ Another aspect stresses the transition from the focus on the modality of visual perception to that of acoustic range, thereby highlighting the interplay between visual and auditory modalities.⁸²⁴ This dynamic is particularly relevant to the activities conducted on the Terrace, which would have been experienced not only through visual observation but also acoustically. Residents situated on the slopes of Korakies would have perceived activities on the Terrace with a heightened intensity compared to those on the settlement plateau. Consequently, while the Terrace is topographically part of the settlement, its engagement extends more profoundly towards the slopes and the valley below, accentuating its significance within the broader spatial context.

8.1.2 Space Syntax

Much discussion has spawned regarding the Neopalatial style, its defining characteristics, uniformity, and even its general existence.⁸²⁵ Local materials and topography

820 Cunningham 2001, 76.

821 Tilley 2006, 7.

822 Thomas 2001, 167.

823 The sociology of space (Raumsoziologie) has been used to tackle the question of identification of cult rooms within Minoan settlements and complexes (Müller 2015, 112–113).

824 Feld 2005, 182–185.

825 Driessen 1989–90.

remained essential in determining the local tradition, but nevertheless, these localised instances have been viewed as linked within an underlying Neopalatial style since the early 90s.⁸²⁶ The variety of those manifestations does not deprive the “style” of its unifying character, but rather, it has to do with its nature. The diversity helps the defining factors of the Neopalatial style come to the surface. These, as expressed by Preziosi, are various patterns and relations rather than a homogeneous set of rules as seen in other cultures.⁸²⁷

In the Neopalatial period, the arrangement of built forms did not tend to follow a prearranged set of guidelines but rather to elaborate so each location may have a unique style. However, the composition of architectural elements shows similarities, based on the underlying set of rules that defines the style; the Neopalatial architectural language.⁸²⁸ There have been efforts to quantify this set of rules.⁸²⁹ Letesson called it the Neopalatial genotype, which, per definition, remains unseen,⁸³⁰ while what becomes observable is the phenotype.⁸³¹ Although initially hidden, the commonalities caused by their association can be revealed after studying many examples and sorting the underlying unifying themes and patterns through tools.

One of these tools is the space syntax analysis.⁸³² One could undertake a syntax analysis of the spatial distribution to better visualise the spatial distribution of rooms and paths as well as their architectural function.⁸³³ Such an effort was undertaken to study the internal organisation of Minoan palaces,⁸³⁴ but can be expanded to the smallest domestic units.⁸³⁵ The nodes reflect a location or unit that is defined, such as a room, and are represented by a circle. The more the so-called tree structure grows, the deeper the various rooms are located in the building. The straight lines represent the paths between the rooms or areas.

In the case of the ‘sanctuary’ and, more specifically, the access to Room 1 (presented in Figure 73 above), the gamma Syntax, following the concept of Hillier – Hanson, can be presented in the following manner in Figure 75.

826 Letesson 2014, 55; McEnroe 1990.

827 Preziosi 1983, 200.

828 Driessen 1989–90, 8, 11.

829 McEnroe 1982, 3; Preziosi 1983, 105–110.

830 Letesson 2009, 321–368.

831 Letesson 2014, 55–57.

832 For a summary of this concept, see Hillier 2014, 19–22.

833 Hillier – Hanson 1984, 147–155.

834 Vander Beken 2015, 260.

835 Hillier – Hanson 1984, 180–181.

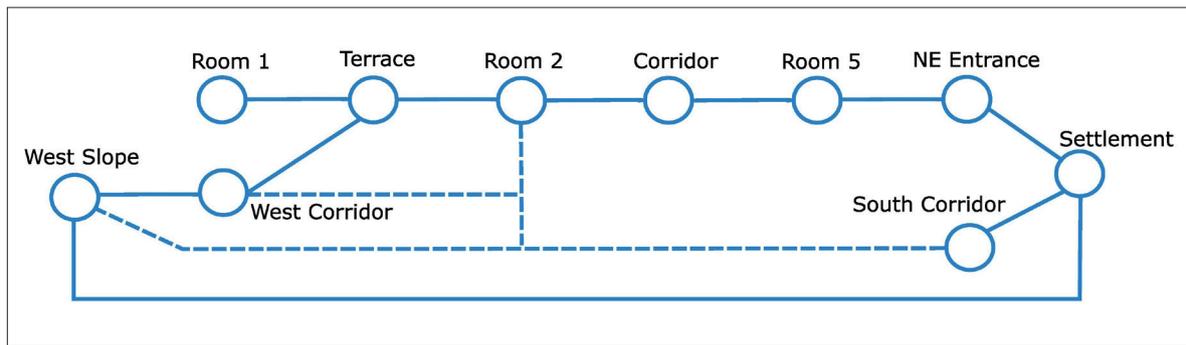


Figure 75: Space syntax for the area of the 'sanctuary'.

Walking from the west slope of the Korakies hill, one reaches relatively level ground around the saddle between Peaks 1 and 2. From there, one can continue traversing towards the central plateau of the settlement, bypassing the 'sanctuary' entirely by taking the path south of Room 10 (lower solid line in the space syntax map of Figure 75). If, however, one turns northwards, one can access the 'sanctuary', and the Terrace through the western corridor (solid line), or one can reach the area of the southern Corridor (the vertical corridor), where the slab between Walls φ and υ is indicated (dashed lines in Figure above). As noted before, the bad level of preservation in this area hinders a secure assumption, with a possibility of a direct connection to this corridor from the west slope directly or through the west Corridor. The west Corridor in itself, situated along the cliff of the hill, leads directly to the area of the Terrace, from which Room 1 is accessible. The other clear entrance to the 'sanctuary' is from the settlement through the NE Entrance, denoted by a maze-like walk (the top line, from right to left in Figure 75). This reaches Room 1 through a path that exceeds 20 m. (see discussion in Chapter 7.1 related to Figure 73). This path, which can be assumed to be addressed to a specific class of guests, has six nodes and can therefore be dubbed structurally as a deep-structure.⁸³⁶

These access points should be seen in relation with the movement patterns on the hill, as analysed with the aid of least-cost-path analysis in Chapter 6, and which reflect the experience on the terrain.

The layout is seen as a balance between spatial solidarity and social solidarity. As the interior is homogeneous in its perception and with clear boundaries that denotes structure, the element of the social solidarity is high. At the same time, the three main access points, and the assumed interconnectedness of ways in the unfortunately not well-preserved area, stresses contiguity and smoothens the spatial continuity from the outside, at least in the south of the 'sanctuary'.⁸³⁷

⁸³⁶ Hillier – Hanson 1984, 198.

⁸³⁷ Hillier – Hanson 1984, 144–146.

8.2 Terrace at Koumasa and Liminality: Interfacing with the Outside

The area in front of Rooms 1 and 2 acts like a physical terrace, beyond which, due to the descending slope, a wide-angle view of the Messara and the surrounding mountains is visible. Depending on the building's size, the western side of the settlement and the tholoi area would also be visible, as seen in Chapter 6.

In this area archaeological evidence indicated a terracing construction aimed at equalising the different levels and achieving a plain floor amidst the generally ragged rock surface (see Figures 69 and 70). The floor of this area was at least partially plastered, and that of the adjacent Room 2 was chiselled to form a smooth surface. To the west, the steepness of the hill would not allow access without significant physical effort.⁸³⁸

The few finds from this area may be seen in correlation with the terrace being the obvious destination for visitors of the Korakies hill due to the panoramic view, and hence the area most prone to being looted by said visitors. However, another explanation would be that the area was deliberately free as an example of performative space. The relative density of conical cups in Room 1, comparable only with that of Room 4, points to a certain consumption of liquids, which in the palace period was linked with the elite's ability to host such events and demonstrate it in the palatial environment. This trend to emulate the palatial elite in built form but also in social practice becomes more than a mere reflection of the copied ritual and indicates its adoption, acting as an element of a renewed identity.⁸³⁹

The examination so far describes the Terrace as providing an open space which has been artificially enclosed. It is secluded by the hill's geology – namely the bedrock to the northeast – and the building complex to the southeast. Nevertheless, as an unoccupied space with an unhindered westward view, it enjoys a high degree of visibility. The topographically assured predominance over the region is additionally emphasised by the isolation of the complex from any nearby buildings. In combination with the imposing entrances to the area, this manufactures exclusivity and denotes or rather enhances the area's natural centrality. At this point the concepts of centrality and liminality in forming exclusivity should be explored.

An assessment of the degree of accessibility and the relation of the area to its surrounding natural and man-made environment can be done by defining the type of open space to which the area belongs. Such categorisation of open spaces, ranging from the most private to the most public, is a subject of models of architecture theory.⁸⁴⁰ In the context of Aegean archaeology, Palyvou implemented this theory in her discussion of

838 See discussion on page 194ff.

839 Vavouranakis 2020, 271–278.

840 Such as the work of Chermayeff – Alexander 1966.

Minoan open spaces.⁸⁴¹ Her “group private” type, which describes an open-air space with restricted access, is the one most fitting for the Terrace area. This type would rank fourth out of six in the privacy-scala of Chermayeff – Alexander, and fifth out of nine in the one by Palyvou.

Apart from viewing the Terrace as an example of an “open-air space”, the wide view allows for an analogy with that of a balcony. As seen in architecture and art, the balcony is a projection of the roof level.⁸⁴² Similar to a balcony, serving as a point of visual contact and as a contact and boundary zone, this layout could serve as a semi-outdoor area. This term used by Palyvou in her discussion of the palatial courts can be adaptable for the terrace, as the rendering of the architectural units is similar.⁸⁴³ However, a second actor, the observer, is needed. In the case of the balconies in the palaces, the court assumes the receiver or the second actor necessary for the dialogue or ritual acts, such as the hypothesised use of balcony of appearance in the palaces.⁸⁴⁴ In the case of Koumasa the role of the spectator, or the second actor, is assumed by the lower parts of the settlement and its western extremities, including the tholoi area and the countryside. The Terrace acts then as a natural balcony of the ‘sanctuary’, overseeing the plateau to the foothill and the Messara beyond. In this discourse the architectural layout domesticates the particular part of the hill, allowing the analogy with palatial buildings.

The idea of defining a space with high visibility and with terrace characteristics within an otherwise secluded area, offering a sense of privacy to a certain group is not new in Aegean archaeology, as seen in the great court in front of the Megaron of Mycenae.⁸⁴⁵ There again, the local topography and relation of the court to the access road is stressed through architectural implementation. Such an area would have aspects of performative space, as the actors would be engaged in an active performance not only to their peers but to the rest of the populace, as the Terrace and actions within it would be visible not so much from the settlement itself but from outside of it.

Any kind of gathering may transform the Terrace into a type of social arena,⁸⁴⁶ the participation in which would have been controlled. This control, if not physical, of which we cannot be certain, is at least defined by the architectural arrangement, which is seen to impose a sense of liminality in this interior and the most secluded part of the ‘sanctuary’ complex. In this context, the liminal points act within the three steps of the

841 Palyvou 2004, 209–211. In her analysis, Palyvou expanded on the Chermayeff – Alexander model, proposing nine stages of exclusivity, with the notion that her model was conceptualised for Minoan palaces.

842 It is a separate entity, which corresponds to the eighth level out of nine in Palyvou’s categorisation (Palyvou 2004, 211–212).

843 Palyvou 2002, 173.

844 Hägg 1987, 132–133.

845 Maran 2006, 80–81; Fig. 1.

846 Here the term often used in the description of the social aspect of the palatial courts is used, such as for that at Knossos in Letesson – Vansteenhuyse 2006, 92.

rites of passage, as defined by Turner.⁸⁴⁷ Architectural remains can communicate these processes, as they are reflected in the arrangement of the architectural elements, which include the usage of the topographical elements that define the underlying meaning or ritual processes. Liminality is to be found in the second phase, that of the transitional state.⁸⁴⁸ The theory of the physical experience of transition, developed by Arnold van Gennep, can be seen in the act of approaching the area of exclusivity, which is stressed by the architecture. In this case, the architectural theory, such as that of Benjamin,⁸⁴⁹ concentrates on the relation between architecture and the gathering of experience.⁸⁵⁰

Such a dynamic relationship between society and architecture was researched by Maran in Mycenaean architecture by way of identifying points of liminality or nodes in the main road of Tiryns.⁸⁵¹ These are seen as borders, physically restricting access while simultaneously creating or strengthening the feeling of exclusivity for those traversing them. The role of borders has often been analysed as a sociological terminus by sociologists such as Mary Douglas. She stressed the role of borders as an organisational unit of the experiences made by the society's members or participants.⁸⁵² The borders here are not meant to be physical. Rather, they are meant to denote psychological aspects that, nevertheless, can be quantified or represented in the architectural design.

It is not seldom for an open space with no architectural elements to be found in areas of specific social and religious significance, such as in peak sanctuaries, where topography and the rocks demarcate ritual areas, serving an architectural purpose.⁸⁵³ Its wide visibility enhances the emotional experience of those walking towards it, as the anticipation of the goal transforms into a feeling of abstractness that integrates with the spiritual. Approaching is a dynamic interaction with the landscape: for those approaching from afar, seeing the goal as a small element on the horizon, to those nearer, climbing on the slopes and seeing the goal transform through their own movement to gradually occupy a great part of their vision.⁸⁵⁴ Hence, when walking towards peaks, a dynamic sense in the experience of the landscape can be assumed.⁸⁵⁵

When atop the hill, access to the Terrace seems to be through narrow passages, which allows to some extent for a controlled access, as it can be approached only by

847 According to Turner, rites of passage form a transition of the individual between two phases and have three levels: Separation, Transition and Reintegration. (Turner 1969, 94). This initially belonging to anthropological study of religion can fit with the architectural theory and movement between spaces (Deflem 1991; Coleman 2015). For a discussion of liminal points within Mycenaean architecture, see Maran 2006, 82.

848 Coleman 2015, 93.

849 For an analysis of this aspect of Benjamin's architectural theory, see Wagner 2016.

850 Schöttker 2009, 154.

851 Maran 2006, 82.

852 Douglas 2002, 50–51.

853 Such as the lower open terrace at Atsipades Korakias (Peatfield 1994, 22).

854 More on the Experience of Walking in Chapter 11.1.

855 Peatfield – Morris 2012, 233.

walking between the northeastern walls of the complex buildings and the descending slope on the southwest. These stops, seen in the nodes of the space syntax above, enhance the significance of the goal. The suggestion that this region was imbued with meaning stems from the topological arrangement.

The ellipse of vision that allows a comfortable perception of space, meaning without the need to move the neck or eyes, is 14° above the horizontal line.⁸⁵⁶ At the limit of 18° , the viewed object is perceived as impressive, according to Märtens rule.⁸⁵⁷

When applied to the landscape around Koumasa, observations from the tholoi area reveal that the built elements near the peak are situated at an angle of approximately 16° , with this angle exceeding 20° as one starts to ascend the slope.⁸⁵⁸ So, the terrace with the hill and its buildings is perceived to be monumental. The discussion of monumentality is usually applied to building structures, but here, the architectural perception can be viewed within this framework of emitting monumentality through the integration of the topography of the Korakies Hill within its building programme.

Approaching Korakies Hill from the west and north, at first it blends almost seamlessly into the background of the Asterousia Mountains. As one draws nearer, the hill begins to emerge more distinctly. The physical act of ascending is accompanied by a gradual transformation of the visible surroundings, shifting towards an increasingly monumental character. This inherent monumentality of the landscape is appropriated and amplified by the architectural design, which becomes even more central to the perception of the visitor as he draws nearer. When the visitor finally reaches the Terrace area, he is enveloped by the constructed environment that accentuates the natural grandeur.

8.3 Interfacing with the Inside

The role of the eastern front of the ‘sanctuary’ as a barrier to the rest of the Koumasa plateau, utilising the hills ca. 4 m. drop, was discussed above (see Figure 70 and discussion on page 201). Possible changes in the morphology due to erosion and other factors have been taken into account, particularly in relation to the southern part of the complex. However, in the central area of the plain, there appears to be no significant evidence of terrain alteration. However, the removal of many elements that would have formed the eastern front of the complex has occurred, as analysed above.

For the interaction of the area of the ‘sanctuary’ with the rest of the plain, it is noted that the two known column bases are located in the eastern part of the complex. Could this be an indication that the rooms were open to the rest of the hill plain? The

856 Letesson – Vansteenhuyse 2006, 95.

857 Letesson – Vansteenhuyse 2006, 94.

858 Ayash 2023, 144–146, Fig. 3.

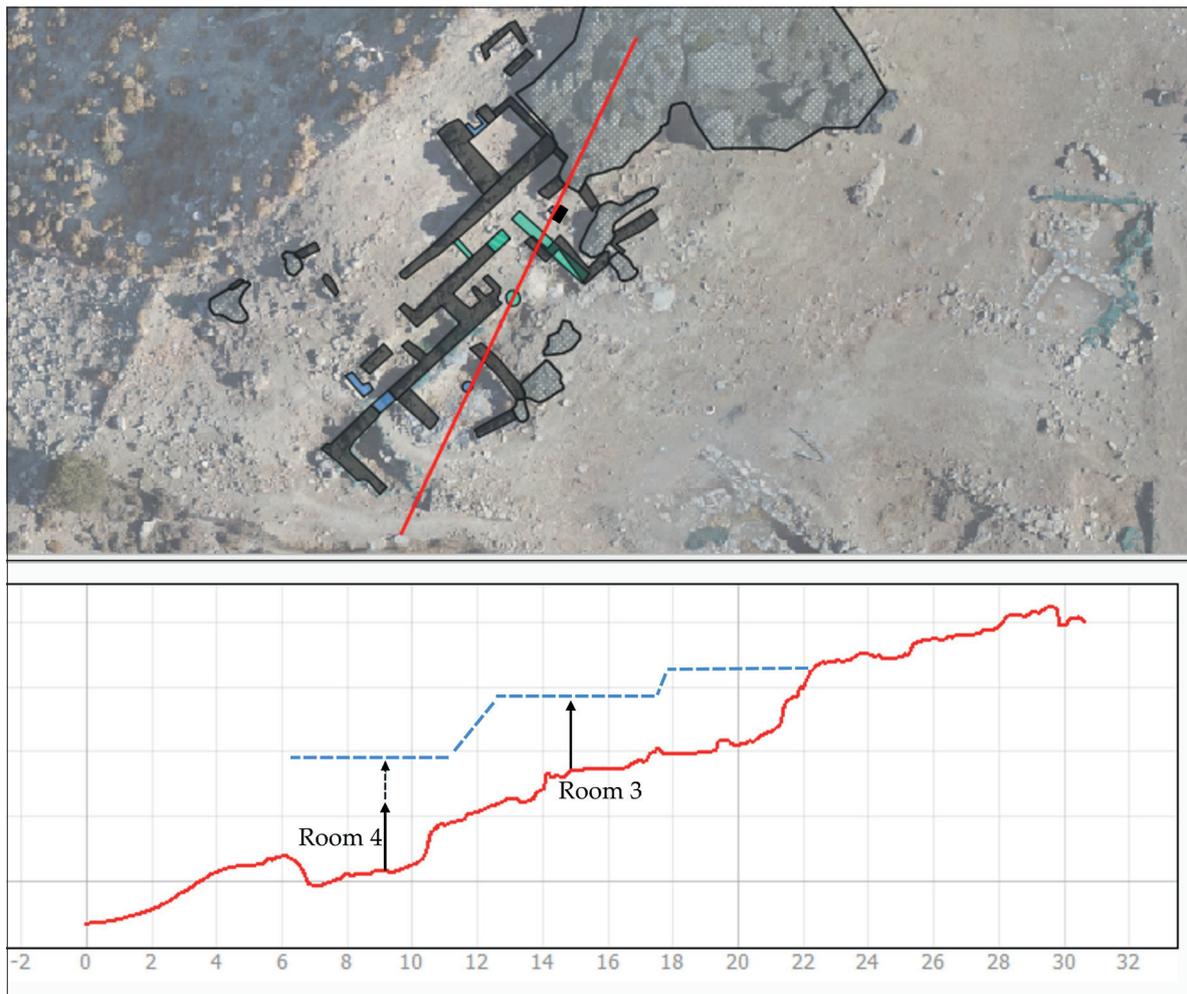


Figure 76: Rendering the effect of 3m structures at Rooms 4, 3 and NE area, as seen from the middle of the plateau (red shade, from left to right).

eastern wall of Room 4 is of LM I dating, allowing for the possibility the earlier column base being viewed from the plateau. Unknown is the situation of the eastern part of Room 3.⁸⁵⁹ Given the scenario of a walled eastern side, as well as a building activity along Wall ζ, the 20 m. front as seen from the plateau (discussed on page 201) would be seen as Figure 76. In the illustration, a height of 2 m. was assumed for the ground floor and in the case of Room 4, the upper floor.⁸⁶⁰

⁸⁵⁹ See discussion on page 234.

⁸⁶⁰ The heights were taken as a conservative estimation considering the heights of the rooms from Akrotiri, where five ground floor rooms have a height in the range of 1.9–3 m., with a mean height of 2.34 m.; seven upper floor rooms have a height in the range of ca. 2–2.7 m., with a mean height of 2.32 m. (Palyvou 2015, 128, Table 1).

8.3.1 Thoughts on the Two Column Bases of Koumasa

When approaching columns, the shaft itself and its effect on the perception of rooms and courts is often discussed, as seen in colonnades and staircases. However, less attention is given to the use of a column base as a statement, a feature exemplified at Koumasa. This may be because column bases are often simple flat stones or, in cases where they are more elaborate, they are largely buried. Even when partially exposed, they are typically not situated at the epicentre of their surroundings nor designed to serve as the primary focus of attention. To a certain extent, the more elaborate luxurious bases used in a “palatial” context are dimmed by their surrounding court, colonnade, and palatial complex and ultimately shadowed and drowned within the greater grandeur of their surroundings.

The Room 4 column base seems to be made of creamy or white limestone, which is a material not naturally found in the surrounding region.⁸⁶¹ Its upper part is precisely chiselled round and flat with an upper diameter of 51 cm. The column base gets wider in its lower diameter as it is slightly conical. Its lowest part so far has been reached only partially due to its location between a (so far unexcavated) charcoal layer to its south (which clearly originates from burned beams, possibly making up the fallen floor of the upper storey) and a narrowing bedrock enclosure to its north. It reaches a height of at least 45 cm; this would mean that its depth is approximately equal to its upper diameter.⁸⁶² The dressed surface exhibits small cavities, an indication of the work method, as a result of the picking of the hammer.⁸⁶³ A less carefully chiselled part begins 20 cm. from the top, which itself measures another 22 cm. at least. Its deepest points are very roughly worked, allowing for spikes in the stone that alter its round shape to an irregular polygon. This last part can be presumed to have been below the area the plastered floor would cover, should it extend up to the column base.⁸⁶⁴

The plastered floor corresponding to the last phase of the room (in LM I) was at the level corresponding to that of 27 cm. below the surface of the column base and ca. 6 cm. below the part of the column base where it begins to be less finely chiselled. It is logical that the lower part would not have been visible (see Figure 77). Scarce elements of Protopalatial sherds beneath that level and the column base itself allude to an earlier phase where a larger part of the column base may have been visible.

The unusual placement of the column base, which seems to be in a corner of the room (see also Figure 74 in Chapter 7), lends itself to the assumption that the assumed upper storey might not have occupied the entire area of the now-perceived room. It is more likely the upper storey consisted of a structure covering an area not overlapping with that of the ground floor.

861 For the naming and typology, see Shaw 2009, Appendix B.

862 Panagiotopoulos 2019b, 451, Fig. 15.

863 Similar to the work on other bases (Palyvou 2005, 130).

864 Panagiotopoulos 2019b, Fig. 16.



Figure 77: Column base in Room 4.

The first documented column base in Koumasa is the one of Room 3, which was mentioned by Xanthoudides in his first study of the settlement;⁸⁶⁵ however, it has since been lost. Its location, as well as the location of the photographer, has been approximated using the method described above.⁸⁶⁶ From the documentation, it can be said that it is a wide stone with a circular surface and conical shape. In the area where its position is assumed, the ground is deeper, possibly alluding to the creation of space for the establishment of this lost column base.

The existence of the column base in itself is not unusual, as column bases appeared in Minoan architecture from the beginnings of the Middle Bronze Age and from then on become one of the most persisting architectural forms of Minoan culture, lasting for

865 See Footnote 40. For the third column base, see Footnote 899.

866 See Figures 71, 72 and 73; Footnote 55 and discussion in Chapter 7.2.6.

the whole remainder of the Minoan chronology.⁸⁶⁷ On the practical aspect, the shaft of a wooden column needs a base mainly to protect the lower part of the shaft from humidity, but it is also an aid for stability.⁸⁶⁸ The use of a base allows for adjusting the height of the shaft and also provides room for movement as an antiseismic measure. This is one reason that in all cases where measurement was possible, the shaft had a smaller diameter than the base on which it was standing.⁸⁶⁹

When examining the rooms that contain a column base, the discussions concerning the size of this type of room often tend to be self-referential.⁸⁷⁰ Indeed, in a building complex, when a room exceeds a certain size, it needs extra support; it is also obvious that a room widened by the addition of a column would be one of the biggest rooms within the layout of its corresponding complex. For a pure static function, the common size for this type of room is 5 m. × 5 m. with a typical surface of 25 m².⁸⁷¹

In fact, the appearance of the column base is seen in relation to the ability and the technology of building such rooms.⁸⁷² The search for patterns within a typological analysis facilitates an understanding of this type of room and its broader significance.

While acknowledging these challenges, a broad analysis of the column-room type can nonetheless yield certain insights. Initially, the shared motifs and defining features of this room type are identified, followed by an exploration of the specific characteristics of each individual case. The following conventions regarding the column room seem to apply: The first and obvious is that it concerns the biggest rooms of the building in which it is located. The second convention is that it has an importance within the plan. Within complexes, the room with a column often acts as a focal point from which ways to the other rooms begin. Additionally, it is usually located in relation to the entrance.⁸⁷³ In more elaborate constructions – such as framing courts in colonnades – columns mark more exclusive areas or the official passageway.

Originally, column bases were strongly associated with workshop activities,⁸⁷⁴ as some wooden columns appear to be less about supporting upper storeys and more

867 Palyvou 2015, 182.

868 This stability is provided by burying the base in the pavement, or by embedding it within slabs in the typically Minoan colonnade system.

869 This can be seen by coal traces of the shaft, or carvings on it (Shaw 2009). Three of the six bases at Akrotiri showed such markings (Palyvou 2005, 131). Seldom finds of the lower part of the shaft illustrate this point (Sakellarakis 2013, 279–280, Tables 162b, 163).

870 Michailidou 1987, 509.

871 In Akrotiri for example, six rooms produced stone bases made of hard lava, of which two were found in situ. Of the six rooms, four have areas ranging between 25 m² and 26,2 m², with only two deviations with 33,9 m². and 34,8 m². respectively (Palyvou 2005, 130).

872 Lebesi 1976, 25.

873 Michailidou 1987, 509. Furthermore, it is interesting that maybe all the six examples of such rooms in Akrotiri, were built as an annex to or a modification of an already existing complex, after the early LM IA earthquake destruction (Palyvou 2005, 182).

874 Begg 1975, 196–199.

about widening the area and, therefore, working space within the rooms they are central to. Newer excavations tend to verify this usage in some cases,⁸⁷⁵ but others indicate a different purpose. Studies, such as by Michailidou, tried to investigate various possibilities for the function of rooms that originally held columns (none of which fit the situation encountered in Koumasa exactly). The omnipresent example of the Archanes clay house model indicates a special meaning for the room with a column type, its characterisation circling around terms indicating it as a “predominant living space” and “common room for everyday activities”, as the association with a clear purpose is clearly a difficult task.⁸⁷⁶ Overall, the depictions of columns in seals and other media also show a symbolic aspect of the column.⁸⁷⁷

8.3.2 The Koumasa Column Base as an Example of the Elaborate

As can be seen in a study of the column bases in southern-central Crete, the base itself can constitute an element of affluence in Minoan architecture. What constitutes a harsh antithesis in Koumasa is the size and form of the base(s) in relation to the limited site of the area they are part of.

In Koumasa, the base found is of a hard stone material, from an unknown quarry, but clearly alien to the region, the transfer of which must have been a significant effort. It is much more elaborately worked than the typical column bases for workshops or other types of rooms. As for its colour, although not polychrome (see below), the effect of the foreign and, thus, opulent character of the base should not be overlooked. It is likely made of creamy or white limestone (following the naming pattern of Shaw), a quite popular material, albeit more prominent in the Neopalatial era. It is the material used in Kommos for 10 out of 13 (ca. 77%) column bases, for 8 out of 45 in Phaistos (ca. 18%) and generally 47 out of 263 (ca. 18%).⁸⁷⁸ Judging by the 1909 image, the lost column base of Koumasa seems to have been similarly made of white or creamy limestone.

There doesn't seem to be a consistency that would allow precision in the chronology, as limestone was also used later, together with gypsum, as they are much easier to work with than other stones used in Minoan architecture.⁸⁷⁹ The main use of the room is within LM I, but small shards of Kamares and Barbotine ware in the deepest levels

875 For example, the Artisan's Quarters in Mochlos (Soles et al. 2003, 56–65).

876 Lebesi 1976, 25; Palyvou 2015, 182.

877 Such illustrations include terracotta model (*Knossos I*, Fig.166) and seal impressions with a column and one animal (Achat seal from Knossos, CMS-II,3-040-1) or two animals symmetrically flanking it, albeit from later date, from Mycenaean mainland (Achat seals, CMS-XI-196-1; CMS-I-098-1, gold signet ring, CMS-VI-364-3; and the lion gate of Mycenae).

878 The percentages are based on a study by Shaw of 263 bases (from various chronologies) (Shaw 2009, Appendix B).

879 The chosen material in Knossos for the much smaller bases after MMIII seems to have been plainer, i.e. gypsum or limestone, but the lack of polychromy would not constitute a sufficient argument for a later

or those near the bedrock of Room 4 suggest a Protopalatial phase (which is securely proven for other areas of the ‘sanctuary’). As the column base also seems to touch upon bedrock and lowest layers, it is not clearly datable to LM I, but may also be a MM phenomenon.

An examination of the decorative character

The bigger and taller column bases are typical in a MM II palatial context and – perhaps as a second use – up to MM III in Phaistos and Knossos, and thus have been linked with the Protopalatial period since Evans.

Generally, most column supporters – including those attributed to workshops – are slabs or thin stone bases not much higher than a few cm., having only a functional role, to stabilise and protect the wooden shaft from dampness.⁸⁸⁰ This trend is also seen in various rustic villas, as in the case of Vrachnou o Lakkos in Kouses. In these cases, the base was only worked to the floor level.⁸⁸¹

Even in colonnades, the base sometimes does not rise more than 5 to 10 cm. above the stylobate or even lower, often corresponding to half its total height.⁸⁸² Even one of the widest known bases – the one on the Propylon of the entrance to the west court in Phaistos, which measures up to 1.2 m. in diameter – rises just 14–18 cm. above ground.⁸⁸³

In some cases, however, notably in the first palace period, the column bases themselves were more clearly part of the showcasing, which translates into much taller, well-chiselled stones, often coloured. The decorative principle is also visible in stylobates, where the bases were finely chiselled towards the side from which it would be seen, while the back side was ergonomically left rough and covered with plaster.⁸⁸⁴ Interestingly, those in Knossos were categorised by Evans not only based on their size but also the chosen material, namely veined marble, serpentine, and porphyry. However, a variety of stones can be used.⁸⁸⁵ The similarity of colours and material of Protopalatial column bases to the stone vases of that time enforces the decorative character.⁸⁸⁶

dating. This polychromy was although popular, not the rule for the Protopalatial period, and was most attractively used in Phaistos (Shaw 2009, 80).

880 Evans speaks of 5 cm. width above pavement for these bases that are the only variety after the MM III period.

881 Marinatos 1924–5; Shaw 2009, 82.

882 See the base in Kato Zakro, or in Knossos in the light well of the Grand Staircase (Shaw 2009, Fig. 136, 134, 130) or in Kommos (*Kommos V*, Pl. 1.117). Sometimes, the bases can even be completely embedded within the Stylobate, as is the case in Malia (along the eastern side of central court) or in Ayia Triada (Shaw 2009, Figs. 132, 133).

883 Shaw 2009, Appendix C.

884 Shaw 2009, 81.

885 *Knossos I*, 211; Shaw 2015, 129.

886 *Knossos I*, 211–213.

Of these rather tall bases, there are not many samples of, but some common characteristics can be deduced. To counterbalance the height of the stone being exposed, the depth in which the base is placed must be deeper so that the buried part of the base can act as an anchor, stabilising the base. The buried part can remain without precise chiselling. Besides the obvious benefit of being less work, this would add to the weight of the buried part, lowering the centre of gravity.⁸⁸⁷

It's important to note that a wider lower part does not mean the visible base corresponds to the total height of the upper part.⁸⁸⁸ In other cases, there is no clear differentiation of a lower and upper part, but rather a cylindrical shape is produced. This does not seem to be era specific, as such examples of this are found in Knossos, or the Kommos court.⁸⁸⁹

Akrotiri serves as an interesting analogy, despite not being in the cultural vicinity of the Koumasa region. The exquisite preservation of the remains provides a detailed insight into architectural techniques. Interestingly, four out of the total six bases were part of the upper storeys. Their shape is cylindrical in the upper part, and a gradual transition to a roughly round and thicker lower part. Five of them have an upper diameter between 40 and 51 cm. and height between 31 and 38 cm.⁸⁹⁰

As for the height, Evans notes a trend of higher column bases during the Protopalatial period, with some bases being reused until MM III. Two bases from Phaistos are mentioned, one 50 cm. high and 70 cm. wide base and another 83 cm. in diameter worked into the pavement of Corridor 7 east of the West Portico. Another example can be found in the Knossos Northwest Portico.⁸⁹¹ Two similar-sized bases were re-used in the next phase – earlier MM III – 34 cm. high and 58 cm. wide at the top, with a slightly conical shape.⁸⁹² Their dimensions are comparable to the base on the stylobate of the Knossos north-eastern Portico indicating a similar quarry and technique. Two others similar to those in the spiral fresco area were found at the border of the east portico with some irregular ledge below.⁸⁹³

887 Typical for the bases from Akrotiri. An extreme representation of this comes from Kato Zakro, where the lower part of the base is given a round shape. Shaw 2009, Fig.146.

888 A very good image illustrating this comes from Akrotiri (Palyvou 2005, Fig.189), regarding the Alpha-East, Room 1. It is clear that more than four fifths are beneath the pavement, including almost half of the upper half of the base.

889 *Kommos V*, Pl 1.136.

890 See Table 1. The Data is taken from Palyvou 2005, Fig.187. For one of the six columns no data for the height was presented. As it was the one with the smallest diameter it was not included in the table.

891 *Knossos I*, Fig.161.

892 In the area of the spiral fresco. One in *Knossos I*, Figs.156, 157, and an image of the two in *Knossos I*, Fig. 268.

893 *Knossos I*, 213, Fig.157.

The shape of the ‘showcase’ bases can be conical or cylindrical, especially in Neopalatial contexts.⁸⁹⁴ An examination of the north and south stoa of Building T in Kommos, within the early LM IA context, reveals a notable uniformity in the column bases, with a clear preference for standardised circular, cylindrical designs.⁸⁹⁵ Also in this case, work from the same quarry is assumed.⁸⁹⁶

The columns that fit in the general showcase or tall type have a height-to-diameter ratio of more than 0.5. In a comparison with bases in Phaistos, Kommos, Knossos and Akrotiri,⁸⁹⁷ It is seen how the Koumasa base is one of the tallest, but crucially one the biggest in terms of volume and overall size. This qualitative comparison allows for a Protopalatial dating and, thus, its initial integration in the first phase of the building programme.

8.3.3 The Eastern Front Towards the Plateau

Room 4, in its greatest possible expanse, would have an inner area of 16 m². Therefore, for purely static reasons, a column seems to be unnecessary. Room 3 however, would be 28 m², fitting the typical norm of rooms with column, as seen above.⁸⁹⁸

The presence of column bases in the ‘sanctuary’ is not in itself remarkable or unique for this area.⁸⁹⁹ However, the presence of two adjacent rooms featuring large column bases exceeds what one might typically anticipate within a settlement house complex.⁹⁰⁰

While the primary function of supporting a second floor is conceivable, the relatively short vertical distance of less than 6 m. between them, coupled with the proximity of approximately 6 m. from the lost base to the rising bedrock to the north, presents intriguing possibilities for the architectural arrangement during the LM I phase, particularly if Rooms 4 and 3 were at least partially open to the east. Situated in proximity to the eastern front of the ‘sanctuary’, these features could have been intentionally designed to be visually prominent when viewed from the rest of the plateau. The height difference between their surfaces is estimated at 3 m. – though this remains an approximate measurement – which roughly aligns the upper part of the second storey in

894 Palace of Phaistos Room 64; Shaw 2009, Fig. 56.

895 The analytical dimensions of the bases in *Kommos V*, 90–92, 1031, 1037.

896 Shaw 2009, 104.

897 Unfortunately, the underground part of many of the column bases is not visible, so a more detailed analysis cannot be completed at this point.

898 See Footnote 871.

899 In Trench 16, which is located centrally on the settlement plateau, a column base was discovered (Panagiotopoulos 2023b, 312–313, Figs. 24, 26). As in the case of Room 4, this base seems to belong to a bigger room of an earlier, Protopalatial period, which was filled in the Neopalatial phase (as seen by the raised floor level) and was rendered smaller by a vertical wall.

900 Palyvou 2015, 182.

Room 4 with the level of the ground floor of Room 3, as illustrated in Figure 76. This configuration would project the impression of a multi-storeyed structure. The axis on which the two column bases are located, the extension of which to the north meets the rising central bedrock at its southernmost extension, is at an angle of 16° with the grid of the 'sanctuary' but only 6° with the grid of the rest of the settlement. While the discrepancy between the two grids was ascribed to adjustments made in response to the natural terrain and the topographical division of the two regions, the proximity of the axis between the column bases to that of the plateau grid, which also aligns with the natural cliff separating the 'sanctuary' and the settlement, suggests a deliberate design on that area (see Figure 76 above).

If indeed observed from the plateau to the east, the arrangement of these features could be interpreted as an attempt to emulate a palatial architectural layout, with the two column shafts positioned along the same axis but at different levels. The potential presence of upper-floor storeys aligned along the eastern edge of the 'sanctuary' would further accentuate this effect. However, if the columns were not visible from the exterior (for instance, if obstructed by the eastern walls of Rooms 3 and 4), their impact would be confined to the interior, particularly along the access route to the Terrace, where they would delineate two significant rooms.

8.4 Conclusion

In this chapter, the impact of the 'sanctuary' on the slope to its west and the settlement plateau to its east was examined, with an emphasis on how the architectural elements enhance and reinforce the natural characteristics of the *locus*.

In both scenarios, the architectural programme of the 'sanctuary' appears to underscore two distinct narratives. First, it suggests the notion of an exclusive area with interactions directed towards the western slope and beyond. Second, it conveys a connection to the rest of the plateau, reinforcing the area's liminal role. This is achieved either through an imposing front or through the display of two columns, aiming to emulate palatial design.

The impression of this complex is seen as a manifestation of the notions of the sociologist Clifford Geertz, according to whom every human culture is a self-spun web of meaning in which humans have become entangled.⁹⁰¹ This concept can be seen reflected in the architecture, which while expanding gradually adapts to and utilises the uneven terrain, within a literal understanding of the proverbial *web* of Geertz's metaphor. The building activity may thus be understood as interacting with the *locus* forming channels for the creation and spread of meaning, enveloping visitors in a complex web of significance.

901 Geertz 1973, 5.

Part IV
From the Mesoscale
to the Macroscale of Koumasa

Introduction

After analysing the microscale of the area of Koumasa and aspects of movement and architectural layout within it, as extension of the topography in Part III, in Part IV a larger scale of everyday activities will be studied, aiming to contextualise Koumasa within its surrounding neighbourhood – that is the wider expanse of its perceivable and traversable area of daily engagements – and beyond.

9 The Adjacent Valley and Mountain as Part of the Mesoscale of Koumasa

The methodological questions regarding the region of the Asterousia and the Messara and the area's perception in the literature were presented in Chapter 3. In this chapter, the area around Koumasa will be studied in order to better understand its position within its immediate surrounding environment. This involves the region of daily activity around the settlement, with locations being encompassed in one day's work; i.e. movement to and from within one day being realistic, taking into account the activities of herding, cultivation and trade. A separation of this area into mountainous and valley is often pursued, but this does not reflect the realities of everyday life with regards to proximity. It is an arbitrary separation reflecting the sensory differentiation of the parts of the immediate vicinity that are in the valley and within eyesight, and those on the mountain and hidden.

This section will begin with a new definition of the areas of the Asterousia, which is necessary for the discussion of areas with intensive interactions with Koumasa.

9.1 Redefining the Asterousia

As demonstrated in Chapter 3.2 (Figure 16), the division of the Asterousia into western and central regions, as well as the choice of an exact contour line for the definition of the mountain, is arbitrary, aligning with archaeological data and influenced by modern conceptions. For the discussion in this chapter, a separation of the mountain into five areas is considered more fitting, accounting for both archaeological evidence and the nature of movement. In Figures 78 and 79, the contour line is used to delineate much of the northern border, reflecting an arbitrary decision that excludes some areas from the Asterousia (e.g., Apesokari) and includes others (e.g., Panagia and Fournofarango), which could be considered in the grey zone between valley and mountain. This choice is maintained for consistency in the contour chosen. For certain sections of the northern border (e.g., the westernmost line toward Matala), and in the division lines between sections, major streams and natural gorges were considered (based on the watershed analysis in Chapter 5.5), along with empirical data from walking in the mountains, so that the five areas reflect an actual feeling of internal coherence. The vertical divisions follow gorges corresponding to streams of Strahler Order 6 and 7, as discussed in Chapter 5.5, which represent natural divisions of the landscape; thus, it is less surprising that

9 The Adjacent Valley and Mountain as Part of the Mesoscale of Koumasa

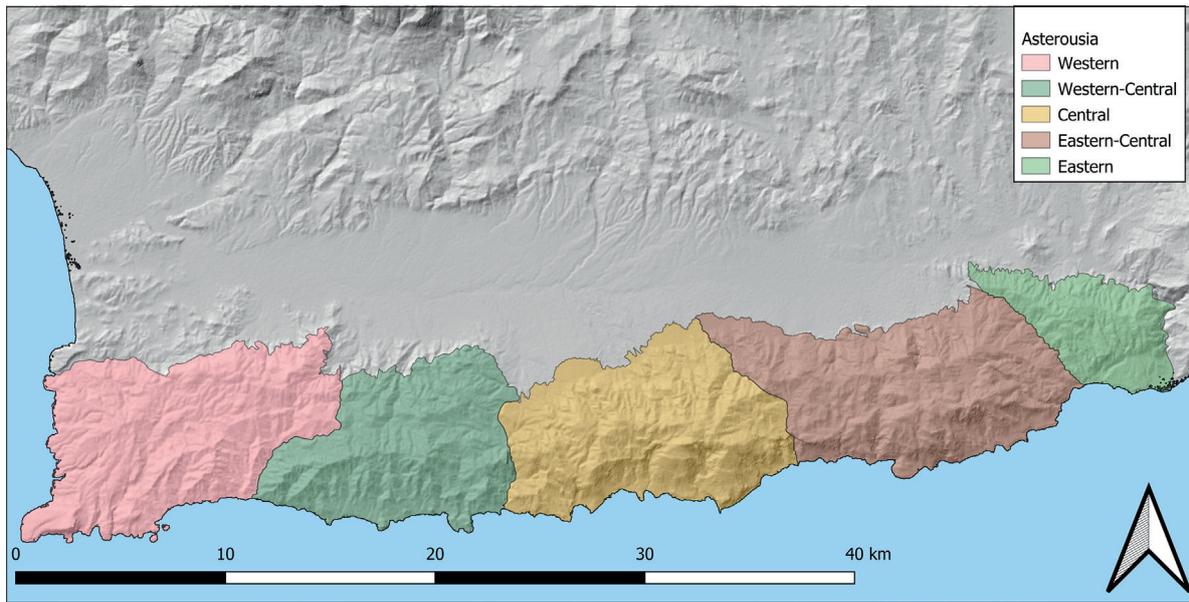


Figure 78: The five regions of the Asterousia.

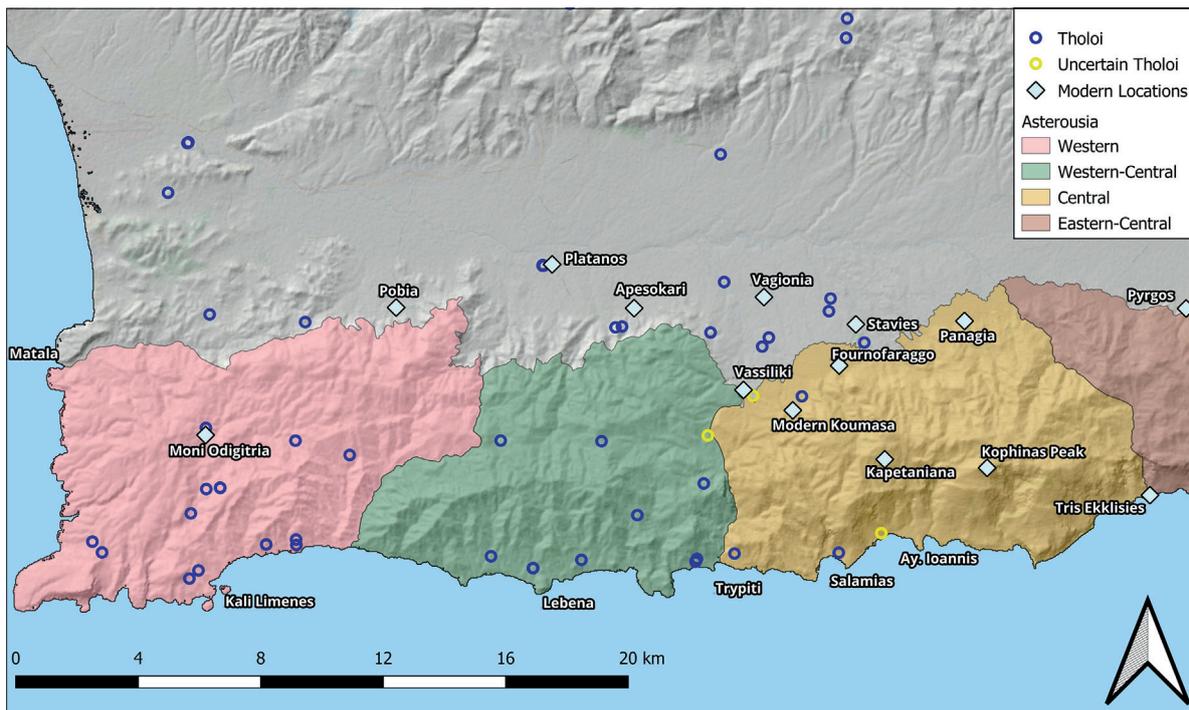


Figure 79: The western half of the Asterousia, in the middle of which the Koumasa Region is located.

they coincide very well with divisions between communities today. Finally, the proposed borders much some of the geological data discussed in Chapter 1.1.

The eastern Asterousia has an area of 33.3 km² and are bordered on their eastern side by the Anapodaris river until its output at Ayios Ioannis Pediados. On its western side, its division from the eastern-central area is defined by a local stream network and the Mindhri and Tsoutsouro gorges, and it meets the sea at Tsoutsouros. This line coincides with the modern border of the municipality of Pediada. The output of Anapodaris sees a concentration of sites, such as Ayios Ioannis-Plaka and Keratokampos mentioned above,⁹⁰² and the settlement at Aliori and the peak sanctuary at Chousakas.⁹⁰³

The eastern-central area is 94.7 km², and contains modern Ethia and its environs; to its north and northwest, the modern areas of Rotasi, Pyrgos and Charakas are located, which correspond to the output area of the paths leading there from Tris Ekklesies, the south-western corner of this area. These paths (as elaborated in Chapter 5) follow the network of streams and gorges that define the western side of this area and the border to the central area.⁹⁰⁴ It is also noted that this separation aligns with the change of geological composition, from the carbonates in this area to the flysch tectonic and carbonate – karstic thrust sheets of the central area.⁹⁰⁵

The central area is dominated by the Kophinas peak, whose area is 88.7 km². It is the main mountainous part of the Asterousia, with only a handful of paths allowing its ascent.⁹⁰⁶ The southern shore extends from Koudoumas to Ayios Ioannis; Salamias up to Trypiti are, therefore, arguably the most secluded harbours from the point of view of a walker in the Messara. To the north of this area, the documented tholoi begin to appear. Apart from Koumasa and Trypiti, located at the edges of this area, until recently, no tholoi were documented, but the recent documentation of the tholos of Salamias and another tholos near Ayios Ioannis suggests a change in this picture.⁹⁰⁷ To these, the tholos at Tris Ekklesies could be considered.⁹⁰⁸ The area of Koumasa is located to the north of this segment. The paths discussed in Chapter 5 that bypass the Kophinas peak concentrate on the edges of this central area, adding to the reasons it was defined as a cohesive subregion. Its western border is defined by the path network, and the Goulo-

902 See Footnote 83.

903 Vasilakis 2017, 79.

904 The features of this area include the calculated paths from the shore to the Messara, which demonstrate an accumulation of paths predominantly in the western part of this region, particularly those originating from the area of Tris Ekklesies and its surroundings it. The next possible artery to the west is those leading to the area of Koumasa. See discussion on pages 128ff.; iteration 4 in Chapter 5.2 Study 3 (Figures 29, 30 and 31); and page 151f.

905 For this and subsequent geological references, see Fig. 3.

906 The walking expeditions are presented in Chapter 11.1; Figure 92. For the computed paths, see Figure 29 and discussion in iteration 4 in Chapter 5.2, Study 3.

907 Based on a private discussion with Lucy Goodison; in addition to the tholos at Ayios Ioannis, two other round structures located near it are to be presented in her forthcoming revised tholoi catalogue.

908 At the area of Tragopiastis (Vasilakis 2017, 78).

farango gorges leading from Vassiliki to Trypiti (see Chapter 11.1.1). The northern edge of both the central and the eastern-central area corresponds with the fault ranging from Panayia through Charakas until north of Rotasi.

The western-central area remains mountainous but significantly less so than that of the central area.⁹⁰⁹ Its area is 72,5 km². It is defined by Apesokari and Pobia to its north and by Trachoulas, Lentas and Gerokampos to the south. Movement-wise therefore, this section has contained connection networks from these harbour areas to the Messara and Gortyn in both the Bronze Age and the Hellenistic and Roman periods.⁹¹⁰ The area of Miamou, home to one of the earliest known settlements in the mountainous Asterousia, confirms this view.⁹¹¹ Of the tholoi located on the mountains themselves (see discussion below), a local concentration of four tholoi (Ayios Kyrillos, Korakies near Miamou, Krotos and Christos), to which the uncertain Plakoura tholos could be added, form a group, divided from those of the western area. The western-central is divided from the western area by the line defined by a major local stream exiting to the sea at Platia Peramata. It follows the dividing line of the communities of Pigadia and Antiskari closely, the latter located in the western-central area and both closely fall along the geological divide of the flysch tectonic thrust from the schist area to the south.

The western area, 95.2 km², is defined by the sea on the southern and western seashore, with mount Lithino at its south-western edge and Matala at its northwest. It includes Lassaia and Kali Limenes to the south, and is topographically characterised by the Ayiofarango gorge in its central area, and Moni Odigitria to the north. The role of the Ayiofarango through the ages has been discussed elsewhere (refer to Chapter 3).

The whole area of the five regions comprises 384.5 km².

9.2 Koumasa's Neighbourhood

To understand the choice of Koumasa as a regional centre, the grammar of location, as put forth by Nixon, should be considered.⁹¹² This pertains to the semicircular extension of the Messara southwards, an area which Koumasa directly oversees. The semicircle defined by the contour lines of 330–360 m. comprises an extension of the valley southwards, passing through the immediate south of Vassiliki (Figure 80).

The insight into visibility within its main neighbouring region can be useful as a first step in this analysis. The area is characterised by a high degree of intervisibility (discussed below), and well-defined topographical limits (briefly presented in Chapter 3.3).

909 See section-cuts of Figure 18.

910 See discussion page 53ff.

911 See Footnote 99.

912 Nixon 2006, 92.

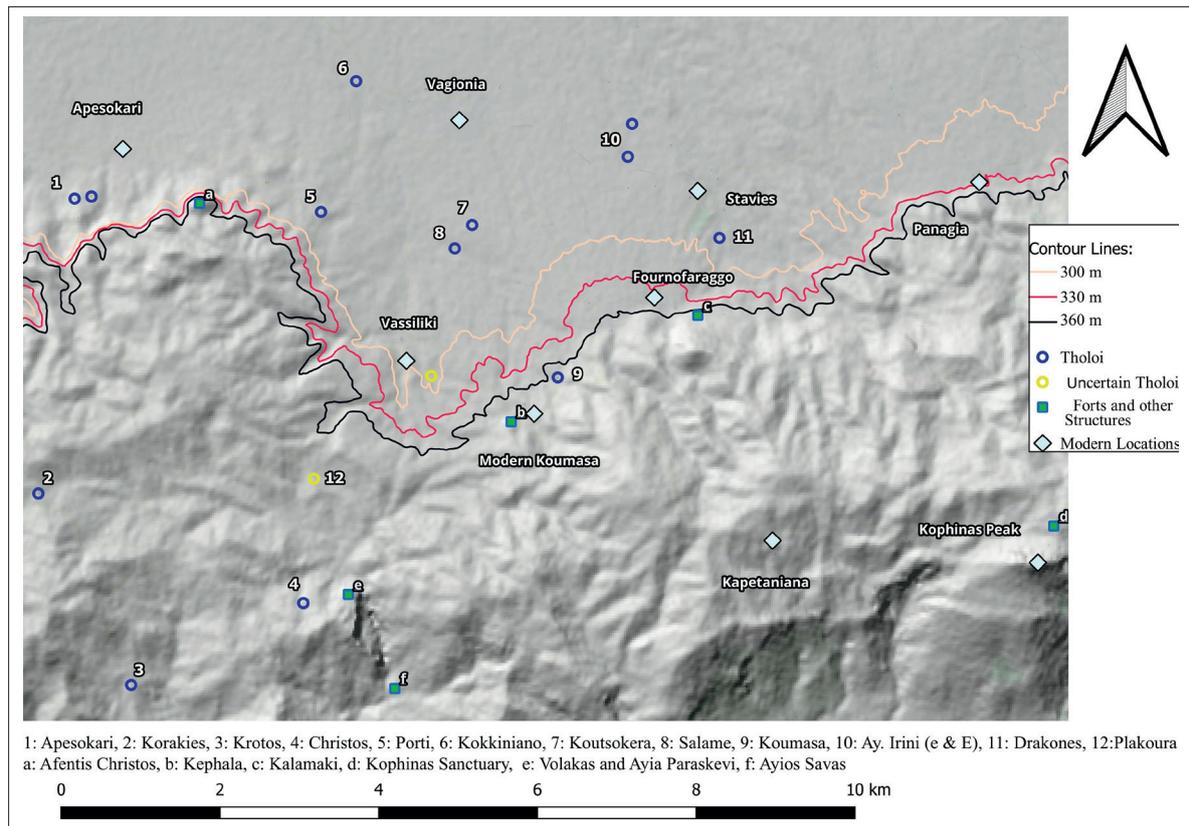


Figure 80: Topography of the immediate vicinity of Koumasa.

This image presents a mapping of sites with archaeological information, including known tholoi and two *dubitanda*, as described below.⁹¹³

The mean elevation of this valley extension is around 250 m., thus 100 m. lower than the Koumasa tholoi and more than 150 m. lower than the settlement plateau, allowing for a panoramic overview of this area.

9.2.1 The Adjacent Valley

At the northeast corner of the semicircle is the area of Fournofarango, where the ridge of Kalamaki is the northernmost extension of the Asterousia range into the valley, with its rugged slope indicating a clear transition from the valley to the mountain. Kalamaki produced some FN II–EM I ceramic sherds,⁹¹⁴ while the Drakones tholoi is situated less than 1 km. from it. This hill is very much perceived by Koumasa, as it blocks the view of

913 The site of Merthies SE of Vassiliki was not numbered, as its identification as a tholos is highly doubted. See Footnote 922.

914 Nowicki 2014, 160–161.

the smooth transition from the mountain to the valley (see Chapter 9.3). The shadow of the hill is cast on the settlement of Koumasa in the morning hours after sunrise during the summer months.

On the northwest corner of this semicircle is the area of Apesokari Vigla, the EM–MM settlement of Apesokari and Afentis Christos, a hill above Vasilika Anoyia which is visible from Koumasa. Apesokari Vigla and Afentis Christos show FN II–EM I settlement traces, with the one in Afentis Christos being characterised by Nowicki as one of the largest of this type of settlements on the northern side of the Asterousia, with mainly an advanced EM I phase. Material of the Greek-Roman period found in a round building is attributed to the effect of Gortyn, in a parallel to Pobia gia Vigla.⁹¹⁵ The Afentis Christos settlement is seen from Koumasa as the northernmost part of elevation before reaching the valley.

Another area of FN II–EM I presence is at the south of the topographical semicircle, on the hill of Kephala, which is clearly visible from Koumasa.⁹¹⁶ Thus, with regard to the earliest elements of habitation in the area, these three sites can be seen as strategically covering the whole semicircle while keeping a level of intervisibility between them. Also of relevance is the possible FN find in the Ossuary at Koumasa, which would make it part of this early network.⁹¹⁷

The EM period is characterised by the tholoi culture, with few other built structures. 10 tholoi are found in a radius of less than 5 km. towards the north (downhill from Koumasa), without including 2 uncertain examples: from east to west, they are found in Drakones, Ayia Eirini, Loukia, Merthies, Koutsokera, Salame, Plakoura, Porti, Kokkiniano and Apesokari. Of those, the oldest, stretching back to EM I, tend to be in the lower parts of the valley.⁹¹⁸ The tholoi are as follows:

Two tholoi in Drakones south of Stavies: Drakones D with a diameter of 5.85 m., and Drakones Z with a diameter of 7.1 m., both with earliest period of use in EM III;⁹¹⁹ two tholoi in Ayia Irini, north of Stavies, mentioned in the bibliography as both Hagia Eirene and Ayia Eirene: Tholos E with a diameter of 7.7 m. and Tholos e with a diameter of 6.6 m., both with the earliest period of use in EM I or EM II;⁹²⁰ a tholos at Loukia, considered uncertain. As the possibility of it being a mapping error is high, it is not includ-

915 Nowicki 2014, 159. See also discussion on page 51. This could also be seen as a parallel of the role of Koumasa in the Hellenistic and early Roman period.

916 Nowicki 2014, 159–160.

917 See Footnote 112.

918 Summarised in Legarra Herrero 2014, Fig. 9–10. Of all the tholoi around Koumasa, including those to the south, Koutsokera and Trypiti are dated with some certainty in EM I; Salame, Plakoura, Ayia Irini are probably, but not certainly, also EM I.

919 Xanthoudides 1924, 76–80; Pendlebury et al. 1935, 86; no. 16 and no. 18 in Legarra Herrero 2014, 173; no. 55 and no. 56 in Branigan 1993, 146; no. 17 and no. 18 in Goodison – Guarita 2005, 183.

920 Xanthoudides 1924, 51–53; no. 20 and no. 21 in Legarra Herrero 2014, 173; Branigan 1993, 146; no. 6 and no. 7 in Goodison – Guarita 2005, 180.

ed in the *dubitandae* tholoi in the map above.⁹²¹ Merthies, 500 m. southeast of Vassiliki, is also considered uncertain.⁹²² Koutsokera, south of Vagionia, with a diameter of 5.5 m., has the earliest period of use in EM I.⁹²³ Salame, south of Vassiliki, with a diameter of 5 m., has the earliest period of use in EM I.⁹²⁴ Two tholoi are located in Porti between Vassiliki and Vasilika Anoyia: Tholos Pi with a diameter of 6.6 m., and the small Tholos D with a diameter of 2.5 m., with the earliest period of use in EM II or EM III.⁹²⁵ Kokkiniano, near Vasilika Anoyia, being at a distance of around 5 km., is considered by some as uncertain but not by Goodison – Guarita.⁹²⁶

Viewshed Analyses

Visibility has been suggested as an important aspect of communication and one of the main determinants when occupying certain areas to establish a settlement.⁹²⁷ As for the Messara in general, implementing the connectivity index shows that Koumasa's position is less than optimal with regards to visibility, when compared with Apesokari, although it is larger in terms of area covered.⁹²⁸

As discussed in Chapter 5.4, the viewshed from Koumasa offers a wide view of the central Messara (Figures 45 and 46 in Chapter 5.4 and corresponding discussion). Koumasa exhibits a higher viewshed of the valley overall, while Apesokari provides a broader view to the west and east, though less in the north-south axis. This comparative analysis sheds light on the visual connectivity and landscape perception from these distinct locations. While relatively secluded, with the view to nearby tholoi, such as Drakones, being obstructed, a number of tholoi are visible beyond the immediate vicinity of the hill. The tholos of Korakies near Miamou is visible, as is Marathokephalo.

Based on these viewsheds and the one presented in Figure 81, the other tholoi mentioned in the valley near Koumasa, with the exception of Drakones and Ayia Irini, can be visible in a line of sight from Koumasa.

921 *Knossos II*, 71; under the category of *dubitanda* in Legarra Herrero 2014, 306; no. 52 in Branigan 1993, 146. Listed as a mapping error in Goodison – Guarita 2005, 208.

922 Pendlebury et al. 1935, 87; no. 90 in Legarra Herrero 2014, 196; no. 50 in Branigan 1993; Goodison – Guarita 2005, 202–203.

923 Xanthoudides 1924, 72–73; no. 71 in Legarra Herrero 2014, 190; no. 53 in Branigan 1993, 146; no. 37 in Goodison – Guarita 2005, 188; where exact coordinates are provided.

924 Xanthoudides 1924, 73–74; no. 130 in Legarra Herrero 2014, 208; no. 54 in Branigan 1993, 146; no. 61 in Goodison – Guarita 2005, 194.

925 Xanthoudides 1924, 54–69; no. 126 and no. 126 in Legarra Herrero 2014, 207–208; no. 59 in Branigan 1993, 146 who takes only Tholos Pi into account, as does Goodison – Guarita no. 60 in Goodison – Guarita 2005, 194.

926 Pendlebury et al. 1935, 87; no. 58 in Legarra Herrero 2014, 186; no. 60 in Branigan 1993, 147; no. 32 in Goodison – Guarita 2005, 186–187.

927 On the subject, see Mytum 2013.

928 The Connectivity index, analytically developed in (Hammond – McCullagh 1978), is a method utilised to yield the number of links in a network as a ratio of the maximum number of theoretical links between all nodes.

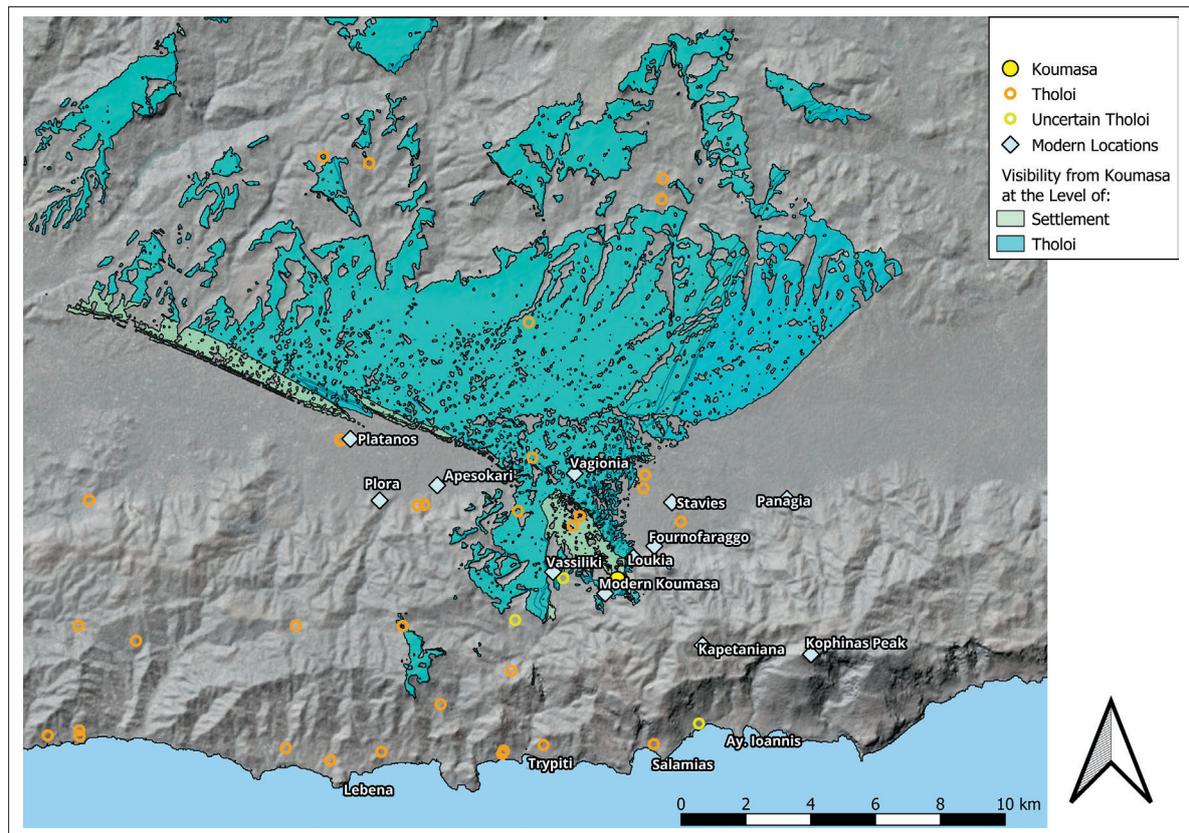


Figure 81: Viewshed from the Koumasa settlement and from the level of the Koumasa tholoi and settlement.

Visible from Koumasa at the level of the tholoi are Porti, Kokkiniano, Gagales and Marathokephalo, and from the settlement also Salame Koutsokera and Korakies by Miamou, or at least its area. In the case of Marathokephalo and Korakies, selective visibility is observed, as, interestingly, only the area in a radius of 70 m. around Marathokephalo is visible from that tholos, and similarly for Korakies. If visibility from the top of the Korakies hill is taken into consideration, then the tholoi of Salame, Koutsokera, and partially Korakies, are visible. For the last one, again, selective visibility is observed, i.e. only the area of the tholos is somewhat visible.

When Drakones, or Salame-Koutsokera, are considered as viewing points, the viewshed result shows zero viewshed with other tholoi. In fact, for the tholoi in the vicinity of Koumasa, only the viewshed of Porti shows a high degree of visibility, which covers Koumasa, Kokkiniano, Salame-Koutsokera and to the north Gagales, and, as in the case of Koumasa, Marathokephalo.⁹²⁹

⁹²⁹ These viewsheds are not illustrated.

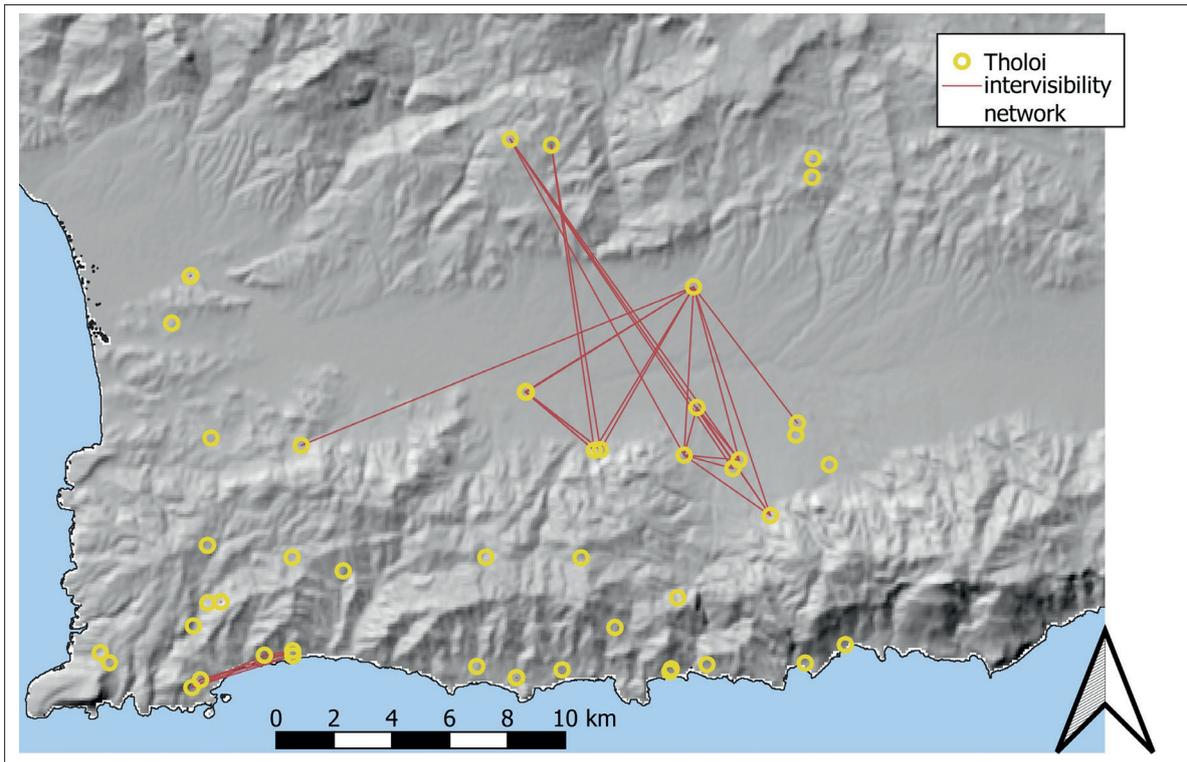


Figure 82: Intervisibility network between the tholoi.

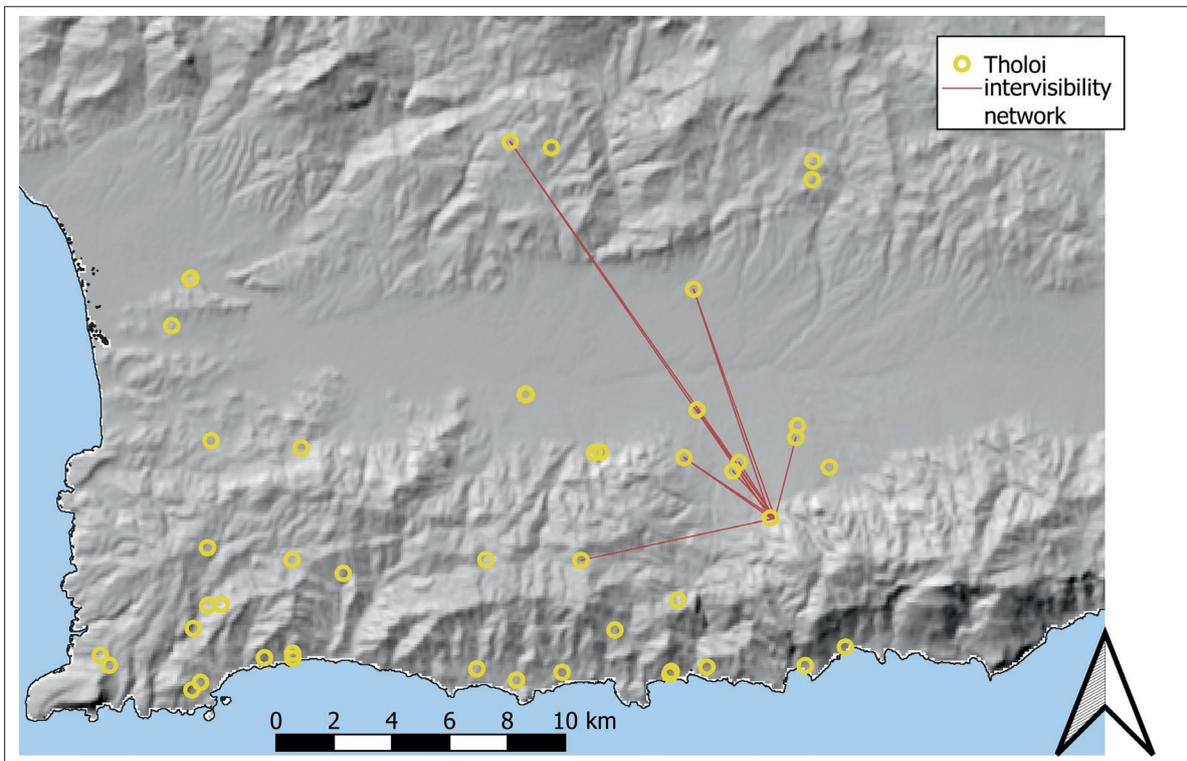


Figure 83: Intervisibility Network from Koumasa, seen from the tholoi and the Korakies hill.

The Intervisibility of the tholoi are minimal, as seen in Figure 82, which is restricted in the area of the Lassaia bay for the tholoi of Lassaia and Kali Limenes and in the central Messara.

The intervisibility network in the Messara is solely based on six tholoi with elevated locations that overlook central Messara: Apesokari, Koumasa, Porti to the south of Messara; and Marathokephalo, Kalathiana, and Gagales to the north. The only other tholos-location with a line of sight is the one Sopata-Kouse, due to its line of sight to Gagales.

When considering only Koumasa, with viewpoints from the tholoi level as well as from the settlement level, the number of observable tholoi increases (Figure 83). The intervisibility map of what is here called “mountainous tholoi” offers an interesting addition (see Figures 84 and 85).

The results are in agreement with Nixon’s observation that the tholoi are not located according to intervisibility, a fact changing in the Protopalatial period.⁹³⁰ From Koumasa, Platanos is located barely on the invisible side.⁹³¹ However, some locations, such as Marathokephalo, Apesokari and Koumasa, offer a view that could be argued was a result of the settlement in their vicinity. However, this point is not proven for Koumasa, as the tholoi preceded the settlement, at least based on the archaeological data thus far.⁹³²

9.2.2 The Mountainous Region

Traditionally, tholoi have been geographically categorised into those located or associated with the valley and those situated on the Asterousia mountain, including those along the coastline (e.g., Trypiti, Salamias, Lebena-Geropotamos). Tholoi along the coastline, positioned near the sea on relatively flat terrain with expansive viewsheds toward the sea, exhibit distinct geographical characteristics compared to those on the mountain, such as Ayios Kyrillos, Christos, Korakies, and Krotos, which are situated in the central-western Asterousia. Therefore, for the purpose of this analysis, and as discussed above, a refined distinction is proposed: tholoi along the coastline, tholoi on the mountain, and tholoi in the valley.

Looking at the mountainous region, in the area of central Asterousia, the Kophinas sanctuary is of interest, and in the western-central Asterousia four tholoi are located, (excluding the uncertain Plakouras), as follows:

Krotos, with a diameter of 4 m., was used in EM II–III.⁹³³ Christos, with two tholoi, Tholos X, 6–6.5 m. in diameter, and in use in MM IA–MM IB, possibly founded in

930 Nixon 2009, 275. See also Footnote 1001.

931 It is noteworthy that Platanos, being central in the Valley is on the line of sight of only two necropoleis: Gagales and Apesokari.

932 See discussion in Chapter 2, and below Chapter 9.4.

933 No. 72 in Legarra Herrero 2014, 190; no. 44 in Branigan 1993, 146; no. 40 in Goodison – Guarita 2005, 189.

9.2 Koumasa's Neighbourhood

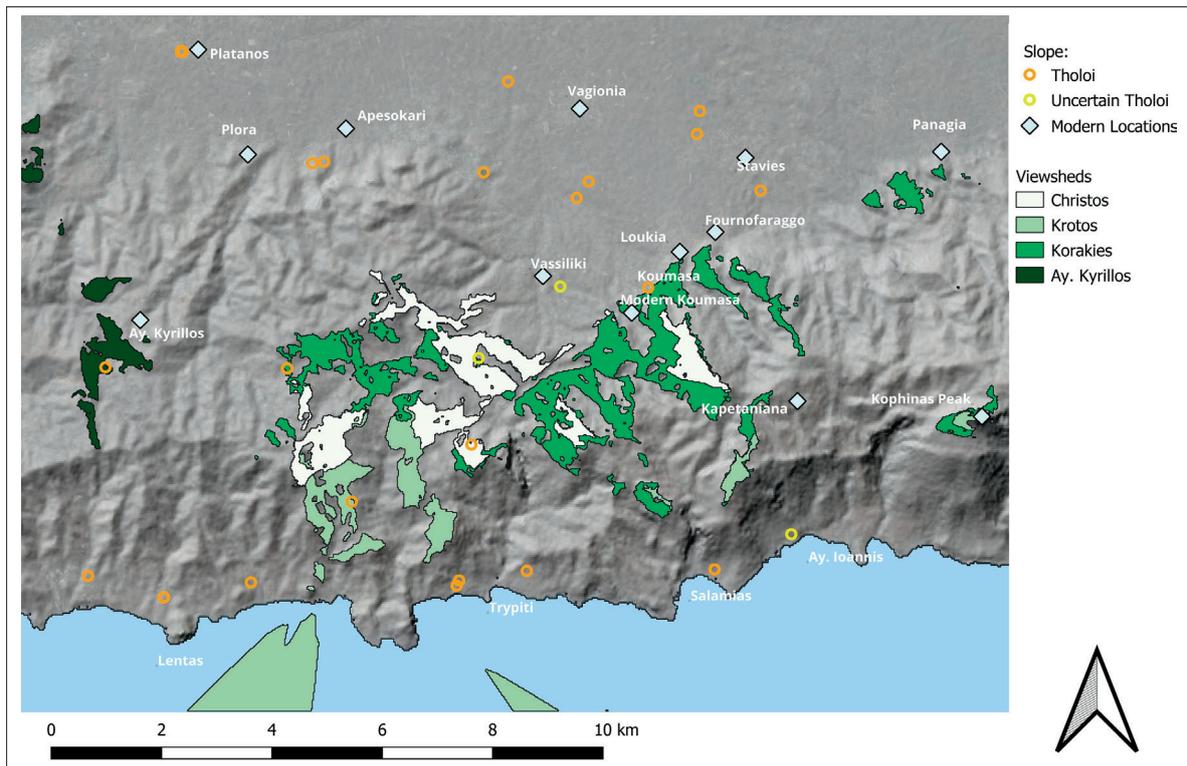


Figure 84: Viewsheds of the four mountainous tholoi of western-central Asterousia.

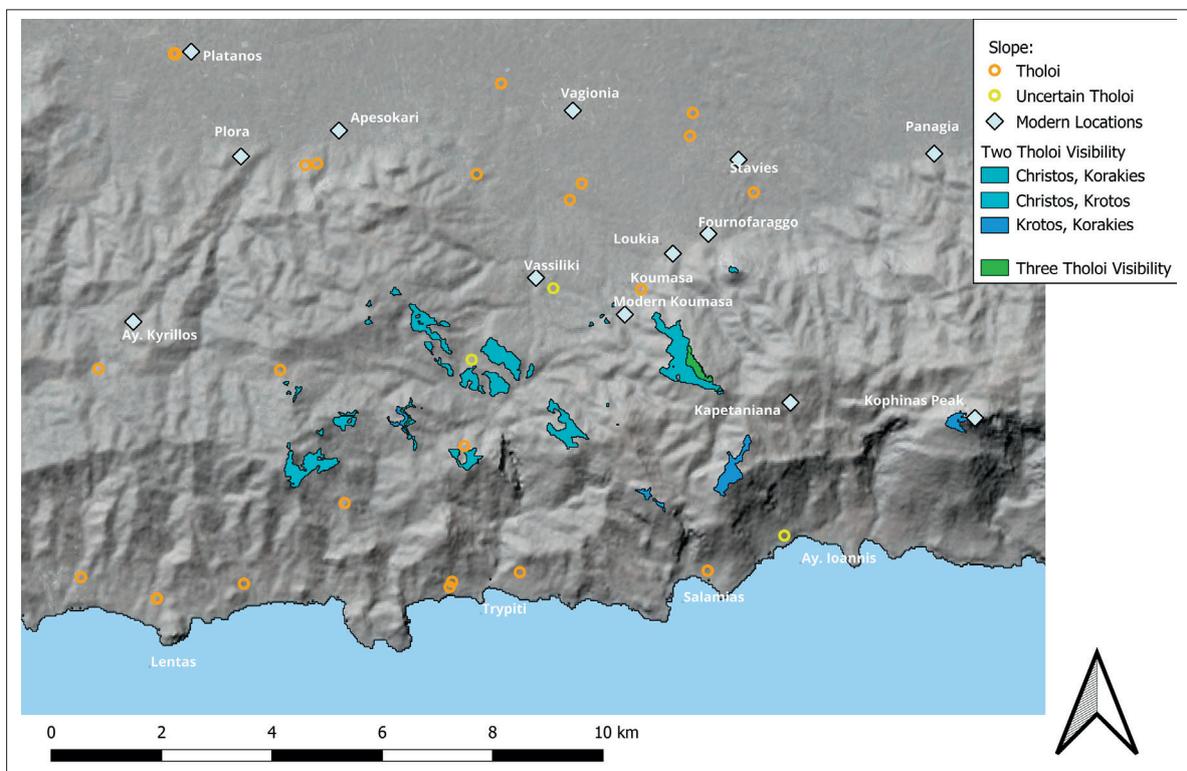


Figure 85: Intervisibilities of the tholoi mentioned above. 1: Korakies, 2: Christos, 3: Krotos.

EM III.⁹³⁴ Korakies near Miamou, with a diameter of 5.2 m., is dated in MM I.⁹³⁵ Ayios Kyrillos, 5.85 m. in diameter, could be as early as EM I but most concordance is for the period EM II–MM IA.⁹³⁶ Plakouras near Vassiliki is considered as uncertain.⁹³⁷ Its location, even if it is not a tholos, should be seen in correlation with Krotos and Christos and the path network they lie in, as it is located on the path leading from the valley towards them, at the junction of the road.⁹³⁸

These tholoi belong to a common environment situated on the mountain, topographically between those along the shoreline and those in the valley. Chronologically, their use overlaps only in EM III and perhaps partially in the case of Korakies, which was possibly founded in MM I, which is also the main period of use of Christos. A common characteristic of these is the lack of visibility either to the valley or to the shore (with the exception of Krotos, which offers a partial view of the sea; see Figure 84). Their location has been characterised as close to settlements (e.g. Korakies),⁹³⁹ but in other cases, this is uncertain.⁹⁴⁰

For the four mountainous tholoi of western-central Messara a study of intervisibility was performed, with the results summarised in Figures 84, and 85.

For some of the tholoi, visibility extends beyond the valley to the slopes of Mount Ida, which is not visible in the Figures above, and is deemed as not essential information. Ayios Kyrillos is the most secluded of the group, with no intervisibility with the others. Korakies, Christos and Krotos have some but very little overlap.

Mostly, the visibility areas on the mountain range for Krotos and Korakies are complementary rather than overlapping. This is the case with Christos also, but to a lesser extent. The areas with the widest overlap of visibility are located on the western slope of the central Asterousia, while the areas where visibilities do not overlap, but rather complement each other for greatest sight-coverage, are in the area they are located, i.e. the western-central Asterousia.

Overlapping the intervisibility from the four tholoi, the covered area comprises only 0.11 km², of which a negligible area of 0.017600 km² (or 1.7 hectares) is on the western-central Asterousia and not on the Kophinas slope.

934 No. 11 and no. 12 in Legarra Herrero 2014, 171; no. 45, 46 in Branigan 1993; no. 29 and 30 in Goodison – Guarita 2005, 186.

935 No. 59 in Legarra Herrero 2014, 186; no. 42–43 in Branigan 1993; no. 33 in Goodison – Guarita 2005, 187.

936 No. 37 in Legarra Herrero 2014, 180; no. 41 in Branigan 1993; no. 16 in Goodison – Guarita 2005, 182–183.

937 Pendlebury et al. 1935, 87; no. 111 in Legarra Herrero 2014, 203; no. 51 in Branigan 1993, 146; disregarded in Goodison – Guarita, as the remnants and most of the sherds “do not look Minoan” Goodison – Guarita (2005, 204–205).

938 “on a small spur at a point where the [track] to Miamou branches off from that to Christos and the south coast” (Pendlebury et al. 1932–3, 87). See also discussion on page 289ff.

939 See Branigan 1998, Table 1.; also Chapter 9.3.1.

940 The settlement at Volakas hill referred to by Xanthoudides seems to belong to a settlement of late LM III or later, perhaps belonging to the category of refuge (see Footnote 1124).

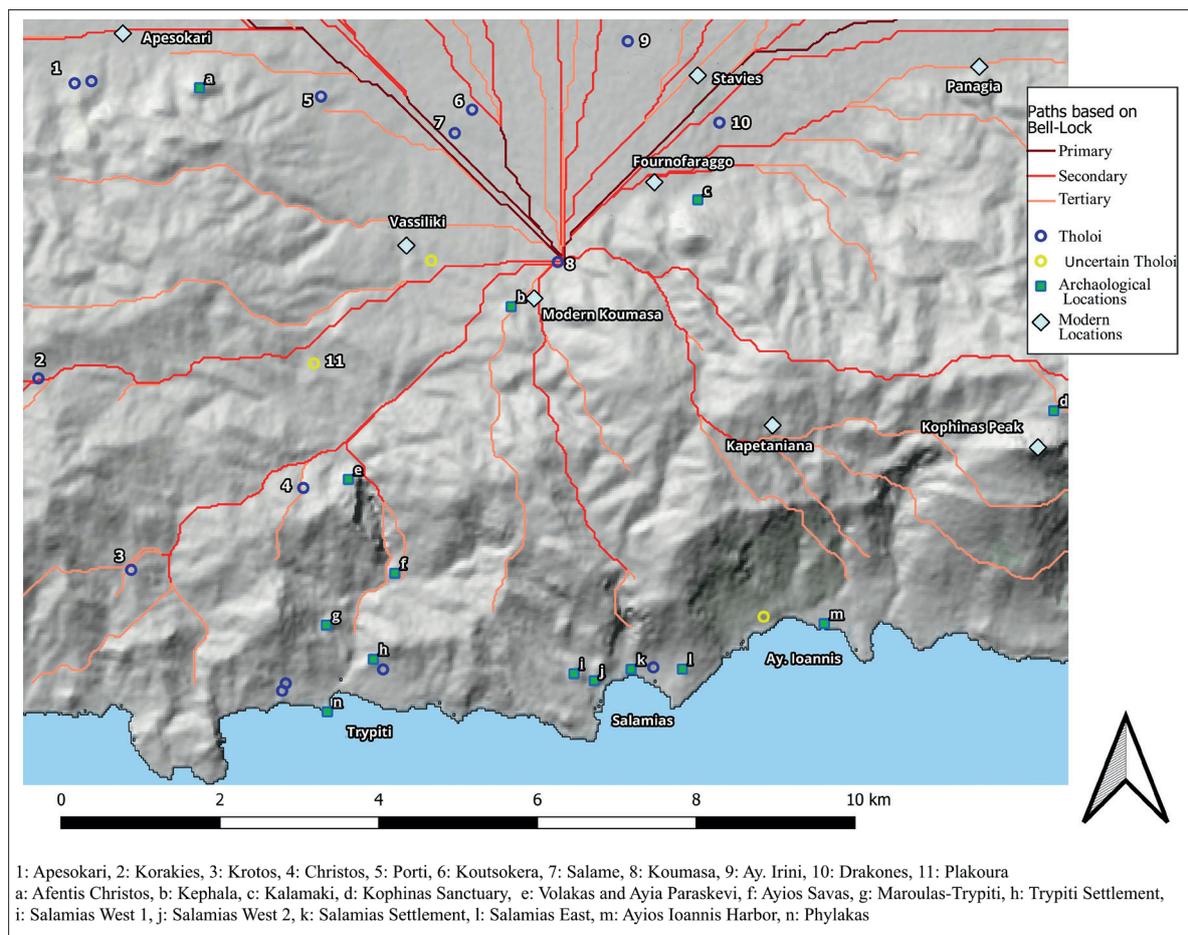


Figure 86: Flow accumulation from Koumasa with an overlap of locations of interest.

This is similar to the results of Déderix's study of the tholoi of the Ayiofarango,⁹⁴¹ and could be expanded in a study of the other mountainous tholoi of the western Messara, including Kaminospilio and Skotomenou o Charakas, which are two sites in the western Asterousia not concentrated along the Ayiofarango.

Before referring to the discussion in Chapter 9.4, a further interesting insight showcasing the nodal role of Koumasa can be gained from flow accumulation analysis (as discussed in Chapter 5.3.2), showing the connectivity networks based on Koumasa.

In Figure 86, the flow accumulation based on Koumasa is superimposed on the locations of the tholoi, showing an optimal connectivity to the locations of these mountainous tholoi. As discussed in the case of flow accumulation, Bell-Lock yields more *natural looking* results for mountainous areas, and is thus utilised here.⁹⁴²

941 Déderix 2023.

942 See the comparison of the Tobler and the Bell-Lock functions on page 147. The negative aspects of the Bell-Lock in the valley are illustrated in the paths generated in the valley, whose long linear segments are not realistic. On the contrary, the implementation of Tobler shows paths on the mountain that are *less natural*.

A first observation is that the mountainous tholoi are located along natural paths stemming from the central Messara. A second is the high connectivity of Koumasa towards the tholoi of the region, as well as other areas of interest, which extends to those on the mountain.

It is of note that Korakies, as well as Ayios Kyrillos (not shown in the Figure above), are connected to Koumasa through the same secondary path, without the need of going through the Apesokari or Pobia regions, as suggested by the modern street network. This would give Koumasa direct access to these locations. Overall, all primary and secondary paths are very accurate in relation to the reality of walking, and the tertiary ones are very close to actual paths, carrying an indicative value of the access possibilities.

9.3 Locations of Tholoi: A Topographical Approach

9.3.1 The Problem of the Tholoi Distribution and Location

Although the area around Koumasa is the focus of this work, for the question of the tholoi distribution a wider perspective needs to be considered. Historically, the location of tholoi has been connected with that of settlements. As the tholoi form our main source of information for this period, ranking the settlements according to their nearby tholoi or even their number has been tempting.⁹⁴³ Assigning settlements to tholoi has been strongly pursued, as Branigan's table summarises.⁹⁴⁴ More than two thirds of the tholoi are seen to have a settlement, located at a distance of approximately 10 to 400 m., with a unifying trend in the direction of settlement (though significantly more to north and south than anywhere else).⁹⁴⁵ Most are within a five minute walk, some even immediately next to each other, and this seems to have been deliberately planned.⁹⁴⁶ However in other cases, such as Sopata Kouse and Ayios Kyrillos, it could be 1 km. or more, as presented below.

Tholoi are usually not built on a prominent landmark in order to be visible or stand out, or in special relation to one (e.g. with a view of Mount Ida), but rather in the middle of a slope or on low ground (Krotos, built on a white rock is an exception).⁹⁴⁷ It is to be noted that the Ayios Ioannis tholos and Korakies tholos, the only ones on the

943 Watrous 1994, 705; Sbonias 1999, 29. On the Prepalatial settlements, see also Legarra Herrero 2014, Fig.5.

944 Branigan 1988, Table 1.

945 Branigan 1998, 15–16. On the erroneous mention of Koumasa settlement, see Footnote 965 below.

946 Branigan 1998, 18.

947 Branigan 1998, 13–14. See also Footnote 930 above.

Asterousia in view of the Kophinas peak, are deliberately oriented to it,⁹⁴⁸ thus arguably deviating from this rule.

Based on this observation, discussion on the choice of locations for building the tholoi has assumed their function as territorial markers, as maintenance of the tholos would legitimise control over the resources around it.⁹⁴⁹ A double effect was assumed by Murphy for choosing a location on a “raised area or a slight hill”: to show where people worked, and that they were present in the landscape, and to provide partial visibility over the landscape.⁹⁵⁰ Cultural parallels in ethnographic studies give examples of tombs that mark the ancestors who are buried as owning the land, and therefore the inhabitants inherit rights and responsibilities over the land via their ancestors.⁹⁵¹

With regards to the location of the tholoi, Xanthoudides concluded that settlements are due west, and he assumed this manifested a certain belief system. He based his observations on Koumasa, Porti, Platanos, Marathokephalon and the Pyrgos Cemetery.⁹⁵² The information is, however, contradicted in the publication of the vaulted tombs, as, for Porti, the assumed settlement is mentioned to the south and elevated, and in Kalathiana, a settlement is to the north.⁹⁵³

One can also add the rectangular buildings and vessels identified to the north of Vorou A on the hilltops overlooking the area;⁹⁵⁴ to the south of Lebena Papoura, on the hill of Aginaropapouro a Protopalatial settlement is assumed;⁹⁵⁵ Livari is connected to various settlements;⁹⁵⁶ for Megali Skini A, Tholoi A and B, Alexiou mentions a Prepalatial settlement to the south,⁹⁵⁷ and Legarra Herrero one probably 60 to 100 m. northwest of the tholoi;⁹⁵⁸ in Apesokari, the Vigla building is located to the south and on a higher location;⁹⁵⁹ 1 km. from Ayios Kyrillos, an EM settlement is mentioned;⁹⁶⁰ similarly

948 For Korakies Miamou orientation, see Goodison 2018, 280–281, Fig. 1.a; for the yet unpublished Agios Ioannis, observed by the author and based on oral communication with L. Goodison; see also forthcoming updated catalogue of Goodison.

949 Murphy 1998, 27–28.

950 Murphy 1998, 30.

951 Murphy 1998, 31.

952 Xanthoudides 1918, 169.

953 Xanthoudides 1924, 54; 84–85; for Porti see also Vasilakis et al. 2016; Alušík et al. 2019.

954 Marinatos 1930–31, 166–167.

955 Alexiou – Warren 2004, 14; Nowicki identified an early settlement on Lentas Kephali (FN II–EM I) and beneath it, by Anginaropapouro, a later one (EM I–EM II) (Nowicki 2014, 192–93).

956 Tholos close to Final Neolithic fortified acropolis, large EM settlement towards the shore, and MM–LM settlement at the coast, all in bay and coastal region of Livari (Schlager 2018, 251), as summarised from (Schlager et al. 2010, 295–310). See also Papadatos – Sofianou 2012.

957 Alexiou 1967, 483.

958 Legarra Herrero 2014, 195–196.

959 Flouda 2023, 66–67.

960 Legarra Herrero 2014, 180.

1.5 km. from Sopata Kouse, elements of a settlement were seen;⁹⁶¹ at Miamou-Korakies the settlement is 60 m. south of the tholos, overlooking it;⁹⁶² Ayia Triada A may possibly be connected with the settlement of Hagia Triada;⁹⁶³ Moni Odigitria A and B have four possibly associated hamlets dated to EM II and two larger settlements in MM I.⁹⁶⁴ To conclude this by no means exhaustive list, the settlements of Trypiti, Phylakas and Salamias have tholoi to their southeast, north and east respectively.

Almost no settlement was described as being to the east of tholoi;⁹⁶⁵ this correlates with the theory that the tholoi doorways almost always face east or south-east (in the case of those tholoi for which settlements are known). There seems to have been a certain aversion to having a settlement face the tholoi entrances: “(...)whilst the living can see, and oversee, the dwellings of the dead, the dead cannot reciprocate.”⁹⁶⁶ As Branigan shows, the orientation is not precise but varies in all directions, except the east⁹⁶⁷; this might be the essence of what Xanthoudides initially wanted to convey.

Apart from settlements, little is known about other features of “man-made landscapes”, such as pastures and cultivated land, which are untraceable, or shrines and other sites of cultural or ritual activity. Within this unknown landscape, most tholoi are on elevated ground, sometimes on a slight slope that required cutting a terrace, and with a likely proximity to a contemporary settlement (at least as early as MM I). There were originally one to two tholoi per settlement, located to one side of it.⁹⁶⁸ In most known cases, the settlement is further uphill and can look down on the tholoi. There are also examples the other way around, so the Megali Skini tholoi look over their corresponding settlement, and sometimes they are at the same elevation, as at Kamilari, Lassaia,⁹⁶⁹ and Salamias.

The chronology of the tholoi-settlement pairs should, however, be revisited. Of Branigan’s catalogue, some settlements, such as those near Megali Skini, Christos, Koumasa and Kalathiana, seem not to be contemporary with the nearby tholoi, or at least not with its early stages. Xanthoudides’ description of a settlement near Christos might be of a much later refuge settlement, and that near Koumasa has not, to date, shown

961 Chatzi-Vallianou 1979, 384.

962 Alušík et al. 2019, 125, Figs. 8, 14.

963 Legarra Herrero 2014, 177–179.

964 Legarra Herrero 2014, 197–201.

965 Branigan mentions Platanos as an exception (where, at the time, the location of the settlement was only assumed) but this is applicable also in Koumasa, which is erroneously mentioned in Branigan 1998, Table 1 as having the settlement to the south.

966 Branigan 1998, 19.

967 Branigan 1998, Table 1. On the discrepancy in the case of Koumasa and the implication this might have had in the choice of orientation, specifically in the case of Tholos B, see Ayash 2023, 152.

968 Branigan 1970, 9–11.

969 Branigan 1998, 15.

Prepalatial elements.⁹⁷⁰ Furthermore, the settlement north of Kalathiana yielded MM dating.⁹⁷¹ But these old references are still used in the evaluation of the connection of tholoi in their first stages to specific settlements; for example, Murphy's discussion of the choice of location, beside specifying a hilly area not suitable for farming, focuses on vicinity and also visibility from the settlement, using, among other sites, Koumasa and Christos as examples.⁹⁷² Taking the later chronology of these settlements, this relationship would still hold, but only by inverting cause and effect: making the tholoi a reason for choosing the area for settlement.

The absence of evidence of contemporary settlements near a number of tholoi is of course not proof of their absence. In fact, many of the tholoi do show the feature of a nearby settlement, as shown above.⁹⁷³ But it requires a more careful approach.

All of the above has also prompted speculation that tholoi may not be intrinsically tied to specific settlements, and that those settlements without their own tholoi might have utilised the nearby ones established by neighbouring villages.⁹⁷⁴ Another perspective that could offer an explanation for the clustering of settlements around tholoi is the role of the latter as cultural focal points, which would have served successive short-lived settlements.⁹⁷⁵ However, these conjectures predominantly centre on the issue of tholos ownership, striving to establish a one-to-one correspondence between tholoi and settlements to explain their locations. The notion that successive settlements emerged around enduring tholoi – despite its analogy to similar tendencies in other historical epochs – relies on establishing an unequivocal correlation between tholos and settlement.

9.3.2 A Non Settlement-Centric Approach

Hence, while acknowledging the correlation between settlement and tholoi datasets, a pivotal step undertaken here involves taking an approach that prioritises understanding the topography of the tholoi first, disentangling these two phenomena. Indeed, the conjectures presented warrant reconsideration through an analysis of the topographical attributes characterising each tholos separately. While general factors like defensibility, and site-specific criteria, have been pursued for settlements, tholoi may not conform to a uniform explanation, as the distinct sociological contexts and topographical deter-

970 See Footnotes 1123, 1124.

971 Xanthoudides 1924, 84–87.

972 Murphy 1998, 28–30.

973 See Megali Skini, Vorou A, Krasi to name a few.

974 Blackman – Branigan 1977, 70.

975 For a summary of this discussion, see Relaki 2004, 179. This observation could also extend to Livari (see Schlager et al. 2010, 295–310; Papadatos – Sofianou 2012; Schlager 2018, 251).

minants particular to each locale may have given rise to different requirements. At the same time, understanding the special logic – or grammar of location – of this dataset should go beyond just the monocausal settlement association.⁹⁷⁶

Tholoi are built during a very long time period,⁹⁷⁷ which can be split at least into the periods of EM I–IIA and EM III–MM IA (as presented in Chapter 3.1), two periods with social structures sufficiently different that they need to be studied separately.⁹⁷⁸

The social context remains the subject of ongoing debate, whereas the topographical aspect can be argued with greater certainty and would apply to both periods. A common topographical trend seems to be highlighted, allowing for a justification for the position of the tholoi.

The consensus around the topographical characteristics of tholoi can be condensed down into the following criteria: (1) not in a prominent position; (2) often near a settlement, which in many cases dates later than the first phase of the tholoi; (3) with no great visibility and intervisibility with other tholoi; (4) pertaining to those on mountainous terrain, near or along communication paths, (5) and almost always near streams.

For the visibility, as the analysis above showed particularly well for the mountainous tholoi, there is a focus on complementary visibility, meaning that the viewsheds from the tholoi tend to cover the widest possible area while minimising overlap in their respective viewsheds. Each tholos encompasses a specific region, extending beyond its immediate vicinity to include more distant locations in the mountains. This reflects a delicate balance between isolation and maximum coverage. Simultaneously, however, certain tholoi, including Koumasa, diverge from this trend and are situated so that their visibility cover encompasses a significant number of other tholoi, even those situated at a considerable distance. However, the principle of lack of intervisibility could be seen applied to the Koumasa and Platanos viewsheds if, for these, a central role is considered.

The last criterion involves proximity to waterways, a fact often ignored or taken for granted. This is the subject of the analysis in the next section.

9.3.3 Insights from Watershed Analysis

In the early mentions of tholoi, nearby streams were observed but described mostly in a peripheral manner; for example, the Khlios stream near Lebena Papoura⁹⁷⁹ and Kalamitsi near Lebena Yerokampos,⁹⁸⁰ and to the west of Megali Skini, a gorge.⁹⁸¹ By

976 Nixon 2006, 92–96.

977 Relaki 2004, Fig. 9.1.

978 Legarra Herrero 2014, 161.

979 Alexiou – Warren 2004, 14.

980 Alexiou – Warren 2004, 15.

981 Alexiou 1967, 483. This being the Ayiofarango gorge.

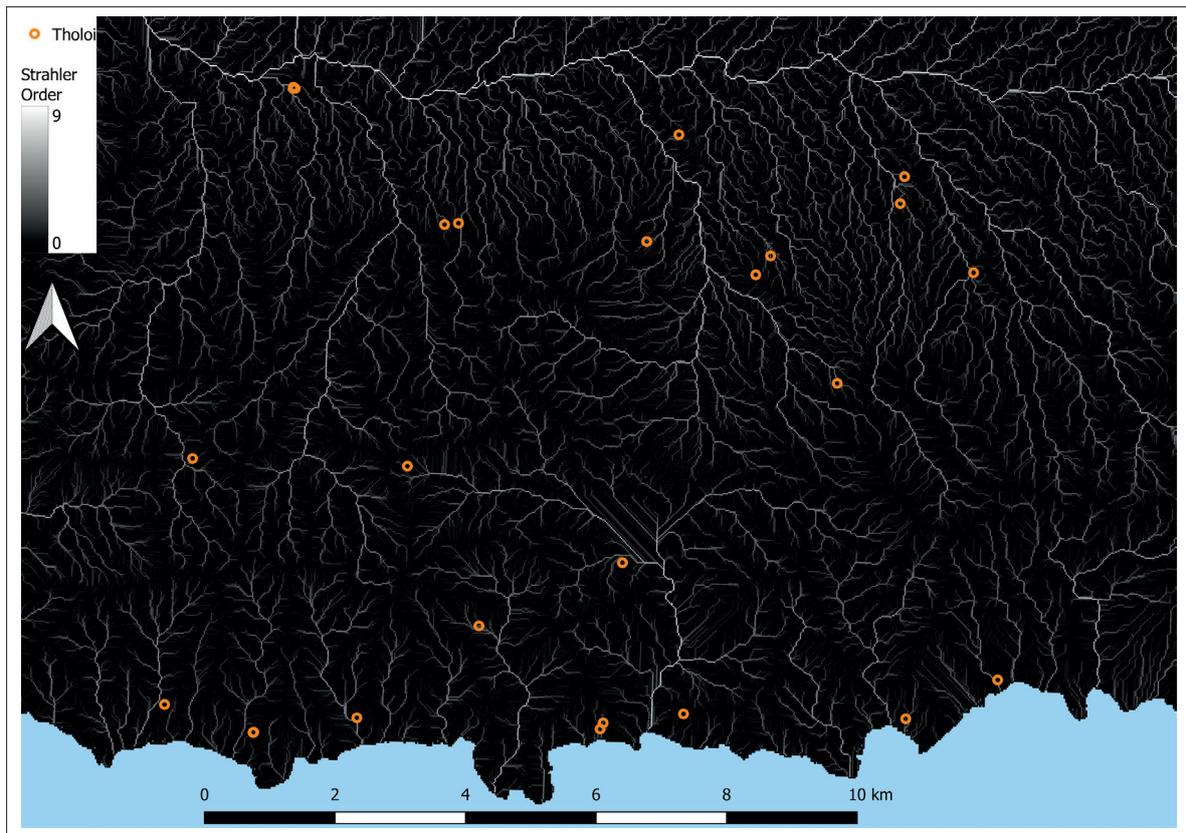


Figure 87: Water drainage channels of central Asterousia and southern Messara; computed on 30m.-DEM.

Drakones, the brook was strong enough to wash away part of the tholos wall,⁹⁸² and as early as 1937 neither tholos was recognisable due to looting and also erosion by the nearby stream.⁹⁸³

It is here that modern methodologies provide an innovative means to shed light on the hitherto underexplored phenomenon of the spatial distribution of EM tholoi in relation to waterways. This is done by studying the water flow accumulation as extracted from the catchment of the valley of Messara, utilising GIS tools on a DEM, as demonstrated above (Chapter 5.5, Figures 53–56). Here, the focus is on the area from the foot of the Asterousia mountains up to the Geropotamos river, with the results illustrated in Figures 87–90.⁹⁸⁴ The results, which have been analysed elsewhere in greater detail,⁹⁸⁵ could not only offer an indication of the position of the tholoi but also act as an input to the question of their relations to nearby settlements.

982 Xanthoudides 1924, 76.

983 See Pendlebury 1932, 86. Belli (1984, 111) could only find traces of stone concentrations.

984 On the methodology and definition of the categorisation per Strahler Order, see Chapter 5.5.

985 Ayash 2025.

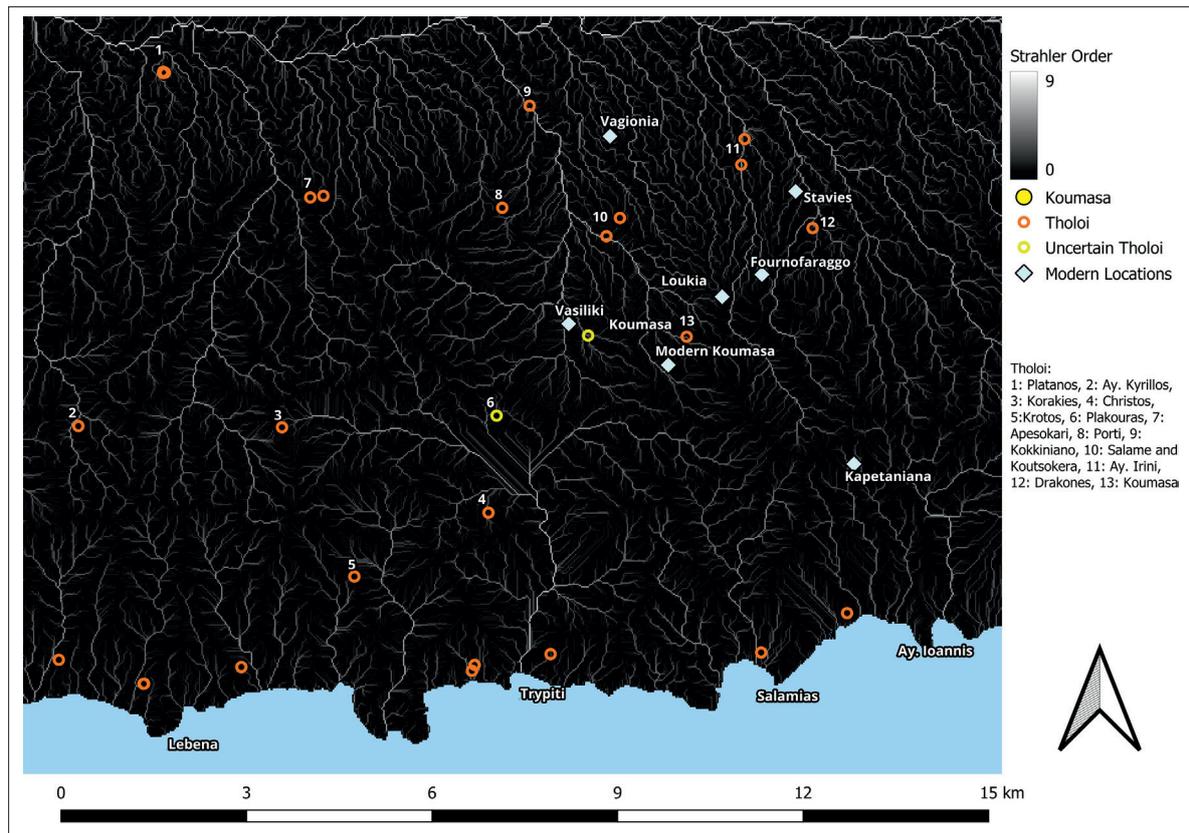


Figure 88: Water drainage channels of central Asterousia and southern Messara; computed on 20m.-DEM.

Most of the areas of interest, including modern locations, can be seen to be in the vicinity of possible streams, which in itself is unsurprising. In the case of the tholoi, however, this correlation is far more pronounced. Of those depicted in the area of interest for this chapter, Porti has a distance of 180 m. from the closest stream of Strahler Order 4 and 570 m. from a stream of Strahler Order 5. Porti also lies 1 km. west of the point at which the Koumasiano stream meets with that from Vassiliki, forming a stream with value 6 in the Strahler Order, on the path on which Kokkiniano is located, at a distance of 50 m. from the stream. Koutsokera is 400 m. from the Koumasiano stream (which is of Strahler Order 6 at that location), and the nearby Salame is almost on it (with a distance of less than 50 m.). Towards the east, Drakones and Ayia Irini (around the modern village of Stavies) are also located near streams of value 5 of the Strahler Order, based on the approximate location given to them.⁹⁸⁶ The two tholoi of Ayia Irini show a distance of less than 50 m., and with distances of 190 m. and 570 m. respectively from a stream of value of 6. Drakones is around 150 m. from a stream of value 5, and less than 40 m. from one of value 4, which should be the one causing its partial destruction, as

⁹⁸⁶ For insights on their approximate location, I am thankful to Déderix and Goodison for their input.

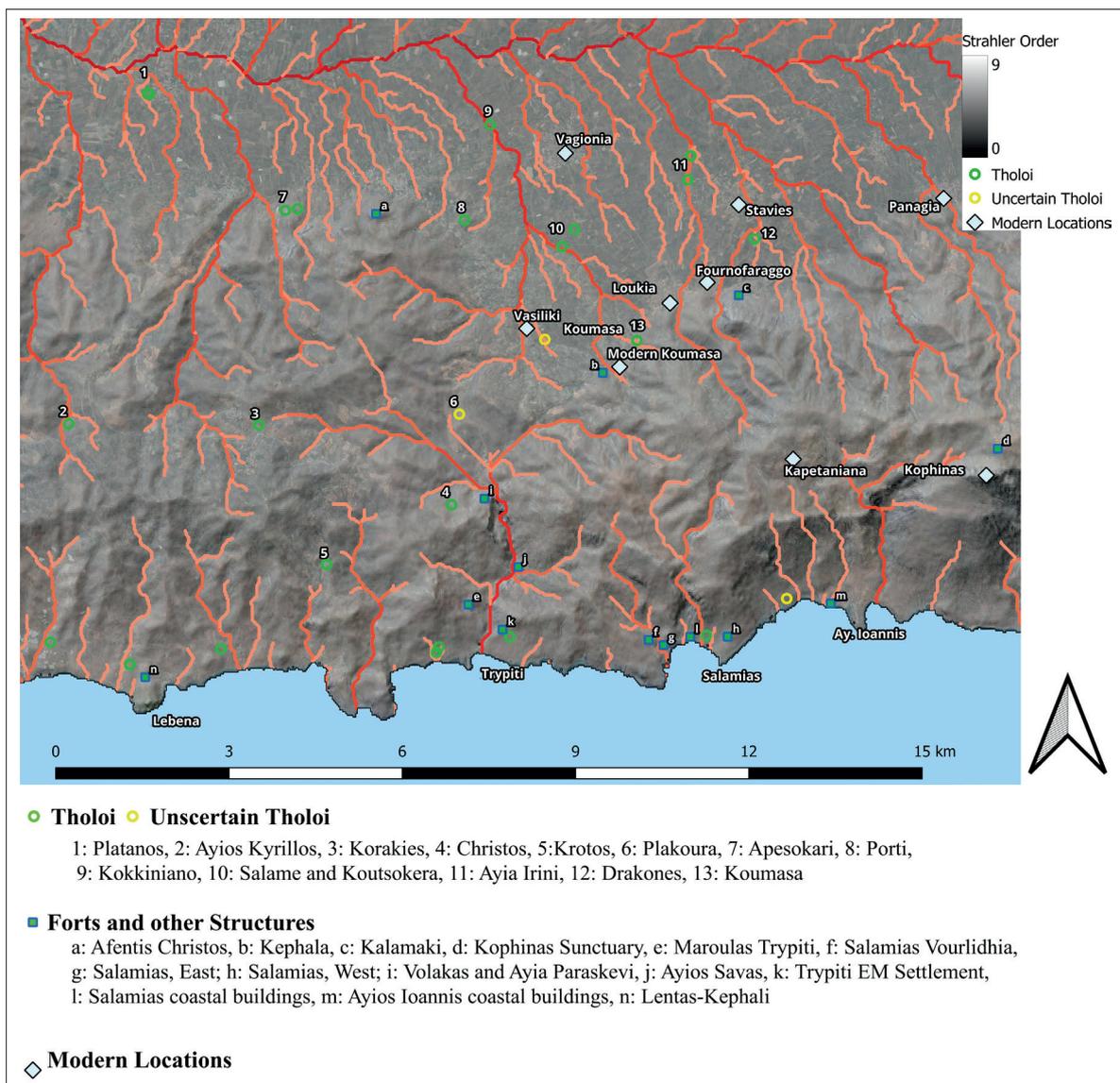


Figure 89: Water drainage channels of values 4 and above as per Strahler Order in the region around Koumasa, including places of interest.

mentioned above.⁹⁸⁷ Koumasa is also in the direct vicinity (less than 50 m.) of a stream classified with Strahler Order 4, and 670 m. from the Koumasiano stream, which at that location has a value of 5 in the Strahler Order.

Moving to the mountainous tholoi, Ayios Kyrillos is at a distance of 100 m. from a stream of Strahler Order 5. Korakies is seen as strategically located with regards to streams, with access to two on the east and west, at 250 m. and 350 m. respectively from streams of order 4, that grow to order 5 at distances of 500 m. and 650 m. from it respectively. From Christos, it is 350 m. to a stream of Strahler Order 4, and 550 m. to a

987 See Footnotes 982 and 983.

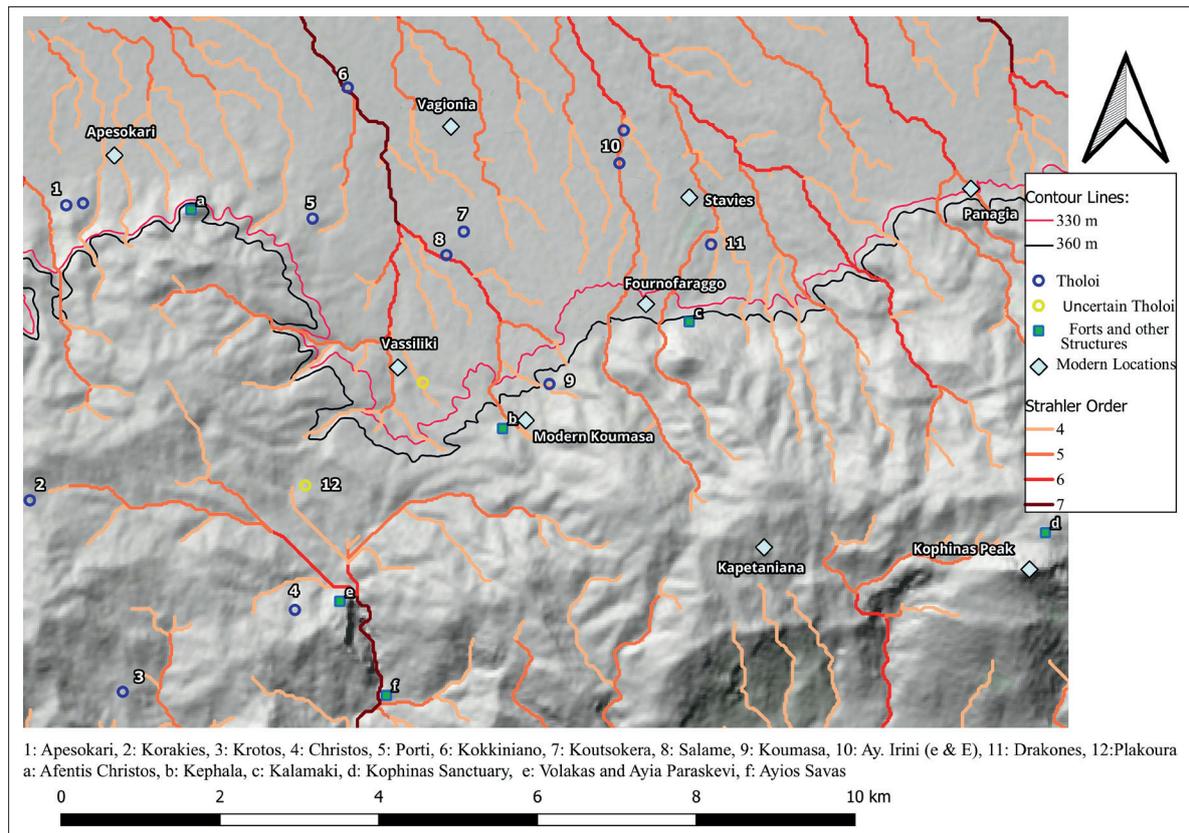


Figure 90: Water drainage channels with places of interest, interpolated with the view of Figure 80.

stream of Strahler Order 5. Krotos is approximately 370 m. from two streams of Strahler Order 4, that grow to Strahler Order 5 at distances of 450 m. and 650 m. from the tholoi.

The mean distance to the closest stream with the minimum of value 4 is 160 m., a distance reduced even further when the coastal tholoi are also considered, as Salamias and Trypiti for example lie very close to their closest stream. If streams with only a minimum value of 5 are considered, the mean distance is 260 m. It should also be noted that streams of Strahler Order 3 could have enough water to make an impact and provide water in the rain seasons, but were not regarded in this computation to stress the proximity to streams of higher orders. To be noted, that due to the small distance from the mountain line and the shore and the high inclination, geographically it is more seldom for streams of Strahler value greater than 4 to appear; nevertheless, the one at Salamias is of value 5. Finally, if the closest distance to the nearest stream for each tholos is measured (accepting stream values of 4 and more), the average distance is 153 m. with a median of just 75 m.

Following this close examination of the Koumasa mesoscale, it is valuable to make a comparison with the pattern all tholoi in the Messara show. The first step is to define the distances from a random point on the map to a stream network of 4 and above, and

then 5 and above. This allows for comparing the distance from the tholoi to streams with that of random point to them to examine the extent of deliberation in the choice of location for the tholoi versus randomness. To approximate a random point, two methodologies for producing a quantity of numbers were tried out, namely a grid of points and utilising the random point generator of QGIS. No significant variations were seen between the two methods, but the number of points was crucial, with 10,000 being sufficient and also computationally possible.⁹⁸⁸

These 10,000 random points were created in the area that the Messara and Asterousia tholoi cover, and then the distances to their closest stream were measured with the add-on “Nearest neighbour join (NNJoin)”. The distance to a stream network for an approximated random point is represented by the mean value, which for streams of Strahler Order 5 and above is 450 m., and for that of Order 4 and above is 242 m.

After determining the random point distance from the streams, the distances for all the tholoi of the Messara and Asterousia, based on their known locations, were measured from streams with values of 4 and above and 5 and above. Tholoi have an average distance of 430 m. to the closest stream of value 5 or above. This value is close but still less than the average of the approximated random point. The average distance to the closest stream of value 4 or above is 167 m. This value is less than two-thirds of the distance of a random point.⁹⁸⁹ The idiosyncrasy that pertains to the coastal tholoi mentioned above was not rendered, which would further minimise the average distance of tholoi to their closest streams. A more analysed discussion of these results has been presented elsewhere.⁹⁹⁰

Another aspect to be considered is the error the liminations of the method introduce. In Figure 91, the Gaussian distribution (bell curve) of the distances from the tholoi, grouped in their respective necropoleis, to streams of Order 4 and above is displayed.

On the left side of the bell-curve, the graph flattens instead of the expected downwards curve, depicted with orange dashed line. This concerns small distances of less than 50 m and is attributed to the pixelation effect, as each pixel measuring 20 or 30 m in the DEM raster influences short movements in an unrealistic manner.

So, although a concentration around streams of Order 5 and above is observed statistically, a clear divergence from the average representing a quantifiable concentration of tholoi is significant for channels of type 4. This emphasises choice rather than chance.

It should furthermore be noted that here proximity to only one stream was followed, ignoring the fact that very often a tholos is located close to more than one. Considering this factor only underlines the correlation of tholoi to waterways. To be noted,

988 For example, the average distance from the streams of Strahler Order 4 and above is 214 m. when calculated for 1,000 random points, and 191 calculated with the grid of 500. The value flattens around 240 m. at 10,000 points and remains generally stable.

989 With the median value being also beneath the mean distance of the tholoi to streams.

990 Ayash 2025.

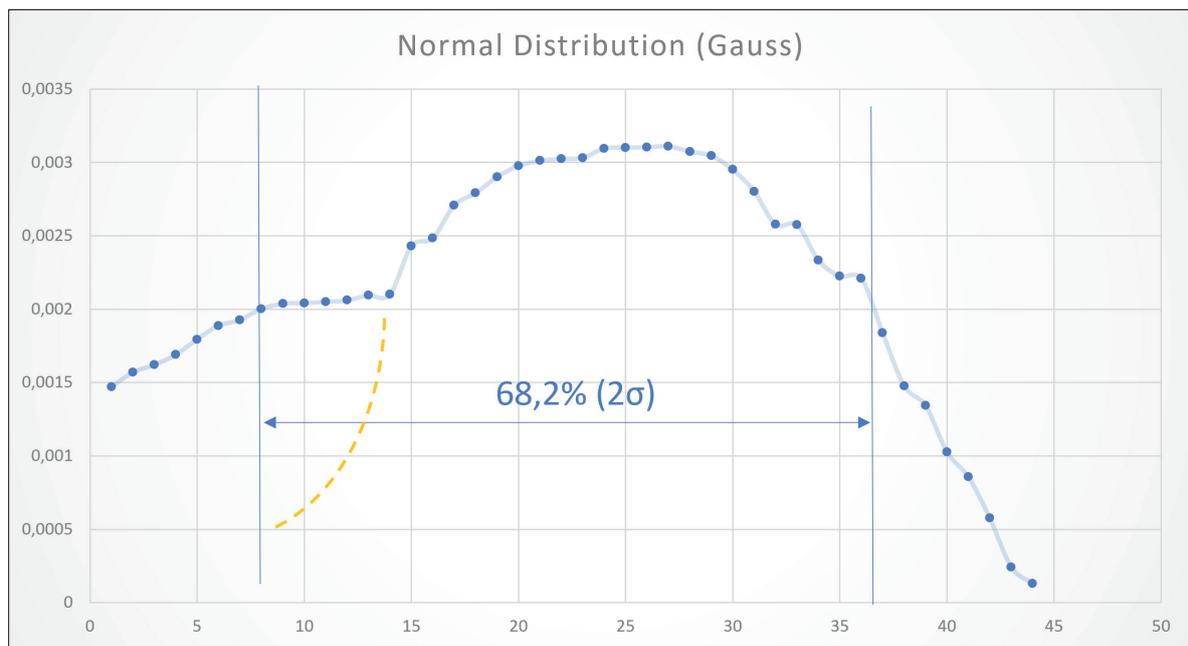


Figure 91: Bell-curve of the distances of Necropoleis to streams of value 4.

that Strahler does not equate to stream strength but as an indicator of it. As noted, especially in areas of high inclination, such as the slope of the southern Asterousia, a Stream of Strahler value 3 could carry more water than one of value 4 in the valley. An analysis of these streams in situ would be a desideratum.

The presence of streams should, therefore, be considered in the selection of tholoi locations. In the cases of Trypiti, Phylakas and Salamias, the respective tholos is closer to a stream than the settlement it belongs to. Approaching the tholoi based on visibility and proximity to major streams would remove the need to seek a corresponding settlement. This relationship could be inverted, suggesting that, at least in some cases, the choice of an optimal tholos position gave the area an air of prestige, while offering the settlement a proximity to waterways. Consequently, later in their period of use, the decision to build a settlement on that spot followed the founding of tholoi. This is most obviously the case with the Trypiti settlement, which was built there after the tholos,⁹⁹¹ and is also applicable for Koumasa.

One possible interpretation of this relation to water is that it corresponds to the need for water in activities related to the tholos. A further point to be considered, within the framework of an archaeology of the senses, is the impact flowing water and its sound would have on the sensory landscape of the tholoi.

991 McEnroe 2010, 24–26.

9.4 Discussion

Above, a decoupling of the assumed relationship between tholoi and settlements was proposed as a starting point for an investigation into the topography of the tholoi. The second step was to reexamine the question of settlements and their relation to the tholoi with a shift in focus: visibility and waterways were highlighted among the criteria that determine the location of tholoi. While the connection to settlements may explain both, the first raises intriguing questions; for example, if the restriction of intervisibility also extends to settlements.

This could be contemplated if isolation were a primary concern. Alternatively, and especially if tholoi are not necessarily connected to a specific settlement, it might be an element specific to the tholoi and the rituals associated with them, to ensure that each tholos has a unique viewing area.

In cases such as Koumasa, a local centrality could be postulated. The fact that seemingly isolated tholoi, such as Korakies and Marathokephalo, would have fires lit there that were visible from Koumasa (even if the tholoi themselves, and the people present, were not discernible), would render the latter an overseer. The chronology of Korakies in MM I is key here, as it, therefore, falls into a period more open to visibility, as discussed above.⁹⁹² This would link the observers of these activities in various regions near and far in a “network of relevance”.⁹⁹³ At the same time, they keep their isolation from other tholoi. Again, Platanos and Koumasa are only just mutually invisible. This could allude to a purposeful choice of location, or at least implies an awareness thereof, and emphasises the uniqueness of each of these two primary centres of tholoi as they grew into what Murphy has dubbed as sacral focal points.⁹⁹⁴

As per the definition of Koumasa’s position within the Messara, revisiting the distribution of the main tholoi clusters offers a nuanced view, based on visibility and focal network analysis. As discussed above (see Chapter 3.1.2), the EM II period brought stability and growth, especially in the Messara, where many of the known sites have more than one tholos and control the better part of the Messara, with a certain distance between each site to allow for their growth.⁹⁹⁵ The presence of hamlets is noted though, at least in the west of the Messara.⁹⁹⁶

The fundamental association of tholos location in relation to streams adds a further dimension to the initial choice of location. But what prompts the evolution of only some of the centres, such as Koumasa? Various socioeconomic factors can denote which

992 See Footnotes 930, 1000.

993 Relaki 2004, 173.

994 Murphy 1998.

995 Sbonias 1999, 28.

996 As part of the survey of Watrous 1994, 705.

cemetery would endure and become bigger.⁹⁹⁷ The growth that Koumasa experienced, which seems to coincide with the activity in Korakies and Christos, locations that are demonstrably connected with it, could therefore be seen as disentangled from the initial choice of location for the tholoi in that region, but nonetheless spurred on by it. It could be perceived in terms of the increased public use that is observable for the tholoi during EM III–MM I,⁹⁹⁸ not only in terms of material but also of visibility and connectivity.

Although new sites with tholos tombs appear in EM III, the importance of the sites which already had two or three tholoi seems to increase.⁹⁹⁹ It is noted that very seldom does a second tholos appear in the same cemetery complex of one of the new sites. For locations established at later periods, Nixon observes the rising importance of viewing earlier places of significance, rather than being placed upon them.¹⁰⁰⁰ This would include the tholoi of Christos and Korakies, with visibility access to the gorge below in the case of the former and to a range including the region of Koumasa and the Kophinas peak in the case of the latter. The continuous use of Koumasa in the LM period also supports the theory that visibility or access to the old graveyards became more important in this period.¹⁰⁰¹ This could explain cases such as Koumasa, where the viewing, especially from the ‘sanctuary’, seems to have been deliberately encouraged by the architecture, as was presented in Chapters 7 and 8.

Following the examination of the mesoscale of Koumasa in this chapter, distinguished by an arbitrary twofold classification of mountain and valley, a portrait emerges of a central hub with strategic potential in overseeing movement between the valley, the western-central Asterousia, and the central Asterousia. The latter expanse encompasses the harbour regions of Ayios Ioannis, Salamias and Trypiti. These were self-sustaining settlements, but with connections enabling the import of products.¹⁰⁰² The expanse of connectivity and its strengthening, at least in the Protopalatial period, would naturally connect the shore with pre-existing systems of the Messara, established as Koumasa expanded. A detailed exploration of these regions and the pathways leading to them will be expounded upon in chapter 11, which is devoted to the exploration of the mountainous terrain of central Asterousia. Although this concerns the mesoscale, it will be analysed alongside a discussion of the mountains, with which it is thematically linked.

997 Murphy 1998, 32–39; Sbonias 1999.

998 Legarra Herrero 2014, 163.

999 Legarra Herrero 2014, 73–74.

1000 Nixon 2009, 272.

1001 Nixon 2009, 275.

1002 McEnroe 2010, 24.

10 The Regional Role of Koumasa: The Macroscale

Before delving further into the exploration of the Asterousia in Part V, this chapter brings to a close the *zoomed-out* perspective adopted in this study, characterised by an examination from the micro- to the meso- and macroscale. While the macroscale is not within the primary focus of this work, its significance in shaping the broader understanding of Koumasa cannot be overlooked. Internal developments, including urbanisation¹⁰⁰³ and specific archaeological finds at the site, are influenced by broader trends extending across the entire island of Crete. Additionally, the study of Koumasa's role within the larger context of the Cretan environment is essential for a comprehensive understanding, as previously discussed in Chapter 2 regarding the chronological sequence.

10.1 Characteristics of a Settlement with Regional Role: Approaching the Macroscale

The political geographies of Crete constitute a central topic within Aegean archaeology.¹⁰⁰⁴ One of the key dichotomies involves the definition of between palatial centres and local elites, with the implications of Koumasa's location being explored in Chapter 3. GIS analyses have shown Koumasa not being on the main axes of the Messara, which was verified in the analysis above.¹⁰⁰⁵ The unanswered question is to which cultural environment Koumasa is closest. The flow accumulation analysis (Chapter 5.3.2; Figure 36) shows mainly three axes, the one leading the Phaistos (following the Geroptamos path) continuing to Amari valley, the second going northwards, and the third (following to some extent the Anapodaris) leading to the Pediada, with a node near Dhamantri, and from there northwards, offering a link with areas such as Galatas and eventually Archanes and towards the greater Knossos area. The geography would imply the possibility of influence from the Pediada area, as well as from the Phaistos.

1003 The question of the processes of urbanisation benefits from approaching a larger geographical region rather solely as an ad hoc development (Buell 2015).

1004 E.g. Cherry 1986, 20–26, Fig. 2.2; Renfrew 1986; Relaki 2004; Bevan 2010, 31–37; Schoep 2010, 116–117; Rethemiotakis – Christakis 2011a, 213–215; Knappett 2012, 389; Cadogan 2022; Driessen 2022.

1005 See Figure 42 in Chapter 5.3.3 and also Footnote 432.

The least-cost-path analysis conducted for Phaistos indicates that accessing Monastiraki from Phaistos incurs a higher cost compared to accessing Koumasa from Phaistos.¹⁰⁰⁶ Interestingly, the cost of accessing the Kophinas sanctuary is similar to the cost of accessing Monastiraki.¹⁰⁰⁷ Much has been discussed on the dependence of Monastiraki and Apodhoulou on Phaistos.¹⁰⁰⁸ The similarity of materials found at Koumasa, Monastiraki, and Apodhoulou supports the idea that these sites may belong to the same sphere of influence as Phaistos.¹⁰⁰⁹ Furthermore, the topographical layout of the site, with the elevated central rock, which seems to receive different treatment, and the general capacity of the site to overlook a wider area, would act as further similarity of the two locations.

The Inclination of the bibliography towards this connection is, as discussed in Chapter 3, partially influenced by ascribing Koumasa to the Phaistos sphere of influence. But such a monosemantic dependency – as a Phaistian outpost – does not have to be exclusive when the closeness to other regions should also be taken into consideration.

As mentioned above, the pottery of Koumasa shows a similarity with that from Skinias, for which a connection to production with local characteristics, but with connections to the Galatas area from the one side and Pediada and beyond is assumed.¹⁰¹⁰ The distance from Phaistos to Monastiraki is higher than that of the distance between Koumasa and Skinias by 16%, and almost double the distance of Phaistos to Koumasa.¹⁰¹¹ Taking the Neopalatial Dhamantri complex as a reference, which is considered to be a major palatial centre,¹⁰¹² the distances to it from Koumasa indicate it as the closest palatial centre.¹⁰¹³ This centre is, in turn, seen as pivotal for its connection between Galatas to the north and the less known east Messara, in which both Skinias and Koumasa could be seen as part thereof.¹⁰¹⁴

The reasons for allowing Koumasa to grow are identified with its relation to the mountainous region, as sketched in Chapter 9 and further elaborated on in Chapter 11.

1006 See Figure 25. The path from Phaistos to Monastiraki is 1.6 times more costly than the path to Koumasa based on the Tobler function, and 1.4 based on the Ox-Cart function.

1007 Monastiraki is 2% more difficult to access based on the Tobler.

1008 See Footnote 182 and discussion on page 44f.

1009 For example, the micromorphological analysis of plaster (see Footnote 761) but also the technique, with a black line separating the white from the red zone (compare the plaster piece from Monastiraki: Kanta 2006, Tab. 13.b with Panagiotopoulos 2018, Fig. 13).

1010 Mandalaki 2011, 381; 391; Knappett 2011, 393.

1011 Calculation was made with the Tobler's Function.

1012 Vasilakis 2017, 80–81, Figs. 41–43.

1013 In the least-cost-path analysis towards eight selected destinations, Dhamantri is 4th in terms of least-cost to access with the Tobler function; 5th with the Ox-cart; 2nd with the Bell-Lock; and 1st with the exponential. See Table 1 and discussion in Chapter 5.2. In the isochronous lines of Figures 34 and 35, the time distance to Dhamantri and Phaistos are comparable, with Dhamantri being slightly closer.

1014 Knappett 2011, 393–396.

This peripheral location would allow for assumption beyond direct dependencies, which would allow for input from more than one cultural and social circle. A homogeneity of the region of Asterousia, as has been argued based on the analysis of seals,¹⁰¹⁵ would increase the role of centres in this periphery.

Following Knappett's definition regarding the localisation of sites, they should not be viewed in isolation but rather as integral parts of larger communities devoted to agricultural exploitation and surplus storage. Many of these sites, like Myrtos on the southern coast, evolved quite naturally from earlier settlements and were an essential part of the Neopalatial economic system.¹⁰¹⁶ A similar thought is pondered for areas such as Skinias, for which no significant Prepalatial phase exists.¹⁰¹⁷ However, this is not the case in Koumasa, where a transition to a Knossian control seems possible.

The Neopalatial building in Pyrgos (Pyrgos 4) is situated on the top of the hill, with viewing possibilities up the river valley to the Lasithi mountain.¹⁰¹⁸ As for the Protopalatial phase, a similarity with Gournia is observed so that Knappett involves it with the theory of the birth of a Protopalatial state – in this case the assumed one for Mallia.¹⁰¹⁹ Similarly, the internal topography with an elevated hill in the middle of the settlement for which a special meaning is interpreted is seen in the case of Monastiraki. It is tempting to seek a parallel of the development and layout of the Koumasa settlement, better expressed at this point as the Koumasa complex, in relation to buildings of the palatial type. Although the grid could be seen as comparable with that of Gournia, the rooms' layout and the grid's utilisation pose similarities with other building complexes, such as Pyrgos IV and Petras.¹⁰²⁰

In the Neopalatial period, at least in the western Messara, there seems to be a decrease in the number of settlements, as well as a reduction in their size.¹⁰²¹ For Koumasa to receive the elaborate treatment indicates that its role, already established in the previous periods, and in this work identified as the exclusivity to a segment of the southern shore and the central part of the mountain still remains, with the Kophinas peak sanctuary adding to the relevancy of its position.

Some of the finds in Koumasa were discussed in Chapter 7.3. Regarding the pottery, for example, given the lack of examples from the area of the Asterousia, similarities and influences have been sought with the Phaistos area. However, also towards the east, the similarities of the LM I main phase of Koumasa with the LM IB Skinias building at the

1015 Pini argues for a local seal workshop in the Asterousia and a local tradition based on the distribution of special seal types (Pini 1990, 126).

1016 Cadogan 1978; Niemeier 1997, 15–17; MacGillivray 1997, 23–25; Knappett 1999.

1017 Knappett 2011, 393–396.

1018 Cadogan 1978, 77–82, Fig. 21.

1019 Knappett 1999, 629–667, Fig. 4.

1020 Niemeier 1997.

1021 Watrous et al. 2004, 291.

easternmost outskirts of the Messara are of great interest. The excavation at Skinias, Kolokythi, near the village of Lagouta, henceforth Skinias, is located centrally in the Messara, at a distance of 2 km. to the Anapodaris stream. This location would make it topographically similar to Dhamantri. Furthermore, Skinias, as Koumasa, does not lie on the main network of the island, specifically the road from Knossos to Phaistos, but rather, like Koumasa, is seen to be part of the connectivity networks towards the south and the sea coast, in this case alongside the Anapodaris stream to Tsoutsouros.

The main building excavated produced 900 vases of which 650 are conical cups.¹⁰²² The similarity of many of the forms as well as clay quality to those from Koumasa (including cooking jars, alabastron, and undecorated conical cups)¹⁰²³ raise a need for a closer investigation and the possible anchoring of the LM IB dating for the main phase of Koumasa, pending the pottery analysis.

The similarities of the motives from Galatas and Skinias led to assumptions of a local tradition; a centralised production somewhere in the Pediada area providing Knossos rather than the opposite.¹⁰²⁴ The similarity seen in the Koumasa production would allude either to an integration of Koumasa in this network or to the need to expand the area of common use of Pottery in central-southern Crete.

Attempting to incorporate these finds into an accepted narrative of regional development, the interpretation hovers between two contrasting perspectives that can be summarised as the assimilation – integration dipole. On the one hand, there is a tempting inclination to perceive Koumasa as part of the periphery of the Phaistian and then Knossian spheres of influence, serving as the eastern counterpart to Monastiraki and Apodhoulou – to focus on the Protopalatial period. Conversely, there is the possibility of emphasising the role of local elites, designating their habitat as Phaistian.¹⁰²⁵ This interpretation suggests that the efforts to integrate Koumasa's architecture into a Phaistian style reflect an assertion of regional importance. Rather than viewing this development as a form of assimilation or external control, it could be seen as an endeavour to assert autonomy or self-identification – an effort of integration, already from the Protopalatial period.¹⁰²⁶ The somewhat forced implementation of certain palatial elements into confined spaces, such as the disproportionately large column base in a relatively small 'sanctuary' area or the grandiose retaining wall for magazine facilities, may allude to this dynamic. However, an opposing argument could underscore the imperative of security, as these magazine facilities are not easily accessible or visible from the valley below, and they manage to create storage facilities in a well-defended location.

1022 Mandalaki 1998; 2011, 380.

1023 Mandalaki 1998; 2011, 387; Figs. 18, 22, 32.

1024 Rethemiotakis – Christakis 2011a, 212–218; Rethemiotakis – Christakis 2011b, 225–227.

1025 On a summary of the discussion of territories, see Driessen 2022, 6–8, Fig. 3.

1026 See the schematic territorial demarcations in Cherry 1986, Fig 2.2; and discussion in Cherry 1986, 20–21. On the influence of this model in subsequent studies, as well as modern perception, see Driessen 2022, Fig. 3 and analysis on pages 69ff. See also Schoep 2010, 116–117.

These two seemingly extreme cases can be effectively reconciled within a qualitative evaluation and understanding of state formation. This perspective views state formation as a dynamic process rather than adhering to the traditional understanding of a state as static lines on maps. It incorporates multiple factors, accommodating local trajectories within a unifying whole. The subsequent chapter delves into the concept of state formation, approaching it from a less traditional standpoint.

10.2 A Theoretical Model for State Formation

In the realm of Aegean archaeology, macroscopic studies of the societies and their complexity have been extensively researched, interpreting the finds within the context of sociological and anthropological models.

The role of locations perceived to be marginal is traditionally seen through the lens of the poles of the periphery-centre, in which the periphery is the passive recipient of central trends. As the archaeological record primarily offers elements of the prevalent regional power, researchers have overemphasised the dynamics of change in a peripheral region as external, generalising the elements of material remains of art and typology to a holistic influence scheme extending to social and political transformational processes, downplaying the internal developments.¹⁰²⁷

The marginal regions are defined by the natural environment of their settlement spaces for which ad hoc strategies were developed. Hence, the effort to define more than one ‘marginality’.¹⁰²⁸ In this view, the analysis of local development is seen primarily as a local phenomenon and less as a passive recipient of external input. Using a term from the discipline of biology, it is seen as an ecological niche rather than their simplifying categorisation as satellite societies of a prevalent centre.¹⁰²⁹ These methods offer an alternative to the traditional analyses done primarily through the mod of directionality, seen to expand influence from the more advanced centre, seen as the core, to less complex polities.¹⁰³⁰

The analyses of peripheral regions are often transferred in the discussions of the economic growth of complex societies, which is especially crucial for societies for which no written evidence is available. The large-scale interregional exchange networks are

1027 Stein 2002, 903.

1028 In (Bebermeier et al. 2016) marginality is analysed as spatial, economic, ecological and social, and proceeds of analysing this concept in areas traditionally seen as remote in their corresponding disciplines (Petra, as per the Graeco-Roman world; the Kushite Musawarat as per the Egyptian influence; and Conana as per the Hittite influence).

1029 Bebermeier et al. 2016, 2–5, 7.

1030 Stein 2002, 904–905.

primarily perceived as networks of several competing polities, a view that is bounded by the directional model.¹⁰³¹

Another angle of looking into the characteristics of a given culture, especially the economic one, is viewing it as subject to the second rule of thermodynamics. This theoretical model can be used to lift some of the constraints in looking for a political structure to assign Koumasa into. This methodological framework is not a new tendency in the study of cultures, but it is hardly mentioned in Aegean archaeology.¹⁰³² The methodology explicitly developed the study of their collapse¹⁰³³ but extends to a holistic perception of cultures.¹⁰³⁴ The driving power of formation and dissolution of any state can be seen as in any other closed system, as a battle against entropy.¹⁰³⁵ In this perspective, we view a state as any other self-sustained system in nature, be it biological or physical. This avoids some of the weaknesses of the established “life cycle” approach to cultures.¹⁰³⁶

The use of the word ‘entropy’ as a summation of the second law of thermodynamics has proliferated steadily outside the department of physics, such as the famous Shannon’s entropy law in informatics, but also to theoretical disciplines such as in arts, social anthropology, or even in theology, where eschatological principles are thought to be enforced by the finality that seems to be expressed by the principle of entropy. One downside to the mainstream use of the term is the misunderstanding of its true meaning, rendering it from a fundamental law of the universe to merely a metaphor or figure of speech. The Second Law, which the philosopher Charles Sanders Peirce has argued to be amongst the finest achievements in science, expresses much meaning in an eloquent and seemingly abstract way.¹⁰³⁷ This made the idea accessible and is exactly what made it appealing in the first place in academic discourse, often focusing on it as a quip rather than appreciating the fundamentality of it.¹⁰³⁸

1031 Hopkins – Wallerstein 1982.

1032 One such mention in Knappett 2012, 389–390.

1033 Famous targets for such studies can be assigned to two types; the first is that of the historic impactful, or perceived abrupt or final collapse, such as that of the Roman Empire, Mayan culture. The second includes the ones that literary fit the concept of isolated ecosystem: The Easter Island culture, and the Greenland Viking settlements.

1034 For a view of the holistic study of human cultures see Leslie 2005.

1035 Tainter 1988; 2011; Diamond 2005.

1036 Referencing the tripartite division of the life span of cultures which traditionally was applied to many civilisations post facto and introduced as a given form in Crete as pre, middle and late Minoan. The negative point of this tripartite division of the life span of cultures views is the closed cycles principle, as well as the isolation in which cultures are viewed as a monolithic entity, to be preserved, mature and ultimately perish. Whereas the energy preservation models rely less on the vague concept of cultural identity that implies ethnogenesis and more on the pragmatic nature of interconnections and economic and social entanglements.

1037 The quote is from the philosopher Charles Sanders Peirce, who was referring to the statistical interpretation of Boltzmann’s entropy law (Reynolds 1996, 413).

1038 On the various often erroneous uses of the word entropy, see Davis 2011, 121.

Bearing these methodological pits in mind, the focus will be on the evolution of some ideas of entropy in economic systems and entropy in society.¹⁰³⁹

First, a brief introduction to Entropy is in order, although it is clear that any short definitions presented here are only indicative and cannot be assumed to even approach the proper definitions that would require much elaboration, as one can see presented in specialised literature.¹⁰⁴⁰ Despite the first law's stipulation that the total energy of the universe is stable (Law of conservation of energy), the amount of useful energy is diminishing, a fact that can be seen as a drive to homogeneity or equilibrium. This causes a defined energy course in any process development, defining thus the arrow of time. The effect is that heat cannot be transferred spontaneously from the colder to the warmer body, directly or indirectly, as an equilibrium is the system's desired state. Similarly, a broken glass or a shuffled deck of cards will not return naturally to their original, sorted state. This tendency towards an equilibrium means less order. Enclaves of lower entropy are possible, such as order and symmetry in a garden or in a built structure). Still, it needs external energy in the form of labour to preserve it and, if left alone, will deform towards a more homogeneous forest (in the case of the garden) or a rabble of stones (in the case of the structure). A defined culture is then here seen as a closed system with cultural developments resembling an external energy source, impacting the closed system.

The application of this mechanistic approach to observing civilisations takes into consideration the vital external energy required to sustain the closed system of a civilisation, with such a source often being identified in the political economy. Soddy and Georgescu-Roegen discussed the second law of thermodynamics in relation to the economy of a society in the first half of the 20th century.¹⁰⁴¹ Soddy's view that real wealth, as well as any closed system, is subject to the second law of thermodynamics has gained traction in the last decades and has been proliferated in the bibliography mainly stemming from – or in reference to – Tainter's analysis of the collapse of empires and complex state formations.¹⁰⁴² In these analyses, it is observed that the constant rise of complexity adds benefits to a society at a gradually slower rate, faster at the beginning and ever slower as the complexity rises until a turning point, after which the rise of complexity diminishes the benefits and even becomes harmful. In other words, the exploitation of resources, production, and the growing network – comprising middlemen and bureaucracy facilitating the flow – has a strongly nonlinear relationship with the complexity of the system. In a diagram with complexity in the y-axis and benefits in

1039 Trigger 1990.

1040 As an introductory example, chapter 24 in Shankar 2019, 411–441.

1041 Soddy, a Nobel prize winner for chemistry, applied the way of thinking from his field to the social problems (Soddy 1926). His book was mostly discarded at that time (Avery 2012, 167–168).

1042 Tainter 1988 used ca. 15 case studies from different areas and time periods to illustrate his thoughts, such as the Roman and the Maya empires, but with the background being applicable in any large-scale organised state.

the x-axis, the simple model is an inverted U shape.¹⁰⁴³ This complexity is assumed to be proportional to the size of the bureaucracy, hence applicable to smaller or bigger structures. After the turning begins, the decision-makers try to address the crisis by measures that increase complexity even more, creating a self-enhancing loop.¹⁰⁴⁴ So, the counterintuitive phenomenon appears, that overexploitation of the resources leads to collapse¹⁰⁴⁵ even if said resources are available or renewable, given that the rate of the rise of the internal complexity is not balanced.¹⁰⁴⁶ Another crucial factor indicated for population growth is that, when it is not accompanied by corresponding hierarchical and bureaucratic structures, it may trigger a collapse.

These views of the life cycles of greater human structures has a long history that began with observations regarding the collapse of states with literally hundreds of causes, that range from case specific to more holistic approaches.¹⁰⁴⁷ Seeing from the perspective of thermodynamics, where the energy accumulated corresponds to the rise of bureaucracy, the need of army and infrastructures, and the rise of tensions within classes or local elites in the growing state, has the benefit of viewing a state as yet another system, beside the concept of a singular living organism, where the primary forces are reduced to energy accumulation versus the ever existing entropy, or force for simplification. Based on this, the following analysis can be pursued.

Looking back at the “start” of certain hierarchical cultural groups, seen here as relaying order within a closed system, entropy falls, and thus, energy must be spent in compliance with the second rule of thermodynamics. In other words, a formation of a concentrated hierarchy is diminishing the entropy of the system. This energy infusion in the case of a political institution is cost in material and manpower. In other words, political structures are costly and although the formation of one is seen as relatively easy, as it is profitable in the short term, a long term sustainable political structure needs not only a stable environment, i.e. economy, but to find expansions to replenish the initial energy influx needed to sustain the more complex system.¹⁰⁴⁸ As the second

1043 Tainter 1988, Fig. 19.

1044 In Tainter’s words, the “diminishing effects of complexity causing the problem-solving strategy to yield declining marginal return” (Tainter 1988, Fig. 118–120). On this point, a historical example used was that of the Diocletian reforms, which, by enhancing the bureaucratic apparatus and further restrictions left the empire not able to further adaptation after the 4th century. It is to be noted here that some elements of the analysis are following a more traditionalist and not necessarily aligned with modern views of the Late Roman history (Tainter 2011, 92–93).

1045 With state collapse, the definition preferred is that of a drastic decrease in human population size accompanied by the reduction of political and social complexity, and for an extended time. This leads naturally to economic downsize in regions where settlements may be abandoned and/or less secure. (See Diamond 2005).

1046 Tainter 1988, 121; Bard et al. 2019, 13.

1047 In the Western literature this quest starts with the efforts to explain the causes of the fall of the Roman Empire (Gibbon’s Rise and Fall of the Roman Empire) and more recently (Demandt 1984) on the same issue where numerous causes are addressed. These were readdressed by for a global range (See also Tainter 2008).

1048 Tainter 1988, 22–37.

rule of thermodynamics dictates, lack of doing so will lead to a decline and simplification of the accumulated energy to its building parts, i.e., dissolution of the union, if we are referring to a union of isolated settlements. Similarly, the gears of the bigger system, such as the new connections, elite buildings and ceremonies, central authority and bureaucracy are all energy-costly, the preservation of which is dependent on the political economy, as a mechanism of constant provision of the system with energy, without which said system will collapse.¹⁰⁴⁹

A manifestation of such energy accumulation would be the emergence of cities and elite symbolism, expressed in costly houses, clothes and habits which must not only be of a collecting nature but also include donations.¹⁰⁵⁰ Expression of this kind of affluence as such an expression of wealth accumulation can also be in architectural design and it is this type that will concern us with the Protopalatial Koumasa, such as in the area of the 'sanctuary', where the elites seem to look inland towards Phaistos for inspiration in materiality.¹⁰⁵¹ For the influx of income, an establishment of trade routes seems to have been one answer, as seen from the Messara exports in other places on Crete, as well as the southern Aegean.¹⁰⁵² Also, connection with foreign lands is proposed as securing the inflow of energy in the form of goods and trade.¹⁰⁵³ Messara Pottery, for example, was found in Knossos, Malia and Myrtos Pyrgos.¹⁰⁵⁴ The port of Kommos seems to serve in the MM IB and MM IIB for at least the regional exchange.¹⁰⁵⁵

An interesting question is if this applies to the other Messara-Asterousia Harbours, in the southern part of Asterousia. With the shepherds' presence seemingly starting at the end of the neolithic, Branigan argues for an egalitarian society EM II, until the expansion starts.¹⁰⁵⁶ To understand this expansion one can turn to sociological studies of civilisations that share this characteristic, in the absence of strong property rights, wealth distribution is governed by bargaining between clans or communities.

1049 Use of the term political economy, has been introduced to Aegean archaeology, as it was used by Knappett in the description of the Protopalatial states (Knappett 2012, 2012) noting that this analogy could be considered as too mechanistic. Viewing states and formations as closed systems, applying basic rules of entropy to understand and explain their existence at a theoretical level, should not be a tabu in the Minoan archaeology. Humanities as portrayed above have long used it as it provides a solid scientific framework for a holistic interpretation of a given entity, that although not perfect, it has some benefits over the traditional tripartite life span of civilisations. (Here Platon's palatial system of chronology is seen rather as an effort to refine the periodisation of Evans).

1050 If one thinks of the Homeric leader prototype one of his main characteristics is gift giving which is competitive in nature towards equals and expected towards faithful supplicants (Quiller 1981, 113–117).

1051 See Footnote 1066.

1052 Knappett 2012, 390.

1053 For connections of the Messara to the Near East in the Protopalatial period, see Van de Moortel 2007; for aspects concerning administration and sealings, see Weingarten 1994.

1054 A considerable proportion of the MM II Kamares Ware consumed at Knossos was imported from the Messara (Day – Wilson 1998).

1055 Knappett 2012, 390.

1056 Branigan 1985, 61.

Bargaining power is influenced by the threat of waging war, and thus benefit from population growth that in the long run puts pressure on the small clan that will need to expand or transform.¹⁰⁵⁷ These results, as mentioned above, are not proportionate on the wealth itself, i.e. not based not on the value of the equation of wealth, but its first and second derivatives.

10.3 Discussion

This analysis shows that a site's trajectory between spheres of influence and belonging to a certain *state*, or better put, dependency network, constitutes an interplay between the local needs and events on the site's macroscale.

The impact of the ordered structure expanded from Phaistos on some regions of the central Asterousia involves material prosperity that used the Phaistian examples as its cultural archetype and a general *palatial* one in the Neopalatial period (see discussions in Chapter 7). One of the reasons such affluence was to be expressed in Koumasa, is the nodal function of this location within the trade networks; too remote to be just a strategic location. A comparison could be made with the role of Koumasa in the heyday of the Hellenistic and early Roman Gortyn (see Chapter 2.5.1). Judging from the finds in Koumasa, which include sherds of pottery makes Koumasa a typical satellite region of Gortyn, which is much closer and, in terms of growth, was at its peak much bigger and thus more impactful on Koumasa as Phaistos ever was.

For the Protopalatial *state* (or dependency network), the disruption of the connection lines would lead to a system collapse. MacGillivrey proposes the turbulence in Egypt and the Middle East as the factor for the decline.¹⁰⁵⁸ This specific notion would not affect the central Asterousia only by proxy but also directly in its nodal function. The fluctuation brought upon the broader Phaistos region in the turn of MM III to LM I is summed up in the survey results by Watrous, which stated that the Neopalatial period there saw a slight decline in the number of settlements and cemetery sites and also for those which continued, in almost all cases, there was a reduction in settlement size.¹⁰⁵⁹ Despite this apparent drop in population, agricultural activity expanded, a fact that may correlate with political reasons rather than demographics, as the demand of the elite for surplus was the motivating factor for the expansion of the agricultural farm areas.¹⁰⁶⁰

1057 de la Croix – Dottori 2008, 53–55.

1058 The time around ca. 1750 BC marked turbulent periods in the East: In Egypt, there was a transition between the 12th–13th Dynasty, and by the Euphrates River, Mari was destroyed by Hammurabi. Those events either coincide with the end of the Protopalatial or before it. In either case these events could be seen to cause destruction of commercial links with these areas, linking them with the collapse of the first palaces, or shortly before (Knappett 2012, 392).

1059 Watrous et al. 2004, 291.

1060 Adams 2017, 119–120; Watrous et al. 2004, 297.

This image seems to fit the greater Messara-Asterousia region, at least for the settlements that continued in the LM period. In Koumasa, the Protopalatial architectural elements seem to stop being used before most of them are reused in the expanded Neopalatial phase of the settlement. Direct evidence for a drop in population that would put Koumasa in the grid of settlements following this pattern is not apparent, but the abandonment of the Protopalatial structures is indicative of a crisis or at least of a transition period. In Apesokari the most significant ceramic groups in terms of chronological and typological coherence are the ones in which most of the specimens are datable to MM II through to early LM I.¹⁰⁶¹ Another example that might form a pattern is the settlement of Doukiania, which existed in the Prepalatial and Protopalatial periods, but with a significant growth in the Neopalatial period. The new location, consisting of approximately 30 houses, was not precisely upon the older settlement but in the vicinity of the older, repeating a trend also seen in Trypiti and continuing up to the LM III period.¹⁰⁶²

In this period in the Messara plain, a rise in the urban and rural villas spaced across the whole central region may serve as an indication of an elite's hold on the redistributive system.¹⁰⁶³ The villa of Mitropolis Kannia is assumed to benefit from its location on the route to Knossos, thereby bringing the Knossian question to the forefront once again.¹⁰⁶⁴ Even if this is the case, it cannot hold for all villas seen in the Watrous survey, which argues for a Neopalatial Phaistian State.

Perhaps the study of the Asterousia region of the Neopalatial period would benefit from an approach that is, on a first level, disentangled from the question of Knossos's influence in the Messara. The scale of its existence could, at a second level, be regarded within the question of the region's broader political trajectories and the balance between Phaistos and Knossos.¹⁰⁶⁵

The role of the elite dynamics should be considered in this antagonism of centre-periphery. Two types of aristocracy have been mentioned: one oriented outward, beyond the island, and another focused inland, emulating the material culture of the former.¹⁰⁶⁶ This distinction may be linked to the broader political context of the period. Knappett suggests a turn to inland trade materiality after the disruption of the connections to the East, relating to the later phase of the Protopalatial period.¹⁰⁶⁷ This could

1061 Flouda 2023, 127–132.

1062 Vasilakis – Sbonias 2018, 285.

1063 It is for this period that an expansion to the eastern Messara is assumed (Watrous et al. 2004, 295). Watrous further discusses this elite system running parallel to a central authority with anachronistic values, seeing analogies with the situation in Egypt during the New Kingdom.

1064 Adams 2017, 119–120.

1065 The relation in LM I is described as hegemony, even by advocates of the indirect Knossian influence in general. (Puglisi 2003, 146).

1066 Shoep 2006, 58.

1067 The appeared increase of influence of Malian elite on that of other locations of eastern Crete is stressed, with the example of Cretan Hieroglyphics in Petras and fine wares in Myrtos Pyrgou (Knappett 2012, 392; Cadogan 2022, Fig. 1).

be seen as an effort to replenish the prestige-carrying import influx or seen within the theory of energy preservation presented in Chapter 10.2 as a way to hinder further collapse. The effort in Koumasa to emulate the Phaistian style is clearly an example of the second type of aristocracy, according to Schoep. It is only logical for various nearby states to do be associated with the prevailing one, and there are examples where this is analysed, such as Monastiraki.¹⁰⁶⁸ This trend to emulate the palatial elite becomes more than a mere reflection of the imitated ritual, and becomes part of a renewed identity.¹⁰⁶⁹ Beyond the underlying reasons, a smaller society adopting the lifestyle of a larger one can be understood from an energy perspective. This alignment enables a higher energy potential to be achieved, facilitating the flow of energy to the smaller society.¹⁰⁷⁰

Koumasa is seen by Watrous as a possible part of this state due to the “large structure” built there, which passes well with the scheme of local semi-independent elites.¹⁰⁷¹ This view emphasises the top-down hierarchical structure and has a different narrative than the bottom-up view of the integration of marginal societies in a certified system. It furthermore takes the idea of “state” for granted. On the other hand, the proposed territories discussed above often split the Messara diagonally so that Koumasa is on the edge of the western part, assigned to Phaistos, and an eastern one, assigned to Dhamantri or Knossos.¹⁰⁷² Within this perspective, the affluence of Koumasa aligns with the view of the sociopolitical structures in the Messara being collective rather than hierarchical, in which the local agents would shape the regional dynamics and as a result, the palaces would act as integrated actors in the regional systems with roles of coordination and emitting political message, rather than an absolute hierarchical system.¹⁰⁷³ Of course these two views need not be viewed as antagonistic to one another *per se*.¹⁰⁷⁴ Within this perspective, one needs not to seek homogeneity in the whole Messara; instead, it should be viewed as a collection of interacting localities. The connections between each locality, such as Koumasa, and regions like Phaistos or even the Pediada to the east should be understood as bilateral relationships, represented by a bilateral arrow between the two areas and not as a one-point arrow, in the traditional directionality model of cultural expansion.¹⁰⁷⁵

1068 Kanta 1999, 391–393.

1069 Vavouranakis 2020, 278.

1070 Petric 1991, 127.

1071 In this view, interestingly, the cult continuation in Kophinas at this time is seen as a measure of autonomy in the central Messara which contradicts the presence of a new palatial Phaistos power in Koumasa. (Watrous et al. 2004, 295).

1072 Driessen 2022, 6–8, Fig. 3.

1073 Puglisi 2003, 91; Christakis 2008, 5. See also discussion in the regional character of the Messara in Adams 2017, 126.

1074 The convergence of the theories of hierarchical and heterarchical society has been observed by Letesson – Knappet 2017, 5.

1075 Stein 2002, 903.

These connections function then as reciprocal exchanges between the two areas rather than adhering to a unidirectional model of cultural expansion. Furthermore, focusing on the local patterns is a key to understanding social change, as small societies can be seen as the drive behind big-scale patterns.¹⁰⁷⁶

The aim of this chapter is to observe the location of Koumasa at a macroscopic level, indicating the challenges the possible networks pose in evaluating the role and the dependency of this location, as well as to reexamine the question of autonomy. Further, a nuanced approach to the bottom-up way of thinking of states and dependency networks was endeavoured to go beyond the presumed dichotomy with the more traditional perception, which studies cultures from above, as it also has many useful elements. It occupies a location apparently thriving from the EM period, as seen by the tholoi with a long period of usage, and continues evolving with time, adapting to the needs of the economically overlapping communities in which it exists. On the one hand, its function on a geographical level seems similar to other locations, such as Apesokari, but at the same time involves particular elements, such as the observation of the way to Kophinas and the only node for accessing some harbour bays. A pondered dependency on far away centres and cultural shifts island-wide, although impactful in the emphasis given to the region, remains less relevant for the day-to-day activities within the meso-scale and microscale.

1076 Sbonias 2012, 273.

Part V
Experiencing the Mountain
as a Cultural Landscape

11 The Mountainous Mesocosm of Koumasa of Central Asterousia: The Nodes of a Mountain Cultural Landscape

11.1 Walking

In continuation of the exploration of the Mesocosm in Chapter 9, this Chapter will focus on the mountainous part of the Asterousia around Koumasa and the paths within it. This pertains to identifying the role of the location as per this mountainous region, as well as verifying and examining the results of computational analysis and theorising on the role of this area presented in the chapters above.

The exploration of the terrain upon which settlements emerged has gained widespread acceptance and utilisation in archaeological methodologies, particularly within the field of landscape archaeology and beyond.¹⁰⁷⁷ This has found ample applicability in the case of historical Crete.¹⁰⁷⁸ This approach facilitates the comprehension of networks connecting settlements and, more heuristically, opens up the experiential aspects of ancient inhabitants' lives. Such an exploration provides deeper insights into the diachronic nature of landscape experiences. This insight extends to everyday aspects of life, encompassing elements that traditionally receive less emphasis when studying places of interest, including considerations of the horizon, visibility, and the dynamic interaction with the landscape, thereby transcending a focus solely on the ground plans of buildings, and introducing a landscape-driven cultural biography. In the case of Crete, the mountains defined the way of life, but their role extended to enact an agency of their own, interacting with the dwellers' daily experiences.¹⁰⁷⁹ On Crete, the four mountain ranges offer fixed points of reference that act as a spatial orientation and an active interface of land and sky, as Bollnow puts it. The four mountain ranges, and for the case of Messara, the peaks of Psiloritis and Kophinas by the Asterousia, flank the horizon, rendering the space around one to a finite and manageable surrounding, again

1077 Bollnow 1994; Haaland – Gunnar 2011; on the propagation of the term Landscape Archaeology out of Britain and gradual incorporation of Mountain Archaeology in it, see Widmann 2014, 123.

1078 Rackham – Moody 1996; Chaniotis 1996a; Widmann 2014; Nowicki 2014a; Kalantzopoulou 2022.

1079 Widmann 2014, 120–126.

to use Bollnow's words.¹⁰⁸⁰ This can be seen in the etymology of Messara as "the area between the mountains".¹⁰⁸¹

The mountain life has been interwoven with the culture and identity of Cretans, with the mountain peaks not only acting as a common point of reference but adding to a sense of security and at-homeness. "To Cretans, the high mountains have always been a well-known part of the island's culture. (...) High mountains are revered as a place of solitude and, on occasion, the last stronghold of the eagles of freedom. Although the average Cretan probably never sets foot in them, it is the sight of the mountains that has brought courage in the dark days of the past."¹⁰⁸² This development is connected with the need for security, as, from the early Middle Ages, pirates have forced populations to seek refuge inland.¹⁰⁸³ A brief mention of this fact is seen in the experience that the early traveller Fynes Moryson documents.¹⁰⁸⁴

For a better understanding of the impact of the landscape, a study of the act of walking is necessary; in this chapter, this is presented for the mountainous areas around Koumasa. Movement is not merely an accessory to knowledge, but, as Ingold and Vergunst eloquently assert, the act of walking itself constitutes a distinct way of knowing.¹⁰⁸⁵ This perspective, which finds resonance in Minoan archaeology, was already articulated by Pendlebury in his thoughts on maps, which he regarded as a supplementary tool in the context of the aforementioned evaluation. He emphasised time rather than distance as the most crucial factor and noted that the terrain of Crete, in particular, is less compatible with the utilisation of cartography.¹⁰⁸⁶ Bintliff underlined the importance of walking time rather than map distances and described catchment areas delimited by a given walking time threshold.¹⁰⁸⁷ Walking through a landscape without dependence on modern technology, as evident in ethnographic research, represents a fusion, or rather an integration, of two seemingly contradictory emotions: fear and confidence.¹⁰⁸⁸ This is particularly pronounced in mountainous terrains, a phenomenon substantiated by psychological studies.¹⁰⁸⁹ Walking on a mountain presents a contrasting experience to

1080 Bollnow 1994, 77.

1081 The name in various variations is found in many islands, such as Thera, Andros, or in Cyprus where it appears as Messaoria, supporting this etymology. An alternate etymology is refereeing to an area in the inland of the island.

1082 Rackham – Moody 1996, 193.

1083 *Knossos II*, 85. A similar behaviour could be seen in other periods of instability, such as LM III.

1084 See Footnote 1104 below.

1085 Ingold – Vergunst 2008, 5.

1086 See Footnote 535.

1087 Bintliff 1977, 112–113.

1088 Conclusion based on the walking habits of the Batek tribe of Malaysia, their customs and linguistic analysis of words referring to walking (Tuck-Po 2008, 32).

1089 For the perspective evolutionary psychology offers for the human's perception of the mountain, see Chapter 12.3.

movement in a plain or urban environment. Walking in an urban setting has been considered a social activity, characterised by “the way the person’s movements are continually responsive to the movements of others in the immediate environment”.¹⁰⁹⁰ By contrast, the interaction when walking a mountain is not social but a sensory one, interacting with the landscape itself. Movement on a mountain demands adaptations in each step; an elevation here, an unstable rock there. Thus, contrary to the social nature of movement in a city, navigating a mountain introduces a unique form of dialogue. In this context, the mountain serves, on the one hand, as a steadfast counterpart in terms of the view and far peaks, but one that is, on the other hand, elusive in its incremental and step-by-step behaviour, fostering a dynamic interaction with the natural environment. Walking is, then, related with the sense of feeling as a sensory input; not only through movement and through the feet on the ground,¹⁰⁹¹ but also the resistance of the ground, felt through the walking stick by the hands.

The other crucial sensory input, that of seeing, should also be considered. These landscapes offer an ever-shifting panorama of depths and heights, invoking an element of uncertainty that is mitigated solely by the confidence derived from experience in these rugged mountains. “The walker experiences the material depth of the proximate environment through binocular vision and through the effect of motion parallax created by the blurring of near objects in contrast to those further away. The touched, smelled and heard proximate material world is thereby woven into the walker’s sensory field, leading him or her to experience the landscape as a topological realm of contiguous places”.¹⁰⁹² Perception is not defined from a static point, but rather from continuous movement along the path, being thus a “path of observation”,¹⁰⁹³ with the parallax impacting the senses at a primal level, as the human brain is not adapted to accept it as natural, hence inducing a sense of awe and otherness.¹⁰⁹⁴ These effects give visibility a dynamic aspect during walking.¹⁰⁹⁵ Thus, the landscape is created by the viewer’s perception and is not a static characteristic but a collection of experiences and viewpoints.¹⁰⁹⁶ Here, one touches on the philosophical discourse moving between phenomenology and Berkeleyan idealism. The latter links the existence of physical objects with their perception by the mind, being revealed or “materialising” through the multisensory character of experiences, and it is understood particularly in perceiving landscapes.¹⁰⁹⁷ This is often

1090 Ingold 2004, 328.

1091 Ingold 2004, 319–321.

1092 Olwig 2008, 84.

1093 Ingold 2004, 331.

1094 On this phenomenon see Footnote 1273; for a discussion of the role of evolutionary psychology in perceiving mountains, see Chapter 12.3.

1095 Peatfield 2009, 257–258.

1096 Haaland – Gunnar 2011, 24–25.

1097 Schmidt 2020, 267.

summarised in the principle of “being is to perceive”, that leads to ontological perceptions that have been the subject of philosophical discourse.¹⁰⁹⁸ This thesis can be seen in relation to, but also a reversal of, traditional platonism or Kant’s views, summarised traditionally in the aphorism of “Das Ding an sich” (the thing-in-itself), where reality is understood as independent of our perceptions, but accessible through our mental faculties. A middle ground could be seen in the phenomenological principle emphasising the embodied nature of perception.¹⁰⁹⁹ The idea is that our perception of the world is fundamentally tied to our lived, bodily experiences.¹¹⁰⁰ It argues for a kinaesthetic consciousness, a term which is akin to kinaesthetic sensation, and the union of viewing and touching, an element, interestingly, strongly derived from Berkeleyan Idealism.¹¹⁰¹

Returning to Minoan studies, many of the mountainous areas on Crete have not been well studied.¹¹⁰² This is particularly the case for the mountainous heart of the Asterousia range, which has attracted little attention because of its marginality.¹¹⁰³ Despite its relatively modest width, in the area of central Asterousia specifically, movement is governed by a limited number of narrow paths, often obstructed by precipitous gorges.

The Ayiofarango valley, despite being less rugged terrain – an aspect that contributed to its selection as the primary route toward the southern Asterousia during Hellenistic and Roman times, albeit resulting in a longer distance from Gortyn – was still acknowledged for its challenging nature. This difficulty was documented in one of the earliest modern accounts of the area by the traveller Moryson.¹¹⁰⁴

1098 For a review of the “Esse est percipi” principle, see Muehlmann 1978, 89–92.

1099 Schmidt 2020, 276; Husserl 1977.

1100 Merleau-Ponty 2012; Husserl 1977.

1101 Schmidt 2020, 264.

1102 Kalantzopoulou 2022, 1.

1103 See discussion in Chapter 2. It is characteristic that Asterousia is absent from the study of Cretan mountains, as seen in, for example, Wildmann’s analysis (Wildmann 2014).

1104 Fynes Moryson described the way from the harbour of Kali Limenes towards the Odighitria Monastery that his party took in 1596, and which he does not depict as a particularly enjoyable experience: “... they shewed me about the wilde Rockes, called Calisminiones, a Monastery of the Greeks, some three miles distant, and called Santa Maria Ogidietra. We being left alone, and staying there fasting till noone, at last espied, and called to vs two men passing by vpon the Mountaines, but they thinking vs to bee Pirats, fled away as fast as they could. Presently behold, my man comming out of the Wood, and bringing with him an Asse, which hee had found there, who perswaded me to lay my baggage on that beast, and so to walke softly towards the Monastery. I willingly tried my strength, and leaning vpon our two swords for want of a staffe, and yet often falling, went forward like a snaile, till despairing of going further, I fell vpon the ground. After an howers space, a Shepheard passing by, and I shewing him gold, and naming Monastery, which word he vnderstood, he swiftly ran to the Monastery, and telling the Monkes (called by the Greekes Caloiri) our state and condition, they presently sent a seruant to vs, who in the Italian tongue telling vs the great danger wherein we should be, if we staid vpon those Mountaines till night, aduised vs to make haste to the Monastery. Thus driuen with feare, and encouraged by his company, I tried againe to goe forward, and with great trouble passed one mile ouer the Mountaines. For leaning, as I said on two swords, and vpon the passage of any steepe Mountaine, by reason of the lightnesse of my head, creeping vpon hands and feete, with great difficulty I went so farre. And now being not able to goe any further, no not to saue my life, behold a boy, who came to water his Assears Fountaine adioyning, to whom the seruant of the Monkes gaue a piastro, and so whether he would or no

The southern slope of the Asterousia range is characteristically steep, as seen from the density of the contour lines in the map of Figure 92 below, often presenting areas that are impassable for groups carrying heavy loads (indicated by the highlighted areas in the map). This pronounced ruggedness is primarily attributed to the steeper nature of the southern slope when compared to the northern one, as can be seen in the cross-sections of Figure 18 in Chapter 3.3. Another noteworthy aspect of the Asterousia is its dual symmetry, wherein one can invariably perceive either the sea or the valley at each location. This characteristic serves to demarcate one's position on either side of the range. Transitions from one side to the other typically occur during the shift from ascending to descending segments of the paths. These transitional points are considered liminal, and their significance extends beyond their strategic value, as will be discussed in the case of the path to Trypiti. They also hold psychological significance, marking the shift from the realm of the sea to that of the valley, and vice versa.

For an initial comprehension of the Asterousia from the viewpoint of a Minoan archaeologist, one needs not look beyond the accounts provided by Evans and Pendlebury in the first half of the 20th century. Evans traversed these mountains while exploring what he believed to be the route between Knossos and the Messara region, while Pendlebury offered a more analytical description of paths from Miamou to Vassiliki and from there to Trypiti.¹¹⁰⁵ These belong to the region of western-central Asterousia and the borders with central Asterousia (as defined in Chapter 9.1), so that the central Asterousia area remained underexplored. While walks towards Kophinas has been undertaken, the topography of the central Asterousia itself remained outside the primary focus of those studies.¹¹⁰⁶

For present day research, a tool often utilised for evaluating walking is based on GIS methods, as discussed in Chapters 4 and 5. When addressing questions of topography and walking distances, one cannot, however, rely solely on the algorithms of GIS and map analysis.¹¹⁰⁷ While these tools are undeniably essential and insightful, they remain quantitative instruments for understanding a particular location. True comprehension necessitates physical exploration and firsthand experience of the terrain in question, to form a qualitative approach. After all, a landscape is created by the viewer's perception, as discussed above. So, for evaluating it, an eye-witness account is essential.

In an attempt to comprehend the role of Koumasa within the network of routes in central Asterousia, the author embarked on a series of walking expeditions. These journeys were based on prior surveys conducted in the region and supported by GIS methods, as well as information gleaned from interviewing local residents of Koumasa, Loukia, and Kapetaniana regarding established paths and their usability. These

tooke his Asse, and set me vpon it, and so at last wee passed the other two miles (longer then three English miles) and came to the Monastery. The Caloiri or Monkes receiued vs courteously ..." (Moryson 1617, 253).

1105 *Knossos II*, 81–87; Pendlebury et al. 1935, 83, 85–89.

1106 See Footnote 359.

1107 See Footnote 584 and discussion on page 117.

investigations, notably the expeditions to access the sea and Kophinas peak, offered valuable insights into the exertion required, and the time investments demanded by such treks. The focal point was determining viable paths for the transportation of goods and cargo with the aid of animals, prioritising routes that circumvent the need for climbing – a preference sometimes not held by locals, who primarily employ such paths for shepherding and hunting.

To create a comprehensive picture of the path networks, five treks were documented using a smartwatch equipped with GPS capabilities. This technology not only tracked the routes taken, but also provided essential data on total distance covered and the duration of each trek. Four of these treks started at Koumasa, with the starting point, for consistency, in the area directly north of the tholoi. These routes concluded either at the sea-shore, on locations considered as Minoan harbours, or at the Kophinas peak. The path from Salamias to Ayios Ioannis was measured as an extra trek. Additionally, a sixth trek charted an alternative path originating from Ayios Ioannis and passing through Kapetaniana, so that these paths are interconnected. For an overview of all paths, see Figure 92.

The integration of GIS analysis and walking was taken into consideration in the preliminary assessment of potential paths offered by the programme.¹¹⁰⁸ However, a genuine evaluation of their feasibility can only be attained through physical exploration and walking these paths in person. The author undertook to walk some of them, especially those which did not seem probable, judging by the contemporary road and path systems. The GIS suggestions to directly access the sea are the routes to Salamias – Ayios Ioannis and Trypiti. Of those, the most surprising was the suggested route to Salamias from Koumasa, which seems to offer a shortcut that rendered Salamias as the nearest place to access the sea.¹¹⁰⁹ The fact that in these locations a Minoan presence is known increased the credibility of the assumption of such a connection. The author's efforts to traverse the mountains were complemented with interviews with locals, who often undertake such excursions for hunting and caring for their flocks.¹¹¹⁰ Walking alongside, or close to, the line suggested by GIS helped to understand the logic of the algorithm, allowing for its evaluation, which will be presented for each path separately. On a large scale, the routes proved to be good suggestions and, amongst the possible routes, were some not mapped by modern paths. An inaccuracy at the small scale, as expected, was also seen; for example, where a human would walk around a small gap or a large stone, the algorithm would indicate a direct line through the obstacle. These inaccuracies, stemming from the pixelation of the DEM raster, having a pixel resolution

1108 Martini 2020. Although this article considers a modern urban environment, which differs from the aims of this study, the methodology of comparing empirical experience and the algorithmically calculated paths is still valid.

1109 See related discussion in Chapter 5.2.

1110 Including Markos Skordalakis, Dimitris Tsiknakis, Giorgos Tsiknakis, Stelios Tsiknakis, Konstantinos Kokkinakis.

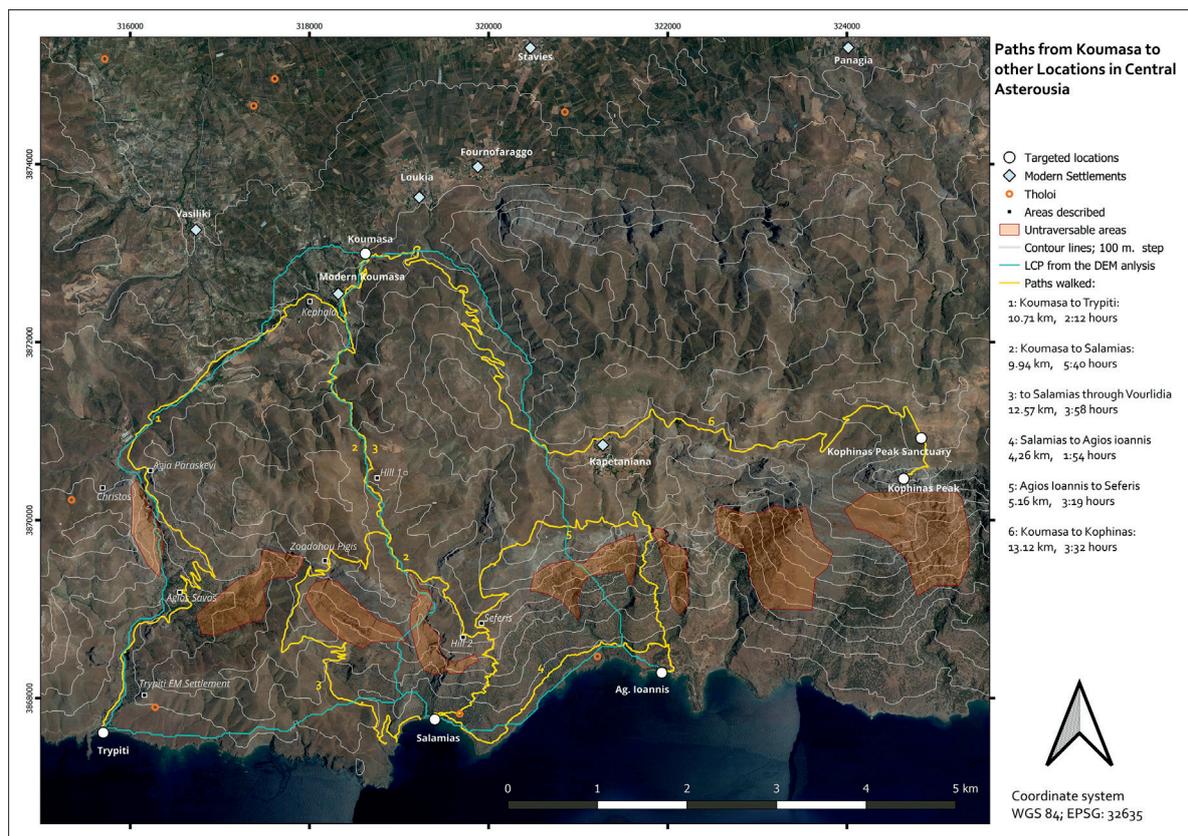


Figure 92: Illustration of the documented paths within central Asterousia.

of 20 m., were to be expected. Each pixel has eight neighbours, and movement through a fairly straight gorge, for example, will appear straight, not taking into account the small-scale zigzagging required to traverse the terrain. These uncertainties can be seen represented by the GIS paths as straight lines that are longer than 20 m., which does not represent the reality of walking. Of the three calculated least-cost-paths (LCPs) beginning from Koumasa southwards (blue lines in the Figure below), this effect is primarily seen in (1) the Gourlofarango gorge, which Path 1 bypasses from the east; (2) the beginning of the Salamias gorge, that the LCP follows, which in reality must be bypassed through Hill 2 (Path 2) and through Zoodochou Pigis (Path 3); and finally, (3) the eastern one passing through a difficult peak east of Seferis, that Path 5 bypasses from the east.¹¹¹¹

¹¹¹¹ The contour lines were produced by editing a 30 m. SRTM DEM in QGIS, with an API key obtained by <https://portal.opentopography.org/>. LCPs calculated on the 20 m.-DEM.

11.1.1 Walking to Trypiti

From an archaeological perspective, the route to Trypiti was initially delineated by Evans,¹¹¹² who began his description from the tholos of Christos, proceeding downward as indicated below. With regards to access from the Messara region, the most obvious route involves passing through the contemporary village of Vasiliki. Its location serves as a pivotal juncture, connecting several villages within the Asterousia range, including Koumasa to the east,¹¹¹³ and other areas to the west with paths leading southwards but also towards Miamou¹¹¹⁴. This second route traverses the vicinity of the tholos of Porti while proceeding upstream. Notably, various tholoi are situated adjacent to these streams, as previously discussed.¹¹¹⁵ Within the immediate vicinity of Vasiliki, several positions yielded surface finds, as identified by Pendlebury, albeit no longer observable today. Among these locations is Gyrokephala, which, based on its description, could be associated with the Kandila cemetery, featuring EM, MM, and Roman pottery sherds.¹¹¹⁶ Vasiliki itself presents MM I pottery sherds, located, according to the precise description provided, to the north of the village near the school,¹¹¹⁷ situating them in proximity to the Vasiliki stream. Other locations mentioned by Pendlebury and Nowicki have been noted in Figures 80, 86 and 89 above. These, showcase this characteristic of the location of Vasiliki, as it lies on the southern edge of the semicircular extension of the valley, which is shown in the contour line of 300 m. that passes above the village. The contour lines of 360 m. and 400 m. that pass just above the tholoi of Koumasa also accentuate the semicircle-shape of this region of the Messara.

The path taken by Pendlebury, and conceivably also by Evans, leads directly from the area of Vasiliki point to the summit of Ayia Paraskevi, where the Goulofarango gorge, known today as the Ayios Savas gorge, commences. In its entirety, the route followed by Pendlebury takes less than two and a half hours.¹¹¹⁸ The author, who proceeds at a slower pace than Pendlebury, completed the distance in 2:40 hours, benefiting from the modern road infrastructure that reduces travel time.

An alternative route taken by the author commences at the tholoi of Koumasa and deviates from the downhill route leading to Vasiliki (Path 1 in the map of Figure 92),

1112 *Knossos II*, I 82–83.

1113 Pendlebury et al. 1935, 86–87.

1114 See Pendlebury 1939, Map 2. This was also seen in the analysis in Chapter 9.2.2.

1115 The identification of these by Pendlebury, as well the path connecting Apesokari to Vasiliki through Vasilika Anoyia can be seen on the map Pendlebury et al. 1935, Fig. 2.

1116 Described as a local rise 15 m. north of Vasiliki; the cemetery of Kandyla is the only topographical feature that satisfies this description. At 10 minutes, the distance is a bit shorter than that described by Pendlebury from the traditional centre of Vasiliki, but it is accessed through a modern road, which reduces the travel time.

1117 Pendlebury et al. 1935, 87.

1118 Pendlebury 1939, 11.

which from the elevated position of Koumasa seems counterproductive as it lies 100 m. lower as the contour lines show, and, most importantly, the other way is exclusive to Koumasa. Instead, it proceeds directly southward, traversing the modern village of Koumasa and passing at the base of the summit of Kephala, where a settlement is indicated by EM I–II house remains, while FN II–EM I pottery is seen on its northern slope.¹¹¹⁹ This would make it contemporary with the earliest documented use of the Koumasa tholoi area. This hill is less than 1.6 km. from the tholoi area, requiring 25 minutes to reach. As with the other two locations,¹¹²⁰ this early location is at a fortified position, at the northern end of the Asterousia, and in addition, Kephala is the closest in walking distance from the coast, in this case, the Trypiti area.

The route from Koumasa to Trypiti spans a total distance of 10.7 km. and takes approximately 2:20 hours to complete via modern roads. While the preindustrial path may have taken slightly longer, the time required is still comparable to that from Vasiliki, with only a 20-minute difference. Around the 5 km. mark, halfway along the total distance, this route, the terrain of which rises slightly upwards but without any abrupt gradient in the slope, reaches the summit of the Gourlofarango gorge, known today as the Ayios Savas gorge, or Katsakné, and intersects with the road originating from Vasiliki. At this junction, the southern horizon unfolds, offering a first glimpse of the sea, albeit at a modest azimuthal angle. Shortly after, the promontory of Phylakas at Trypiri (near the goal of the path) comes into view, thus rendering this junction a liminal point in this path. The perceived landscape is illustrated in Figure 93.

On the one side of this junction, roughly 20 minutes to the southwest, above the western slope of the gorge, one encounters the tholos of Christos with a timespan covering EM III or MM IA to MM IB.¹¹²¹ Within an area of 50 m², 15 sherds of FN II–EM I dating were found.¹¹²² On the nearby hilltop of Volakas, settlement activity was noted, characterised by Xanthoudides as Minoan, which led to its identification as a ‘sanctuary’.¹¹²³ However, the dating of the site seems to be later. The extent of the small settlement of ca. 3,000 m² yields surface finds of late LM III and Early Iron Age, being topographically similar to small refuge settlements.¹¹²⁴ Indeed, its position is highly defensible, with an overview of a large area and control over the route described here, but at the same time, it is not directly visible to those walking along the gorge.

On the other side, approximately 5 minutes eastward from the junction, the church of Ayia Paraskevi is situated atop a small summit that Pendlebury believed to be a fort,

1119 Panagiotopoulos 2015a, 545; Nowicki 2018, 21. For a view of this hill as seen from Koumasa, see Panagiotopoulos 2015a, 560, Fig. 30.

1120 On Kephala, Afentis Christos and Kalamaki, see discussion on page 241f.

1121 See Footnote 934.

1122 Nowicki 2018, 25.

1123 Xanthoudides 1924, 70; *Knossos II*, 81.

1124 Rutkowski – Nowicki 1990, 114.



Figure 93: Above: first glimpse of the Trypiti bay and Phylakas promontory. Christos settlement and tholoi behind the Volakas hill on the right. Below: view towards the Volakas hill beyond the Gourlofarango gorge. Christos tholoi and settlement on the other side of the hill.

based on the presence of architectural remnants and pottery sherds.¹¹²⁵ Most notably MM I pottery sherds were identified at this location, coinciding with the final phase of use of the Christos tholos.¹¹²⁶ Unfortunately, these elements could not be verified, except for very small pottery fragments that could not be dated. The current church is a modern structure whose construction could have eliminated these features. The topographical features of this area, including the view of the sea and the strategic positioning at the beginning of the abruptly descending path to Trypiti, lends credence to the possibility of it serving as a fort or checkpoint, as Pendlebury assumed.¹¹²⁷ Moreover, it is situated at a bottleneck, and ca. 1 km. before it is where the roads from Miamou and Krotos (the location of two more tholoi), Vasiliki, and the direct route from Koumasa converge. At that point the round structure at Plakouras was identified.¹¹²⁸

The road downwards has a greater gradient in contrast with the first half of the trek. Evans provides a literary-style description that underscores the desolate nature of the terrain. He details a route that commences at Christos and proceeds through the gorge of Ayios Savas, after which there is a narrow passage that he describes in a dramatic tone as a “Chasm” (Figure 94).¹¹²⁹ In contrast, Pendlebury does not ascribe a specific level of difficulty to this gorge.

It is worth noting that the initial section of the Gourlofarango gorge is impassable without climbing, suggesting that access must have been via the road that traverses the church of Ayia Paraskevi. This alternate route, followed by the author along the modern road, continues along the eastern flank of the gorge, following a zigzag pattern. Located at the base of the gorge is the church of Ayios Savas, where Pendlebury identified pottery dating to the LM I and LM III periods, as well as Roman pottery, and a structure.¹¹³⁰ Although remnants of a possible structure are still visible, precise dating remains unattainable due to the presence of modern pavements and other buildings in the area. Access to the bay itself is facilitated through a natural opening in the rocks mentioned above, forming an impressive tunnel that serves as a torrent bed. Following rainfall, this opening can become a hazardous watercourse. Beyond this point lies the isolated bay of Trypiti, which is well sheltered from the prevailing west winds and is largely detached from the broader Asterousia region.¹¹³¹ The path along the gorge marks the sole direct path leading to Trypiti, with the other being a traversable but longer path, of similar

1125 Pendlebury 1939, 125; Pendlebury et al. 1935, 87.

1126 Of the two tholoi in the area, the first (no. 61 in the catalogue of Branigan 1970) is of unknown dating, considered by Xanthoudides as an unfinished tholos (Xanthoudides 1924, 70), while the second (no. 11 in Branigan 1970) spans the period EM III–MM I. (On these two tholoi, see Legarra Herrero 2014, 171–172). See also Footnote 934.

1127 Pendlebury et al. 1935, 87.

1128 See Footnote 937.

1129 *Knossos II*, 82. For its location, see Figure 100.

1130 Pendlebury et al. 1935, 87, Pl. 13a; 1939, 235.

1131 Evans' description is very accurate (*Knossos II*, 82–83).



Figure 94: Evans’s “Chasm”, beyond which lies the secluded Trypiti bay.

difficulty, that passes through modern Krotos and the tholos, approaching Trypiti from the west via Trachoulas.¹¹³² The tholoi of Krotos and Christos can thus be seen to be located midway on the two paths from Trypiti towards the Messara.

At Trypiti Pendlebury describes a Geometric settlement,¹¹³³ and also Roman buildings are known,¹¹³⁴ but to us the area is known mainly for its Minoan features. Their overview and the implications they have for Trypiti's role as a harbour are analysed in Chapter 11.3.1.

Regarding the evaluation of the route suggested by the GIS, it initially recommends a path that starts from Koumasa, veers towards Vasiliki, but subsequently turns southward before reaching it. While this route is not entirely implausible, it introduces unnecessary complexity just in order to avoid the initial uphill ascent undertaken by the author, which, in reality, is not particularly challenging. Additionally, at the gorge of Ayios Savas, the GIS evaluation fails to acknowledge the difficulties encountered in its initial stages due to the sudden vertical drops of the stream, resembling a cataract-like formation. This oversight is attributed to the inherent limitations of DEM, as it does not discern abrupt changes in terrain at the median level of each pixel (pixelation effect). Of the functions used on the 20m.-DEM (see Figure 23), only the second degree-polynomial – called here as the exponential – diverges significantly, choosing the way through Krotos to approach Trypiti from the west, from the direction of Trachoulas. As mentioned above, this is indeed the other way to Trypiti, but is longer. It is noted that it is this path that the algorithm proposes when a route from Apesokari to Trypiti is queried (see Figure 26). When using the 30m.-DEM, the Bell-Lock function diverges but in a less practical way, following the route to Krotos but reverting to the main path (Figure 24). This is yet another example of the Bell-Lock being less accurate on the mountainous terrain.¹¹³⁵ Applying peripheral points along the south coast, a route close to the path taken is the only main access to Trypiti, based on the raster slope and the Ox-cart function, as seen in Figures 30 and 31.¹¹³⁶

The flow accumulation based on the Tobler and Bell-Lock (Figure 39) also lead to Trypiti almost as expected, with Bell-Lock diverging slightly, again as expected. By utilising the exponential approximation of the cost surface (Figure 40), GIS analysis produced a secondary path until the Ayia Paraskevi region, continuing with a tertiary path through the Trypiti gorge until the chasm, whose opening of 7–9 m., being less than a single 20 m. pixel, is not perceived, hence the existence of a blockage; this contrasts to

1132 This path was proposed by implementing the exponential function, as seen in Figure 23 and discussed on page 124f.

1133 Pendlebury et al. 1935, 88, Pl. 12d.

1134 See Footnote 1170.

1135 See Footnote 1169 and discussion on page 304.

1136 It is noted that the cut-off slope implemented in iteration 3 of Study 3 in Chapter 5.3 does not affect the path significantly.

the least-cost path, where the way was forced, as a beginning and end for the journey is required. The actual path therefore is very similar to the result of the least-cost path.

In summary, the DEM-derived routes serve as a useful reference for identifying the suggested path but may benefit from further refinement to account for the intricacies of the terrain as seen in the author's journey. Certainly, they offer a finer understanding of the terrain *post evento*, after one has walked the route.

11.1.2 Walking to Salamias

The route to Salamias (Path 2 in map) is an off-road journey, the first two-thirds of which represent only one of several possible paths up to the Seferis summit. The path was chosen because it aligns with the one generated by GIS, in order to assess it. It proved to be the best choice up to a certain point, as discussed below. The total distance covered is 9.94 km. and required 5:40 hours. It begins from the tholoi and passes through the modern village of Koumasa, following two natural stream beds known locally as Amygdalos and Goulas up to 30 m. below a local peak (635 m.), situated ca. 500 m. east of the Diakoniaris summit. At this point, designated as *Hill 1* in Figure 92, with an elevation of about 600 m., the valley disappears from view, and the sea becomes visible, as seen in Figure 95; this marks the first third of the route, covering the initial 3.5 km., and was traversed in 1:10 hours. The abrupt change in scenery allows its characterisation as a liminal point.

The second third of the journey is a gradually descending path spanning from the 3.5 km. point to the 7 km. point of the journey, and required 2:30 hours.¹¹³⁷ The terrain is relatively even and without significant slopes. The stream bed followed downhill develops into a gorge, called Salamias gorge, which, after a certain point, is not walkable without climbing (at the point where Path 2 diverges from the LCP path in Figure 92). So, the trek to Salamias should either deviate eastwards to the area called Flomias, which is the continuation of Path 2, or turn shortly before this blockage towards the west (see discussion on Path 3 below). Continuing on Path 2, the view of the sea becomes quite commanding, extending from the Kophinas peak in the east to Lentas and beyond in the west, unobstructed by any obstacles. Towards the conclusion of this segment, which passes through the region known as Flomias, the path reaches a local hill just southeast of Seferis. This hill, with an elevation of ca. 500 m. (designated as *Hill 2* in Figure 92), was in the recent past utilised by shepherds, who constructed stone enclosures related to shepherding. Among these enclosures, older ruins are discernible, possibly remnants of terracing, where Roman pottery sherds were seen. From this point on, Ayios Ioannis becomes visible to the southeast.

¹¹³⁷ This time is certainly less for one familiar with the terrain, as the author's slow pace due to uncertainty added to the time needed.



Figure 95: View from Hill 1. First glimpse of the sea.



Figure 96: View from Hill 2. View from Hill 2.



Figure 97: Salamias bay, as viewed at the beginning of the final third section of the path, beneath Seferis. The steepness of the mountain is visible.

The third and final part of the route involves a steep descent, necessitating zigzagging along the only viable path that leads to Salamias beach (see Figure 97). This section spans from the 7 km. point to the end of the route at Salamias, up until the 9.94 km. mark of the journey at the seashore, immediately beneath the Minoan building complexes, and requires 2:00 hours to traverse. The beginning of this downward path is situated to the south of the Seferis summit. The only other feasible descending path leads southeastward directly to Ayios Ioannis. Testimonies from the locals suggest that the inhabitants of Kapetaniana in the 20th century utilised this path to obtain salt, with the help of donkeys.¹¹³⁸ This is substantiated by the presence of structured retainer elements for the zigzagging path that are still visible, as well as a horseshoe seen near Hill 2.¹¹³⁹ Around Hill 2, which is surrounded by small structures, like the mitata that are still used by shepherds, elements of older walls are visible, and pottery fragments that, though undated, could be Roman at the latest. The archaeological interest of the Salamias bay will be discussed in the next chapter.

1138 Based on testimonies from the villages of Kapetaniana, Koumasa and Loukia.

1139 The fact that this path downhill is not frequented has led to it being more difficult to walk, as its state has deteriorated due to fallen rocks.

As mentioned above, the southern slopes of the Asterousia are particularly steep which allows only for a couple of easily walkable paths to the bays of the southern side. This rugged terrain contributes to the isolated nature of Salamias, and this also applies to Ayios Ioannis (see also the cross-sections in Figure 18 and refer to the areas marked as untraversable in Figure 92). The region around Koumasa serves as a natural nexus, facilitating connections between this area and the Messara region – an exclusivity that is more pronounced than in the case of Trypiti.

Again, the first segment of the route aligns very well with the GIS-generated path, particularly in recognising the two stream beds of Amygdalos and Goulas, which were known to the inhabitants of modern Koumasa. However, the second part, where GIS estimates a path through the Salamias gorge, is less likely to have been a frequent route for the exchange of goods by parties utilising pack animals due to its high level of difficulty. As mentioned previously in the discussion of Trypiti, the GIS's limitations are associated with its inability to account for sudden, cataract-like changes in elevation, which are not captured in the raster elevation pixels. The third part of the route (descending from Seferis Hill) corresponds to trekking paths connecting Salamias to Kapetaniana. The flow accumulation based on the cost surface (Figure 40) and the Tobler (Figure 37) indicate this path with a secondary path up until the beginning of the Salamias gorge, and then through it with a tertiary path, which, as discussed above, is not easily walkable. However, this indication led the author to try and find a direct way, so this method is deemed valuable as a suggestive tool. As per the other functions utilised, all but the Bell-Lock yield a similar path both in the least-cost-path and the flow accumulation methods.¹¹⁴⁰

As previously mentioned, prior to encountering the obstacle presented by the Salamias gorge, there exists an alternative route to Salamias by heading westward and then proceeding toward Salamias via the modern road that links the Zoodochou Pigis church to Vourlidia (Path 3 in Figure 92). Departing from Vourlidia, there is a relatively challenging coastal path that leads to Salamias, an option chosen by the author. Alternatively, a somewhat easier but slightly longer route descends from the hilltop, north of the FN fort of Salamias West.¹¹⁴¹ This path from Koumasa to Salamias through Vourlidia spans a distance of 12.57 km. and requires approximately 3:58 hours to complete. Although it is roughly 3 km. longer than Path 2, it requires 1:40 hour less time, largely owing to the descent portion, which covers the distance from Zoodochou Pigis to the seashore along a milder slope. The presence of modern roads in parts of this descent is also a factor. The flow accumulation based on the cost surface suggests the path towards Zoodochou Pigis, as a tertiary path from the beginning of the Salamias gorge, at which point it stops as the elevation descends from that point. Tobler also indicates this path (Figures 39, 40).

1140 See discussion in Chapter 5.2 and Chapter 5.3.

1141 See Footnote 1175 below; point b in Figure 102.

11.1.3 Walking to Ayios Ioannis

The bay of Ayios Ioannis is situated almost directly beneath the Kophinas peak (Figure 98; see also cross-section in Figure 18) and can be accessed from the east via a lengthy path leading to east Messara (in the direction of Treis Ekklesies) and from the west via a mountainous path descending from the hill of Seferi (interestingly, only the Ox-cart function suggested this path in the LCP analysis, see Figures 23 and 24).

However, its most direct connection is from Salamias, along a 4.26 km. path requiring 1:53 hours (Path 4). This path terminates at the shore by the Minoan complex described by Hadjidaki.¹¹⁴² A Minoan presence in this region is further corroborated by tholos tombs and other sites detailed in the following chapter.

The GIS-suggested path runs alongside the shoreline but offers limited utility, as it mainly follows the coastline or passes through the terrain which has a uniform slope, so that the algorithmic input is not particularly insightful.

Two additional routes extend northward from the bay, leading toward the modern village of Kapetaniana. One follows a zigzagging path similar to the modern paved road, while the other ascends via the mountain pass above the Ayios Ioannis gorge, covering a distance of 4.21 km. and taking approximately 2:50 hours (Path 5). Although traversable, this path cannot be considered suitable for transporting heavy loads due to its steep sections (refer to the contour lines of Figure 92). After reaching the relatively even terrain south of Kapetaniana, one can descend toward Seferis Hill (a descent lasting slightly more than 30 minutes), and continue on to Messara through the Koumasa area. Alternative paths through the northern slope of the Asterousia, along the Koumasa–Kophinas route, are also feasible.

This network of paths underscores that easy access to and from the Messara valley, or Kophinas peak to Salamias and Ayios Ioannis, is primarily attainable via the Seferis hill, which is a local focal point for movement in this area.

Eastward of Ayios Ioannis, a path along the shore leads to the cave of Ayios Antonios, Koudoumas monastery, and ultimately to the bay of Tris Ekklesies.

With the exception of the Ox-cart function that suggests the route to Ayios Ioannis from Seferis (see also the emerging network paths in Figures 23, 31), the other functions suggest a walk through the mountainous ridge south of Kapetaniana, which is not traversable (Chapter 5.2, Study 1). It is, therefore, in this instance that the GIS methods show the maximum divergence from the reality of walking. The flow accumulation, based on the other reclassifications (Chapter 5.3.2), indicates that there is accessibility almost towards Kapetaniana with a secondary path, with a less practical route again through the main gorge south of Kapetaniana, but also over the non-traversable ridge.

1142 See below in Chapter 10.3.3.



Figure 98: View of Ayios Ioannis from Seferi. To the north (left) Kophinas peak is visible.

11.1.4 Walking to Kophinas

Numerous paths lead from the valley to Kophinas, offering different approaches from its northwest through Kapetaniana or directly from the north. The most direct route commences from the area around the village of Panayia, while longer but more level paths originate from the areas of Koumasa and Loukia, leading to Kapetaniana. From Kapetaniana, one road leads to the Kophinas peak and through the Kophinas sanctuary. The documented route embarked from the same starting point as the others, reaching the Kophinas peak via the peak sanctuary. This path (Path 6) follows the modern roadway and continued on the dirt road from Kapetaniana, covering a distance of 13.12 km. and lasting approximately 3:32 hours.

At around the 6 km. mark, nearly halfway through the total distance, one reaches a liminal point where the valley to the north fades from view, the Kophinas Peak becomes visible, and a vista of the sea to the south unfolds (see Figure 99). A bit further, around the 7 km. point, lies the village of Kapetaniana, which, in the context described here, holds a similar role to that of Ayia Paraskevi on the route to Trypiti or, along Path 2 towards Seferis and Salamias, the area between Hill 1 and Hill 2, providing an equivalent setting from a topographical point of view; isolated from the valley and with command



Figure 99: First glance of the seashore and Kophinas peak.

of the view southwards. The Kophinas peak offers a spectacular point of reference. The road remains relatively even until reaching the Minoan peak sanctuary.

After Kapetaniana, the road continues, passing by the Tris Ierarches church and the location of the Late Byzantine monastery. At the 3-hour mark, with a total distance of 12.25 km. covered, the peak sanctuary of Kophinas is reached. From there, the peak itself, which requires some climbing in its final section, lies another 900 m. away, a journey completed in approximately 30 minutes. From there, a wide view is available, including the Messara to the north. The view to the north includes most of the Messara valley and Psiloritis peak to the northwest, and Phaistos to the west. A line of sight exists to Youktas,¹¹⁴³ Liliano, Kastelli Kephala¹¹⁴⁴ and the sanctuary of Tylissos to the north.¹¹⁴⁵ To the south, the view includes almost all the coastline of the Asterousia,

1143 Soetens 2009, 264; Fig. 22.1.

1144 Rethemiotakis 1997.

1145 Peatfield 1994; Kyriakidis 2005; Briault 2007, 134–137. On the lines of sight, see Soetens et al. 2008 155–158, Fig. 6. The view of Damantri and Phaistos is used for discussion as indicators of territoriality (Soetens et al. 2008 155–156, Fig. 4). Kyriakidis (2005, 17–19) notes that the sanctuary's location not being on the peak

with the cape of Aspro Mouri to the south east and the Ayios Ioannis bay directly to the south. Towards the west, the shoreline is visible until the cape of Salamias, and then the promontories of Trachoulas and Lentas, up until the western end of Asterousia at Kali Limenes, together with the island of Megalonisi and up to Cap Lithino due west, and, weather permitting, even to Gavdos.¹¹⁴⁶ For the archaeological information and evaluation of Kophinas peak and the peak sanctuary, see Chapter 11.4 below.

As for the GIS indications, in the LCP analysis, a path similar to the one taken is suggested by all functions except the Bell-Lock, which yields an access from the north, suggesting a path that partially traverses the valley. This is indeed possible, but the limitations of this function, as discussed above regarding its applicability in mountainous terrain and the emphasis on favouring valley routes, is again relevant (see Figures 23 and 24). However, in the flow accumulation, the Bell-Lock leads more directly to the peak than the Tobler (Figure 39). In the flow accumulation based on the cost surface (Figure 40), the path to Kapetaniana described above branches out to a tertiary path leading, as with the rest of the functions, more or less on the path traversed up to the peak.

11.2 The Southern Asterousia Coastline and Harbours

The investigations described above pertain to the mountainous network of routes in the central Asterousia, with the harbours themselves being described in Chapter 11.3, and the mountain itself in 11.4. The model of the regional survey in the area was pioneered by Blackman and Brannigan who, in their survey area, defined the Ayiofarango as a research unit based on environmental and geographical factors, aiming to investigate evolving social and economic patterns in the valley and trends over time to characterise the natural surroundings of the human activity there.¹¹⁴⁷ A similar approach is pursued here for the central Asterousia, which is also a confined geographical location. It is similar to the Ayiofarango survey not only for the geographical proximity, but also its seclusion, definition by a handful of paths, and relative lack of known locations, in contrast to broader surveys in the mountains of east Crete, where the relative density of finds allows for different methodologies.¹¹⁴⁸ However, when addressing the question of harbours on its coastline to the south, the locations studied cannot be considered in

itself should not be considered as falling within the class of the peak Sanctuaries, although many of its characteristics and finds are ascribing it as such.

1146 See Chapter 5.4 for the visibility map from Kophinas peak (Figure 47) and for the visibility line of sight between the peak and the southern coast towards the west (see Figure 48).

1147 Blackman – Branigan 1977, 13.

1148 Kalantzopoulou 2022; also, the forthcoming publication of Xenaki's dissertation (related to her presentation "A view from the mountain's top: modelling the use of mountainous areas in eastern Crete" presented on January 9th, 2024, at the British School at Athens).

isolation, as, despite what their access possibilities to the north may be, the coastal sites present a similar level of connectivity between them, being in generally even distance between them and spread in a way that makes best use of the natural harbours and the relatively few even areas. Furthermore, throughout most of history, the settlements on the coast of the Asterousia, from Cape Lithino and Martsalos to the west until the Viannos region to the east, exhibit common patterns in their social trajectories, allowing them to be considered within a common regional framework, and they should first be addressed as a whole, as was presented in Chapter 3, before focusing on the central Asterousia in the following chapters.

The social trajectory within the Asterousia region is characterised by homogeneity, primarily shaped by the significance of harbours and their role in sustaining life.¹¹⁴⁹ The mountainous areas, although utilised for economic purposes, have a thinner width compared to other mountainous regions in Crete. Unlike places like Lasithi, the Asterousia lacks extensive plains that could serve as a permanent anchor for settlements. Instead, the utilisation of areas and the presence of communities are intrinsically linked to the presence or absence of harbours below, that would determine the need for, and the frequency of use of, the available routes.

It is important to note that the analysis of Asterousia in Chapter 3 is based on evidence from the western part of the Asterousia, up to Lebena, and from the northern side of the Asterousia, at the edge of the valley; Vasilakis' work in Trypiti represents the closest that analysis has been made on the eastern side of the central Asterousia. However, new finds in the areas of Ayios Ioannis and Salamias would indicate that this image needs to be updated.

11.3 Harbour Areas Connected to Koumasa

As discussed earlier, one of the objectives of this work, as outlined in its goals, was to investigate the connection between the settlement of Koumasa and the sea. This investigation was prompted by the need to provide an explanation for several aspects, including the opulent nature of the settlement; the presence of storage features in LM architecture, the evidence of MM storage activities revealed in modern excavations, and the concentration of EM tholoi, but also the decline in the Postminoan periods. The evidence suggesting that fish served as a primary source of nutrition for individuals interred in the tholoi added an extra dimension to the inquiry.¹¹⁵⁰ The presence of seashells, triton shells, and pebbles, likewise suggested a connection to the sea. The walking expeditions undertaken in central Asterousia, the most relevant of which are detailed in Chapter 11.1, demonstrated the potential routes to access Trypiti, Salamias,

1149 McEnroe 2010, 24; Vasilakis – Sbonias 2018, 281.

1150 See Footnote 429.

and Ayios Ioannis from the Messara region. Among these, Koumasa appeared to be the most strategically positioned, especially for reaching the latter two areas.

These regions exhibit signs of activity, which, while comparable to the better-known evidence in the western Asterousia, is somewhat less visible and less explored, with the exception of Trypiti.

11.3.1 Trypiti

Trypiti was first mentioned in the reports of Evans and Pendlebury, as seen in Chapter 11.1.1, while more information was offered by the excavation of the EM settlement by Vasilakis. Beyond this, with regards to the neighbouring coastline, we rely only on surveys, such as the Survey by Vasilakis extending to the Phylakas region, at the west of Trypiti bay, the wider survey of west Asterousia and the more recent ones by Nowicki.¹¹⁵¹ The distribution of places of archaeological interest is seen in Figure 100.

As to the earliest phase of habitation, a LN presence has been identified on the southern edge of the Trachoulas promontory, based on sherds and chipped stone. Its low defensibility is noted, as opposed to the trend characterised by the settlements of the next period (location d in Figure 100).¹¹⁵² The first location in the area, which includes building structures, seems to be the Trypiti Maroulas settlement at the summit, which includes buildings and a defensive enclosure, dating to FN II–EM I (location b in Figure 100). It is arranged in three terraces, with a total surface area greater than 2,000 m².¹¹⁵³ Its position overlooking the opening in the rocks (that “Chasm” in the words of Evans) that opens up into the Trypiti plain, and with an elevation of 1.1 km., can only be characterised as strategic and defensive.

An EM presence in the area is established by the tholoi. Beside the known tholos to the east of the EM settlement, two tholoi are recorded about 500 m. west of the Phylakas promontory,¹¹⁵⁴ while another structure that possibly constitutes a tholos is located around 100 m. west from it.¹¹⁵⁵

The settlement “Stou Adami to Korphali”, excavated by Vasilakis, offers additional insight on the defensible aspects of the settlements and on their economy.¹¹⁵⁶ The connection to the sea-economy is obvious with a high number of seashells from secure EM II contexts. More than 4,000 pieces were found, constituting the biggest concentration of seashells encountered in an archaeological site on Crete and the third largest

1151 Vasilakis 1989, Vasilakis – Sbonias 2018; Nowicki 2014; 2018.

1152 Nowicki 2018, 37–38; location 312.

1153 Nowicki 2018, 24–25.

1154 Vasilakis 2000, 124.

1155 Vasilakis – Sbonias 2018, 284.

1156 Vasilakis 1988; 1995.

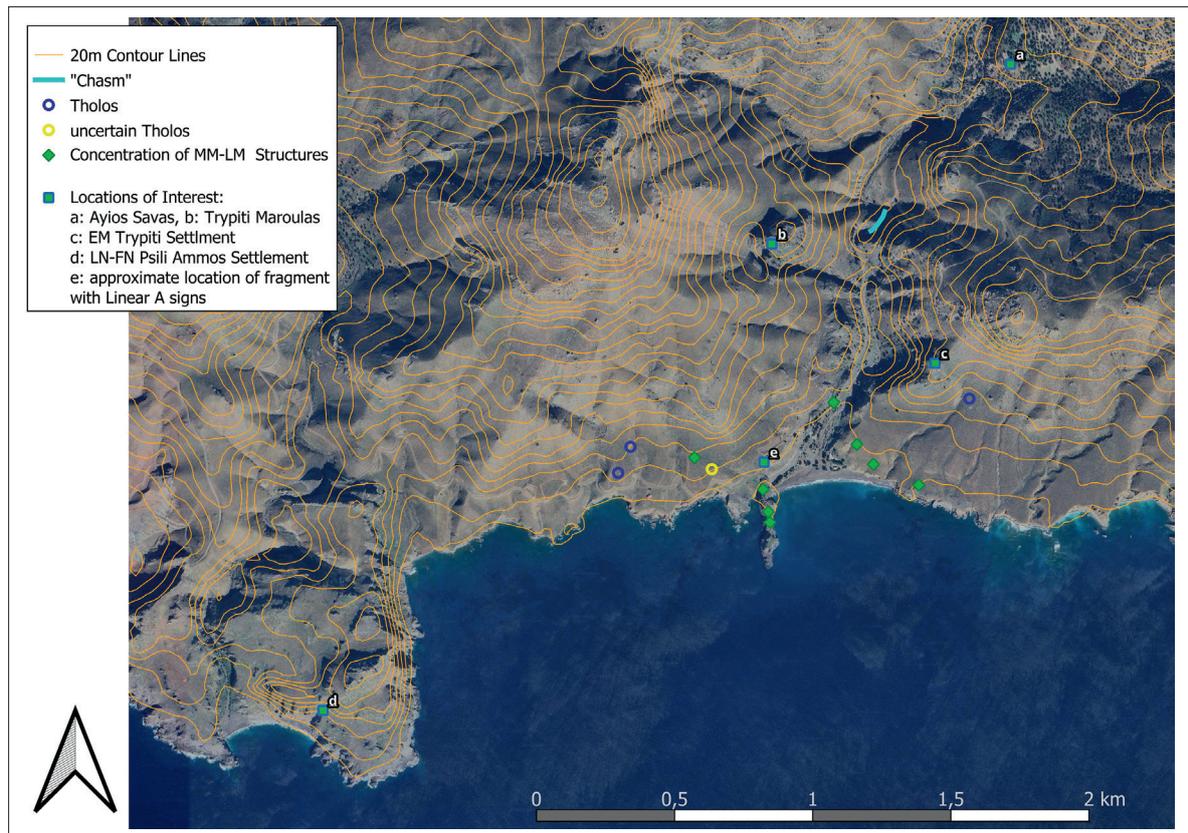


Figure 100: The area around Trypiti with locations of archaeological interest. To the east overlapping with the map in Figure 102.

within the Aegean, after Polyochni in Lemnos and Archontiko in Giannitsa. In addition to the practical motivations of nourishment, food consumption has been associated with a form of cultural expression, in this case a direct link to the sea.¹¹⁵⁷

Regarding the MM and LM periods, within his survey project in Trypiti, Vasilakis documented the existence of habitation scattered around the shore in the Protopalatial or Neopalatial periods, which included buildings, and a concentration of pottery.¹¹⁵⁸

Beneath the EM settlement (Kalokampos plane), scattered pottery can be seen, whilst the sherd density increases in the lower parts near the sea, although they extend over the whole area. Standalone buildings coincide with this distribution. The existence of buildings closer to the sea and with easy access to it, indicate that securing a fortified position was not a priority in this era. On the Phylakas promontory, a settlement was observed with a development phase extending from MM I to MM II, while the pottery is also dated to LM. The settlement is characterised by standalone buildings with 20 to 30–35 m. between them. The pottery from this region is mainly MM and LM, but

1157 Veropoulidou – Vasilakis 2018, 178–182.

1158 Results of a survey published in Vasilakis – Sbonias 2018, 275–290.



Figure 101: View from the Kalokampos and the area of the tholos looking westwards, with the promontories of Phylakas and Trachoulas in the background.

the presence of EM I and EM II pottery was also noted, possibly associated with the tholoi.¹¹⁵⁹ The layout falls under the typical pattern of harbour sites.¹¹⁶⁰

Since the Protopalatial period, the area evolved to constitute a significant harbour region, as there is a dispersion of building activity and habitation in MM to LM across the entire Trypiti plateau, as evident by the pottery and architecture remains near the shore and on Phylakas.¹¹⁶¹

The area directly north of Phylakas has not yielded results, as it has been disturbed by modern activities, but a continuation of the settlement pattern is assumed. It is noteworthy that this is the area in which Evans recorded MM II and LM I pottery and found a fragment of a clay larnax inscribed with Linear A signs (approximately by point e on the map above).¹¹⁶² Evans' own observation of MM II and LMI pottery in the area fits well with the narrative of a coastal settlement, whereas the Linear A fragment could

1159 Vasilakis – Sbonias 2018, 283–284.

1160 Vasilakis 1991/93, 295–6; Vasilakis – Sbonias 2018, 284.

1161 Vasilakis 1991–93, 293; Vasilakis – Sbonias 2018, 282.

1162 *Knossos II*, 83, Fig. 40.

allude to ritual activity in the region, which would fit in the area's role as a trade node, in connection with the wider Messara context.¹¹⁶³

It is indicated that habitation was dispersed, as the buildings seem scattered, and although the majority of the finds are palatial, there is evidence of habitation from the beginning of the Minoan period, as the two main clusters on either side of the Trypiti bay are located near tholoi.¹¹⁶⁴ The lack of centralisation is indicative of the absence of direct threats or of a temporary use of the facilities, as no great agricultural activities can be assumed for the region. The continuation of habitation in the area of the tholoi, albeit in a different way, being more drawn to the sea, is, for Vasilakis, an example of a divergent trajectory, that is paralleled in other areas such as Doukiania in the Kephali area of western Asterousia.¹¹⁶⁵ Elements supporting an administrative function for Trypiti – needed in order to assume a trade centre – could be suggested by the cultic activity, alluded to by Linear A evidence described above.¹¹⁶⁶ This function could be considered to have helped in maintaining the settlement structure in this area; in this respect, the connection with the Messara, particularly the Apesokari and Koumasa regions, could have aided in this stabilisation. This connection has most recently been argued by Flouda.¹¹⁶⁷

Finally, along the western part of the shore Evans noted buildings that he dated as Minoan.¹¹⁶⁸ These, however, are not recorded in subsequent research. Pendlebury mentions a Geometric settlement which is also not easy to identify, possibly relation to the early Roman structures.¹¹⁶⁹ These are the only secure post Minoan activity, with a group of structures at the beginning of the beach, along the stream, mostly destroyed by locals.¹¹⁷⁰

11.3.2 Salamias

Salamias bay stands out as perhaps the most isolated and rugged of the areas under consideration. It features a seashore in the shape of an arc, with a length of approximately 750 m., which accounts for only the walkable portion of the bay. As one moves

1163 To be noted that the only other known sample of Linear A from central Asterousia is from the Kophinas peak sanctuary (see Footnote 1228).

1164 Vasilakis – Sbonias 2018, 283–285.

1165 Vasilakis – Sbonias 2018, 285–286.

1166 Showing cult practice akin to that shown in larger centres or sanctuaries, alluding less to a local tradition and rather following a trajectory parallel to that of the wider Messara.

1167 Flouda 2023, 65–66.

1168 *Knossos II*, Fig. 39.

1169 Pendlebury et al. 1935, 88; Pl. 12d.

1170 Two Rooms of a building originally containing five rooms were possible to investigate, with a dating in 1st century BCE. to 1st century CE, but most of the structures were destroyed (Vasilakis 1992, 561–562).

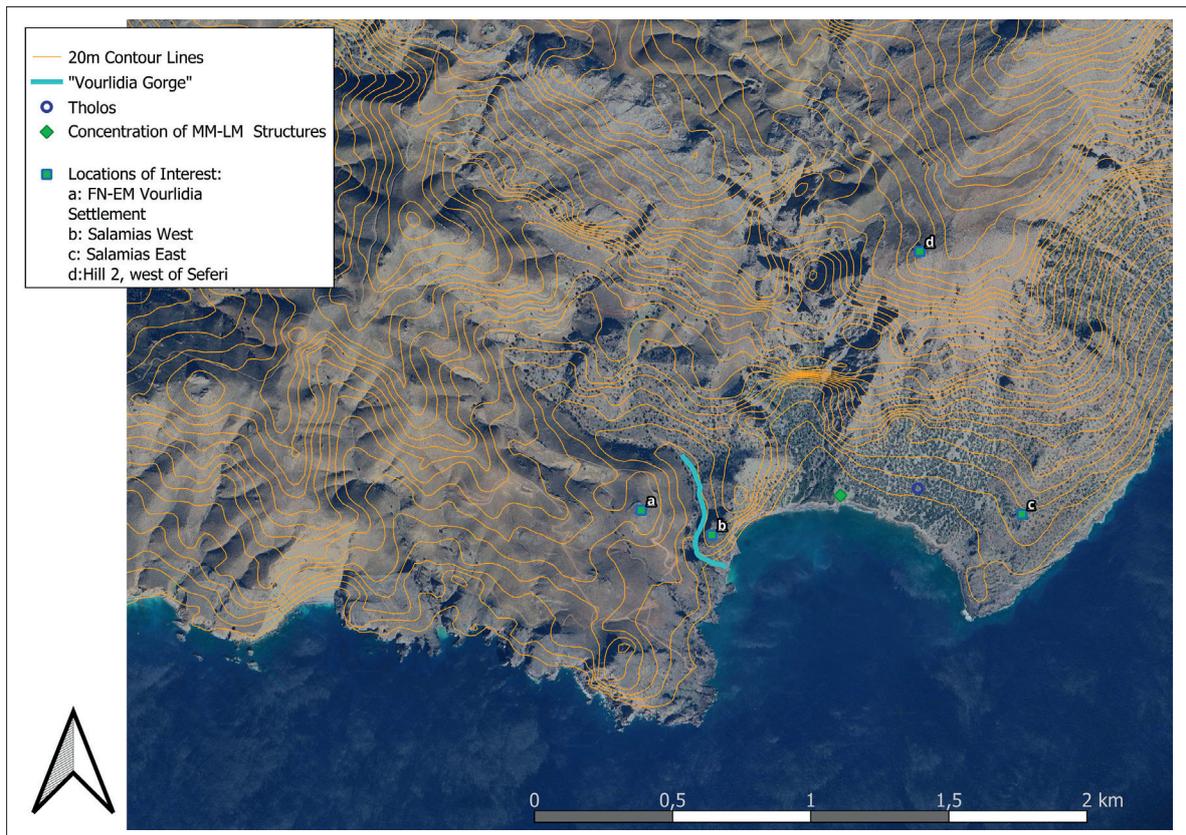


Figure 102: The area around Salamis with locations mentioned. To the west, overlapping with the map in Figure 100.

northward, the terrain becomes steeply inclined, limiting habitable areas to a maximum of 15 to 18 hectares at most. In recent times, starting in the early 20th century, this area was used for salt collection. Salt was transported to Kapetaniana using donkeys, a practice that persists today with the use of boats towards areas connected with the street network.

Apart from a couple of sheds related to this recent activity, the only other man-made features are the following: a tholos located 140 m. from the sea, measuring 5.2 m. in diameter, with a still-standing trilithon door and a vestibule and two rows of large stones that remain upright (see Figure 103). In a brief description, Kanta characterised it as MM without specifying if any finds were seen.¹¹⁷¹ Solely based on the architecture, as very fragmented pottery sherds could not be dated by the author, an EM dating for the construction seems possible.

Approximately 280 m. to the west, directly above the bay's centre, rows of stones arranged in clear lines suggest the presence of a complex of connecting walls, indicating the existence of at least three buildings. Most of these structures are integrated with the

1171 Kanta – Serpetsidaki 2015, 59. See also discussion above, Footnote 423.



Figure 103: View from the Salamias tholos towards SE.

natural bedrock, while a free-standing rectangular building measuring 20 m² is situated 20 m. to the west of the complex. Kanta, in her description, also found MM pottery.¹¹⁷² Nowicki dates it as EM–MM I.¹¹⁷³ The pottery fragments seen by the author include undecorated light ochre pieces crafted from fine clay and segments of coarse reddish cooking ware, all compatible with a MM to LM I dating (see Figure 104). Architectural elements could also be aligned with a LM I dating. Other pottery fragments were seen in the shoreline area, mostly near the Minoan complex. Nowicki identified some sherds to the east of the seashore as FN II–EM I.¹¹⁷⁴

Three more locations have been identified on either side of the gulf of Salamias, almost symmetrical in relation to the complex described above, at the centre of the bay. The first (point b, Figure 102), which is 500 m. west-southwest from the complex, at 70 m. from sea level, is on the hill separated from Vourlidia via a walkable but steep gorge. (the view from this hill towards the bay eastwards is seen in Figure 105). Access

1172 Kanta – Serpetsidaki 2015, 59.

1173 Nowicki 2018, 23.

1174 Nowicki 2018, 23.



Figure 104: Scattered sherds near the Salamis coast.

to it is possible only from the north, via going uphill either from the Salamis bay or from the Vourlidia stream bed, the latter route being very steep.

The defensible nature of the position was noted by Nowicki, who identified the location as a FN II–EM I settlement, laid out in two parts, the lower one being a terrace with an area of 30 by 30–40 m., where the FN II material was located.¹¹⁷⁵ The upper part was rich in pottery, including examples of the red ware fabric group and pithoi fragments, which Nowicki identifies as the same type as examples found on sites on the coastal strip of the Asterousia coast and contemporary sites elsewhere, extending to the east Siteia region, in itself an indication of the seafaring activity in this early period.¹¹⁷⁶ On another hill, west of the Vourlidia ravine, another FN II–EM I site was located,

¹¹⁷⁵ Nowicki 2018, 22; No. 204 in his Gazette.

¹¹⁷⁶ Nowicki 2018, 22–23; Pl. IV.



Figure 105: View of Salamias bay from its western promontory.

covering an area of ca. 500 m² (point a on the map of Figure 102). As part of his theory of the external colonisation of the seashore of Asterousia, Nowicki interprets this location as a fort built by the first settlement with the purpose of securing the area from any aggression coming from the north (implying from the Messara population).¹¹⁷⁷ The author sees it rather as an establishment on the other side of the relatively steep ravine, offering a fortified point for the plateau of Vourlidia, which extends over a large area towards Trypiti, with its fortified position reflecting that of early habitation sites in the area, without any particular targeting to any direction other than towards the sea.¹¹⁷⁸ The duality of these two locations reflects the two locations of Trypiti, the EM settlement and Trypiti Maroulas, as seen above. Nowicki does not provide another gazette number for this second hill. The third location shows usage through different eras,

1177 Nowicki 2018, 23.

1178 Noteworthy is such a fortified use in the modern era, during the Second World War, with a German fort or observatory still standing ca. 300 m. south of point a, overlooking the Vourlidia and Salamias bays. The lower part of the 10 × 6 m. structure still stands today.

covering FN II, EM, LM and Graeco-Roman periods, as the pottery remains show.¹¹⁷⁹ Rows of stone indicate structures (two or three, according to Nowicki) from different chronological phases. This location is documented in Figures 102 and 107 as point c. Sherds that could be considered Roman were also seen on Hill 2, as discussed above (point d in Figure 102).

11.3.3 Ayios Ioannis

On the route to Ayios Ioannis (designated as Path 4 on the map of Figure 92), the path traverses the stream bed of Gerakia, where the cave of Peristerias is situated along the shoreline. The point where the path meets the stream bed is located at the 2.9 km. point, or 1.36 km. when approaching from Ayios Ioannis (see Figure 106). On the western side of this stream, to the south of the path (Peristerias ridge), a circular man-made structure, defining the perimeter of a tholos, was shown by the guide but could not be closely investigated.¹¹⁸⁰ According to accounts from local residents, there are two additional such structures in the vicinity.¹¹⁸¹ If verified, these would represent three previously unknown tholoi in the area. It is worth noting the presence of the Peristerias cave, where locals have mentioned the discovery of antiquities. However, further details were not readily disclosed, as this area is associated with illicit networks involved in the illegal trade of antiquities. A future survey of this area to substantiate these claims and, at the very least, to visit the aforementioned cave, constitutes a *desideratum*.

The bay of Ayios Ioannis is notably more hospitable for habitation compared to Salamias, as it offers a habitable area exceeding 35 hectares, providing ample space for agricultural activities, which are still practiced there by modern inhabitants.

At the shoreline of Ayios Ioannis, situated directly west of the main promontory (place name Plaka), a total of 21 structures were observed and surveyed by Hadjidaki. These structures yielded pottery from EM II and MM III periods and possibly LM.¹¹⁸² This complex extends for approximately 500 m. along the seashore and stretches 600 m. northward towards the mountain (see indication of MM–LM structures in Figure 107). Some of the walls within this complex reach lengths of up to 8 m. Additionally, a reef in its direct vicinity appears to have been adapted for use as a mole or breakwater, with enhancements made to its northern portion.¹¹⁸³ However, the raised sea level should

1179 Nowicki 2018, 23.

1180 The potential tholos has been recorded by Goodison, dubbed as Tholos x in her forthcoming new catalogue. The existence of a doorway, even if badly preserved, and the structure's diameter of 3 m. leaves few other possibilities for the purpose of this building.

1181 As the goal was documenting the pathway, deviations from this or other paths were not made. Further investigation will be undertaken in the future.

1182 Hadjidaki 2004, 59.

1183 Hadjidaki 2004, 55–56.



Figure 106: View of Ayios Ioannis Bay as approached from the west (photograph taken along Path 4 [see Figure 92], after crossing the Gerakias ravine, a little after bypassing the tholos and the Peristerias Cave).

be taken into account (see Chapter 3.4.1). This location served as the point to which Paths 4 and 5 of Figure 92 extend.¹¹⁸⁴ For the tholos mentioned above and the Peristerias cave near it, see Figure 107. Aside from the Minoan harbour facility, no other Minoan activities are known from the bay itself. At the Ponta promontory, there are also Minoan-built structures recorded.¹¹⁸⁵

To gain insight into the topographical characteristics of this region, the evidence for Post-Minoan activities at the site are worth examining. Possible connections with the Asclepius cult were presented in Chapter 3.5.¹¹⁸⁶ The only other period with secure use of the area is documented in the Late Byzantine period. Before reaching the village of Ayios Ioannis, the path passes by the eponymous monastery, constructed within shallow caves and adorned with wall paintings dating back to 1360 CE (point a in Figure 107). Furthermore, approximately 2 km. to the east, the Ayios Antonios church was

1184 For a sketch of the structures at the Plakias bay, see Hadjidaki 2004, Fig. 4.3, 4.9, 4.10.

1185 Vasilakis 2017, 77.

1186 See discussion on pages 53ff., 62.

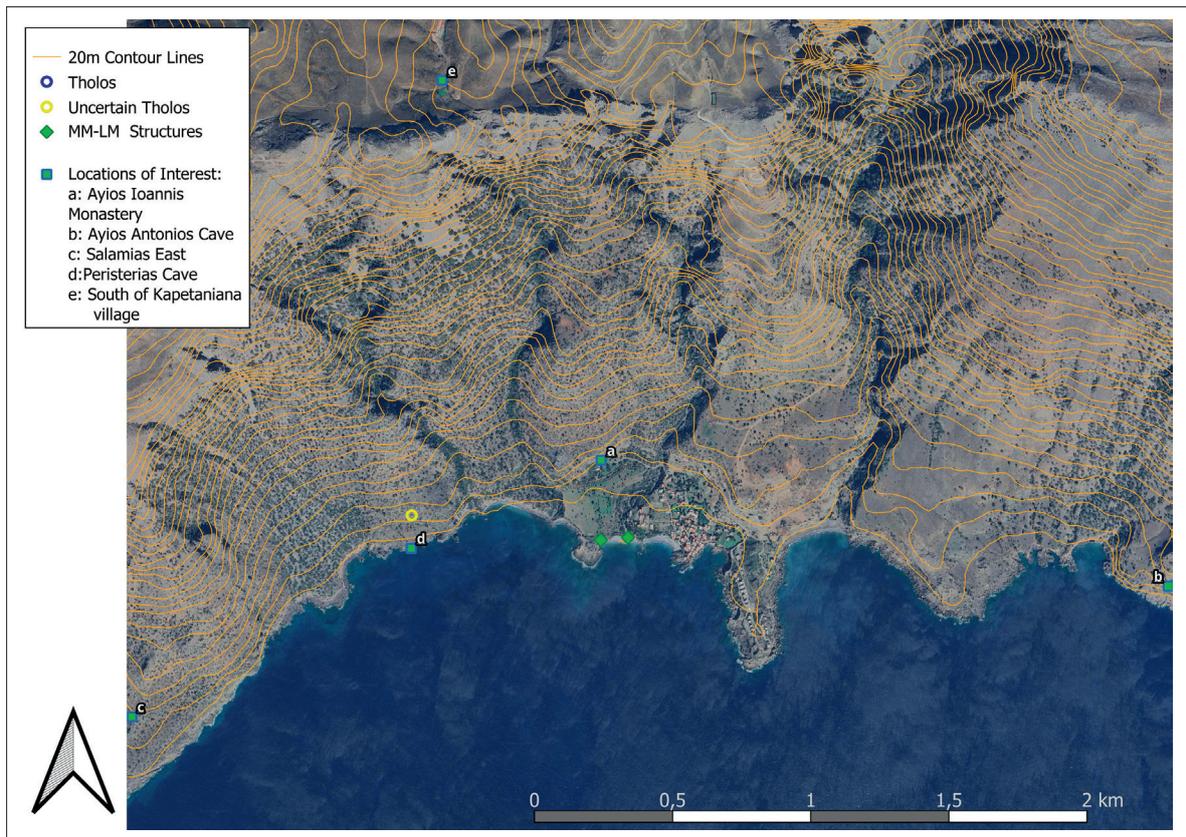


Figure 107: The area around Ayios Ioannis with locations mentioned. To the west overlapping with the map of Figure 102.

established within a cave, also in the 14th century (point b in Figure 107).¹¹⁸⁷ This monastic activity aligns with the upsurge in monasticism throughout the entire Asterousia region. Its spiritual centre was situated to the south of Kophinas, led by Philagrios, a prominent figure in the new wave of monasticism in the area. His teachings emphasised dwelling in caves, and he was particularly active after 1367 CE. In 1393 CE, he founded the Tris Ierarches church, located along the route from Kapetaniana to Kophinas, which subsequently developed as the spiritual hub of this movement.¹¹⁸⁸ The church of Ayios Michail, located 500 m. east of Kapetaniana, was established in the 14th century, and the decoration of the Panayia church in Kapetaniana was completed in 1402 CE, with both facts attributed to the proximity of Kapetaniana to Tris Ierarches.¹¹⁸⁹ The presence of the churches of Ayios Ioannis, the closest cave complex to the centre of this monastic movement, suggests a connection with the three paths linking Kapetaniana and Ayios

1187 Andrianakis – Papitsoglou 2012, 137.

1188 Paliouras 2017, 13–14.

1189 Andrianakis – Papitsoglou 2012, 136; Paliouras 2017, 14.



Figure 108: View to the Ayios Ioannis bay from the north. Photograph taken along Path 5.

Ioannis. The most direct of these paths is described in Path 5 above. The presence of cisterns in both monasteries also underscores the common challenge of water scarcity in the region.¹¹⁹⁰ But in general, this bay is more amenable to habitation, based on its space and possibilities for arable land, than Trypiti and Salamias. For Ayios Ioannis, Hadjidaki argued against the possibility of self-sustained cultivation in this area, although the feasibility of such cultivation, albeit challenging, cannot be entirely ruled out, particularly if small-scale agriculture was practised. Her argument gains validity, however, when considering the Salamias complex. The existence of the Salamias tholos, along with the potential tholoi near Ayios Ioannis discussed above, suggest the presence of permanent habitation.

1190 Andrianakis – Papitsoglou 2012, 137.

11.3.4 Discussion

The existence of habitation and harbour functions in these coastal regions in the period coinciding with the palaces raises the question of dependency. Certainly, the larnax fragment carrying Linear A in Trypiti would speak for this argument, or at least for the interaction with networks bearing palatial ideology. Regarding Ayios Ioannis, Hadjidaki correctly observed that a dependence on centres such as Phaistos is unlikely, due to the considerable distance. She instead posited that these coastal communities relied on trade with the Messara region, exchanging their marine resources for goods imported through seaborne trade.¹¹⁹¹

Focusing on a chronological examination of central Asterousia's topography and communication networks, there is an ongoing debate about the role of external influence in developments during the FN, given the lack of continuity from the LN period, versus seeing the changes in Crete as an internal development.¹¹⁹² In both cases the communication of mountain and valley is of relevance.

The Prepalatial period encompasses the appearance and development of settlements and the tholoi culture (see Chapter 3.1). The expansion of those east of Trypiti, as the new evidence from Salamias and Ayios Ioannis shows, and the presence of a tholos at Tris Eklissies,¹¹⁹³ i.e. the eastern Asterousia, alludes to an expanse of this culture along the southern shore of Asterousia. As discussed in Chapter 9.3, the association of tholoi with nearby settlements was presented, focusing on issues of ownership.¹¹⁹⁴ Another explanation that has been proposed for the positioning of settlements and tholoi in the central Asterousia region is based on the topographical characteristics of the landscape, and attempts to link them with the functional needs of each type of establishment (see Chapter 9.4).

These proposals are applied in the area under study: the new evidence from Salamias and Ayios Ioannis aligns with the broader narrative. For instance, the Salamias tholos is situated between earlier and contemporary settlements: 750 m. from the settlement of Salamias West (dating from the FN II–EM I period), 350 m. from the settlement at Salamias Vourlidia (points b and c in Figure 102), and 280 m. from the palatial complex on the shore. Furthermore, the Salamias tholos is positioned alongside a stream bed, the smaller of the two seen in the Salamias bay, fitting the pattern regarding waterways discussed in Chapter 9.3.3.

Similarly, the tholos near Ayios Ioannis is located near the Gerakias ridge, and approximately 1,300 m. from the settlement Salamias East and about 1 km. from Ayios Ioannis (Figure 107). This tholos, although at a relative distance from the two closest

1191 Hadjidaki 2004, 59. See discussion on page 309.

1192 Nowicki 2011–12, 8.

1193 See Footnote 908.

1194 See Footnote 974 and discussion on page 253.

known settlements,¹¹⁹⁵ is nonetheless in proximity to the ravine of Gerakias. In these cases, it appears that the position of the tholoi is determined by their proximity to running water rather than any specific settlement. Similarly, the tholos at Trypiti is located only 20 m. from the stream bed, indicating a closer association with the water source than the settlement 180 m. uphill. Expanding the view to the nearest mountainous tholoi, this holds true also for Krotos, while the Christos tholoi is situated near the Ayia Paraskevi ridge, suggesting the presence of a settlement or fort. Their position is less than 400 m. from the stream bed, which is further than the average distance of the other tholoi to streams, although still within the margins discussed above. One further possible explanation for this placement could be related to the observation that the location of this tholos is concealed behind the peak at the beginning of the gorge. This arrangement may have been deliberately chosen for security reasons or other factors, although the exact motive remains speculative.

By considering the landscape's influence on settlement patterns and the functional needs of tholoi, research can gain insights into the dynamic interplay between human communities and their environment in central Asterousia with a broader application of this methodology.

Moving to the main period of harbour usage in the area, and with reference to Hadjidaki's assessment of the assumed settlement of Ayios Ioannis and its codependent trade network with the Messara discussed above,¹¹⁹⁶ this line of investigation interestingly runs parallel to the discourse that has emerged regarding the earliest habitation of the area during the FN period.¹¹⁹⁷ This discussion centres around the concept of distinct groups inhabiting the southern coast, potentially maintaining separate, and even antagonistic, relationships with those in the Messara region. Nowicki's research further supports the notion of separate and potentially contrasting groups residing on either side of the mountain. Summarising his observations on five sites established in defensive positions on the northern slopes of the Messara, spanning from FN I to EM I, he wrote that: "their defensive characteristics are located more on the Messara than the Asterousia side. They dominated the Asterousia foothills, often lying near settlements (their successors) founded in the late EM I or early EM II period on lower hills, closer to the plain or on the plain itself. The defensible characteristics of these sites and their later fate indicate that the northern edge of the Asterousia mountains was for some time at least (approximately during the last centuries of the fourth and the first centuries of the third millennium BC), a division line between different groups of people confronting each other rather than building up a single community".¹¹⁹⁸

1195 With the distance being normally less than 400 m.; see Footnote 945. The unexplored nature of this area should, however, be taken into consideration.

1196 See Footnote 1191 and the presentation of the area on page 309.

1197 Nowicki 2018, 7–9.

1198 Nowicki 2018, 8–9.

This notion corresponds with the perception of these harbour sites as secluded settings. While the evidence from these locations spans various periods of the Minoan era, particularly the timeframe from EM II to early LM occurs in all sites discussed here. This overlaps with the main phase of presumed interactions between Koumasa and the three harbour regions.

A methodological concern arises in this chapter, as it involves examining the relationships between various locations across different time periods. The framework used for this analysis primarily focuses on landscape characteristics and their potential significance in facilitating interactions. The topography constitutes a palimpsest of repeated activity, always bound by the margins defined by the constant background that is the landscape. It is important to clarify that this approach does not imply that the societies of the FN, Bronze Age, Greek/Roman periods, and the Byzantine monasteries, along with the pre-modern inhabitants of Kapetaniana, operated under the same behavioural patterns or shared social structures. However, they did exist within a common landscape and faced similar challenges related to mobility. The exploration of the opulent characteristics of Koumasa and its potential connections to the seashore is one of the main aspects of this work. It is within this context that the examination and evaluation of interactions spanning different historical periods play a crucial role in shedding light on the historical dynamics of the region. This approach enables us to gain a deeper understanding of the role of the landscape in facilitating human activities and relationships across time.

Hadjidaki's solution to the question of dependency, positing autonomous settlements as a counterargument to a dependence on Phaistos, may inadvertently fall into the logical fallacy of a *false dilemma* by excluding the possibility of relationships with centres closer to these shores. Furthermore, it predisposes a hierarchical structure for settlement interrelations. Taking Kapetaniana as an example, the village's interactions with Salamias and Ayios Ioannis in the 20th century, where the latter was settled by residents from Kapetaniana, as well as the Late Byzantine period when monastic life expanded from the area of Kapetaniana and Kophinas to Ayios Ioannis, underscores the interconnectedness of these regions and the role a centre on the mountain has with the settlements on the shore. This role for the Minoan times could have been Koumasa, based on the evidence presented. However, this interconnectedness does not necessarily indicate interdependence, but rather an extension of the activities of the more privileged mountainous region, with its further resources from the valley. It reflects a sense of homogeneity rather than stark differences between these communities.

The degree of homogeneity and shared group identity between the shores of Ayios Ioannis and those of Kapetaniana and Kophinas is based on the relative vicinity and the exclusivity of their connection. As demonstrated by the explored paths, the connectivity between these harbours and sites in the Messara, with Koumasa being the closest, allows for daily travel back and forth. Being thus the main hub, it is plausible that the harbours were under its sphere of influence or rather, that they belonged to the same cultural-economic subgroup of the wider Minoan world.

11.4 The Central Asterousia Ecosystem and the Role of Kophinas as a Cultural Anchor

As mentioned above,¹¹⁹⁹ the existence of the trade route to the Near East is considered vital for the existence of the assumed Phaistian state, but also as a lifeforce to the region of central Asterousia, independently of the existence of a wider state. The presence of harbours to the south of Asterousia and settlements on the northern side of Messara suggests a co-dependency, forming a local ecosystem. During periods of higher central authority, this system could have been integrated into the broader structure of a Phaistian state, represented by the expansion of Phaistian-style material and later to the Knossian. In times of fracture, this local system might have provided a degree of autonomy to the wider central Asterousia region. Further, this proliferation of a Phaistian style could be seen as an internal development of local elites, imitating the central influence, rather than understanding it necessarily as imposed.

The role of the Kophinas sanctuary as a binding element for the nearby settlements should not be underestimated. Reachable from the Messara, through routes that, amongst others, start in the Koumasa region (see Path 6 in Figure 92), the pilgrim would have an overview of the small harbours of the southern Asterousia, starting with Salamias and Ayios Ioannis and optically reaching westwards to Lentas, Kali Limenes and Cape Lithino at the furthest reach of Asterousia.¹²⁰⁰ It acts as a topographical anchor for the senses, a point of reference and recognition from both sides of the mountain; for sailors and for farmers of the Messara. The posited role of Koumasa in relation to this sanctuary is based, as mentioned, on the fact that it lies among natural paths for those in the western and central Messara, which could be seen related to the figurine parts seen in Koumasa.¹²⁰¹

The ritualistic use of Kophinas fits Hodder's approach perfectly, in the sense that both the location and most of the finds there denote something deliberately odd; it does not fit a functional or economic explanation and is unusual, striking, and symbolic when placed within its temporal and spatial context.¹²⁰²

The site, discovered in 1959 by Nikolaos Platon, was excavated first by Platon and Davaras in 1961¹²⁰³ and further in 1991 by Karetsou and Rethemiotakis.¹²⁰⁴ It consists of an approximately 240 m² rectangular area, at 970 m. above sea level, just below the actual peak on its northern side, in the location called Mezzolati.¹²⁰⁵ A large amount of

1199 See Footnotes 1053, 1058, 202.

1200 See Figures 47 and 48 and discussion in Chapter 11.1.4.

1201 Panagiotopoulos 2022b, 330; see also Panagiotopoulos 2013, 425–426; 2018, 480, Fig. 7.

1202 Hodder 1982, 164.

1203 Platon – Davaras 1961; Alexiou 1963.

1204 Karetsou 2014. The later excavation was in response to illicit excavation carried out previously.

1205 Spiliotopoulou 2015, 281.

ceramics were unearthed, predominantly consumption ceramics.¹²⁰⁶ While later Geometric to Hellenistic pottery was also found,¹²⁰⁷ the majority of the Bronze Age finds are Neopalatial, with the earliest finds dating to the early MM III, with its main period covering the entire MM III.¹²⁰⁸ Later usage phases are indicated until LM IA, although there are some LM IB finds, with a resurgence in LM III C.¹²⁰⁹ The cultic presence, as expected in a peak sanctuary, is indicated by a large amount of figurine shards, mainly of animal figurines (exceeding 5,000 in number), and more than 3,000 human ones, mostly representing male figures.¹²¹⁰

An interesting subcategory of the clay figurines are 18 boat figurines.¹²¹¹ Another sea-related find is a 6 cm. bronze fishing hook, indicating the association of the votives with the local means of prosperity, which fishing activities had provided.¹²¹²

The homogeneity of the clay of figurines assumed a local production, however they show a similarity of technique with that of other distant places. If the travelling workshop theory proposed for the Kophinas find is assumed true, this would be an explanation.

As for the role of the mountain peaks, a more modern explanation for their emergence involves the adaptive character of man – nature relations on the basis of the existing climate. As discussed in the chapter dealing with the events of climate change, the emergence of cave worship, as well as the peak sanctuaries, is correlated with the aridity event around the beginning of MM I.¹²¹³ Taking this factor into consideration would offer an explanation for the development towards a usage of this landscape that extends beyond just using the paths or seasonal grazing pastures while the mountain maintained a passive role, towards interacting with it as an active landscape, not only as a transition or separation area, but that of more active dwelling and connecting, or as Moody put it, a change from a natural landscape towards a sacred landscape.¹²¹⁴ This would also hold when considering the theory that the peak sanctuaries succeed the tholoi as focal points of religiosity.¹²¹⁵

1206 Conical cups dominate the finds (Karetsou 2014, 128–134).

1207 For the function of this area in historic times, see Footnote 262 and discussion on page 54ff.

1208 Karetsou – Spiliotopoulou 2018, 167.

1209 Spiliotopoulou 2015, 285. For the repurposing of older cultic sites in the LM III C, see Footnote 223.

1210 Karetsou – Spiliotopoulou 2018, 169. Of interest is also a fragmented bull-head ceramic Rhyton (Spiliotopoulou 2015, 285).

1211 The catalogue of which is to be seen in Karetsou – Spiliotopoulou 2018, 171–173. Although some are fragmentary, the largest dimension is assumed to be 30 cm.

1212 Karetsou – Spiliotopoulou 2018, 169.

1213 See Footnote 494.

1214 Moody 2009, 241; Stevens 2023; Dal Zovo 2023, 65.

1215 Perrakis 2021, 75–76.

Central in the mountainous landscape, the surroundings act as a palimpsest, under the influence of a certain agency emitted diachronically as an ever present cosmological projection.¹²¹⁶

Discussion

The figurines and the boat offerings can be attributed to Aegean ritual within the methodological criterion of them being characteristic signifiers that defy a domestic explanation,¹²¹⁷ and, for that matter, in the case of marine symbols with a signification that mirrors certain notions that are particular to the dwellers in the area.

Most approaches to prehistoric ritual in the Aegean have treated it as a separate domain of activity, in isolation from the domestic or that which is daily, familiar, and habitual.¹²¹⁸ That is certainly the case with the peak sanctuary of Kophinas (if not for peak sanctuaries in general), where analyses, when not focusing on the finds, tend to focus on qualitative comparisons with other peak sanctuaries, and less on the integration of this sanctuary within the surrounding environment, with topographical notions usually linked with the traditional preoccupation with intervisibilities, that tends to put secondary focus on the immediate lived landscape;¹²¹⁹ for example, the distances towards it, and the experience of visiting it for the participants of the ongoing ritual in peak sanctuaries as part of the mountainscape.¹²²⁰ The route coming from Koumasa, and, by extension, those approaching from the western Messara (as presented above), takes 3 hours and covers 12.25 km. From the sea, access to the plain of Kapetaniana, and from there to Kophinas, is accessed also from Salamias (at the junction of Paths 2 and 5 at Seferis) and Ayios Ioannis (along the first portion of Path 5). From Trypiti, Path 1 should be followed at least until Ayia Paraskevi before going eastwards, or continuing until Koumasa and walking from there. From the east, e.g. Tris Ekklesies, other paths lead to Kophinas from the east, and from eastern Messara, the paths from the area of Panayia lead southwards to the peak.

The arrival from the north requires climbing a significant distance. Those arriving, taking the route from Koumasa into consideration, are coming from further inland – from the Messara, passing near the Koumasa region, which would offer a pit stop, or starting from the region of Koumasa itself. The arrival at Kophinas is denoted by the wide view of the sea with the southern harbours, coming abruptly in contact with the sea after the liminal point, mentioned above, west of Kapetaniana. In this regards, offerings of a marine type would indicate an acknowledgment of the transition to a liminal realm, coming into contact with the seascape, otherwise foreign to the everyday life

1216 Dal Zovo 2023, 65. See also Georgiadis 2023.

1217 Renfrew 1985, 19–20; 1994, 51–52.

1218 Tomkins 2012, 63.

1219 Briault 2007, 123.

1220 Georgiadis 2023.

of the dwellers of the valley. As for arrivals from the southern side, the Kophinas peak offers almost a bird-eye view of their world, where offerings denote, in a miniature symbolic way, their everyday activity; an affirmation of their identity in stark contrast with the activities on the mountain or the valley. It is noteworthy that the Kophinas peak is considered to have been a main landmark for seafarers.¹²²¹ In both cases, and regardless of how the sanctuary is related to the two realms, it unites three worlds, that of the agriculture of the valley, the herders on the mountain, and those dependent on the marine economy. And it is the one place all can come together, creating a point of reference to their common identity. Discussions on the sense of connection with the divine as being nearer the sky add another element,¹²²² and indeed the boat figurines have been considered as being representations of *divine vehicles*.¹²²³ Thus Kophinas constitutes a landmark that unites the land – sea – and skyscape of the whole Messara-Asterousia region and the groups associated with each of them.

Evans's observations regarding the meaning of the Youktas sanctuary were strongly based on the impact of the mountain dominating the central court of Knossos.¹²²⁴ A similar connection of Kophinas with Phaistos has been assumed.¹²²⁵ In the case of Kophinas, the peak dominates the local landscape without the immediate presence of a local palace. The effect of the mountain does not need a mediator of civically developed centralised religion, but rather stems from the physical topography, as it serves and marks the local economy while at the same time defining it, with the clear division of the rural north and the marine-based economy to the south.

Yet the Kophinas sanctuary cannot be viewed as an isolated local sanctuary. The finds can indicate a local character of the shrine, but a commonality of the peak sanctuary is observed, so that they have been considered as part of the palatial ideology, or a type spanning Crete and extending beyond it.¹²²⁶ Indeed many similarities with other peak sanctuaries puts Kophinas within the pan-Cretan map of similar structures and rituals.¹²²⁷ Beyond the similarity of finds and function, the Linear A evidence from

1221 Karetsou – Spiliotopoulou 2018, 166. See also Figure 48.

1222 Soetens 2009.

1223 Soles 2012, 197–198. Without delving into debates of Egyptian influence in Minoan religion (for an argumentation in favour of this connection, see N. Marinatos 2010; MacGillivray 2009), this notion would put forth a further similarity with Egyptian cult, as the depiction of deities in a boat traversing the heaven is a common depiction, amongst others in literature adjacent to the Book of the dead (Amduat). This concerns deities who are traversing the sky in a barque. See the Book of Night (Roulin 1996), Litany of Re (Hornung 1975–76), and the Book of the Gates (Zeidler 1999).

1224 Where the goddess supposedly physically presided over the palace in a physical extension of the deity's dominion over the palace (*Knossos I*, 154).

1225 The theory of Kophinas acting as a relay for the communication network between Knossos and Phaistos was mentioned above; see Footnote 1145.

1226 Peatfield 1987, 89; Briault 2007, 125–131.

1227 Similarities of peak sanctuaries, in general, can be seen in Peatfield 2009. Archaeobotanical investigations showed a similarity in the charred archaeobotanical assemblages in Knossos Anetaki, Kophinas and Petras, three rather distant peak sanctuaries. In all three, similar fruit and nut offerings were studied, indicat-

Kophinas indicates a common formulation with inscriptions from other sanctuaries, alluding to a common ritual. Owens noted, however, local deviations in these formulae.¹²²⁸ Evans's notion, which was influential to the perception of peak sanctuaries as an extension of Knossian religiosity, is seen here as reversed. It is not the peak that was rendered an abstraction of the divine (or palace goddess in the view of Evans)¹²²⁹, but the mountain itself intrinsically held a religiosity that needed to be expressed; it, as a landscape element, seems to be the attractor around which a communal identity, and perhaps sacred identity, was formed as the ritualistic nature of the finds indicates.¹²³⁰ This could have then been adapted to the worship framework of the time, i.e. the peak sanctuary (thus allowing for an explanation for the existence of the peak sanctuary so far from the nearest palatial centre). Any assumed Knossian supervision is then seen as a catalyst of an existing trend.

The localised character of Kophinas is stressed by its distance to the main palatial site, as the distance of Kophinas to Phaistos has been shown to exceed the average distance of peak sanctuaries to their nearest palatial centre by more than double the walking time.¹²³¹ Rather than ascribing Kophinas to a particular palatial centre, its locality can be embedded within the macrocosm of the Minoan culture, as indicated by common motif of the shrine and also similarity in the finds.

This conscious understanding of the sea routes as vital for the region could have been expressed in a specific category of clay finds deemed as votives in the Kophinas sanctuary, that of the clay boat, that, although few in number, provide the missing link between the rural areas, the sea and the mountain.¹²³² It is the place of the Asterousia where the seascape, as mentioned by Vavouranakis, meets the predominant mountain-scape in the most emphatic way.¹²³³ The boats' role can be, of course, for fishing, as indicated by the find of the bronze hook mentioned above, alongside a ritual aspect.

The appearance of the boat figurines is assumed not to have been realistic, so perhaps the maker was not aiming at a functional depiction but rather a symbolic offering.

ing a similar cult practice, albeit with variations (Henkel – Margaritis 2022, 7–8). An interesting distinction in Kophinas may be the grape offerings, where the whole fruits were subjected to the flames of this pyre, possibly in the form of a plant sacrifice. This is the only documented case of a Bronze Age plant sacrifice on Crete, with the other one coming from the sanctuary at Mt. Lykaion on Mainland Greece (Henkel – Margaritis 2022, 13–14).

1228 Owens 2017.

1229 A goddess whose assumed association with peak sanctuaries is still echoed in modern research. See Karetsou – Spiliotopoulou 2018, 170.

1230 Here a similar approach of ritual places is undertaken, similar to Tomkins' approach of cave rituals (Tomkins 2012, 63–66).

1231 Megarry 2012, 220.

1232 Karetsou – Spiliotopoulou 2018, 169.

1233 Vavouranakis used the term to codify the collective experience and perception of the maritime scenery (Vavouranakis 2001, 91) and can be linked with finds from the sea or destinations across the sea.

12 Mountain Terrain and Sanctity

In Chapter 11, alongside the practical usability of the mountain for economic exploitation, the reverence for the mountain terrain itself was discussed, as well as an explanation of aspects of religiosity associated with mountain peaks. The adjacent role of Kophinas within the wider area (mesoscale) of Koumasa has already been examined in that respect.¹²³⁴ Evidence of the impact of walking on the slopes of mountains, and on the Asterousia in particular, was also presented in Chapter 11.1.

Besides the archaeological and topographical analyses, however, in this chapter, a more holistic view will be attempted regarding the question of the relation of Man and peaks. It is not only obvious answers such as strategic value and economic use that influence the choice for a settlement, but also the point of importance within and near it. As seen in the discussion, these choices sometimes lead to positions of importance that deviate from the otherwise more fitting position near main routes. These observations allow for a discussion of the fundamental and pananthropic reasons behind the connection of man and mountains.¹²³⁵ For this, the relationship with nature, particularly that of participants in traditional, preindustrial cultures, must be examined.

Trigger suggested a cross-cultural uniformity in some human responses to their surroundings that do not necessarily postulate a universal environmental determinism. On the other hand, these cross-cultural aspects go beyond what he calls “neo-evolutionary” approaches,¹²³⁶ referring to the entropy-based studies of cultures.¹²³⁷ In Chapter 12.1, the relationship between humans and nature will be revisited, followed by an analysis of this connection, particularly to the mountain in Chapter 12.2. This discussion will be further expanded in Chapter 12.3, incorporating the often-overlooked perspective of evolutionary psychology. Amongst others, this showcases the role of empirical observation, which, to a certain extent, can be considered akin to that of the prehistoric dweller, as the criteria for inducing certain reactions and feelings are not only culture-related but, to a large extent, genetic. The analysis will rely on an evolutionary model, which, besides etymology, has very few in common with the “neoevolutionary”

1234 See discussion on pages 157f., and Chapter 11.4.

1235 For the impact on the senses, and behaviour, see discussion on page 28of.

1236 Trigger 1990, 119.

1237 Such an approach for the area of Koumasa was pursued in Chapter 10.2. This is not seen as supplementary and not contradictory to Trigger’s approach mentioned here.

concept that Trigger criticises, aspects of which have been discussed above and should not be confused with it.¹²³⁸

This approach is ultimately, to some extent, aligned with Trigger's perspective, although fundamentally, it represents a cross-section of both environmental and cultural determinism concerning settlement and architectural elements, as summarised by Palyvou.¹²³⁹

12.1 Man and Nature

As noted by Ingold, previous research has tended to favour the assumption that pre-modern civilisations perceived wild nature as a source of life requiring careful treatment to ensure successful coexistence rather than viewing it as a medium for adaptation or development.¹²⁴⁰ The actual occurrence of the latter could be considered a natural evolution of which participants were not necessarily consciously aware. This excludes the phenomenon of certain long-term planning that our post-industrial culture is accustomed to.

This perspective has shaped the work of researchers who have assumed a dichotomy between humans and their environment. Within this framework, the environment is regarded as an external element that individuals must engage with and appropriate. This perceived dichotomy by researchers between the domesticated and the wild environment has led to less emphasis being given to the interaction with *scapes* (such as seascapes and landscapes), into which the human environment is part of.¹²⁴¹

Another aspect of the nature-culture dichotomy is the understanding, by previous researchers, of the human factor as the active element, whereas nature appeared as a passive object, as a mere source of resources.¹²⁴² The notion that the earth was given to humanity for exploitation is a recurring theme in major religious beliefs since the Middle Ages, a notion that can be argued to have significantly shaped prevailing cultural perceptions.¹²⁴³ Elaborating on Eliade's distinction between the modern and pre-modern world, religious life has become increasingly detached from nature in common monotheistic doctrines, which is often regarded as a culturally secondary product. This perception continues to influence contemporary cultural perspectives. Thus, within this

1238 See Footnote 1039 in Chapter 10.2.

1239 Palyvou 2018, 27–28.

1240 Ingold 2000, 42.

1241 Ingold 2000, 42, 72; Hodder 1990, 302–305.

1242 Zimmerman 1985, 250.

1243 An example in the scripture of Jewish and Christian religion is the verse: "The heaven, even the heavens, are the Lord's: but the earth hath he given to the children of men." (Psalms 115:16; King James Version). Also in Islam, an equivalent notion is to be found in the verse: "He is the one who made the earth subservient to you, so move about in its regions and eat from his provisions." (Quran 67:15; author's translation).

framework, nature is often regarded as a culturally secondary product; the cosmos is perceived by modern humans as mute.¹²⁴⁴ Of course, this view is not absolute, as nature was brought forth in various movements of Western culture, such as (but not limited to) the Romanticism movement.¹²⁴⁵ However, it can be argued that, at a subconscious level, it has influenced many perspectives of the research.

This discussion aims at contextualising the discussion made elsewhere in this study on the focus of modern interests in man-nature relations, which, if anything, shows the growing tendency of the academic community towards this subject.¹²⁴⁶ However, this retrospective on the nature of our modern inclinations is deemed necessary.

Following the tendency of current explanatory approaches, the comparison between Koumasa and other settlements may be made by focusing on the environment, which will not merely be perceived as an external entity but as an integral part of a process in which people participate actively and produce meaning through an entanglement with space and time. The daily practices are not only limited to ritual and ceremonial acts but also concern more everyday experiences, such as habitation and moving in space, which constitute a way of everyday entanglement with the environment through which the world is actively perceived.¹²⁴⁷ An environment signified by the human presence, and not only the opposite; a presence that is physical but also active. Subsequently, the human agency can be tackled, offering the possibility of a more meaningful comparison basis.

12.2 Choice of the Peak Religiosity

As discussed, Koumasa is observed to incorporate the transition to the mountain on two levels. The first, on a macroscopic scale, as evidenced by satellite images or from a distance, refers to the transition between the mountain and valley, which is further noticeable in situ through variations in the flora, fauna and geology.¹²⁴⁸ The other pertains to the microscale level, specifically the transition observed within the settlement itself, as evidenced by the shift observed around the Korakies hill, which engulfs the greater, macroscopic transition.¹²⁴⁹ In other words, the transition of mountain to valley occurs within the expanse of the Koumasa settlement (refer to Figure 15). The utilisation of it within the inner architecture for reasons pertaining to representation was discussed in Chapter 8. It can also be assumed to expand on the strategic position of the settlement

1244 Eliade 1990, 127–128.

1245 For a discussion on this subject, see Abou Nasr 2002.

1246 Mainly Chapter 5.4, in the introduction to Chapter 11 and Chapter 11.4.

1247 Ingold 2000, 189–190.

1248 See discussion on page 67. Also, Figure 14 shows Koumasa seen from the northern Messara. Figures 21–22 show a DEM view; see also the satellite image in Panagiotopoulos 2015a, 935, Fig. 3.

1249 On the parallelisation with a fractal structure, see Footnote 692.

to incorporate representation or symbolic aspects related to the mountain routes, seeing its location as liminal on the route from the western Messara to the Kophinas sanctuary or the shore.

This symbolic aspect can only be theorised upon, based on modern notions of linking mountains and mountainscapes with a specific aspect of the human social and psychological behaviour that often translated to spirituality.¹²⁵⁰ According to Eliade, the spiritual person lives in an open world, which connects him to the divine and makes him part of the cosmos. The open space here reflects the open world with which the person correlates.¹²⁵¹ People tend to seek a place, a centre, where the experience of the divine is made possible. As Eliade states, the place of residence acts as a microcosm. Beginning with one's self, extended to one's house or residence and extended to the cosmos.

Ritual is generally understood to denote something deliberately odd, in the sense that it belies functional or economic explanation and is unusual, striking, and symbolic when placed within its temporal and spatial context.¹²⁵²

Architectural forms, such as those discussed in Chapters 7 and 8 for the 'sanctuary' area, have been seen to actively emit (extrovertedly) and embed (introvertedly) the essence of *homology*, as another chain between man and cosmos, in which the triad man-house-cosmos are seen as analogous.¹²⁵³ In some cultures, parts of the house are equated, in the sense of sacral architecture, to the body. In a metaphorical sense, Eliade refers to the trend in various cultures to equate the various components of the house or temple to the structure of the cosmos and of the body. Her main examples in this are the Hindu and Buddhist traditions but she is also referring to pre-modern Western Christian societies, arguing that the religiosity in premodern times is open to the cosmos. The examples to which she refers make this analogy cognitively. It is interesting to examine the ways that societies tend to follow this path unconsciously: "The house as the centre of the world".¹²⁵⁴

In this study on Koumasa, the settlement itself is seen as part of this analogy and added as a fourth chain in the triad body house cosmos, where a settlement atop and around a hill can act as a miniature cosmos, engulfing the topographical transitions mentioned above and expanding beyond them.

In a region characterised by a mountainous landscape, it is fitting to seek a location that embodies this type of agency at the summit of the settlement, from where the ascending slope to the north extends towards the majestic mountain range to the south. This dynamic relationship seems to be summarised in the slope of the settlement itself,

1250 E.g. Dal Yovo 2023; Georgiadis 2023; Stevens 2023.

1251 Eliade 1990, 124.

1252 Hodder 1982, 164.

1253 Eliade 1990, 125.

1254 "Das Haus als Mitte der Welt" (Bollnow 1994, 123).

which acts as a small-scale re-enactment of the surrounding environment – a microcosm of it. By adapting this idea to the architectural design around a peak, as discussed in Chapter 8 for the case of the ‘sanctuary’ and the Terrace, the open spaces amidst the dense build environment can be seen as an effort to emit this type of connectivity to this surrounding environment.

In the level of the house, the elevated openings, such as chimneys, towers, and domes, are seen as a communication possibility or access to the outside and hence, in their metaphorical role, as access to the realm of out-of-the-orderly or the divine.¹²⁵⁵ These openings align with the perception of the axis mundi, a vertical elevation serving as a stabilisation of the world.¹²⁵⁶ This role within the settlement is assumed by the summit of the hill, embodying at the same time the region in which it lies, acknowledging the two different levels over which it presides while also acting as a continuum within it.

Within this view of a continuum, the dwellers of Koumasa would have considered elevations such as the Kophinas sanctuary within their realm, as per the inhabitants of the valley of the Messara, and could have acted to an extent in their anchoring of identity and affirmed their position as per other areas of the mountain, such as the harbour regions and Kophinas.¹²⁵⁷ The discovery of parts of human figurines in Koumasa has been attributed to the site’s connection with the Kophinas peak sanctuary, owing to the parallels with the figurines there.¹²⁵⁸

The significance of the elevation proposed here will be further reinforced if we revisit the aforementioned plant offerings in the Kophinas sanctuary.¹²⁵⁹ The burning of offerings at this location has been proposed as an indication that a deity received the sacrifice, in line with cultural parallels that position fire as the mediator to the divine.¹²⁶⁰ This pananthropic habit is likely attributed to the fact that its smoke ascends into the sky.¹²⁶¹ “In this respect, Kophinas – as an open-air site situated at a higher elevation – provides an ideal location for this type of ritual activity, and its archaeobotanical remains potentially serve as the earliest evidence for the occurrence of a plant sacrifice in the Aegean region”.¹²⁶²

In the next chapter the background of the mountain religiosity will be examined, as a fact coded in the genetics of humans.

1255 Eliade examines the analogy of the house in those societies and makes a comparison of the cosmological meaning and symbolism in their architectural design with the luck thereof in the modern western arrangement (Eliade 1990).

1256 Eliade 1990, 26–27.

1257 See discussion on page 316.

1258 Panagiotopoulos 2022, 330, Fig. 16. See also Panagiotopoulos 2013, 425–426; 2018, 480, Fig. 7.

1259 See Footnote 1227.

1260 Kaliff 2011.

1261 Soetens 2009.

1262 Henkel – Margaritis 2022, 13–14.

12.3 A Perspective of Evolutionary Psychology

After examining the projection of the understood natural order within manmade structures, a closer look must be taken at the religiosity that surrounds the mountains.¹²⁶³ This idea is often regarded as self-evident or, even worse, is given a trivial explanation that excludes a significant number of possibilities.

Since prehistory, humans have not passively adapted to their landscape but have actively shaped it. Within the realm of evolutionary psychology, landscape preferences have been associated with processes related to biological adaptation.¹²⁶⁴ These preferences encoded in pananthropic behaviour constitute an aesthetic reaction to a certain type of surroundings.¹²⁶⁵ Overlooking them as trivial diminishes our understanding of the choices any society makes when adapting to a given environment. This perspective can also undermine the experience of the modern traveller, suggesting it is solely shaped by contemporary cultural influences and thus not relevant for assessing the ancient ones.

As various studies show, the landscapes that humans prefer, or feel closest to, are those that resemble the savanna environment.¹²⁶⁶ According to these investigations, humans do not possess an innate preference for mountainous regions as for savanna-like settings. Following this, the explanation of mountainous regions as choices for settling must be attributed to their practicality and strategic advantages, as the lack of space, the harshness of the terrain as well as the predisposition of human nature would have been negative factors. This pragmatistic approach is well attested, as the increase of remote settlements in times of unease clearly shows.¹²⁶⁷

However, a less explored factor is the counterbalance to the impracticalities of daily life in the mountains or near them. In recent publications, there is a tendency to address senses and evoked feelings; aspects of everyday experiences that are not easily quantifiable in the archaeological remains but nevertheless constitute part of the human experience of the *locus*, as discussed in Chapter 8.1. Thus, the senses can be viewed as

1263 Panagiotopoulos 2008, 117–118.

1264 Appleton 1975, 73.

1265 Durrant – Ellis 2003, 9–10; Wang – Yu 2018; Albuquerque et al. 2020.

1266 This notion is studied within the realm of evolutionary psychology (see Ulrich 1993) and is dubbed the *Savanna Hypothesis* (for a general review of this hypothesis, see Rathmann – Korpela – Stojakowits 2022). Natural selection forged the need for various types of hominids, ranging from early hominids to sapiens, to have preferences for certain landscapes that are most suitable for their survival. The rise in relevance of cultural evolution alongside these biological adaptations is assumed to continue to happen in the various stages of human migration, allowing thus for the adaptability of humans in various environments (Stephenson – Brotherton 1979) whilst maintaining the instinctual need to associate their habitation with savanna-like places (Durrant – Ellis 2003, 9–10).

1267 In late Minoan culture for example a preference for remote difficult to access settlements in the LM III period, dubbed as refuges, such as Karfi, Vrokastro, Kavousi Kastro (Nowicki 1987). This tendency is attributed to uncertain times caused by outer factors, which continued to the geometric age and the role of the Greek Acropolis (Nowicki 2002, 155–157).

part of the archaeological understanding and subject to archaeological investigation.¹²⁶⁸ Investigations of this type include the effect of light in the built environment but also the effect of landscape. However, the primary evolutionary feeling surrounding the mountains,¹²⁶⁹ though present in other faculties such as evolutionary psychology, is mostly less regarded in Aegean archaeology. This feeling is awe.

Awe is an emotion that arises when one encounters something so strikingly vast that it defies one's current knowledge structures and provokes a need to update one's mental schemas. The characteristic related to the theory of evolutionary psychology, or Darwinian psychology, is its permanent latency even if one is in permanent contact with the source emanating this sensory experience.¹²⁷⁰

The feelings related to awe, such as wonder, uneasiness and admiration are linked amongst others with religious experiences but also with exposure to natural wonders.¹²⁷¹ Experiences of awe are often tinged with a primal fear when one encounters something that contradicts what is deemed normal within the evolutionary predisposition. In addition to instilling a sense of alertness, awe is regarded as a positive emotion, as it can induce self-transcendent feelings, thereby reducing the focus on the individual self.¹²⁷² Subsequently, this is linked with religiosity.

The feel of vastness and uncontrollability that surrounds a mountainous landscape, being vastly different than the savanna landscape towards which humans are predisposed to feel at ease through the lens of evolutionary psychology, induces a sense of uneasiness that at the same time seems not only untameable but also the environment itself seems to human minds unreachable and much larger than oneself both literally and figuratively. Even the perception of distance in mountainous regions is flawed, as human vision did not evolve to cope with abrupt changes in altitude in the field of vision.¹²⁷³ As the environment where humans would feel at home resembles a

1268 For further elaboration, see Hamilakis 2002a; Hamilakis 2011, 216–217). Hamilakis mentioned that one of the aims of 'archaeology of the senses' is to tackle issues related to sensory experiences that research had considered as rather ephemeral and immaterial (Hamilakis 2011, 209). I consider the interaction with the landscape and the feeling evoked through it – pertaining to the subject matter of this work – as a subject of this field.

1269 Recent examples are the studies in Dakouri-Hild – Boyd 2016. The works above focus primarily on the senses implying the evoked feelings.

1270 For an introduction to evolutionary psychology, see Durrant – Ellis 2003; Buss 2019; Medicus 2020. For initial efforts to form a methodology for the integration of evolutionary psychology in archaeology, see Wynn 2016; Mithen 1997; O'Brien – Lyman 2000; Wynn – Coolidge 2022. These models pertain mostly, but not exclusively, to the Palaeolithic period.

1271 Keltner – Haidt, 2003.

1272 Zhao et al. 2018; Piff et al., 2015.

1273 The detection of motion parallax between various points of a mountain range will not be perceived accurately from the human brain, and therefore, the gradients will be perceived similar to those of a flat image (Gibson – Flock 1962, 503). These observations, although unknown to Gibson and Flock, apply very well with the evolutionary theory of the predisposition of the human mind for the perception of distances in a savannah-like environment.

savanna-like plain and smooth terrain, the inhabitants of the mountains would sense their surroundings with a subconscious sense of uneasiness. Experiments have shown a link between spirituality induced by a feeling of awe, stemming from appropriate nature scenes.¹²⁷⁴ The catalyst for the spiritual search is the feeling of uncertainty, which is the direct result of the emotion of awe.

The projection of this wonder and awe of the vastness could have caused the association of the peaks with what we associate as divine, i.e. with a supernatural and unfathomable force, as many religions testify. Awe appears to operate on two levels. On one hand, it may foster the feelings of connectedness that often accompany religiosity and/or spirituality.¹²⁷⁵ On the other hand, it spawns an uncertainty and an uneasiness that can be mitigated by perceiving a hidden author.¹²⁷⁶ Although the reason why awe is related to a sense of spirituality is not straightforward, it is clear that there is a correlation, as each can induce the other.

The perceived proximity to the sky, which was discussed above as a factor of spirituality, is an added factor in this perception. Beyond this, the mountainous terrain itself evokes a profound sense of awe, which religious beliefs either seek to articulate or represent as an attempt to provide a logical framework for understanding this feeling. As discussed earlier, the act of walking in the mountains encapsulates the seemingly contradictory sensations of fear and confidence, intertwining vulnerability with a sense of empowerment.¹²⁷⁷

Another interesting take on the psychological dimensions of awe is offered through the field of evolutionary psychology, although this emotion has remained until recently understudied.¹²⁷⁸ Indeed, seen from the perspective of evolutionary psychology, the phenomenon of awe originates in the fundamental emotional response that members of the first human clans would have had towards the powerful group leader.¹²⁷⁹ The experience of this feeling by the mountains, sparked from the factors described above, would induce the association with, literally, a higher power, if one follows the analysis of Keltner and Haidt.¹²⁸⁰

Thus, the long-established view that the correlation between mountains and religious activities is the fact that mountains were perceived as closer to the sky and thus to the divine, although it hits the mark, is an oversimplification, at least. The mountain-

1274 Valdesolo – Graham 2014.

1275 Van Cappellen – Saroglou 2012, 7–9.

1276 Valdesolo – Graham 2014, 177.

1277 See Footnote 1088.

1278 Keltner – Haidt 2003, 297.

1279 Keltner – Haidt 2003.

1280 Keltner – Haidt 2003.

ous terrain in itself can be understood to comply with Foucault's definition of "other spaces".¹²⁸¹

These factors could be considered when dealing with the establishment of a centre such as Koumasa at an area of clear transition from the valley to the mountain and its relation to areas of worship and ritual, such as the mountainous tholoi and the Kopinas peak sanctuary. Further, the rendering of its highest level, the 'sanctuary' area, to a miniature performative arena could benefit from this scope.

1281 Foucault – Miskowiec 1986.

Conclusion

This study delved into the part landscape and topography play in delineating the role of Koumasa at both the microscale of the settlement and the mesoscale, encompassing its location in the surrounding valley and mountains. The analysis was enhanced by employing modern GIS methodologies, the evaluation of which was the second focus of the study. While staying on the main subject, which is Minoan Koumasa and its function within its region, it indicated schemata for similar investigations and criteria for assessing their results. Each chapter within this dissertation is designed to function as an independent, cohesive unit while contributing to the overall unity of the work.

Concerning the specific area under investigation, its pivotal position within the mobility networks during the palace periods as well as its subsequent decline were aligned with the surrounding topography, the usage of which varied across different historical periods.

The area of Koumasa, where activity is primarily observed during the Prepalatial period in the necropolis and throughout the rest of the settlement during the Proto-palatial phases, as well as in LM I and later partially in LM III and in Roman times, presents a risk when assuming a monocausal use for all its occupation. Therefore, the diachronic study presented above aided in the evaluation of each phase. In the Proto-palatial and Neopalatial periods, elements that exceed the domestic use are observable that were intergraded in the local topography, be they symbolic, cultic or profane in nature.

Liminality and sensory approach of the correlation between lived-in space and livelihood was explored within the microscale, as well as seen in the implementation of architecture and the landscape in general in the mesoscale, studying the consequences of the existence of only a few access points to the southern shore of central Asterousia. The latter is the determining factor in the interaction with the macroscale. Koumasa forms a regional node where paths accumulate in a local hub. Its significance is intrinsically tied to these paths; however, the eventual decline in their importance, driven by broader historical developments on the island and shifts in the relative prominence of its territories, resulted in the region reverting to the peripheral role dictated by its topography, or the predisposition of the landscape.

In this analysis, the theoretical approaches implemented showcase the active relation of a settlement with the surrounding natural environment and, more specifically, the effect of the mountains in forming a paradigm that was mirrored in the actions of

the society, including in the architectural arrangement, especially for the most elevated parts of the settlement.

State of Research, Heritage Landscape, and Topography

To begin with, the characteristics of Koumasa's location were summarised in topographical, geological, and sociological factors and were seen in relation to the various categorisations of the region (Chapters 1.1; expanded in Chapter 3.1).

Following this, the history of research and archaeological finds in Koumasa and the perception of its location within the academic community was summarised (Chapter 1.2), emphasising the elements that aided in its categorisation as peripheral. Within this, the need to reassess older theories has become increasingly evident. This is also regarded as true for the wider region of central Messara and Asterousia, which greatly benefits from a holistic approach that integrates insights from landscape archaeology and the frameworks of *entopia* and heritage landscape. These approaches reach beyond archaeology, encompassing the surrounding topography, including land use, geology, and diachrony of human activity and the *grammar of location*.

Within this holistic approach, a diachronic summary of the region was presented alongside the evidence from Koumasa. The study of the historical evolution of the area (described in Chapter 2) illustrates Koumasa not as part of an unchanging terrain but as a palimpsest formed by the successive presence throughout the region's history, showcasing the radical oscillation in the relevance of the region from centrality to obscurity. This was first seen in relation to the rest of Asterousia, and then, in Postminoan times (Chapter 2.5), when the obscurity slowly expands to the whole of Asterousia, as characteristically evident in the relative absence of the range's name in the ancient sources, and to an extent therefore in the modern research.

Chapter 3 presented research history, input from archaeobotanical studies, the climate in the general region, and the challenges of research. The latter's challenging aspects were laid out, and nuanced approaches in the evaluation of older and new data were introduced (Chapter 3.1). In Chapter 3.2, the perception of the stark duality between mountain and valley as a modern construct was discussed, noting its impact on the analysis of past cultures, which was addressed in the rest of the study. Following this, a discussion of the status of the geological and archaeobotanical features and environment of the region in ancient times (Chapter 3.4) revealed the relative stability of the mountain and seashore, but the changes in climate and vegetation density were noted. Although these fluctuated during the span of Minoan activity, the area seems to have been more humid overall. While the cultivation in the Messara was more diverse, a significant presence of olive trees can be observed in Koumasa.

A synthesis of the topographically related studies in this work shows that Koumasa lies at the junction of the western and eastern Messara, a vertical division which – although not arbitrary as it relies on the water catchment and symmetry regarding the

Kophinas mountain – is not as influential regarding the perception of everyday activity as the horizontal division is; the one between mountain and valley. This division is clearly perceived by the dwellers in the region, delineating two realms of everyday experience: one in the valley, which is observable within the viewshed, and the other in the mountainous area, which, though concealed by the abrupt rise of the range, remains relevant.

The role of topography in shaping these historical preferences was pursued, identifying points of interest that provided Koumasa with elements of centrality and liminality during its heyday in the palatial periods, and whose absence in the subsequent periods gradually led to its phasing into obscurity. These being the degree of exclusivity regarding the control over a number of otherwise isolated harbour areas and towards the peak of the Kophinas for those approaching from the central and western Messara and beyond. These characteristics would change this region from a peripheral part with regards to the western Messara – the traditionally perceived cultural entity of the region – to one of many peripheral centres in the wider Asterousia-Messara region, with a connectivity factor between the valley, the mountain, and the sea. The gradual shift of the networks of significance could be understood in a closer look at the Postminoan activity in the region, which was deemed necessary in understanding the topographical characteristics as a tapestry which was used differently in each epoch.

Utilisation of GIS Methods

An integral part of this study was the analysis of the topography. To this aim, the GIS analysis (introduced in Part II and applied throughout this study) was implemented, using Geographic Information System (GIS) tools applied to a Digital Elevation Model (DEM), particularly the viewshed, watershed, and movement modelling tools. The utilisation of GIS methodologies has offered an innovative approach to shed light on a region that has hitherto received limited exploration, particularly the central Asterousia.

In the bibliography, these methods are not always used to their full potential, and there is room for wider and more precise applications in archaeology, for which an intrinsic understanding of the methods and functions is needed. These were analysed in various iterations, and methods of a critical approach towards them and their utilisation were proposed, also hoping to act as a model or example for similar investigations.

Modelling movement was performed in three levels. First, the ubiquitous *least-cost-paths* analysis, of which various iterations were performed, was then expanded to network connectivity analyses and focal mobility networks. Through these techniques, patterns and relationships within the landscape were discerned. Subsequently, the paths delineated by GIS were physically traversed, allowing for a firsthand assessment of their practicality as well as identification of their limitations. This combined method has provided insight into the strategic networks that underscore the importance of sites

proximate to the Messara region, such as Apesokari and Koumasa, mainly during the MM and LM periods and also beyond.

Moreover, a comprehensive analysis of water flow accumulation and watershed was conducted through hydrological analysis and watershed toolsets, followed by a critical evaluation of the findings. The examination revealed the seasonal dynamics of streams to be of particular significance, particularly in relation to the proximity of the Minoan tholoi. This systematic approach offers valuable insights into the distribution of tholoi in the Messara region in a holistic manner and adds to the discussion of early settlements and their cultural trajectories (Chapter 9.3).

The procedures were carried out utilising tools available in both QGIS and ArcGIS platforms, facilitating a nuanced discussion regarding their usability and accessibility.

As outlined in Chapter 4 and subsequently implemented in Chapter 5, the methodologies and functions employed represent a diverse array commonly utilised in archaeology. Unlike singular applications, this study integrated multiple methods concurrently and across various platforms. This approach was driven by the imperative of ensuring quality control and aimed to maximise insights and extract the most from the available methods. When scrutinised in detail, each method and function offers distinct perspectives, thereby enriching the overall analysis. Specifically, the same steps were repeated with different functions so that their results could be compared with each other and furthermore parallelised with the actual situation on the ground (a step often missing in similar applications). Indeed, the use of multiple iterations provides a nuanced perspective on the topographic features under study, enabling a comprehensive exploration of their potentials and limitations and overall applicability, as some were deemed more fitting for mountainous terrain and others more applicable in the valley. Moreover, this approach fosters a deeper comprehension of the capabilities and constraints inherent in each function. Consequently, contradictory findings are not perceived as shortcomings but rather as opportunities for heightened insight and refinement of interpretations. The evaluation of these functions was further enhanced by actually walking in the area under study, allowing for a critical assessment of the practicality and accuracy of the paths suggested by GIS against the actual terrain traversed, as elaborated in Chapter 11. This approach led to a better overall understanding of the region of central and western-central Asterousia, and the role of Koumasa within it.

Results Through the Three-Scale Approach

The main outcomes of this study are summarised below within the tripartite scale approach discussed in the preface. While the enumeration can be restrictive, it aids in condensing the main points in the presentation of the results.

First in the concise enumeration of the results is the discussion within Part I. Although encompassing various sub-results, the cumulative outcome is the exploration of

a lesser-known area through the lens of archaeology, enriched by concepts of heritage and cultural archaeology.

Regarding the role of the area within the broader context of Crete in Minoan times, referred to as the *macroscale* (Chapter 10), the focus was primarily on redefining cultural and economic dependencies with other regions, such as the Pediada region and northcentral Crete. This aimed to offer a disentanglement from the monosemantic association with the Phaistos region, which has previously dominated the interpretative frameworks, as well as the state-like understanding of territories. An exploration of state formation theories was undertaken, coupled with an analysis of the location of Koumasa within the communication networks of the island. This analysis was facilitated by the use of GIS methods in mapping and studying spatial relationships.

Thus, a second result highlights the significant Cretan connections, particularly the proximity to the lesser-studied Anapodaris basin, including sites such as Dhamantri and Rotasi, and extending further to Pediada and Galatas. Indeed, similarities of the LM I material from Koumasa with that of Skinias or Dhamantri that, as the GIS analysis shows, is closer than Phaistos alludes to more complicated sources of influence to Minoan Koumasa. The position of Koumasa shows parallels to Apesokari and Rotasi as locations on the northern Asterousia, positioned between valley and mountain, sharing similar social needs and topographical characteristics.

The relation of Koumasa with its surrounding environment of daily entanglement was dubbed the *mesoscale*. Within this, the valley and mountainous part were studied separately for reasons of approachability in Chapters 9 and 11. The other geographic characteristic is the local southwards expansion of the valley in a semicircular fashion, which is supervised by the Korakies hill at Koumasa, and whose evidence of historic habitation and usage was analysed (Chapters 2.3, 9.2).

Third, the surrounding tholoi were examined, along with aspects related to social behaviour during the period associated with them. This process, which included a viewshed analysis and determination of path networks, deemed a three-way partition of the tholoi assemblages into those in the valley, on the mountain, and shore areas necessary (Chapter 9.2). The influence of topography, i.e. their vicinity to waterways, was also analysed and quantified (Chapters 2.3, 5.5, 9.3). Particularly for those referred to as mountainous tholoi, which exist within the *mesoscale* of Koumasa, there are complementary viewsheds but almost no overlap, suggesting a degree of territoriality concerning the areas covered by each. This behaviour is also observable for the pair Platanos and Koumasa, the two largest necropoleis. Overall, this analysis underscores Koumasa's position within the parameters favouring tholoi concentration while offering greater visibility potential.

Fourth, an innovative and much-needed redefinition of the Asterousia mountains into five regions is introduced, with its areas serving as the backdrop of a palimpsest of historic development, placing them in context. This partition fits the topographical characteristics, as additionally explored on the basis of GIS analysis and walking expe-

Conclusion

riences as well as social behaviour (Chapter 9.1). These are seen to influence the local trajectories throughout the habitation period in the Asterousia.

Fifth, the peripheral location of Koumasa in relation to the island's primary arteries was confirmed and an explanation for its nevertheless noticeable significance during the Protopalatial and then LM I period given. For this, particularly the role of the connection to the sea and to Kophinas sanctuary was considered for this period as well as for the lifespan of the tholoi. Specifically, it was demonstrated that the location of Koumasa serves as a regional centre, functioning as an interaction node that concentrates movement specific to the regions of central and western-central Asterousia (Chapter 11). Nestled in a niche of the valley, where the mountain is steepest, this area provides the best views and serves as a hub for paths converging from various directions. The area oversees the communication with secluded bays where activity in Minoan times and beyond is noted, with a relatively dense activity in the time coinciding with the building programme in Koumasa. The access to those in central Asterousia – namely Salamias and Ayios Ioannis – was deemed exclusive, while for Trypiti in western-central Asterousia the area of Apesokari was shown to share access. Furthermore, Koumasa lies on the vicinity of the main routes to the mountainous tholoi of west-central Asterousia and overlooks the main path to the central Asterousia, which includes the peak of Kophinas when approached from western and central Messara. It, therefore, links the trails leading to the mountainous tholoi in western-central Asterousia on one side and central Asterousia on the other, connecting both the Kophinas sanctuary and the coastal regions.

Sixth, in addition to the material reasons, the psychological and symbolic factors associated with walking in the mountains were also analysed as catalysts for the formation of a local identity, of which the association with Kophinas peak was regarded as a materialisation. (Chapters 11.1, 11.4, 12).

The *microscale* of Koumasa (mainly in Part III) was analysed in terms of movement, visibilities and general characteristics such as slope and watershed with the aid of a local DEM in Chapter 6. The area was seen as transitional between the valley and the mountain, including this quality within its topographical expanse.

The seventh result lies in the analysis of Koumasa's topographically central feature, which is in the so-called 'sanctuary'. This older term is now considered outdated and retained primarily for traditional reasons, as it is firmly established in the bibliography. However, the analysis reveals that it functioned as a focal point of the area and a site of consumption and manufactured symbolism, extending inwards and outwards of the settlement. This was examined in terms of centrality and liminality (Chapters 7, 8). The architecture appears to emphasise and literally build upon the topographical characteristics. The particularity of Koumasa that enables the manifestation of centrality and liminality is demonstrated as being embodied within the *microscale*, reflecting its role within the broader Messara-Asterousia region. Here, the location of Koumasa was irregular concerning the topographical criteria governing the region, and a regional approach was chosen to offer a framework for the interpretation of this previously noted discrepancy. Under this light, the archaeological examination of the Koumasa

‘sanctuary’, aside from its benefits for the community of Aegean Archaeology, may also provide a paradigm for applying methodological approaches that could be extended to broader social and anthropological inquiries concerning architectural practices around hill summits.

Eighth, the investigation of the aforementioned paths and terrains, in all three scales, employed a combination of GIS methods and the act of walking, yielding valuable insights into GIS methodologies, as summarised independently above. Additionally, the experiential aspect of walking itself, coupled with input from local knowledge – often overlooked in GIS analyses – hopes to provide a contribution into the application of this ever-growing methodology. This work thus presents a case study that highlights the efficacy of GIS methods in archaeology. It not only examines their reliability but also presents a methodology for outlining their limitations and applicability, thereby facilitating their acceptance within the archaeological community and serving as a guide for future applications.

This study aimed to showcase the significance of the Koumasa settlement within its broader environmental context, shedding light on how it defied its topographical constraints, as evidenced by the hierarchical communication network map. During its heyday, the nodal characteristics of Koumasa effectively addressed the specific needs of its time, leveraging its strategic positioning in order to overcome limitations, a fact that is mirrored in the architectural activity around Korakies hill. However, as societal needs evolved over time, the area gradually slipped into obscurity – a trend that persisted and became more pronounced with time, up into the 20th century. Ironically, contemporary archaeological endeavours in the region may be catalysing a reversal of this trend, highlighting the transformative potential of archaeological research in reshaping the regions where they occur, acting as yet another pen-stroke in the ever-reused and continuously evolving palimpsest that is the historical landscape of central Messara-Asterousia.

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Although the Minoan site of Koumasa in southern Crete has played a prominent role in research for over a century, its topographical and regional significance has been less extensively studied. The analysis of the topography in and around Koumasa provides both a foundation for future contextual studies and a holistic, diachronic perspective on the networks in the Central Messara and the Asterousia region, at whose transition Koumasa is situated. The innovative application of GIS methods, combined with field surveys, yields new insights both into methodology and the significance of Koumasa during the Minoan period and its subsequent gradual decline.