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## **Between Two Rivers – Early Holocene Landscapes on Mograt Island (Sudan)**

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### **Introduction**

Mograt Island is located at the first great Nile bend close to the town of Abu Hamed from where it can be reached by a regular ferry service. With a length of 31 kilometres along the east-west axis and a width of up to 6 kilometres Mograt is the largest island on the Nile, covering an area of 102 km<sup>2</sup> (Ritter 2008). Mograt Island's prehistory has first been recognised on the impressive granite boulders at al-Saihan<sup>1</sup> covered by numerous rock carvings dating from the prehistoric to the medieval and Islamic periods (Fig. 3). For this reason the site was visited since the early 20<sup>th</sup> century along with the major fortresses at the island of which Ahmed (1971) gave a first overview. Although Jackson (1926: 23ff.), Crawford (1954: 6) and Ahmed (1971: 14-15) doubted a prehistoric component for the rock art, there are indications for this such as the depictions of wild extinct animals and of cattle (cf. the unpublished doctoral thesis of F. H. B. Khalid, University of Lille, 2009).

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<sup>1</sup> Commonly spelled 'Sihan', however, the project decided to adopt the transliteration rules of the Sudan Notes and Records.

However, systematic surveying of archaeological sites including the study of prehistoric remains was carried out by the Humboldt University Nubian Expedition (H.U.N.E.) as early as in the years 2006 (Näser 2006; Lange 2012) and 2008 (Näser 2008).<sup>2</sup> In the course of surveying, the island was mapped in detail (Ritter 2008; 2014, folded map). In 2008, one of the identified early Holocene settlement sites was partly excavated (MOG064; Schulz 2008) resulting in numerous finds that were brought for analysis to the Humboldt University of Berlin. These finds were re-studied in preparation to the actual Late Prehistoric Survey. The latter is a sub-project of the Mogrart Island Archaeological Mission launched in 2013 and directed by Claudia Näser.<sup>3</sup> So far, two field seasons of the Late Prehistoric Survey were conducted in early 2014 (Dittrich and Gessner 2014) and in late 2014/15 (Dittrich *et al.* 2015) the preliminary results of which will be presented here.

Methodically, the survey comprised GIS-based surveying and test-excavating in order to (1) locate prehistoric sites and palaeoenvironmental indicators in their actual environment, (2) understand site evolution and successive events of sediment aggradation/deflation in general, and (3) reconstruct Holocene environments from a diachronic perspective to learn more about how insular landscapes and strategies of human interaction with them may have changed over time. This approach further encloses satellite image interpretation, palaeoecological studies of soils, fauna and flora as well as multiple dating methods. So far we have recorded the outlines of 42 new and 5 known early to mid-Holocene<sup>4</sup> sites (Fig. 1); this number could be increased by another 23 sites of the H.U.N.E. 2006 survey where late prehistoric finds occurred as secondary or as stray finds. As a first result it can be said that the island seems to hold sufficient prehistoric remains to study the Holocene sequence of environmental change and its impact on human subsistence in detail.

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<sup>2</sup> Prior to this survey, a team of the University of California had collected “flint nuclei, choppers, scrapers and flakes” from “gravel-strewn hills” during a short visit in 1949 (Field 1949: 73). Two Neolithic sites briefly mentioned by Kleppe (1982: 147) were recorded during a tour of the University of Khartoum in 1977.

<sup>3</sup> For general information on the project visit [www.mogratarchaeology.com](http://www.mogratarchaeology.com).

<sup>4</sup> The terminus mid-Holocene is used here to refer mainly to the period of the 6th and 5th millennia BC which comprises both the transition from the Mesolithic to the Neolithic as well as the proper Neolithic in the Middle Nile valley (cf. Dittrich 2011; 2015).

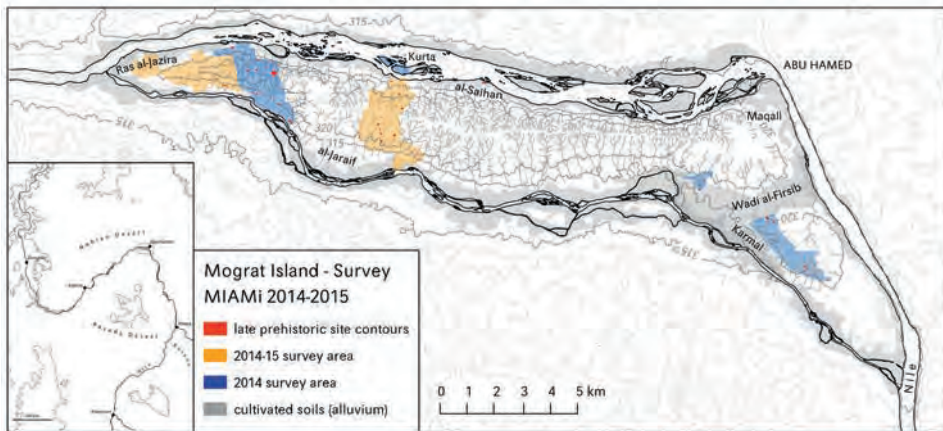


Fig. 1. Mograt Island. Late prehistoric sites surveyed in the seasons 2014 and 2014/15

## 1. The geomorphology of Mograt Island – accessing prehistoric landscapes

### 1.1 Geology and topography

Geologically Mograt Island belongs to the Precambrian crystalline basement complex known as the Bayuda Massif (Whiteman 1971; Stern and Abdelsalam 1996). Therefore, the course of the Nile is mainly confined to deep cracks in the local tectonics but in some parts the southern Nile branch has developed true meanders. Today the latter which is the smaller Nile branch remains subordinated and in some years carries only a very low volume of water (Ritter 2008). The actual survey has shown, however, that this area is largely characterised by thick late Pleistocene and Holocene alluvial deposits (Fig. 2b). They consist of silts and sands discharged by the Nile during more active periods in terms of sediment loads and well before the southern branch cut down its bed to the present level (cf. Williams 2009). These deposits are often cemented through the subsequent precipitation of calcium carbonate which is also visible in calcified coatings of numerous former plant roots. The Holocene sediments are of great interest as they were deposited in more permanent closed-off palaeolakes that existed during the 10th and 9th millennia calBC as well as in extensive seasonal swamps until at least the 6th millennium calBC (Dittrich and Gessner 2014; Dittrich et al. 2015). Being more susceptible to erosion at the northern Nile bank, similar alluvial deposits can be found there only as relics in protected areas.

The patchy topography induced by deep khors cutting their way through the basement finds its continuation in the cataract landscapes at the Nile river where numerous outcrops form small islands. Many of them are densely overgrown, but their size and appearance change with each flood posing a problem to their accurate mapping (Ritter 2014). The northern and main Nile branch is characterised by rapids and whirlpools often found between these islands (Fig. 2a). The rapid fall of the Nile river level of roughly 18 m over a distance of 27 km explains why Mograt has been considered a proper cataract in the past (Lyons 1909: 48; Chélu 1891, pl. 8).<sup>5</sup> Most of these islands are quite persistent as they consist of Precambrian basement to which periodically fresh alluvium is added. Therefore in some parts of Mograt the islands which are reached by small boats play a major role for agriculture. In general, due to the geological settings the cultivation of land appears patchy and rather opportunistic, including the layout of small terraces and fields between outcrops as well as numerous irregular patches of non-irrigated *sallūka* land (Fig. 2a; for the importance of *sallūka* for early Neolithic farming cf. Dittrich, in prep.). So far, one of the major islands named Kurta (Fig. 2a) was included in the prehistoric survey.

The major crest of Mograt island which is identical to its watershed is running from east to west and clearly visible at satellite images due to its present use as the main car track (cf. Fig. 11 below). Highly dendritic wadi courses starting from this line drain surface water to the northern and the southern Nile branch while they follow ancient passages along the tectonics of the basement (Fig. 2c). The lower wadi courses, however, have been significantly altered since the Holocene as they frequently cut through the already mentioned alluvial deposits that must have blocked the valley floors from time to time, thus redirecting the water flow.

Mograt's great antiquity is attested by the frequent exposure of the Precambrian basement consisting of metamorphic rocks such as schists, gneisses and granites (Whiteman 1971: 39). Granites seem to be exposed only along the margins of the long stretched western part of the island, while the eastern part shows a different and more brittle basement structure (Stern and Abdelsalam 1996, Fig. 2). Due to the relative stability of granite rock surfaces, they frequently provide evidence for prehistoric grinding hollows - so-called 'handmills' - as well as rock art (Fig. 3) but also for traces of a former water passage such as whirlpools marking for instance the former Holocene cataract-like landscape along the Wadi al-Firsib and the southern Nile branch (cf. Dittrich and Gessner 2014: 131, figs. 1, 5, 6).

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<sup>5</sup> It also explains why Mograt Island has actually been chosen as the location for a new dam.



Fig. 2. Present landscape features of Mograt Island: a) view over the rapids near Kurta Island (left) at the northern Nile branch, note the durra planted by *sallūka* (digging stick) in the front; b) transition of *hammada* (front) to the early Holocene alluvial deposits discharged by the southern Nile branch (behind the palm groove) at site MOG116; c) a *khorr* confined to the tectonics of the granite massif at central northern Mograt; d) basement outcrop covered by pebble deposits (*serir*) at central Mograt

The central part of Mograt's present surfaces has been stabilised only recently by being covered by dynamic stony pavements (*serir*, *hammada*), as typical for desert landscapes (Laity 2008). The *hammada* as a weathering phenomenon above ridges of the Precambrian basement complex appears as a dark coloured angular pavement often showing a desert varnish (Fig. 7 left). On the contrary, the components of the large gravel plains (*serir*) which mainly consist of well-rounded quartz, chert, including Hudi chert, and chalcedony pebbles have been constantly redistributed all over the island during more recent periods; thus they frequently cover older alluvial deposits or rest directly on outcrops (Fig. 2d). As the *serir* layer filled in cracks and other depressions, the surface of central Mograt has turned into a large plain (cf. Figs. 23, 26). Recent manual digging for obtaining construction material which randomly brought up fresh-looking artefacts, has





Fig. 3. Mograt Island, al-Saihan. The characteristic ‘woolsack’ granite boulders carved with animals, humans, boats and symbols some of which may date back to prehistory, to the right a more recent rock-gong

further dotted this plain with huge fields of pits. During all prehistoric periods, the pebbles have been employed as raw materials for the knapping of lithic tools (cf. Dittrich *et al.* 2015, tab. 6).

### **1.2 Site preservation**

In the course of the survey it proved useful to record the relationship between site formation, surface type, the relative height according to the Nile level as well as the density and structure of artefacts as the main parameters of site preservation. It seems appropriate to describe the sites from the angle of different surface types including the granite outcrops, the pebble or *hammada* plains, as well as the alluvial silt and sand deposits at the Nile terraces (Dittrich and Gessner 2014, tab. 1; Dittrich *et al.* 2015, tab. 5). One reason for this is that the capability of the listed environments to hold stratigraphic information as well as to preserve ecofacts and artefacts differs extremely.

Given that Mograt appears flat and largely featureless without any significant mound or hill, late prehistoric sites are mainly defined by artefact and ecofact concentrations in plain areas or at older terraces sometimes covered by alluvial deposits. Different states of site preservation as observed for various parts of the island can be explained by differing erosional patterns in connection with prevail-

ing wind directions, channelling through surface water and the ongoing exposure of the more durable basement or cemented terraces from which soils and finds were often washed down. To distinguish sites worth a more detailed investigation we were mainly looking for the presence of large immobile artefacts like grinding bases or handmills carved into rock surfaces that hint to former settlement activities and are not just relocated material, or single finds.

Despite this objective, the relocation of prehistoric artefacts is a common phenomenon on Mograt Island. Recent geomorphological research has provided insights into the complex modifications of the landscape along the northern Nile bank where the preservation of sites is extremely poor (Dittrich *et al.* 2015: 133). There the hard rocks of the basement stand out as highly weathered ridges (*yardangs*) parallel to the river, while through wind abrasion as the most important erosional factor in the place the shallow valleys in between are emptied. Additionally, surface water as well as the northward draining wadis seem to be responsible for the washing of most of the artefacts along with softer sediments down the northward slope of the river bank. Larger particles and artefacts, however, have been sometimes piled up at the leeward side of the ridges that formed natural



Fig. 4. Finds and sediments are trapped in hollows inside the bedrock which occurs just below the surface at a test trench close to the northern Nile bank (MOG114)

barriers to this movement (Fig. 4). Taken to its extremes, artefact concentrations resting directly on the bedrock cannot be studied by the method of excavation anymore (e.g. site MOG124, Dittrich *et al.* 2015, Fig. 22). As a result prominent sites do exist in certain places where – often secondary, yet somehow stabilised – artefact accumulations and favourable topographic conditions protecting them from wind and water activity converge which, however, does not necessarily reflect the full range of sites and their spatial extents or inter-site relationships in the past.

### ***1.3 Mapping Mograt's antiquity***

Mograt Island appears first on Western maps of the early 19<sup>th</sup> century when the travel route through the Nubian Desert to enter the Nile valley again at Abu Hamed became an alternative to the crossing of the Bayuda desert (Ritter 2014). Mograt can be thought of as divided into three parts (Fig. 1): western Mograt the landmass of which very much narrows towards the tip of Ras al-Jazira, central Mograt with the rock art site of al-Saihan at the northern bank and large alluvial plains at the southern bank (e.g. al-Jaraif), and eastern Mograt which includes the characteristic bend of the island and the main town of Maqall. The latter part appears as the actual cataract area on early maps (Chélu 1891, pl. 8).

One of the main study interests of the Late Prehistoric Survey project is the former human interaction with past landscapes which involves the access to its relics in the present landscapes. As landscapes we understand not only the island's specific topography or geology, or, more generally, nature and its capability to transform over time. Landscapes are always social constructions, providing cultural-spatial orders for humans, animals and plants as well as for the deceased and for the spirits. This order is established by defining living spheres with various rights and resources, transitional spheres such as tracks and rivers, or spheres of memory that can also act as liminal spheres to access transcendental forces (e.g. rock art sites, specific rock formations, burial sites). All of these spheres are actively created and maintained by a society. As humans have probably never entered an 'empty' landscape, during each period new links between humans and their environments were imposed on existing links. In this sense, landscapes do not only constitute palimpsests in an ideological way – meaning the cultural superimposition of various rights and rules – but also palimpsests in a strict material way – the superimposition of material remains (artefacts, ecofacts) of various periods and activities (cf. Bailey 2007).



For the practical determination of the past insular landscapes it is also necessary to have a look at the maximum Holocene Nile level. The present level of the southern Nile branch is 302-305 m a.s.l. before inundation at western Mograt according to Google Earth terrain data. From the deposits recorded so far (see below) it can be assumed to have reached at least 12 m above the present level. A graphical simulation of the maximum Nile level for the late Pleistocene and early Holocene periods was created by using a Digital Elevation Model based on SRTM data (Fig. 5). It can be noticed that the colouring of the Holocene alluvial basin gradually changes from light in the east to dark in the west which reflects the rapid fall of the river level. By the rise of the Nile level the liveable part of the island would have been limited to its core that rises another 20.0 m above this level, but by the activation of the palaeochannel marked by the Wadi al-Firsib Mograt Island became divided into two major palaeoislands (Fig. 6 lower, left). While assuming a maximum Nile level of 320 m a.s.l., the smaller southern palaeoisland would have still extended over an area of 5.2 km<sup>2</sup>, but together with the larger palaeoisland (36.5 km<sup>2</sup>) the landmass significantly shrank to roughly 40 per cent of Mograt's present dimensions.

Currently the dry course of the Wadi al Firsib is turned into fields thanks to a large-scale irrigation scheme. On the northern limits there are numerous gran-

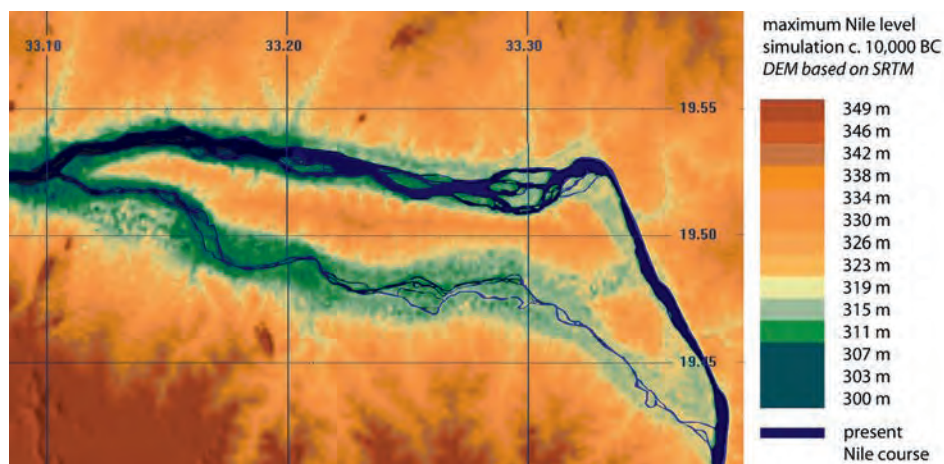


Fig. 5. Mograt Island. Maximum Holocene Nile level simulation assuming the alluvial plain to be extended to a height of 315-320 m, the gradual change of colours to dark to the west is due to the rapid fall of the river level to this direction (data based on SRTM)

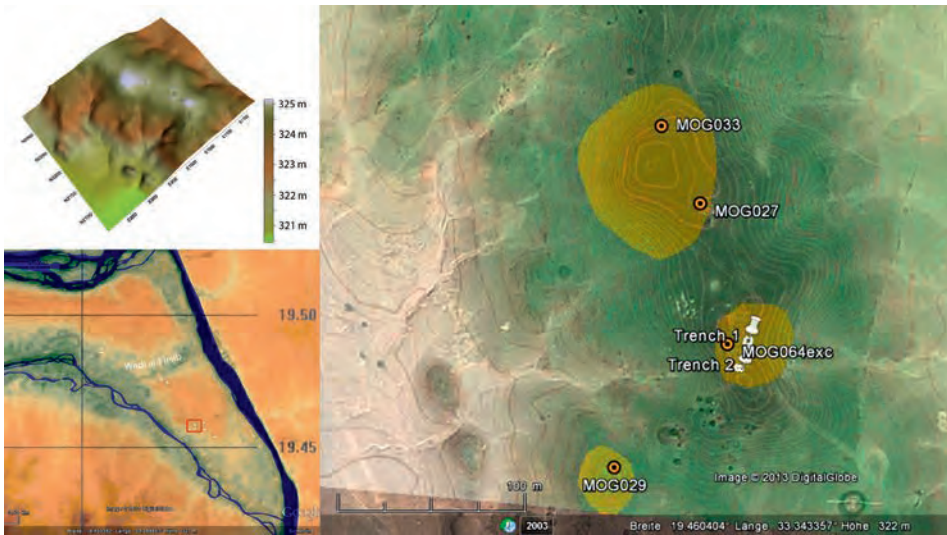


Fig. 6. Mograt Island, eastern part. Early to mid-Holocene sites at the al-Karmal plateau (right) according to local elevation (top, left) which in the Nile level simulation marks the shoreline of the southern palaeoisland (lower, left; sites are marked in white) (local DEM: G. Rees)

ite outcrops which bear traces of a former cataract-like landscape. When compared to the maximum Nile level simulation all of the late prehistoric sites located in the vicinity of the Wadi al-Firsib are clearly lying within the limits of the two palaeoislands (Fig. 6, lower, left). Additionally, the four sites on the northern side of the palaeochannel indicate a horizontal stratigraphy, with the most southern one being the most recent one (late Neolithic), suggesting that the wadi gradually ceased to flow during the mid-Holocene (Dittrich and Gessner 2014, Fig. 1). However, to further reconstruct the prehistoric landscapes of Mograt and to study the chronology of events that shaped them in greater detail it is necessary to focus on much smaller areas and site clusters.

## 2. Study area I: Eastern Mograt

If the focus is set to the al-Karmal plateau as the major basement ridge of the southern palaeoisland it becomes obvious that the late prehistoric sites are located on the highest part of the plateau overlooking the alluvial plain by about 5 metres (Fig. 6). The surface of the plateau is densely covered by the detritus of

the metamorphic basement, mainly gneiss and schist, as well as patinated quartz gravel forming together a dark-coloured *hammad*a pavement. Over a large area this pavement is mixed with artefacts of various prehistoric periods. The finds are more densely concentrated at the sites MOG027/MOG033, MOG029 and MOG064<sup>6</sup> (Fig. 6), but since they are very close they can hardly be considered as separate settlements.

Today, the most characteristic landscape feature are the numerous tumuli which are strewn over the plateau and excavated and studied within the scope of the sub-project ‘Bronze Age burial sites’ (Schulz 2008; Weschenfelder and Rees 2014; Weschenfelder 2015a, 2015b). As prehistoric artefacts are regularly present in the fill of the tumuli’s superstructures, their construction must have caused considerable disturbance of older occupational remains. Additionally, the varying degree of patination on excavated slab stones which marked some of the tombs indicates the former level of soil cover.

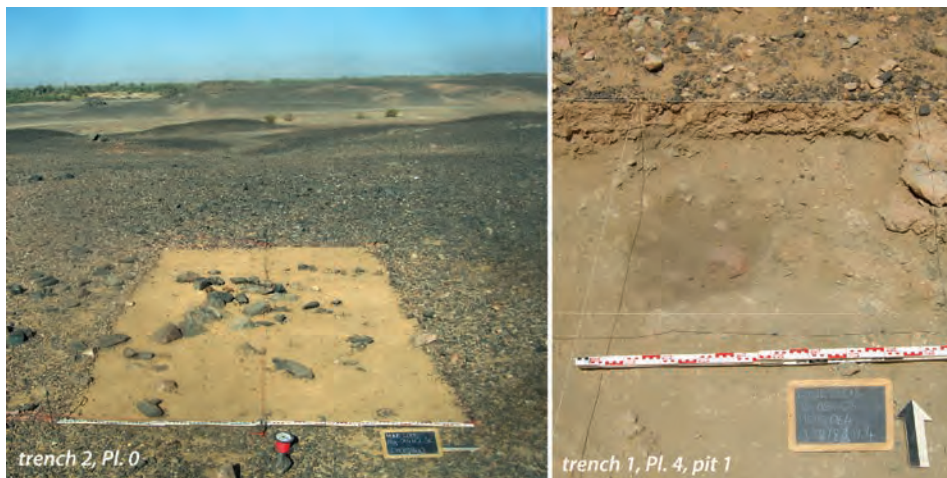


Fig. 7. Mograt Island, al-Karmal plateau. Trenches 2008-1 and 2008-2 at MOG064 during excavation (photos: R. Schulz)

<sup>6</sup> The former were recorded during the H.U.N.E. 2006 season (Näser 2006; Lange 2012) while MOG064 was recorded and test-excavated during the H.U.N.E. 2008 season (Näser 2008; Schulz 2008).



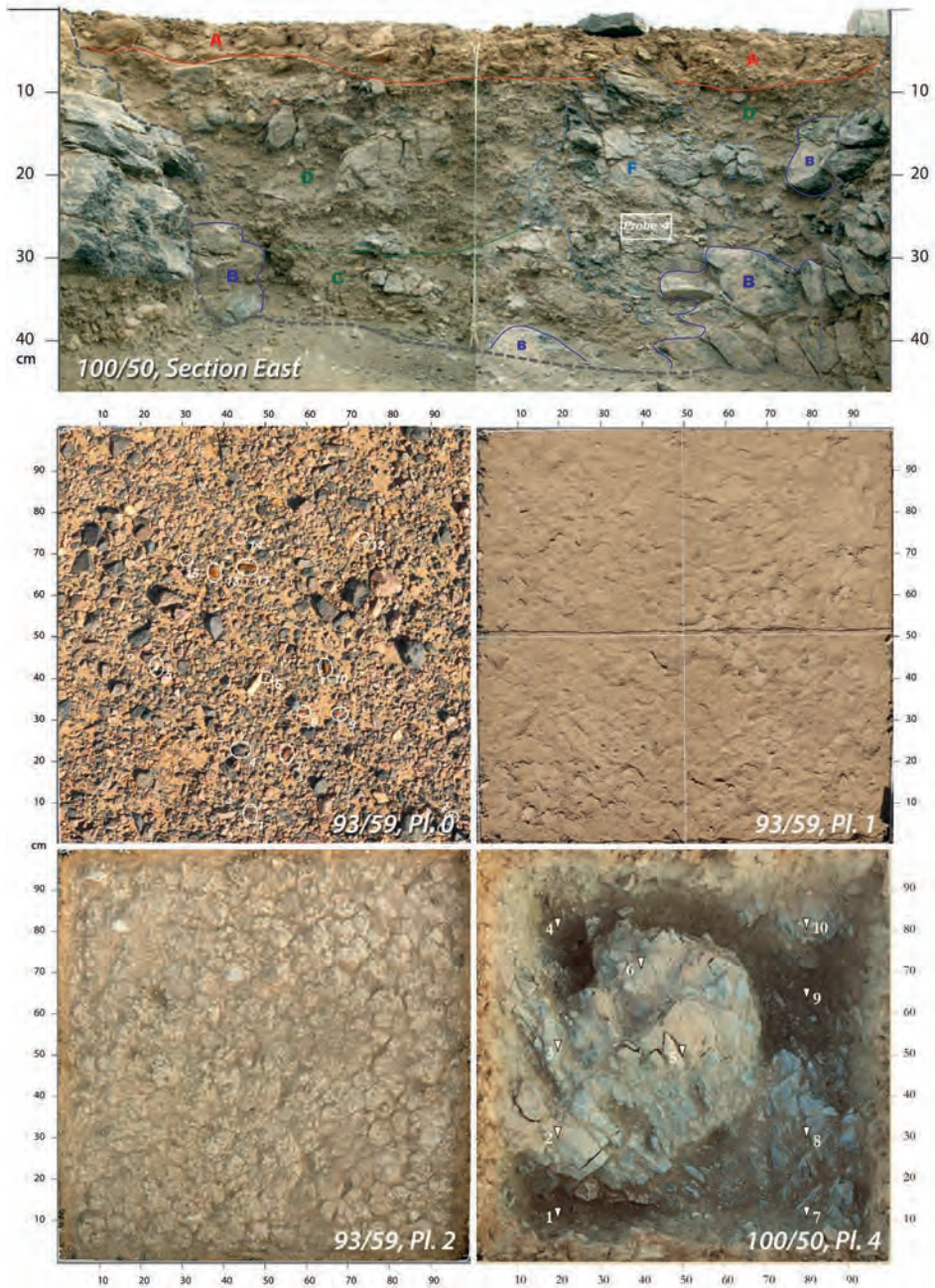


Fig. 8. Mograt Island, al-Karmal plateau. Section and plana sequence at the two geological test trenches 2014-93/59 and 2014-100/50 (photos: J. Schäfer)

Table 1. Radiocarbon dates available for late prehistoric sites at Mograt Island

site/ sample no.	material/ species	context	height above local NN in m	lab no.	conven- tional 14C age	calibrated 14 C age (2 <sup>nd</sup> sigma)	calibrated 14 C age (1 <sup>st</sup> sigma, rounded)
MOG000-33	shell of <i>Lanistes</i> sp. (mature)	WP 189	0	Poz-75369	7590 ± 50 BP	6570–6374 calBC	6480–6410 calBC
MOG064-22	shell of <i>Pila</i> sp.	trench 1, sq. 32/83, pl. 3-4, cont. 1	-0.20–0.40	Poz-63632	6870 ± 50 bp	5877–5661 calBC	5830–5710 calBC
MOG064-21	shell of <i>Limicolaria cailliaudi</i>	trench 1, sq. 32/82, pl. 3	-0.20–0.30	Poz-63630	7325 ± 35 bp	6245–6077 calBC	6230–6100 calBC
MOG064-10	shell of bivalve/ <i>Aspatharia</i> sp. ?	trench 2, sq. 27/68, pl. 2	-0.10–0.20	Poz-63628	8300 ± 35 bp	7484–7192 calBC	7450–7320 calBC
MOG064-SF01	ostrich eggshell bead fragment	trench 2, sq. 28/67, pl. 3	-0.20–0.30	Poz-62767	9060 ± 50 bp	8427–8208 calBC	8300–8250 calBC
MOG064-13	shell of <i>Zootecus insularis</i>	trench 2, sq. 29/67, pl. 2	-0.10–0.20	Poz-63629	18630 ± 80 bp	20753–20385 calBC	20600–20450 calBC
MOG102-26-11-2	shell of <i>Etheria elliptica</i>	trench 1, sq. C, pl. 0–10 cm	-0.10	Poz-75231	6515 ± 35 BP	5549–5377 calBC	5530–5470 calBC
MOG102-26-2	ostrich eggshell workpiece fragm.	trench 1, sq. D, pl. 10–20 cm	-0.10–0.20	Poz-75368	6530 ± 40 BP	5609–5381 calBC	5530–5470 calBC
MOG105-25-2-2	shell of <i>Pila</i> sp. (mature, large)	trench 1, extension (grey sediment)	-0.10–0.80	Poz-72519	6440 ± 40 BP	5479–5331 calBC	5470–5380 calBC



site/ sample no.	material/ species	context	height above local NN in m	lab no.	conven- tional 14C age	calibrated 14 C age (2 <sup>nd</sup> sigma)	calibrated 14 C age (1 <sup>st</sup> sigma, rounded)
MOG105- 24-6-1	shell of <i>Lanistes</i> sp. (imma- ture)	trench 1, sq. C, pl. 0–10 cm	-0.10	Poz-72516	6540 ± 40 BP	5613–5386 calBC	5530–5480 calBC
MOG105- 24-8	ostrich eggshell bead frag- ment	trench 1, sq. D, pl. 0–10 cm	-0.10	Poz-72515	6650 ± 40 BP	5639–5511 calBC	5620–5550 calBC
MOG105- 25-2-1	shell of <i>Bellamya</i> <i>unicolor</i> (?)	trench 1, extension (grey se- diment)	-0.10–0.80	Poz-72518	7190 ± 40 BP	6205–5989 calBC	6080–6010 calBC
MOG105- 24-6-2	shell of <i>Zootecus</i> <i>insularis</i>	trench 1, sq. C, pl. 0–10 cm	-0.10	Poz-72517	8060 ± 50 BP	7176–6815 calBC	7120–6840 calBC
MOG107- 05	shell of <i>Lanistes</i> sp.	silt stra- tigraphy, north wall	2.54	Poz-63636	8975 ± 35 BP	8291–7984 calBC	8270–8020 calBC
MOG107- 02	shell of <i>Lanistes</i> sp.	silt stra- tigraphy, south wall	2.23	Poz-63633	9030 ± 40 BP	8300–8213 calBC	8280–8250 calBC
MOG107- 04	shell of <i>Cleopatra</i> <i>bulimo-</i> <i>ides</i>	silt stratigra- phy, lb 2, north wall	2.33–2.43	Poz-63634	9680 ± 40 BP	9261–8856 calBC	9250–8960 calBC
MOG116- 35-2	shell of Nile bivalve (indet.)	SE sec- tion, m 20	3.33	Poz-72520	9800 ± 50 BP	9360–9200 calBC	9300–9250 calBC

## 2.1 The al-Karmal plateau sites (MOG064, MOG027)

In 2008, two test trenches have been excavated at the site MOG064 (Fig. 7; Schulz 2008). Trench 2008-1 covered 4 by 4 squares and a total area of 16 m<sup>2</sup>. While trench 2008-2 reached only half of this size it produced the major part of finds of altogether more than 5000 lithic artefacts, 400 potsherds as well as few grinders, ostrich eggshell beads, mollusc shells and heavily fragmented animal bones. Since also Middle Palaeolithic artefacts were among the lithics it was thought that the site could provide a clear stratigraphy (Schulz 2008).

The aim of the 2014 survey season was to (1) verify the presence and density of Palaeolithic and early to mid-Holocene finds, (2) study the geomorphology of the plateau as well as (3) assess its capability to provide a stratigraphic relation of Palaeolithic and Holocene finds. Several test trenches of the size of 1 x 1m were excavated in the vicinity to study the stratigraphy of the area (Fig. 8).<sup>7</sup> At the H.U.N.E. site MOG027 systematic surface find mapping (71 m<sup>2</sup>) and collection (39 m<sup>2</sup>) were conducted to study the full range of artefacts dating from the Middle Palaeolithic to the Kerma period (Dittrich and Gessner 2014: 134f., Fig. 3-4). Furthermore, during the 2014/15 season soil samples have been taken out of the still visible trenches at MOG064.

When the top *hammada* layer was removed in each of the geological test trenches, a silt layer of aeolian origin appeared. Characteristically it shows a columnar structure due to shrinking processes which are comparable to loess (Laity 2008: 164-165). These silts cover just the upper 8 cm, and rest directly on top of heavily weathered bedrock (Fig. 8). The consistence of the latter varies to a large degree but there is a zone of at least up to 40 cm below the surface where it is quite brittle and weathered to the size of silt, sand and gravel, additionally mixed with wind-blown and water-rolled material.<sup>8</sup> As the *hammada*'s development oscillates between deflation, surface wash through rains, as well as aeolian sedimentation (Laity 2008), it fosters the vertical movement of artefacts resulting in statistical biases when excavated in stratigraphic layers. In the excavated trenches 2008-1 and 2008-2 there was a high amount of surface finds due to uplifting processes, contrasting with few or even absent finds at the aeolian silt layer, deeper down again followed by increasing frequencies. As the decay of the basement progresses from the top down, the separated lower finds get buried more deeply over time, in case

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<sup>7</sup> Test excavations as well as the study of Palaeolithic artefacts were carried out by J. Schäfer, Berlin (Schäfer, unpublished report).

<sup>8</sup> Next to the camp house at al-Karmal a trench for a pit drainage was dug into the brittle bedrock which was easily removed by means of a *toria* down to a depth of approximately 6 m.

of trench 2008-1 down to 70 cm, while at trench 2008-2 artefacts ceased already at a depth of 30 cm. For trench 2008-1 the excavators described a ‘cultural layer’ which consisted of loose sediment with traces of secondary burning on potsherds (Fig. 10: GE15; cf. Schulz 2008: 58, Fig. 6). Most clearly it occurred as the fill of a pit roughly 45 cm in diameter (Fig. 7 right) from which a shell was dated (Tab. 1: MOG064-22). As it was later confirmed through the excavation of grave pits in the vicinity, such artificial diggings but also natural cracks are capable to act as sediment traps. However, the dry sieving of two sediment samples from the pit at trench 2008-1 gave no indication of charcoal or any other macroremains.

The micromorphological and geochemical analysis of two soil samples taken in 2014 proved a very high mineral content mostly of minerals of igneous origin of the basement, and besides that, organic contents as well as traces of bioturbation.<sup>9</sup> In large contrast to the actual environment, the organic contents indicate a former dense vegetation cover. Also the observed bioturbational features must have resulted from biological activities in more humid conditions. The presence of iron oxide pedofeatures, a product of wetting and drying, further supports this suggestion. From this we would conclude that the *hammada* is one of the oldest surfaces present at Mograt characterised by the constant decay of bedrock and subsequent deflation of former top soils of which only very few components still persist. While the *hammada* surface contains an interesting and wide chronological spectrum of finds it does not provide sediments directly linked to one of the archaeological periods in question. In fact, Holocene stratigraphy seems largely absent. Nevertheless the sites are important archives storing a palimpsest of different events the exact order of which remains stratigraphically so far unknown. With this in mind, we tried to tackle the local chronology of palaeoenvironmental and cultural events by (1) establishing a radiocarbon data series as well as by (2) studying typological features of lithics that allow for a diachronic assessment of the local knapping strategies.

During excavation, numerous conchifera shells have been found that could be employed for the purpose of radiocarbon dating (Tab. 1).<sup>10</sup> Landsnails such as *Zootecus* sp. and *Limicolaria* sp. hint to the former presence of humic soils and grassland and have been dated to the 21<sup>st</sup> and 7<sup>th</sup> millennium BC. The late Pleistocene dating

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<sup>9</sup> This analysis was carried out by S. Neogi, Cambridge (Neogi, unpublished report).

<sup>10</sup> The impact of the hard water effect remains unclear. The similar dates of MOG102 for terrestrial material (ostrich eggshell) and an aquatic species (*Etheria elliptica*) suggest it to be negligible or at least consistent on a regional level (Tab. 1: MOG102-26-2 and MOG102-26-11-2). However, it must be kept in mind that it could cause dates to appear up to 400 older than dates run according to the laboratory standard, i.e. that of charcoal (see discussion in Dittrich 2011: 51-53, 56).



Fig. 9. MOG064. Lithic finds. 1, 2) triangles; 3, 4, 7) lunates; 5) trapeze; 6, 8) backed points; 9, 12) double backed points; 10) backed point (microgravette type); 11) blade end-scraper; 9, 11) surface finds; 1, 2, 3, 5, 6, 7, 10) trench 2008-2, pl. 2; 4, 8) trench 2008-2, pl. 0; 12) trench 2008-2, pl. 1 (all chert, except 7, 8: agate, drawings: M. Ehlert)

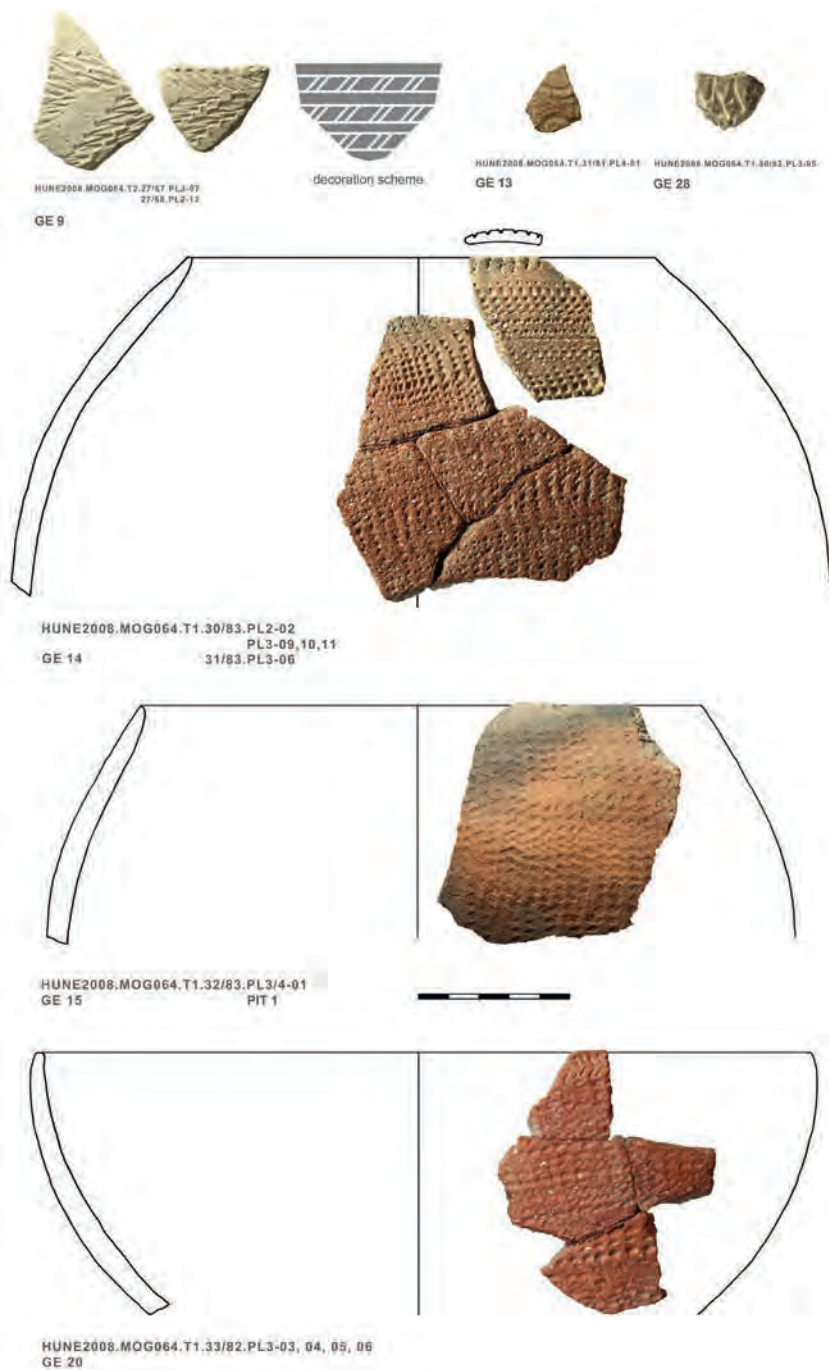


Fig. 10. MOG064. Pottery finds. GE9) surface + trench 2008-2, pl. 2-3; GE13) trench 2008-1, pl. 4; GE14, 20, 28) trench 2008-1, pl. 2-3; GE15) trench 2008-1, pl. 3-4, pit 1



of *Zootecus* sp. from planum 2 at trench 2008-2 would underline that relics of this period further suggested by traits of blade technology are indeed present. Human activity is attested by ostrich eggshell bead manufacture dated to about 8,300–8,250 calBC which must have been a period when the Nile level reached one of its maxima and the plateau became attractive as settlement area. This is corroborated by observations at western Mograt (see below). It is assumed that a significant amount of the lithic finds among them the backed point tradition frequently found at the plateau should be dated to that period. These tools are indicators to hunting in the open savannah. After these events, human activity is indirectly dated through a Nile mussel that must have been brought to this spot around 7450–7320 calBC. From the pit feature at trench 2008-1, containing rocker-stamped pottery and undiagnostic flakes, *Pila* sp. shells were dated to 5830–5710 calBC. Since these shells stem only from adult specimen, they were selectively collected and probably deposited as kitchen refuse. Human presence is finally dated through three charcoal samples to about 3020–2900 calBC (Weschenfelder and Rees 2014: 153). These charcoal finds derive from a grave pit filling in one of the late Neolithic graves excavated in 2014 (see also Weschenfelder 2015a).

The diagnostic lithic artefacts are mostly made from chert reaching high proportions of 60%, sometimes also from agate (c. 7%), and other more opaque stone varieties.<sup>11</sup> The proportion of quartz is relatively low (19.5%) when compared to other sites at Mograt Island. The tools made from chert and agate comprise endscrapers on blades (Fig. 9.11), backed points (Fig. 9.6, 8, 10), double backed points (Fig. 9.9, 12), lunates (Fig. 9.3, 4, 7), triangles (Fig. 9.1, 2) and trapezes (Fig. 9.5), retouched blades as well as different types of perforators and scrapers. The characteristic endscrapers on thick blades would rather point to an Upper or Late Palaeolithic date. Their occurrence is consistent with that of few blades exceeding microlithic dimensions as well as of cores showing a more developed scheme of preparation and reduction. The latter pertains also to a number of backed tools. The tanged backed point (Fig. 9.10) which typologically resembles a microgravette or Sauveterre point (Barrière *et al.* 1969) as well as the long backed points should be assigned a Late Palaeolithic date or very early date within the Holocene sequence. Differently from this tradition, the occurrence of geometric microliths might correspond to the human presence dated by shells to the late 8<sup>th</sup> millennium calBC. Besides the indicators for the Upper and Late Palaeolithic, there is also

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<sup>11</sup> Statistics and drawings of the lithic finds were done by M. Ehlert, Wrocław; the publication is in preparation.

a constant proportion of up to 4% of Middle Palaeolithic finds, represented by Levallois cores and flakes struck from chert pebbles.<sup>12</sup> Discoid cortex platform cores, cortex backed flakes turned into borers as well as irregular and concave scrapers are assumed to date from the Neolithic period.

The pottery fragments from the surface of the trenches were usually very small and eroded. Out of the larger fragments from the excavated levels jars and bowls can be reconstructed (Fig. 10: GE14, 15, 20), while few fragments belonged to pointed bases. Refittings of fragments from different plana were common. The presence of mica temper was always associated to that of rocker stamp decoration (Fig. 10: GE14, 20) and corresponding rim decorations include herringbone patterns as well as simple parallel strokes. Few small and reworked fragments of a quartz tempered fabric showed an incised wavy-line decoration (Fig. 10: GE13) indicating that these finds might have been deposited during earlier periods. 39 fragments - one of them clearly points to the reconstruction as a carinated vessel type - belonged to a fine sandy fabric bearing a banded decoration (Fig. 10: GE9). This decoration consists of small zigzags executed with a plain edge tool. Plain zigzags occurred also in another variety (Fig. 10: GE28). The fine grey fabric reminds of that of similar carinated bowls excavated in the area of the Fourth Cataract and also the way of combining horizontal with diagonal bands is known from there (Dittrich *et al.* 2007, Fig. 1.14, 15; 2.8).

From the pottery finds in the vicinity, namely from site MOG027, further patterns are known such as incised wavy-line which appears in banded patterns rather than as complete fillings (Dittrich and Gessner 2014, Fig. 20.1-3). Other patterns include the so-called wolf-tooth decoration which is actually a variety of plain zigzags (*ibid.* Fig. 20.5, 9), double-pronged tool impressions (*ibid.* Fig. 20.8) and a peculiar pattern which we would preliminary call 'fish-scale' (*ibid.* Fig. 20.7) and which is so far known only from the Fifth Cataract area (*cf.* Alkheldir, this volume). It was probably made by means of a roulette. Concluding also from the presence of different fabrics, these decorations are suggested to date from the Mesolithic to late Neolithic periods.

To sum up, the al-Karmal plateau bears the chronological record of several prehistoric events when human interest was directed to this elevated spot which

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<sup>12</sup> As this proportion does not vary between surface finds and that of trench 2008-1 it is likely that MOG064 does not bear an *in situ* Middle Palaeolithic knapping site (as supposed by Schulz 2008: 58), but Levallois cores and flakes might have been collected during the Holocene together with other raw materials brought from the pebble plains or wadi beds to the site. There are clear traces of re-use on Levallois artefacts (Ehlert, unpublished report)

in the long-term changed from a living sphere, manifest in various activities such as cooking or the manufacture of tools and beads, to a sphere of memory, manifest in numerous burials. At the same time the environmental record indicates various climatically more favourable episodes of sustaining humic soils and grassland vegetation before the present desert pavement developed.

### 3. Study area II: Western Mograt

During the 2014 and 2014/15 seasons surveying work was also conducted at western Mograt (Fig. 1, 11). The systematic prospection covered full transects from the northern Nile bank, including Kurta Island, to the southern Nile bank. Out of the mappings there emerges a clear pattern of sites located more or less along the river banks and of a second group of sites located along the main crest of the island which is always the highest ridge of the island and still the shortest way to cross it from east to west (Fig. 11).

#### 3.1 Hajar al-Nur – The lake site (MOG107) and the settlement site (MOG106)

These two sites are located near a small homestead called Hajar al-Nur at the southern Nile bank roughly 100 m to the north of the actual river branch (Fig. 12). They consist of two distinctive landscape features. One is a very well preserved alluvial mound (MOG107, Fig. 13) which is the product of continued sedimentation at the early Holocene alluvial plain or, more precisely, inside a basin once filled by an ephemeral lake. From the contour lines it is possible to preliminary reconstruct the extensions of such a lagoonal lake limited by outcrops of the basement along a wide NE-SW orientated crack crossed by a wadi today (Fig. 12, top right). This wadi cut its way through the Holocene deposits, thus exposing their stratigraphy down to the basement (figs. 14, 15). The second site is a very dense surface concentration of lithics, grinders, potsherds and few poorly preserved animal bones on a flat mound (MOG106) which is situated between the Holocene lake relics and the present southern Nile branch. Part of its surface was recently removed by machinery probably in quest for deposits containing gold.<sup>13</sup>

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<sup>13</sup> In fact, the clearly visible patterns of recent sediment extraction at the nearby stratigraphy for the same purpose indicate that it is the lowest Pleistocene pebble layers that are most likely to contain the precious metal.

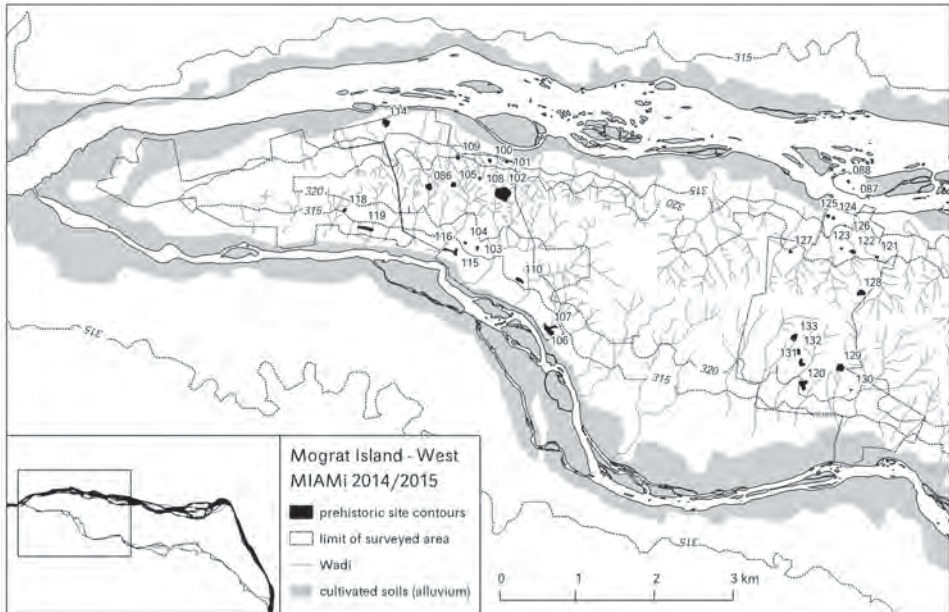


Fig. 11. Mograt Island, western part. Surveyed area and contours of late prehistoric sites (top), satellite image (below, Corona 1965, colours inverted)



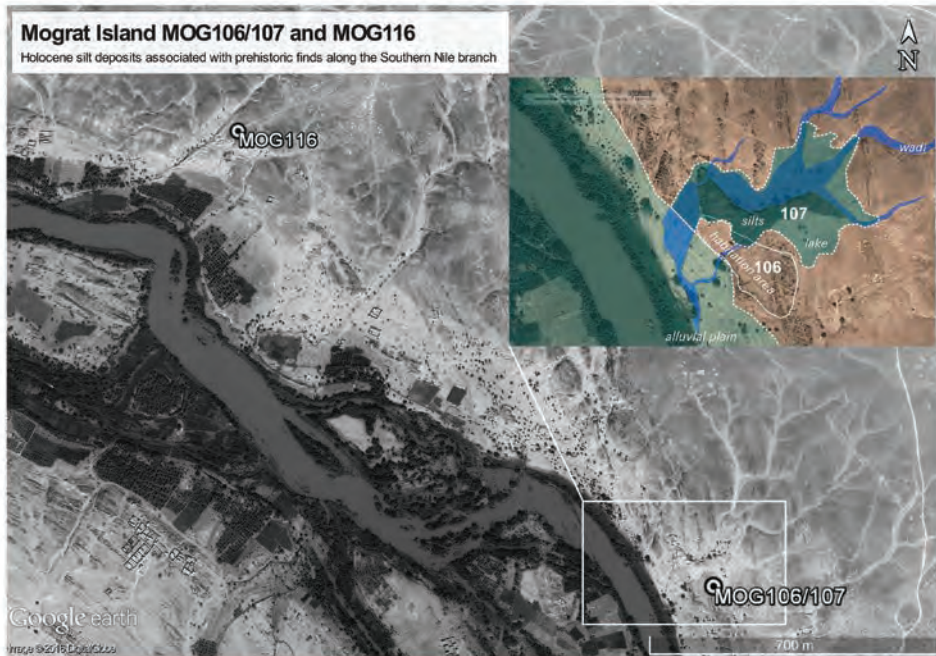


Fig. 12. Mograt Island, western part. Satellite image with the location of the sites MOG106/107 and MOG116 along the southern Nile branch (Google Earth) and the assumed extension of the early Holocene lake (top, right)



Fig. 13. Panorama view of sites MOG107 (silt bar, centre) and MOG106 (right, in front of the car) enclosed by a wadi bed, behind the trees to the right flows the southern Nile branch

During the first season the stratigraphy of MOG107 was recorded in detail over a height of 3.50 m (Fig. 15; cf. Dittrich and Gessner 2014: 138ff.). From the stratigraphic observations two distinct phases of sedimentation were evident and could be roughly associated with the early Holocene and the Pleistocene or earlier periods. In the lower part it revealed gravels and sands of an older Nile terrace that contained few rolled Palaeolithic artefacts (Fig. 15.H-L). As a major discontinu-





Fig. 14. Working at the stratigraphy of MOG107, the arrow marks the upper lakebed the softer sediments of which are more eroded, the section was cut by the course of a wadi (right)

ity the gravels are overlain by fine calcareous silt and sand accumulations which characterise the upper part (Fig. 15.A-G). During the second season we decided to complete the recording with more detailed soil studies and to take samples for studying soil micromorphology and carrying out geochemical analysis (Dittrich *et al.* 2015: 123ff.).

The thin sections obtained from the upper part of section (Dittrich *et al.* 2015, Fig. 3, tab. 1: samples 1–2) show horizontally laminated silts, identified mainly as quartz, mica and tourmaline and are interpreted as the result of repetitive flooding events and water logging conditions.<sup>14</sup> Due to indicators for extensive bioturbation, it can be assumed that soil fauna was most active between the flooding events when the sediments had dried out. Soil formation processes seem to have been well underway. This is suggested by limpid clay coatings of particles which are characteristic of stable and densely vegetated land surfaces. Thus, the area might have been of interest not only because of its proximity to aquatic resources

<sup>14</sup> This analysis was carried out by S. Neogi, Cambridge

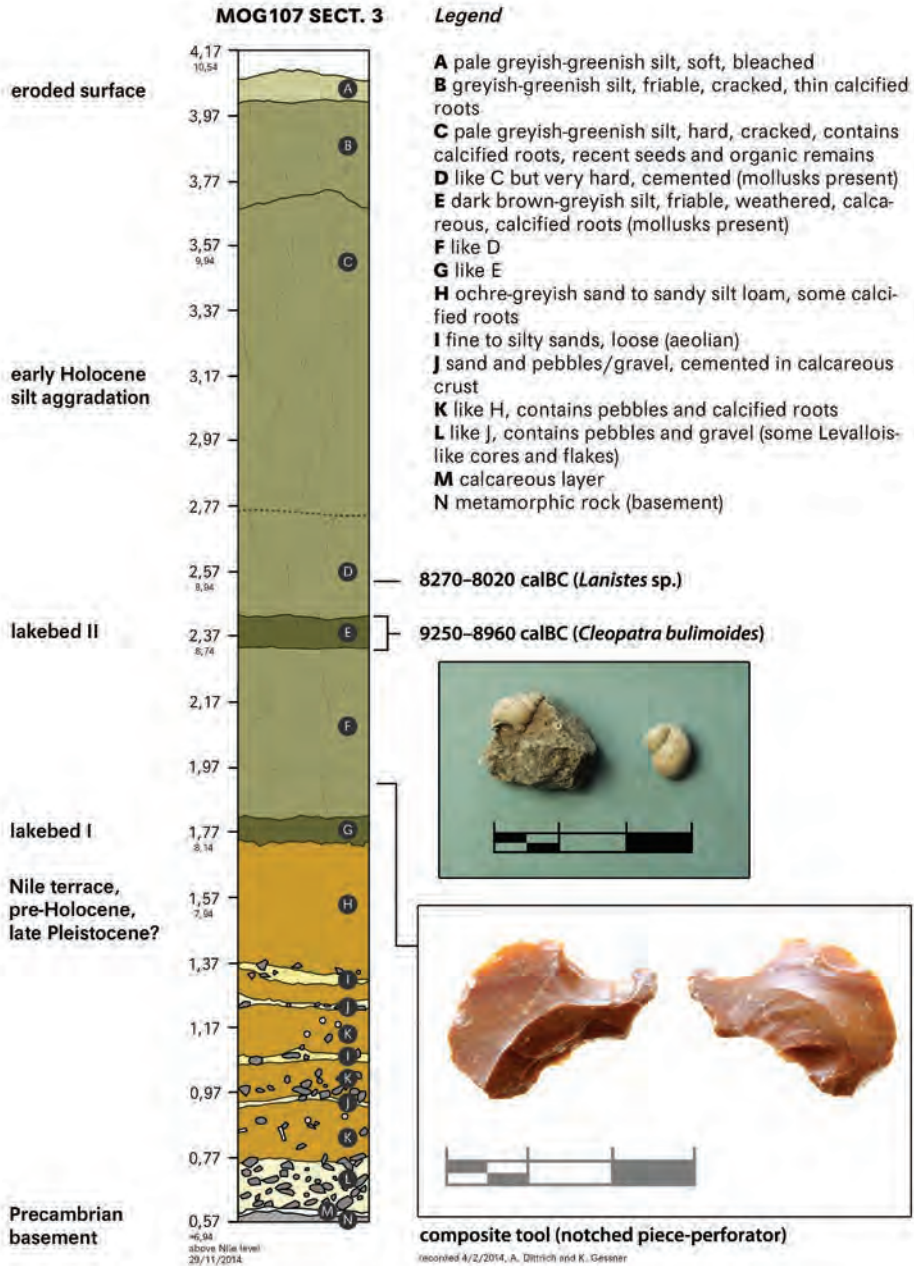


Fig. 15. MOG107. Stratigraphic record with the positions of radiocarbon dated mollusk shells and of a singular tool find

but also to plants growing during interim episodes. As post-depositional events, redoximorphic features such as iron mottles indicate a fluctuating water table later followed by the drying-up which led to the subsequent precipitation of calcium carbonate. Embedded within the silts were two dark brown layers with higher organic content (Dittrich *et al.* 2015, tab. 1: sample 2) which were interpreted as lakebeds (Fig. 15.E, G). This was further suggested by the inclusion of mollusc shells.

These shells have been attributed to the freshwater snail species *Cleopatra bu-limoides* (Fig. 15), the carinated shells of which strongly point to the prevalence of lacustrine environments (Van Damme 1984: 23; Tothill 1946: 160, Fig. 9). The other identified species is the apple snail *Lanistes* sp. which is a typical inhabitant of alluvial plains grown with an acacia-tall-grass community and being flooded for a significant part of the year (Tothill 1946: 159). Thus, the radiocarbon dates of the respective shells indicate two events dated to 9250-8960 calBC suggesting more permanent lacustrine environments and to 8270-8020/8280-8250 calBC pointing to seasonal flooding of the lake followed by the fast growth of grasses. Interestingly, the *Lanistes* sp. date closely matches that of an ostrich eggshell bead excavated at the al-Karmal plateau at eastern Mograt (Tab. 1: MOG064-SF01). Therefore, one of the objectives of the 2014/15 season was to search for a stratigraphic connection between the early Holocene lake (MOG107) and the nearby settlement (MOG106) and to identify artefact types dating from that period out of the mixed find assemblage.

During the second season several trench sections along an axis of altogether 41 m were excavated to provide a section through the mound of MOG106 on which the majority of surface finds is resting (figs. 16, 17; Dittrich *et al.* 2015: 126ff.). One important question is whether the mound could have supported a shoreline habitation close to the lake, since the present height of the mound (c. 9.4 m above present Nile level) appears much lower than the highest lake level as indicated by the preserved height of silty deposits (c. 10.7 m above the present Nile level).

Indeed, at the lakeside end of trench 1, the two significant lakebed strata of the adjacent site MOG107 were again identified, with upper limits of c. 8.7 m and c. 9.0 m above the present Nile level (Fig. 17 left). They gradually slope to the north towards the centre of the lake basin. Combining the evidence of the four excavated sections, the mound is part of an older Nile terrace probably of Pleistocene age and consists of hard deposits such as calcified silts and sands as well as cemented pebble layers that rest on the local basement. If the early Holocene lake and the



Fig. 16. MOG106. Overview of trench 1 exposing the cemented deposits which formed a stable ground which was occupied during the early Holocene while a lake existed behind (marked by the dark silt deposits of MOG107)

supposed shoreline settlement existed at the same time, more than 1.5 m metre of top soils and deposits at the settlement area must have disappeared since the Holocene due to deflation. This is corroborated by the fact that the artefact density within the surface levels was extraordinarily high suggesting significant deflation of former top soils. In fact, only the bedrock ultimately delimiting the lakeshore (Fig. 17 left) as well as the hard and clay-cemented sediments of the terrace were preserved and exempted from later erosion. Thus, the supposed link between lake and settlement can hardly be proven in stratigraphic terms as the sediments in question and therefore stratigraphic units are missing. The only evidence is just one early Holocene tool, a composite perforator-notched piece, which the stratigraphy of MOG107 revealed itself (Fig. 15 lower, right).

It was only at the opposite end of the mound of MOG106 that indications for a stratigraphic order of artefacts were observed even though they were embedded in a colluvial (secondary) context (Fig. 17 right). The upper layer contained large pieces of rocker stamped pottery, cobble stones and prismatic quartz cores that



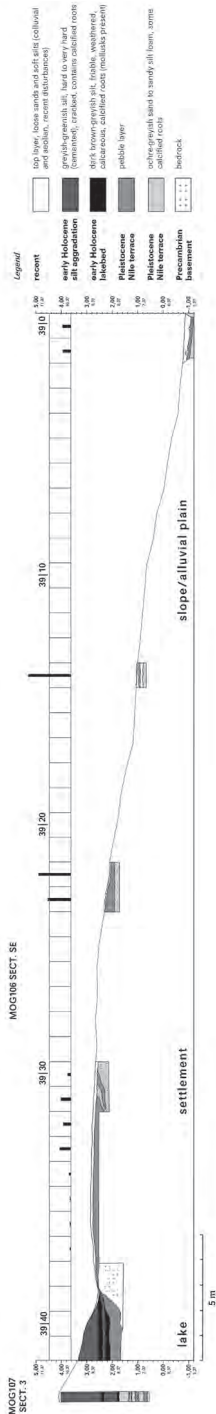


Fig. 17. MOG106, trench 1, SE section. Stratigraphic relation between the early Holocene settlement area and the radiocarbon dated alluvial deposits at neighbouring site MOG107 (left); the vertical bars above the section mark the frequency of lithic finds

must have been brought there from nearby rock fields (Dittrich *et al.* 2015, Fig. 7). This find assemblage appears very similar to that of the stratified Neolithic layer of site MOG116 (see below). By contrast, the lower layer contained small blades and microlithic implements made from chert. Chert artefacts – often clearly exceeding microlithic dimensions of 3 cm –, namely narrow blades and backed implements as well as elongated single platform cores were also frequent at the middle part of the slope (Fig. 17 centre), where they had most probably weathered out of an older layer (Dittrich and Gessner 2014, Fig. 21: 1, 4–7, 22; Dittrich *et al.* 2015, Fig. 8). Judging from the sample of a test trench, however, the majority of lithics were made from quartz (c. 68%) suggesting a chronological shift in raw material preferences. The detailed study of artefacts will be the scope of further research. As a preliminary assumption, the two different lithic strategies could signify two different subsistence strategies, changing from a lakeshore occupation during the early Holocene to a Nile terrace occupation close to arable soils during the mid-Holocene after the lake had finally dried up (Dittrich, in prep.).

### 3.2. Gharghara – The stratigraphy (MOG116)

In a distance of only about 2 km from MOG106/MOG107 a second stratigraphy providing an extensive Quaternary record resting on the Precambrian basement was located (Figs. 12, 18). The site lies at the mouth of a wadi near the single homestead named Gharghara<sup>15</sup>, approximately

<sup>15</sup> ‘Gharghara’ (arab.) means the noise of the water in a current when flowing between stones and is related to the English word ‘to gurgle’ or the German ‘gurgeln’.





Fig. 18. MOG116. Overview of the alluvial deposits as cut by a wadi, the silts at left were dated to the 9<sup>th</sup> millennium calBC (now partly destroyed by bulldozing), to the right lies the section excavated in 2014, behind it are the cultivated fields on top of the mid-Holocene alluvium

220 m inland of the present southern Nile channel and – when recorded in early 2014 – it still consisted of a loose surface find concentration. However, by the end of 2014 the local landowner intended to create a new terrace for plant cultivation which would require the bulldozing of the entire silt deposits as well as the removal of stones and artefacts from the surface.

In the course of the following rescue excavation, the SE section along the wadi passage was cleared at a total length of 24 m (Figs. 18, 19 top, 20; cf. Dittrich *et al.* 2015: 129ff.). During the cleaning an artefact-rich layer varying in thickness between 10 and 20 cm was found. As the layer slopes significantly towards the direction of the southern Nile branch, more recent alluvium has later been deposited on top of it, reaching a thickness of up to 2 m in the area currently excavated (Fig. 20). In the middle parts of the section, finds had weathered out of the stratigraphy which had first given the impression of a mere surface site. From the stratigraphic observation it can now be suggested that the largest portion of the site is still deeply buried underneath the more recent silts and will thus remain preserved.

To the north, a pit excavated from the surface level down to a maximum depth of 1.2 m was exposed by the section (Fig. 20 left). Its walls had been lined with clay which had been burned red through exposure to a high-temperature fire. The pit cut through silty sediments that contained two lakebed horizons, the absolute levels of which (c. 9.10 and c. 9.30 m above the present Nile level) closely resemble those of site MOG107 (see above). A Nile bivalve shell found in the lower one gave

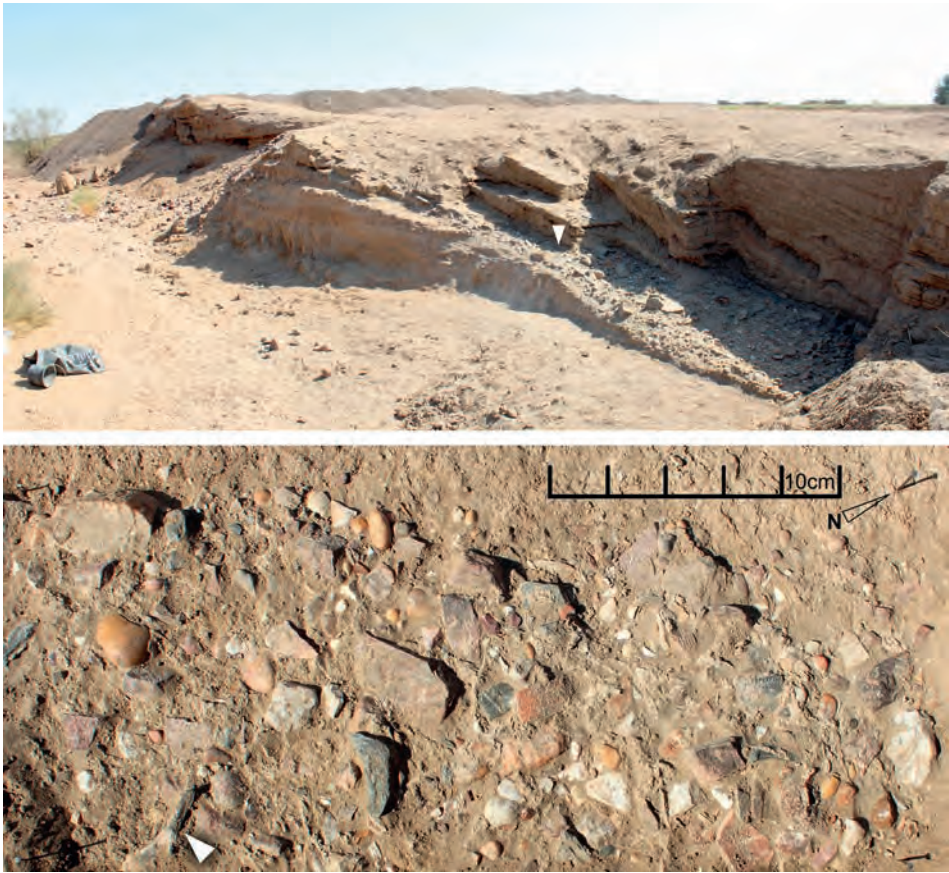


Fig. 19. MOG116, SE section. Overview of excavated area (above) and detail of cleared planum 1 (below, arrows mark the *in situ* findspot of the cattle ulna)

a date of about 9300–9250 calBC which further suggests a lake formation event similar to that recorded at MOG107 (Tab. 1). Unlike the latter site, however, there was no insular mound so that the area was entirely flooded and human occupation on top of the silts became possible only at a much later point in time.

During the clearing of the section a large bone later identified as the humerus of a hippopotamus (Dittrich *et al.* 2015, Fig. 12) was found and the surrounding area cleared down to Planum 1 was enlarged to roughly 9 m<sup>2</sup> (Fig. 21). The surface of the layer consisted of numerous slab and cobble stones originating from ridges of weathered quartz and metamorphic rock located nearby. They had been brought to the site most likely in order to support huts or tents or to be used as

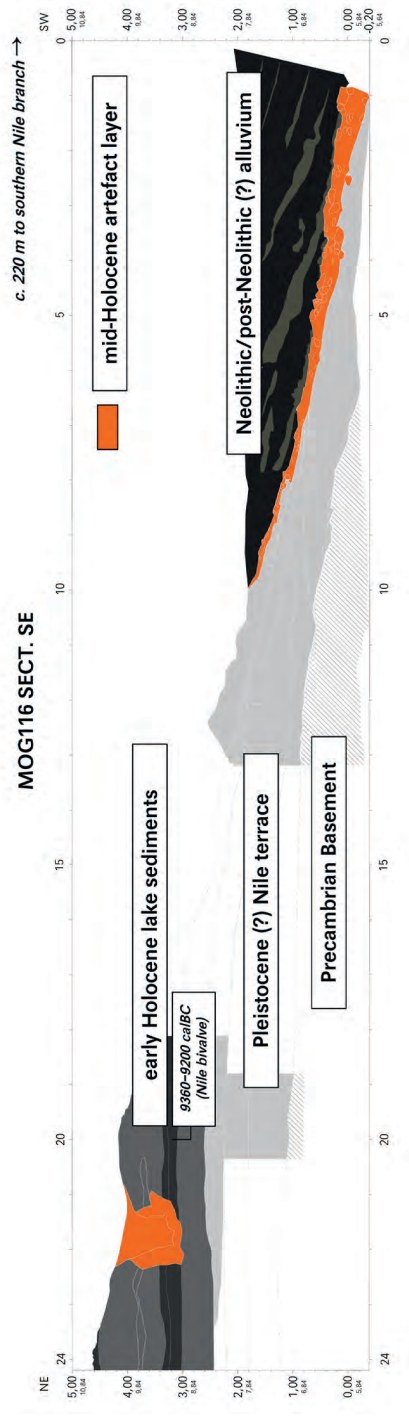


Fig. 20. MOG116, SE section. Chrono-stratigraphical interpretation

anvils. The removing of the archaeological remains from an area of not more than 2.4 m<sup>2</sup> generated extraordinary high amounts of finds, most of which are lithics amounting to nearly 10000 pieces. A few grinders and hammer stones were present in the excavated area. Among the finds were also 2.5 kg of lumps of burnt clay that originated from former fire places and fire pits. As no pits were found in this part of the section, it seems likely that these finds had eroded down from the higher terrace.

Animal bones, though all of them fossilised due to the presence of calcareous environments, were quite rare and include fish, crocodile, gazelle, bovidae, hippopotamus and unidentified Mammalia (Dittrich *et al.* 2015, tab. 3). However, a recent analysis of previously unidentified bovidae gave as result that one molar belonged to an adult sheep or goat (*Ovis/Capra* sp., Fig. 24e) while the left ulna found and recorded in planum 1 can be attributed to domestic cattle (*Bos taurus*, Fig. 19 lower, Fig. 24f).<sup>16</sup> Judging from their position, single occurrences and worn condition, the cattle ulna as well as the hippopotamus humerus could have been used as tools. Other organic materials such as small bones, mollusc shells, eggshell or seeds were conspicuously missing, and so far no radiocarbon date could be obtained.

Among the flaked material, quartz was exceptionally frequent reaching proportions of up to 85%. Most of the quartz and the coarse-grained Hudi chert had just been sliced into so-called wedges and flakes without preparing a platform which seems typical for the Neolithic period. Due to the high calcareous content of the silty sediments, pottery fragments were often corroded giving pot surfaces a rough and gritty appearance. Thus, only few of them still bear traces of a brown burnish. Pottery decorations consist almost exclusively of rocker stamp patterns including very fine and thin dots, spaced zigzags as well as a plain zigzag variety (Fig. 22, top row, second). They are combined with impressed rim decorations or rims modelled in a wavy style (Fig. 22 top row, left), further suggesting a Neolithic date for this layer (cf. Nordström 1972, Fig. 121.22-31 as well as the discussion of the Nubian Neolithic in Dittrich 2015: 53f., Fig. 17).

The significance of this stratified site lies in the fact that the find layer was sandwiched between two different stages of Nile sediment aggradation. The lower stage was preliminarily attributed to a Pleistocene Nile terrace overlain by early Holocene lake sediments – a situation almost identical to that recorded at the site MOG107. However, the Holocene deposits must have been sharply undercut and

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<sup>16</sup> The author is indebted to V. Linseele, Brussels for these identifications.



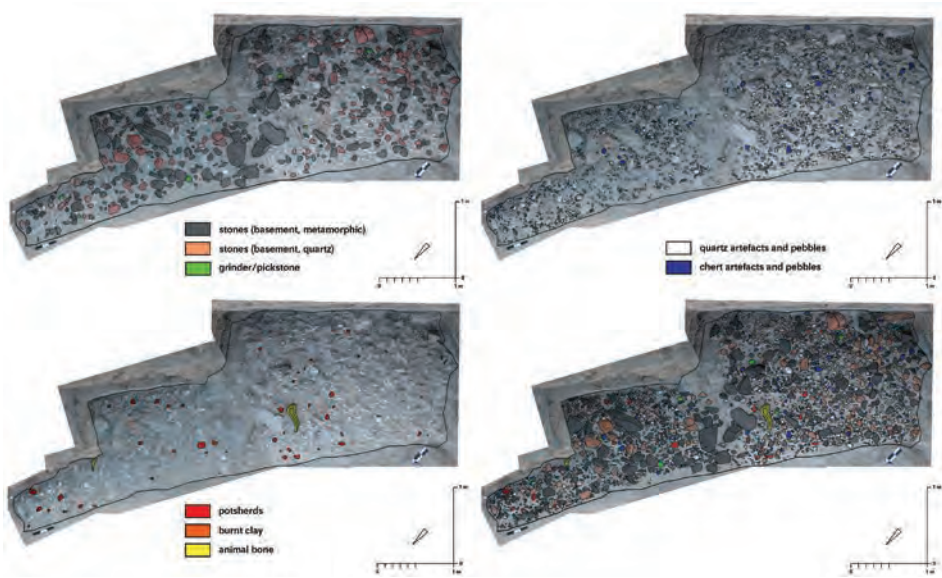


Fig. 21. MOG116. Orthophotographic record of planum 1, artefact classes and bones are marked by different colours (CAD drawing: K. Geßner)



Fig. 22. MOG116. Pottery finds from the mid-Holocene occupational layer (2014 excavation)





Fig. 23. MOG086. Overview of test trench 1 where light aeolian silts overlay pebble deposits embedded in dark red sediment

thus removed by a Nile meander or tributary before the artefact-rich layer could have slipped down from the top of the earlier lake sediments during a landslide (Fig. 20).<sup>17</sup> Obviously, dramatic changes of landscapes still occurred during the mid-Holocene period. The presence of domestic animals as well as of a quartz flaking industry places this occupation event firmly within the Neolithic period, and would suggest a dating to the 5<sup>th</sup> millennium BC or, when compared to the inland sites (see below), even slightly earlier. Finally the artefact layer was sealed by up to two metres of post-Neolithic/late Holocene alluvium. Interestingly, these deposits are part of a large alluvial formation covering the southern plains of Mograt (e.g. al-Jaraif) which suggests a late Holocene date for the arable soils still under cultivation (cf. Dittrich, in prep.).

### 3.3. Inland sites at the watershed (MOG086, MOG102, MOG105)

A further pattern of occupation was observed at the plains of the central island's crest where medium to large surface sites are located (Fig. 11). Today the landscape appears desert-like and entirely uninhabited (Figs. 23, 26). Four sites (MOG086, MOG102, MOG105, MOG108) were identified during the 2014 survey by the presence of stone slabs, grinders, fragments of grinding bases, potsherds and lithics, all of them intermingled with the dense pebble cover of the *serir* plain (Dittrich and Gessner 2014: 136f., tab. 1, Fig. 8, 9). During the 2014/15 survey four sites of this type were found at the central part of the island where the watershed plain is even more extended (Fig. 11: MOG128, MOG129, MOG132, MOG133, cf. Dittrich *et al.* 2015, tab. 5).

At three of the sites (MOG086, MOG102, MOG105) test trenches were excavated which revealed an almost identical stratigraphy (Fig. 23). After the removal of the surface artefact and pebble layer and below an accumulation of wind-blown silts, two brownish to reddish iron-rich soil horizons mainly composed of small pebbles were recognised. So far, no structures were observed in the pebble matrix. However, bones and shells seemed to be much better preserved than those found in the calcium-rich layers at the Nile terraces (compare Fig. 24, top and lower row). The zooarchaeological identification resulted in the following species: catfish (*Synodontis* sp.), crocodile, Nile monitor, ostrich, dorcas gazelle (Fig. 24a), hippopotamus (Fig. 24b), bovidae and other unidentified small to large mammalia

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<sup>17</sup> A similar situation was reported by Arkell (1947, 173) for the site of Khartoum Hospital. Arkell assumed that the majority of finds that were found in a sloping position had eroded down together with the soft sediments from the former elevated settlement area.

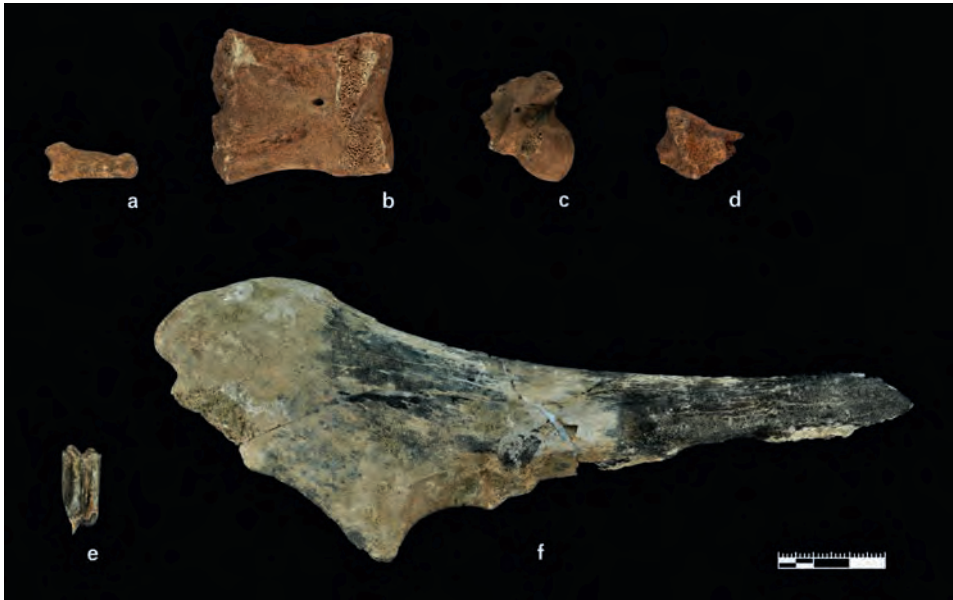


Fig. 24. Animal bone finds. a) *Gazella cf. dorcas*, phalanx 1; b) *Hippopotamus amphibious*, phalanx 1; c) *Ovis/Capra* sp., femur fragment; d) *Ovis/Capra* sp., tibia fragment; e) *Ovis/Capra* sp., molar; f) *Bos taurus*, left ulna (a-d: MOG086, test trench 1; e-f: MOG116, SE section, pl. 1-2, photos: N. Nolde)



Fig. 25. MOG086. Pottery finds from test trench 1

(Dittrich *et al.* 2015, tab. 3). The re-examination of bovidae remains of MOG086 confirmed a femur and a tibia of domestic sheep or goat (*Ovis/Capra* sp., Fig. 24c, d).<sup>18</sup> Mollusk shells are to be attributed to gastropods such as *Pila* sp., *Lanistes* sp., *Zootecus insularis*, *Bellamyia unicolor* (?) and to the Nile oyster (*Etheria elliptica*). As the size of *Pila* sp. and *Lanistes* sp. varies from small immature to very large specimen they probably lived nearby and were not selectively collected by humans as it was the case at MOG064 (see above). But also the presence of aquatic and semi-aquatic species such as the Nile oyster, catfish, crocodile, and hippopotamus is very interesting since these sites are situated a few kilometres inland and are out of the reach of maximum Holocene Nile level (cf. Fig. 5).

It was only at site MOG105 that the environmental aspect of those camp-sites could be studied in more detail. It turned out that the test trench was actually located partly inside a shallow surface depression (Fig. 26) the filling of which appeared as a grey soft sediment the base of which could not be reached (Fig. 27). The shape of the base points to artificial digging and considerable reworking of the sterile reddish pebble deposits. The excavation of the mixed sediments produced a significant quantity of artefacts and ecofacts including also small fragments of a human skull. Three soil samples have been taken (Fig. 27.S1-S3). As identified from the thin sections, the silt-sized greyish-white deposits are the product of the dissolution and reprecipitation of calcium carbonate deriving from the local bedrock (Dittrich *et al.* 2015, tab. 1).<sup>19</sup> Not only do these processes suggest the presence of water, a fluctuating water table is furthermore indicated by the presence of iron mottles. There is evidence for organic material as well as intense activity of earthworms and similar soil fauna, visible mainly in the form of soil mixed with excreta and by the breakdown of the organic matter. From this emerges a picture of a rain-fed shallow water pond that was surrounded by dense vegetation sustaining a humic top soil. The presence of few recent and drought-resistant plants indicate that the spot is still capable to store rain water.

The pottery finds of the three sites show striking similarities in the presence of rocker stamp decorations sometimes arranged into bands or dotted wavy-lines (Fig. 25; Dittrich and Gessner 2014, Fig. 20.11, 13-16). Rims are sometimes decorated with strokes (Fig. 25 top row, right) or modelled in a wavy-style (Dittrich and Gessner 2014, Fig. 20.12) which resemble those of the site Gharghara (MOG116, Fig. 22 top row, left). Among the lithics there is a significant amount of

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<sup>18</sup> Again the author is indebted to V. Linseele, Brussels for this identification.

<sup>19</sup> Analysis was carried out by S. Neogi, Cambridge.



cortex backed flakes just sliced from cores without preparing a platform and randomly turned into partly backed tools, scrapers or perforators (Dittrich and Gessner 2014, Fig. 21. 9, 10, 14, 16, 20). However, finds from the actual test trenches still have to be analysed in detail.

Judging from the finds and their position it appears as if these sites corresponded to each other and were occupied almost contemporaneously. Altogether seven radiocarbon dates for the sites MOG102 and MOG105 partly confirm this



Fig. 26. Overview of site MOG105 at the watershed during test excavation, the large shallow depressions in the surface are clearly visible

assumption (Tab. 1). Five of them cluster conformely at the 2<sup>nd</sup> sigma calibration sequence between 5620 and 5380 calBC<sup>20</sup> despite that four different materials including terrestrial, aquatic and semi-aquatic species have been used as samples that were expected to date quite different events. Human activity is dated by an ostrich eggshell workpiece with a borehole which is further evidence for the lo-

<sup>20</sup> The long span is due to the overlap of the two adjacent wiggle spaces of 5650–5500 calBC and 5500–5300 calBC (cf. Dittrich 2015, Fig. 4), although four of the five dates strongly indicate an event that occurred shortly before 5500 calBC.



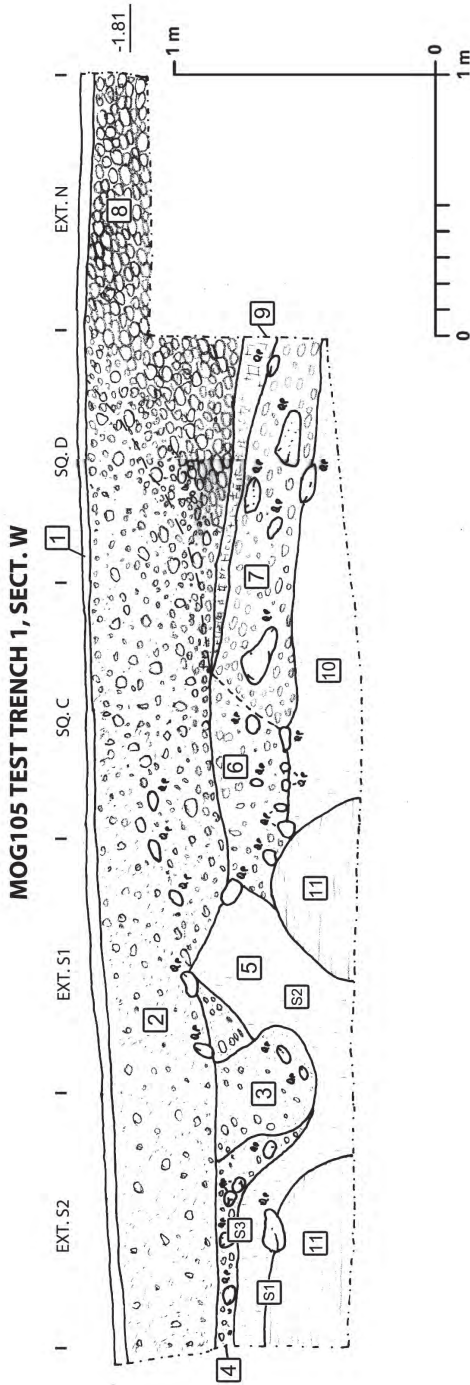


Fig. 27. MOG105, test trench 1, W section. The tightly packed sterile pebble deposits (8, 7) are disturbed and reworked towards the centre of the depression, filled with laminated silts (11) and fine whitish sediments (2-6) which contained numerous finds and indicators for the alternation of humid and dry episodes (S1-S3: soil samples; drawing : M. Ehlert)

cal manufacture of beads (Tab. 1: MOG102-26-2). The diversity of the gastropod fauna present at all of the dated sites indicates conditions varying from grasslands to seasonal swamps between 7120 and 5380 calBC. The study of soil micromorphology produced evidence for intense earthworm activity, which is characteristic for humic topsoils as well as evidence for the alteration between wet and dry conditions (Dittrich *et al.* 2015: 135). Such soils would surely have supported the growth of savannah grasses, but also of any cultivated plant, although no evidence for them exists so far. All of the sites found at the watershed plains provided sound evidence for grinding activities as well as indirect evidence for the watering of hoofed animals, namely by traces of trampling seen in the high degree of fragmentation of pottery finds. Whether the two bones of domestic sheep or goat from site MOG086 were deposited during the human occupational event multiple dated at 5500 calBC, which would seem likely in the view of the recently revised evidence for domestic caprines from Egypt (Linseele *et al.* 2014, Linseele in prep.), can only be decided upon the results of more extensive excavation work. Apart from this, the major evidence comes from aquatic and semi-aquatic species as one would expect it to be the case for an island. As it can be observed today, fish is a common option while the number of herded animals is generally low and confined to the household level. In summary, the sites following the watershed scheme mark a mid-Holocene transitional corridor, which - depending on its water storing capacities - was probably visited only seasonally, but immediately lost its attractiveness when rainfalls started to cease.

#### **4. Conclusions: settlement and land-use patterns – preliminary observations**

If we sum up the preliminary results for the late prehistory of Mograt Island there are at least five different landuse patterns:

- (1) plateau occupation at the southern palaeoisland (Upper/Late Palaeolithic, early to mid-Holocene)
- (2) upper Nile terrace and shoreline occupation along ephemeral lagoonal lakes (early Holocene)
- (3) upper and middle Nile terrace occupation in proximity to early Holocene alluvium (mid-Holocene)
- (4) inland occupation near the watershed around shallow pools of periodically stored rain water (mid-Holocene)

- (5) lower Nile terrace and granite massif occupation overlooking alluvial plains, mainly indicated by grinding activities and the presence of rock art (late Holocene)

Schemes 1 and 2 are clearly connected to higher Nile levels dividing Mogratt into two palaeoislands and turning ephemeral basins into lagoonal lakes. Such lakes have to be assumed for all of the elongated incisions along the early Holocene shoreline at western and central Mogratt as well as at the opposite right Nile bank (Fig. 5). These incisions are identical to the passages of major wadis coming from inland. This situation differed from the tectonics of eastern Mogratt favouring plateau occupation. While additionally at this part of Mogratt numerous small islands emerged at the southern end of each of the palaeoislands (Fig. 5), the islands presently flanking western and central Mogratt do not seem to have existed.

Mid-Holocene sites are either located at the upper and middle Nile terraces (3), still indicating a much wider alluvial plain than today, or around the rain-fed reservoirs that have to be assumed for the island's crest far from the river banks (4). Both locations would have benefitted from the presence of arable alluvial soils as a leftover of the early Holocene lakes, swamps and ponds. Only late Holocene and Kerma period sites which are often connected to granite outcrops at the lower Nile terraces (5) seem to refer to a narrowed alluvial plain indicating the stabilisation of annual Nile floods at a lower level. However, this rough pattern still has to be rendered more precisely through future studies. Also a number of questions are still open as for instance nothing can be said so far about the spatial relation to burial sites of each period.

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