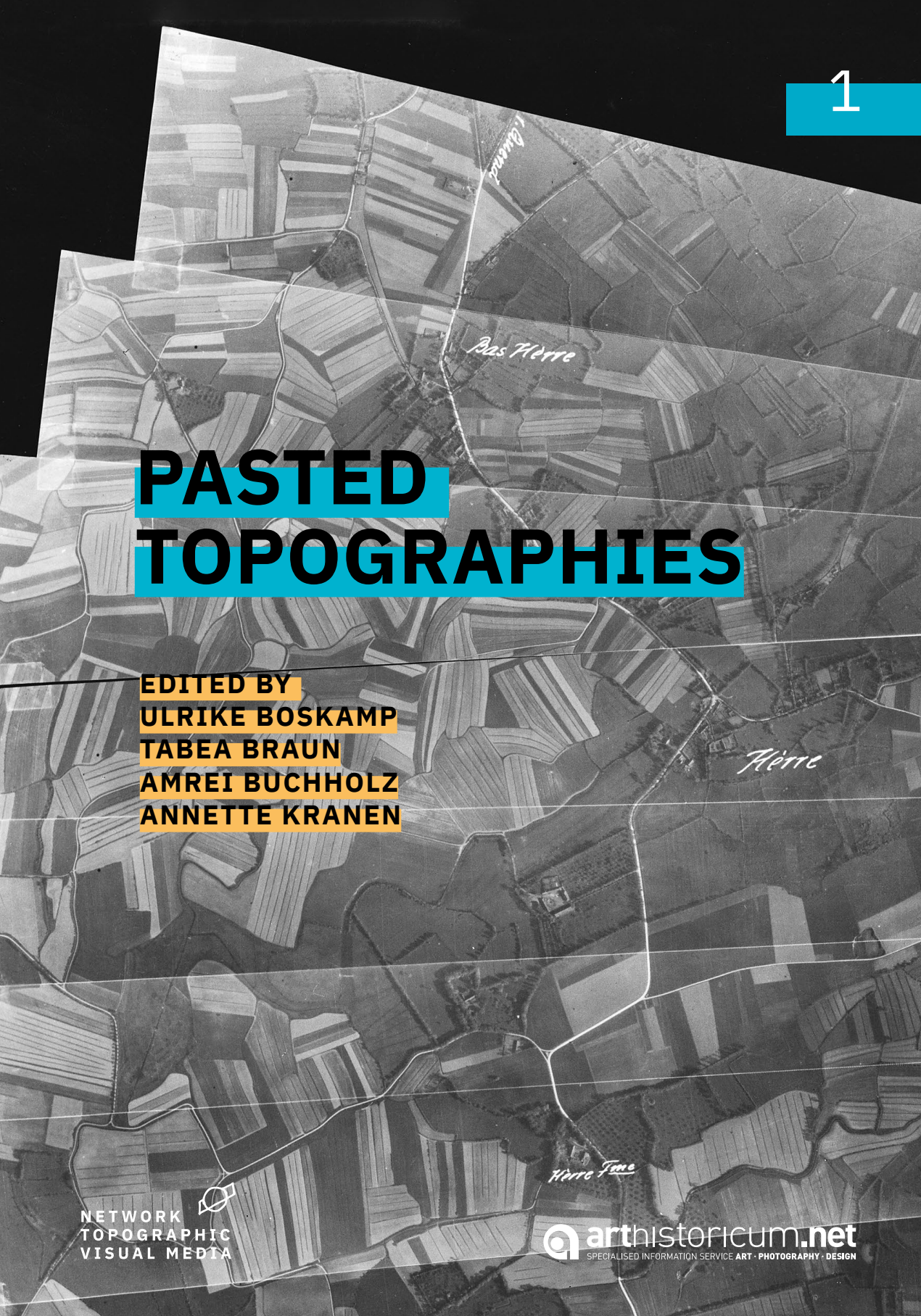

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PASTED TOPOGRAPHIES

EDITED BY
ULRIKE BOSKAMP
TABEA BRAUN
AMREI BUCHHOLZ
ANNETTE KRANEN

NETWORK
TOPOGRAPHIC
VISUAL MEDIA

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PASTED TOPOGRAPHIES

Terrain. Studies on Topographic Visual Media 1
Terrain. Studien zu topografischen Bildmedien 1

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TERRAIN. STUDIES ON TOPOGRAPHIC VISUAL MEDIA
EDITORIAL

Ulrike Boskamp
Tabea Braun
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Annette Kranen

This volume launches the book series *Terrain*, published by the Netzwerk topografische Bildmedien / Network Topographic Visual Media (NtB). Since its founding in 2020, the network has regularly organised digital workshops on visual representations of topographic spaces in their various forms and contexts. It serves as a platform for cross-national, cross-epochal and cross-genre exchange between researchers from different disciplines, including visual, media and cultural studies, art history and the history of cartography. In line with this transdisciplinary approach, contributions on topographic images from different disciplinary perspectives will be published in the *Terrain* book series and brought into dialogue with one another. The series will thus feature a wide range of topics, but with a common focus on the study of material culture. The open access format will ensure that the contributions are freely available and accessible to all researchers and interested members of the public.[1]

Topographic visual media have been and continue to be produced, disseminated and used in a wide variety of fields, such as the sciences, art, the military, administrative contexts, jurisprudence and tourism. The field of research is correspondingly diverse, encompassing topographic sketches, drawings and prints, views, landscape paintings, land maps and sea charts, diagrams and plans, maps of planets and oceans as well as the virtual spaces of computer graphics.

1 The *Terrain* series is hosted on the platform of the specialised information service *arthistoricum.net*, a fact which underscores the network's origin in the cooperation of four art historians with a research agenda grounded in the study of visual and material culture.

Ulrike Boskamp, Tabea Braun, Amrei Buchholz, Annette Kranen: *Terrain*. Studies on Topographic Visual Media. Editorial, in: PASTED TOPOGRAPHIES (TERRAIN. STUDIES ON TOPOGRAPHIC VISUAL MEDIA 1), eds. Boskamp, Braun, Buchholz and Kranen, Heidelberg: arthistoricum.net, 2023, pp. vii–xi, https://doi.org/10.11588/arthistoricum.1323.c18462

These different forms of topographic representation and their contexts have been the object of increasing interest from researchers working in various disciplines in recent years.[2] In transcultural historical studies, for example, the map has become an important source, opening up new, independent horizons of interpretation.[3] In media studies, too, topographic image media (again primarily maps, but also, for example, virtual environments of contemporary gaming) have been reconsidered in their relation to the conceptualisation and perception of space.[4]

These developments follow on from the emergence of space as a much-discussed category in history and cultural studies, referred to as the "Spatial Turn".[5] In these debates, space was examined in relation to practices of domination, control and surveillance. However, space has also become the starting point for describing counter-discourses and identifying practices of using and occupying space beyond institutionalised control, in "in-between spaces" and "third spaces", which in turn elude conventionalised intersections of territorial space and cultural identity.[6]

2 *History of Cartography Series*, Chicago 1987–2019, Gyula Pápay, "Die Beziehung von Kartographie, allgemeiner Bildwissenschaft und Semiotik", in *Bildwissenschaft zwischen Reflexion und Anwendung*, ed. Klaus Sachs-Hombach, Rostock 2005, pp. 86–100; *Raumtheorie. Grundlagentexte aus Philosophie und Kulturwissenschaften*, ed. Jörg Dünne and Stephan Günzel, Frankfurt 2006.

3 Irina Saladin, *Karten und Mission. Die jesuitische Konstruktion des Amazonasraums im 17. und 18. Jahrhundert* (Historische Wissensforschung 12), Tübingen 2020; Mario Cams, *Companions in Geography. East-West Collaboration in the Mapping of Qing China* (c. 1685–1735), Leiden/Boston 2017; Diana Lange, *An Atlas of the Himalayas by a 19th Century Tibetan Lama. A Journey of Discovery*, Leiden/Boston 2020.

4 Stephan Günzel, *Ludotopia. Spaces, Places and Territories in Computer Games*, Bielefeld 2019; Stephan Günzel, *Raum. Eine kulturwissenschaftliche Einführung*, Bielefeld 2020 (2016); *Texte zur Theorie des Raums*, ed. Stephan Günzel, Ditzingen 2013; *KartenWissen. Territoriale Räume zwischen Bild und Diagramm*, ed. Stephan Günzel and Lars Nowak, Wiesbaden 2012; *Raumwissenschaften*, ed. Stephan Günzel, Frankfurt 2010 (2009); *Raum. Ein interdisziplinäres Handbuch*, ed. Stephan Günzel, Stuttgart 2010; *Topologie. Zur Raumbeschreibung in den Kultur- und Medienwissenschaften, Kultur- und Medientheorie*, ed. Stephan Günzel, Bielefeld 2007.

5 Irit Rogoff, *Terra Infirma. Geography's Visual Culture*, London et al. 2000; Sigrid Weigel, "Zum 'topographical turn'. Kartographie, Topographie und Raumkonzepte in den Kulturwissenschaften", *KulturPoetik* 2, 2 (2002), pp. 151–165; Stephan Günzel, 2010 (note 4); Susanne Rau, *Räume. Konzepte, Wahrnehmungen, Nutzungen*, Frankfurt 2013.

6 The most prominent titles that have shaped this field are: Michel de Certeau, *Kunst des Handelns*. Translated by Ronald Voullié, Berlin 1980; Homi K. Bhabha, *The Location of Culture*, London 2004.

Visual representations of space in maps and images, i.e. topographic visual media, are very closely linked to these debates. Since the 1980s, British researchers in the field of critical cartography, for example, have questioned the supposedly objective image offered by topographic maps on various levels.[7] Their aim was to uncover the political and power-driven agendas of cartographic operations and topographic representations. They analysed maps in terms of how they construct realities, and deconstructed their alleged objectivity through a focus on the purposes and modalities of their production.[8]

Since then, the field of research has diversified. Increasingly, scholars are drawing attention to media practices of the generation, visualisation and circulation of spatial knowledge. In German-language art history, this has led to new interfaces with the history of cartography, which was previously considered a fundamentally different field of knowledge. Examples of this are the research contributions of Ulrike Gehring, Tanja Michalsky and Nils Büttner on Dutch art of the early modern period.[9] In 2019, the pioneering exhibition *Quand les artistes dessinaient les cartes* in Paris adopted a similar approach to maps and mapping in 15th and 16th-century France.[10] The disciplines of human geography and mobility studies have also challenged previous understandings of space as a given entity, approaching

7 J. B. Harley, *The New Nature of Maps. Essays in the History of Cartography*, ed. Paul Laxton, Baltimore 2001; *Mappings*, ed. Denis E. Cosgrove, London 1999; Jeremy W. Crampton, "Die Bedeutung von Geosurveillance und Sicherheit für eine Politik der Angst", in *Mediengeographie. Handbuch für Wissenschaft und Praxis*, ed. Jörg Döring and Tristan Thielmann, Baden-Baden 2019, pp. 455–479; Matthew H. Edney, *Mapping an Empire. The Geographical Construction of British India, 1765–1843*, Chicago 1997; Matthew H. Edney, *Cartography. The Ideal and Its History*, Chicago 2019.

8 See Weigel 2002 (note 5), p. 153.

9 Nils Büttner, *Die Erfindung der Landschaft. Kosmographie und Landschaftskunst im Zeitalter Bruegels*, Göttingen 2000; Tanja Michalsky, *Projektion und Imagination. Die niederländische Landschaft der Frühen Neuzeit im Diskurs von Geographie und Malerei*, München et al. 2011; *Die Entdeckung der Ferne. Natur und Wissenschaft in der niederländischen Malerei des 17. Jahrhunderts*, ed. Ulrike Gehring, Paderborn 2014.

10 Juliette Dumasy-Rabineau, Nadine Gastaldi and Camille Serchuk, *Quand les artistes dessinaient les cartes. Vues et figures de l'espace français. Moyen Âge et Renaissance* (exhib. cat. Paris, Musée des Archives Nationales), Paris/New York 2019.

it instead as a relational quantity constituted by social practices.[11] The role of images and visual culture in the perception, coding and imagining of geographical spaces is of central importance for this research.[12] Particularly influential in this regard was the scholarly exchange between human geography and art history, which continues to be based primarily in the Anglo-American context: publications such as *The Iconography of Landscape. Essays on the Symbolic Representation, Design and Use of Past Environments*, edited by the geographers Denis Cosgrove and Stephen Daniels, or *Landscape and Power*, edited by the art historian W. J. T. Mitchell, have been widely read.[13]

The developments outlined above form the starting point for the approach to topographic visual media that distinguishes the book series *Terrain*. This approach includes investigations into media conventions and the material, technical, social and political conditions of their making, for example the interaction of various actors in the production process. It also raises questions about the functions of topographic visual media in social practices, such as their use in the contexts of pedagogy, urban and spatial planning, the military and other fields. As exemplified by the 2014 exhibition *Mapping Spaces* in Karlsruhe, such a broad approach, which insistently positions itself at the interfaces of social and media practices, and the technical and artistic understandings of images, yields fresh insights.[14] Finally, the historical material, the topographic visual media themselves, should be addressed. To this day, classifications of topographic image

11 Henri Lefebvre, *La production de l'espace*, Paris 2000 (1974); John Urry, *Mobilities*, London 2007; Tim Cresswell and Peter Merriman, *Geographies of Mobilities. Practices, Spaces, Subjects*, Farnham 2011; Rachel Woodward, *Military Geographies*, Oxford 2004; Harriet Hawkins, "History, Geography and GeoHumanities", in *The Sage Handbook of Historical Geography*, ed. Mona Domosh, Michael Heffernan and Charles W. J. Withers, London et al. 2020, pp. 1019–1041.

12 See for example the chapter on the "senses" with a focus on the visual in John Urry, *Sociology beyond Societies. Mobilities for the twenty-first Century*, New York et al. 2000, pp. 77–104; Denis Cosgrove, "Landscape and the European Sense of Sight – Eyeing Nature", in *Handbook of Cultural Geography*, ed. Kay Anderson, Mona Domosh, Steve Pile and Nigel Thrift, London 2003, pp. 249–268.

13 *The Iconography of Landscape. Essays in the Symbolic Representation, Design, and Use of Past Environments*, ed. Denis Cosgrove and Stephen Daniels, Cambridge/New York 1988; *Landscape and Power*, ed. W. J. T. Mitchell, Chicago/London 1994.

14 *Mapping Spaces. Networks of Knowledge in 17th Century Landscape Painting*, ed. Ulrike Gehring and Peter Weibel, Munich 2014.

materials along disciplinary and institutional lines make it difficult to even perceive the relations between images from different areas. This can be seen, for example, in the categorisation of panoramic views from the 18th and 19th centuries. While panoramic maps are often filed in map collections and thus categorised as material from the history of cartography, the related landscape views are usually stored in graphic collections and are thereby classified as artistic objects, although both originate from the same production context.[15] This is just one example that reveals the multiple overlappings of supposedly different bodies of knowledge when we pay attention to the material objects and the historical contexts of visual media. Such overlaps range from identical techniques and types of spatial representation to common areas of function and use, mutual aims and modes of reception and coinciding conventions of representation, iconographies or conceptualisations of space. Identifying and taking into account such connections not only opens up our view of the broad field of topographic visual media, but also enables a more precise and nuanced contouring of the individual genres that fall under it. In order to be able to address this field of investigation in its complexity, the different perspectives, specialisations and national research traditions on topographic images need to acknowledge one another and enter into dialogue. To fuel such exchanges is precisely the aim of *Terrain*.

15 An example of an oeuvre that was divided up among different collections in this way is that of Matthäus Merian the Elder whose topographic views are often found in graphic collections, while the maps are filed in map collections, and bound volumes of both in libraries. A similar separation between artistic and topographic/cartographic drawings is applied in source editions. One example is the volumes compiling the visual material from the three voyages undertaken under the command of James Cook between 1768 and 1780. First, the artistic drawings and prints were published in three volumes: *The Art of Captain Cook's Voyages*, 3 vols., ed. Rüdiger Joppien and Bernard Smith, New Haven/London 1985–1988. The cartographic drawings and prints, among them several landscapes and coastal views, were published in another set of three volumes: *The Charts & Coastal Views of Captain Cook's Voyages*, 3 vols., ed. Andrew David, assistant eds. Rüdiger Joppien and Bernard Smith, London 1988–1997. Some of the coastal views are included in both publications, making the overlaps between the volumes obvious. See for example a watercolour by William Hodges showing the *Table Mountain & Capetown*, in David 1988–1997, vol. 2, cat. 2.37, in Joppien and Smith (ed.) 1985–1988, vol. 2, cat. 2.3; and a drawing in pencil and watercolour by William Ellis, *View of the Fluted Cape, Van Diemen's Land, New Holland*, in David 1988–1997, vol. 3, cat. 3.28, in Joppien and Smith 1985–1988, cat. 3.7.

PASTED TOPOGRAPHIES
INTRODUCTION

Ulrike Boskamp
Tabea Braun
Amrei Buchholz
Annette Kranen

The volume *Pasted Topographies* deals with processes of joining papers together by gluing and pasting. These are considered an important, sometimes even constitutive aspect of the production, the processing or the use of topographic images. So far, these gluing processes have mainly been considered in relation to restoration, and hardly at all with regard to their relevance for topographic representations of space. One obstacle to the study of gluing in cartographic production has been the "ideal of cartography", as described and vociferously criticised by Matthew Edney: in the Western tradition, cartographic images are commonly regarded as intellectual products of mathematics and abstraction, evolving and improving through a steady historical progression of precision techniques.[1] This volume counters this idealising and historically inaccurate idea of cartography by presenting studies of the concrete conditions of the production and use of topographic image media, specifically with regard to gluing and pasting and their relevance for the representation of spaces. Its focus on processes of "mapping",[2] which involve various actors as well as technical procedures, instruments and materials, dovetails with recent research trends in the history of science. Here, too, the material preconditions of knowledge production have been the subject of increasing interest in recent decades, bringing practices and objects into focus, such as laboratory equipment or cameras.[3]

1 Matthew H. Edney, *Cartography. The Ideal and Its History*, Chicago 2019.
2 Edney 2019 (note 1), chapter 6: "Not Cartography, But Mapping".
3 The following titles are examples of such an approach: Steven Shapin and Simon Schaffer, *Leviathan and the Airpump. Hobbes, Boyle, and the Experimental Life*, Princeton 1985; Anke te Heesen, "News, Paper, Scissors. Clippings in the Sciences and Arts around 1920", in *Things that Talk. Object Lessons from Art and Science*, ed. Lorraine Daston, New York 2004, pp. 297–327;

Ulrike Boskamp, Tabea Braun, Amrei Buchholz, Annette Kranen: Pasted Topographies. Introduction, in: PASTED TOPOGRAPHIES (TERRAIN. STUDIES ON TOPOGRAPHIC VISUAL MEDIA 1), eds. Boskamp, Braun, Buchholz and Kranen, Heidelberg: arthistoricum.net, 2023, pp. 1–22, https://doi.org/10.11588/arthistoricum.1323.c18463

Dealing with the very specific subject of gluing and pasting brings with it certain hurdles. If such processes are applied in preparatory stages of image making, they can rarely be traced on the cleaned-up end products. Evidence of such preliminary work, which was often rough and messy and could involve individual images being cut up, pasted together or combined, rarely survives.[4] The historically and culturally specific techniques of pasting and gluing are also difficult to research because knowledge of exact techniques and recipes was often kept secret or only passed on orally, within the walls of craft workshops.[5] It is only since the "material turn" that cultural studies today are prepared to appreciate the subject in its radical materiality. Earlier studies of historical pasting and gluing techniques concentrated on the necessities of restoration practice or the classification of these processes as precursors of modern procedures.[6] Moreover, it is not always easy to distinguish precisely between material and other types of joining – like for example the drawing of images on a paper ground that has previously been glued together –, the combination of different materials, or digital processes of *copy and paste*. It is only by examining individual cases that the description of and the distinction between such practices become possible.

The case studies in this volume all deal with the physical pasting or gluing of paper to paper. This was not an active decision on the part of the editors. This focus emerged from the research of the scholars who have contributed to the volume. As self-evident as it may seem in view of the history of topographic image media in Western Europe, this particular technique is subject to specific conditions. One of these is the existence and use of

Bruno Latour, *Science in Action. How to Follow Scientists and Engineers through Society*, Milton Keynes 1987; Bruno Latour, *Reassembling the Social. An Introduction to Actor-Network-Theory*, Oxford et al. 2005.

4 This has been similarly noted in relation to intermediate steps in the production or compilation of texts, which can involve processes of paper-cutting, the use of snippets, as well as gluing. See John Considine, "Cutting and Pasting Slips. Early Modern Compilation and Information Management", *Journal of Medieval and Early Modern Studies*, 45, 3 (2015), pp. 487–504, here p. 492.

5 Katrin Cura, *Vom Hautleim zum Universalklebstoff. Zur Entwicklung der Klebstoffe*, Diepholz et al. 2010, p. 25 (following Karl Kamarsch, *Geschichte der Technologie seit der Mitte des 18. Jahrhunderts*, München 1872, pp. 859–860).

6 Cura 2010 (note 5) also mostly discusses historical techniques in their function as precursors of modern techniques after 1900, which constitute her main object of research.

paper as a ground for images.[7] A second one is the availability of adhesives. Let us roughly outline the material conditions for the gluing and pasting of paper between about 1500 and the beginning of the 20th century. In Europe, following the invention of printing, it was mainly the bookbinders who were responsible for gluing paper and preparing suitable glues and pastes. Since the early modern period, ancient reports on gluing and pasting techniques have served as a line of tradition for the bookbinding trade, such as Pliny the Elder's description of the production of papyrus in ancient Egypt in his *Naturalis historia*. According to Pliny, papyrus strips were pressed together and the adhesive effect of the pollen and sap of the plant made them stick to each other.[8] Based on this technique, as the Greek church leader and scholar Photius reported 400 years later, a certain Phillatius had developed a support for writing at the beginning of the 5th century A. D. The Athenians are said to have been so grateful to him for this that a statue was erected in his honour.[9] In ancient Rome there existed the profession of the glutinator (Latin gluten; glutinum = glue), who glued together papyrus leaves to form scrolls or codices after they had been written onto.[10]

With the invention of printing, the book in the form that is still in use today came into being around 1500. From the very beginning, gluing processes played a decisive role in its production, since a book is held together by the gluing of a textile fabric to a spine. This requires a special sizing that is both stable and flexible so that the pages do not fall apart and the book remains easy to handle. As a result, bookbinders began to specialise in different adhesives and gluing processes. For example, the bookbinder Johann Gottfried Zeidler presented a basic definition of gluing in his *Einleitung in die Buchbinder Kunst* (Introduction to the Art of

7 For a cultural history of paper see Caroline O. Fowler, *The Art of Paper. From the Holy Land to the Americas*, New Haven/London 2019.

8 Plinius, *Naturalis historia*, XIII, 21–26, 81; XXIV, 51. See also Cicero, *Epistolae ad Atticum* 4/4(a), 1.

9 Art. "Phillatius", in *A Dictionary of Greek and Roman Biography and Mythology*, ed. William Smith, 3 vols., London 1873, vol. 3, p. 297: "Filla/tios, (another reading is Φιλτάτιος), a grammarian, contemporary with the historian Olympiodorus, about A. D. 407. Photius (Cod. lxxx.) in his epitome of Olympiodorus, mentions him as having received the honour of a statue from the Athenians, for teaching them how to glue parchments together."

10 Reinhard Feldmann, "Glutinator", in *Lexikon des gesamten Buchwesens Online*, URL: http://dx.doi.org/10.1163/9789004337862__COM_070568 (accessed 15.02.2023); see also Jaroslav Černý, *Paper and Books in Ancient Egypt*, London 1947.

Bookbinding) of 1706. He described the principle of adhesion between two solid surfaces that are joined together by a soft, adhesive mass:

> Gluing, pasting, or caking is manual work in which one spreads or presses a piece of liquid or softened material between two hard and dry things so that the small parts of it enter the pores and small holes or cracks in the hard things and harden in them, so that they adhere to each other.[11]

Two types of adhesives – glue and paste – were and still are distinguished, according to their different raw materials and methods of preparation. While glue was made from boiling animal products – coarser glue was made from bones, finer from parchment or fish bladders – the raw materials for paste, flour or starch, were derived from plants. They differed significantly in their durability and usage: glue could be dried and remained usable for a long time, whereas paste needed to be used quickly after preparation and could not be stored.[12] The basic ingredients also accounted for their different properties when dried: layers of glue flaked off more easily than paste, which is why Zeidler, for example, preferred the latter.[13]
The production and use of adhesives also played a crucial role in other historical handcrafts, for example the paper producers who prepared their own glue, usually from boiled animal bones. It was needed to coat the surface of paper after it was made, so that colour from the printing press

11 Johann Gottfried Zeidler, *Buchbinder-Philosophie oder Einleitung in die Buchbinder Kunst*, Magdeburg 1708, pp. 10–11: "Leimen, Kleistern oder Kütten, ist eine Handarbeit, da man eine zehe flüssige, oder weich gemachte Materie zwischen zweene harte und trockene dinge streichet geußt oder drucket, daß sich die kleinen theilgen derselben in die poros und kleine Löchergen oder Ritzen der harten dinge begeben, und in denselben erharten, also daß beydes an einander hält."

12 On the perishability of paste, see Zeidler 1708 (note 11), p. 12; on the durability of mouth glue, which does not develop an unpleasant odour even after a long time, see the article "Leim", in Johann Heinrich Zedler, *Grosses vollständiges Universal-Lexicon aller Wissenschafften und Künste*, 64 vols., 4 vols. supplement, Halle/Leipzig 1731–1754, vol. 16, 1737, col. 1588.

13 Zeidler 1708 (note 11), pp. 12–14. Zeidler comments on p. 12: "Jedoch ist der Kleister vom Leim darinnen unterschieden, daß der Leim von der Hitze zusammen kreucht, daß seine Theile kürtzer werden, und zerreissen oder abspringen. Der Kleister aber, weil er kürzere theilgen hat, die nicht so dichte, sondern lockerer in einander gewirret, nachgiebt, daß er gleichwohl an einander hält. Weswegen er auch zum Papier und Pergament dienlicher als der Leim [...]."

or ink did not soak in.[14] It was only after Moritz Friedrich Illig developed resin sizing that the scooping and the sizing of the paper could be combined in a single operation, a process that became common practice from around 1840.[15]

Other professionals or private individuals could buy glue for their everyday needs from bookbinders or 'glue boilers'.[16] Since it was easier to handle, glue seems to have been used more often than paste in the private sphere. The most common means of gluing papers together was so-called 'mouth glue', which was probably developed by bookbinders.[17] Mouth glue was a glutinous adhesive that was traded in the form of hard, dry sticks or rods, or in sweet-shaped discs.[18] High-grade glue was obtained from fish bladders (isinglass) or cleaned parchment remains, whilst lower grade glue was mostly made from rabbit or hare skin. Sugar was added to the glue, as this was easily soluble in water at body temperature and improved the taste.[19] Reports on the use of mouth glue date as far back as the 14th century. For example, the artist Cennino Cennini (c. 1370–1398) in his *Libro dell Arte* discussed the composition and use of various adhesives, including mouth glue made from fish bladders:

> There is a glue called fish-glue (colla di pesce, isinglass). This is prepared from many kinds of fish. If you put a piece of this to your mouth as long as is necessary, and then rub a little on your sheepskin parchment, or other parchment, it will fasten them strongly together.[20]

14 Cura 2010 (note 5), pp. 147–152.

15 Albert Haemmerle, Art. "Illig, Moritz Friedrich", Neue Deutsche Biographie 10 (1974), p. 138; URL: https://www.deutsche-biographie.de/pnd13768553X.html#ndbcontent. (accessed: 28.09.2023).

16 Cura 2010 (note 5), pp. 48–49. In the "Ständebücher" by Hans Sachs and Jost Amman, as well as in the *Illuminierbuch* by the artist Valentin Boltz of 1549, the production of glue is also described as a sideline of the "parchmenter", who cooked the particularly pure hide glue from parchment scraps.

17 This is the theory presented by Cura 2010 (note 5), p. 159. This is also suggested by the entry "Leim" in the *Universal-Lexikon* by Johann Heinrich Zedler, which speaks of "Buchbinder- oder Mund-Leim", i.e. bookbinder- or mouth-glue. See Zedler 1737 (note 12), col. 1588.

18 On the different forms, see Cura 2010 (note 5), p. 164.

19 Cura 2010 (note 5), p. 157.

20 *The Book of the Art of Cennino Cennini. A Contemporary Practical Treatise on Quattrocento Painting*. Translated from the Italian, with Notes on Mediæval Art Methods by Christina J. Herringham, London 1899, p. 90. Another artist who reported making his own mouth glue was the painter Valentin Boltz in his *Illuminierbuch* of 1549, see Cura 2010 (note 5), p. 162.

Aside from its durability, the advantage of mouth glue over liquid paste applied with a brush seems to have been the way it could be applied precisely and sparingly, without causing the paper to curl. After the application of the mouth glue, a "smoothing stone" or a knife made of bone or wood was passed over the area, using pressure to spread the glue evenly.[21]
It was not until the end of the 19th century that mouth glue became unpopular, as it was considered unhygienic. Liquid universal glues that could also be used for gluing paper began to be produced on an industrial scale and were marketed widely. One of these was "Syndetikon", which came onto the market in Germany around 1880.[22] However, the problem that paste and wet glues generally caused paper to ripple easily was not solved until the 1960s with the introduction of glue sticks.[23]
As much as gluing and pasting must be understood as technical, material processes, they also need to be considered for their practical and conceptual potential in relation to the production of images. Gluing contributes significantly to the production of topographic visualisations, structuring and enabling certain methods, subject matters and conceptualisations in the representation of spaces, as the case studies in this volume make evident. Its role can be defined more precisely with the help of three heuristic categories. The first, and probably the most important category for topographic images, is the representation of a spatial continuum, which is often based on the assembling of several preparatory sketches or of sheets of paper. The second concerns groups or series, i.e. the creation of an idea of space through pasted arrangements of individual images. The third category encompasses methods of making visible, experimenting with, and testing out alternative spatial designs through techniques of gluing, folding or placing drawings or prints over one another.

21 See Henri Louis Duhamel du Monceau, *Die Kunst verschiedene Arten von Leim zu machen*, vol. 11 of *Schauplätze der Künste und Handwerke, oder vollständige Beschreibung derselben, verfertiget oder gebilliget von den Herren der Akademie der Wissenschaften zu Paris. Mit vielen Kupfertafeln*. German translation, ed. Daniel Gottfried Schreber, Leipzig/Königsberg 1772, pp. 141–180, esp. pp. 159–163, URL: http://digital.onb.ac.at/OnbViewer/viewer.faces?doc=ABO_%2BZ158339609 (accessed 15.02.2023); see also Cura 2010 (note 5), pp. 164–165.
22 Cura 2010 (note 5), p. 174.
23 Cura 2010 (note 5), p. 167.

Gluing together individual sheets: a prerequisite for the visualisation of a spatial continuum

Topographic visual media are often produced with the aim of making visible a larger whole, a spatial continuum. However, such overall views are often assembled from several individual views. Putting them together results in the imagination of a spatial totality, with the seams remaining imperceptible, almost in the sense of a psychoanalytical *suture*.[24] The practical relevance of this process is illustrated by a remark made by the 18th-century bookbinder Zeidler, who described the imperceptible gluing together of sheets of paper into longer formats as a characteristic of topographic pictorial media:

> Occasionally, however, a bookbinder comes across something that has to be pieced together in this way, e.g. Long maps, such as those of the Rhine and Danube, [and] of cities, [...] which consist of more than one sheet, which [...] must be pasted together at first. It requires great care to ensure that the writing, even the subtle lines in engravings and woodcuts, meet exactly, so that one almost does not notice that it is put together, but looks as if it were all printed in one piece.[25]

As Zeidler points out here, it was only by gluing together individual sheets to form a larger support that it was possible to depict certain topographic motifs. To his examples of maps of rivers and city views, others can be added, such as route maps, panoramas and coastal profiles. An engraved

24 Jacques Alain Miller, "Suture (Elements of the logic of the signifier)", *Screen*, 18, 4 (1977/78), pp. 24–34; Jean-Pierre Oudart, "Cinema and Suture (1969)", *Screen*, 18, 4 (1977/78), pp. 35–47. The psychoanalytic concept was transferred to film analysis to describe how the spectator connects the individual shots and settings, shot and counter-shot, into a coherent whole of narration and space by filling in the absences and closing (sewing together) gaps with their imagination. See also Pietro Bianchi, *Jacques Lacan and Cinema*, London 2017.

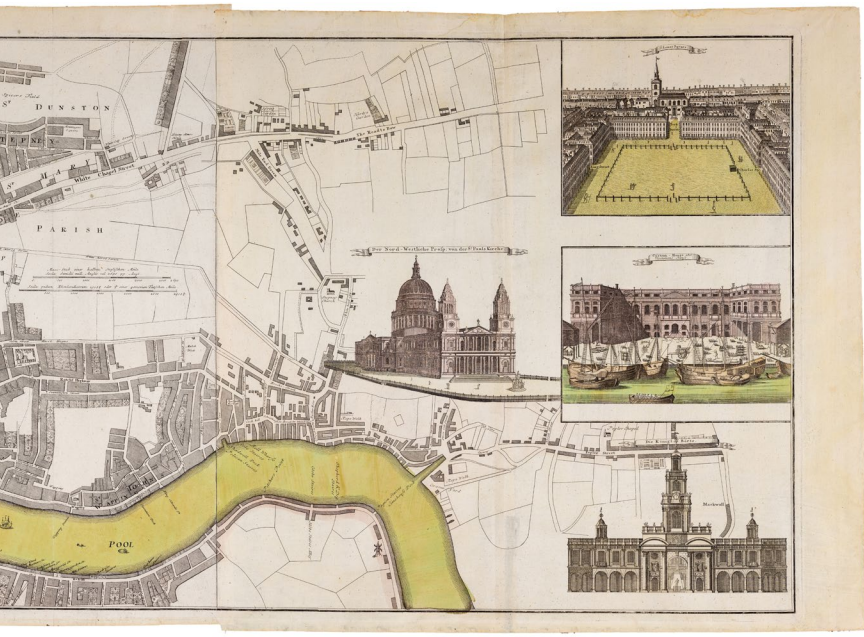
25 Johann Gottfried Zeidler 1708 (note 11), p. 9 (bold in the original): "So kompt doch jezuweilen einem Buchbinder etwas vor, das auff solche art an einander gestücket werden muß, z.E. **Lange Land=Charten**, wie diejenigen sind, die übern den Rhein und Donau gestellet, [und] Städte, [...], so in mehr als einem Bogen bestehen, welche [...] hernach erst an einander gekleistert werden müssen, da es denn grosse vorsichtigkeit brauchet, daß die Schrifft, auch die subtilen Linien in Kupffern und Holtzschnitten genau an einander treffen, daß man es fast nicht mercket, daß es zusammen gesetzt, sondern aussiehet, als wäre es alles an einem stück gedruckt."

Fig. 1
Homann Erben, *Urbium Londini et West-Monasterii nec non Surburbii Southwark (...) / Neuester Grundris der Staedte London und West-Münster, Samt der Vorstadt Southwark (...)*, ca. 1736, etching, watercolour, 51 × 168.5 cm (image), 55 × 177 cm (sheet), Götzfried Antique Maps, Tettnang

map of London produced in Nuremberg around 1736 with the impressive dimensions of 55 × 177 cm is a case in point **(Fig. 1)**. Here, three sheets were first printed individually and then glued together to form the large-format map of the elongated city built along the river.[26]

This assembling of images of individual, small-scale spatial sections is the basis for that naturalised notion of a regular and continuous space which topographic image media can produce and which at the same time conditions them. Both aspects come into play in the analysis of gluing processes: we are not only concerned with better understanding the material

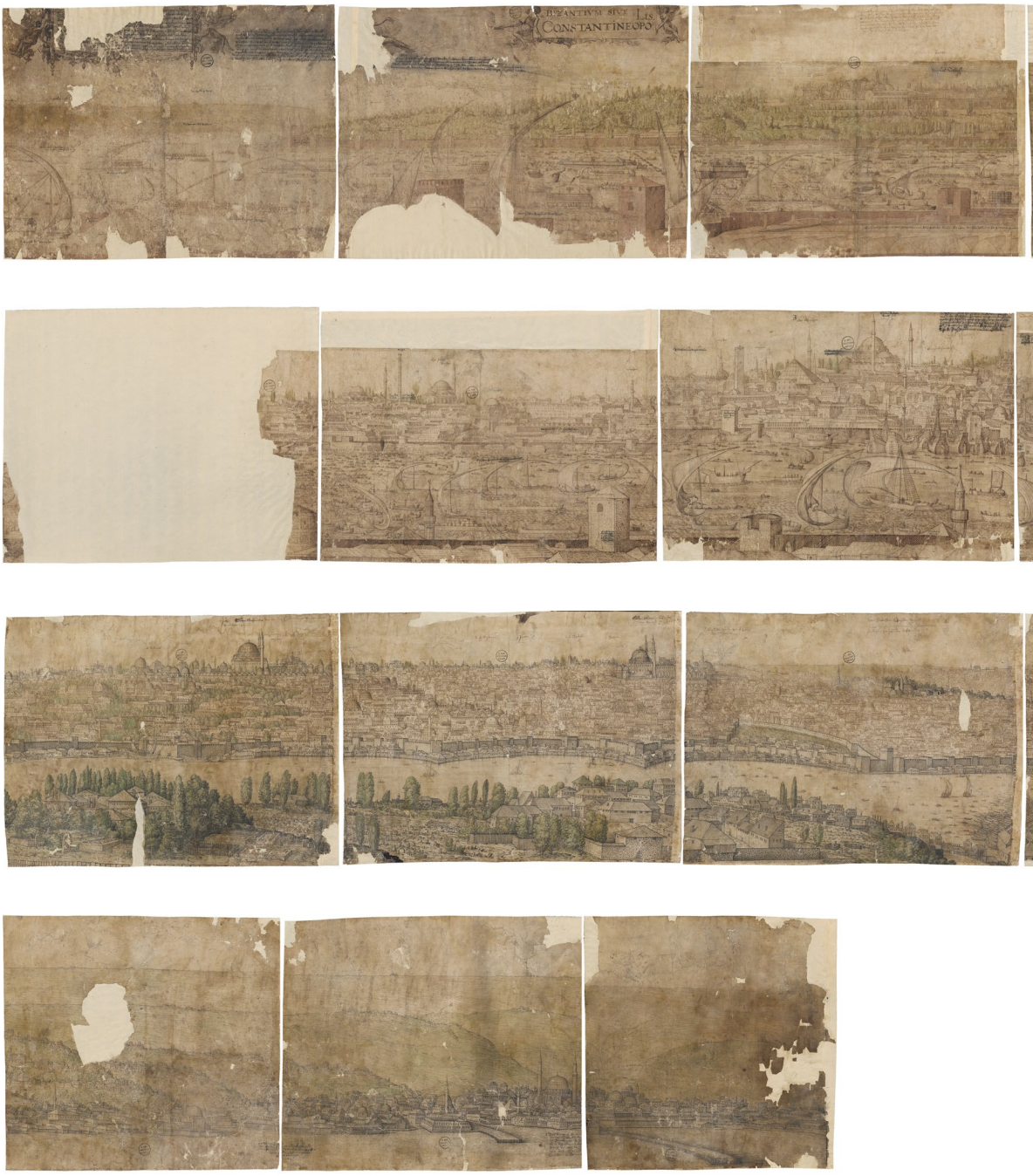
26 See James L. Howgego, *Printed Maps of London, ca. 1553–1850*, London 1964, No. 81.



and practical bases of visual representations of extensive spaces, but also with the ideas and imaginaries that these composite visualisations of space convey.

Just as it was necessary for the printing and mounting of topographic representations to first subdivide the space into individual views and then join them together, the same was true for drawing. A prominent example for this is the very long drawing of a view of Constantinople by Melchior Lorch from 1559 **(Fig. 2).**[27] The wide panorama depicts the city from the Galata city walls. Research has shown that this view is based on a large

27 Melchior Lorch stayed in the Ottoman capital following his position as part of the diplomatic legation of the Habsburgs. His panoramic drawing has been in Leiden University Library since the 17th century. It is available in a facsimile edition: *Melchior Lorck*, ed. Erik Fischer, 4 vols., Kopenhagen 2009, vol. 4: *The Constantinople Prospect*.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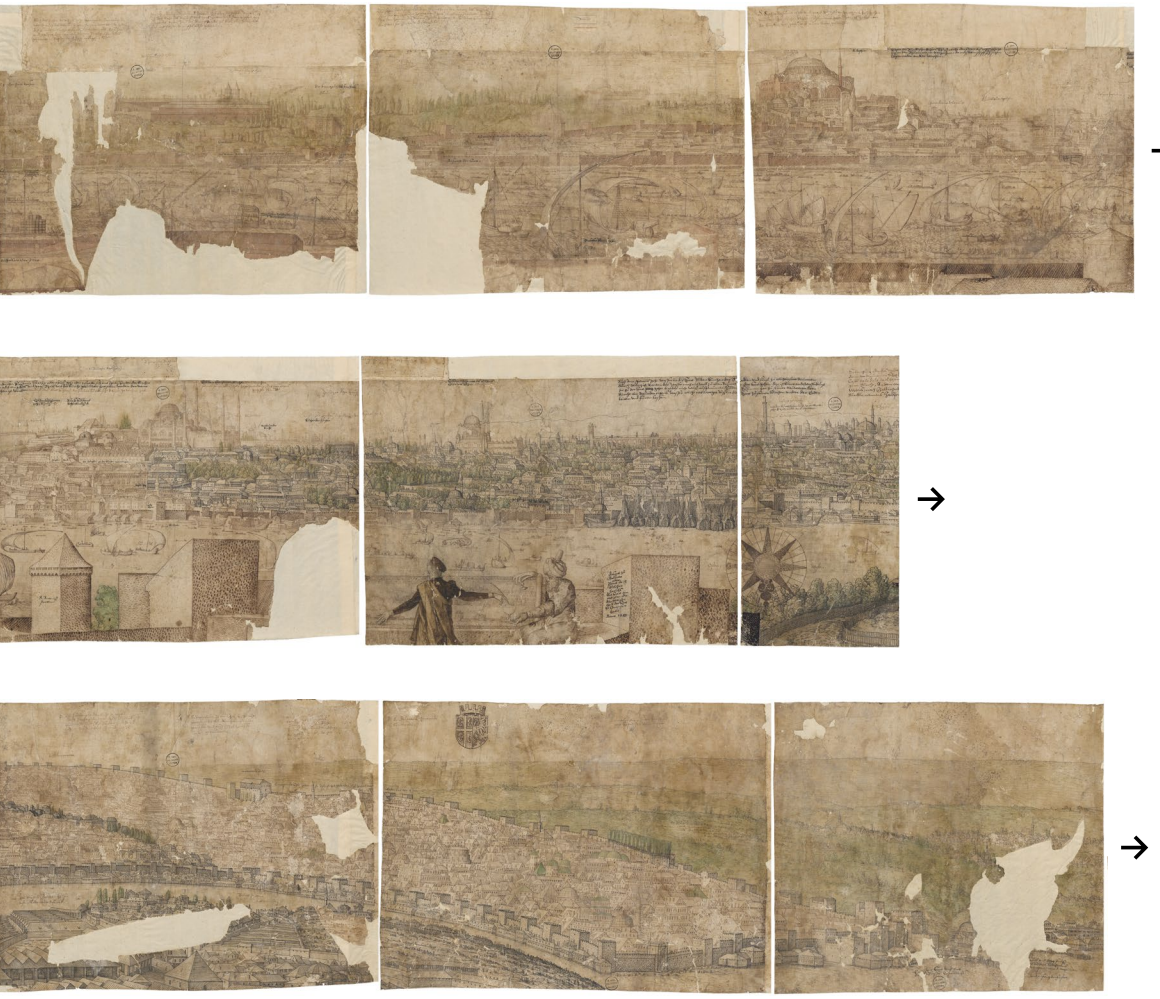


Fig. 2
Melchior Lorch, *Prospect of Constantinople*
(consisting of 21 drawings), 1559, pen and ink,
42.5 × 1127.5 cm, Leiden University Libraries, BPL 1758

number of drawings of smaller sections of space, made from different viewpoints,[28] which Lorch later assembled.[29] Since evidence of the individual drawings or of any intermediate stages has not survived, it is no longer possible today to reconstruct how exactly the artist handled the material. However, it has been shown that and how he adjusted perspective inconsistencies at the seams, in order to create a coherent overall image.[30]

The merging or superimposition of partial representations was not only common for panoramic views, as described in the case of Lorch, but also in the historical production of maps, if only for technical reasons. Surveys of parts of a mapped terrain were joined together, or older maps were integrated into a new map, supplemented, or improved.[31] One convincing study of such piecing together is that of the 240 × 47 cm *Karte der Marsch-Quartiere des königlich sächsischen Infanterie-Regiments Prinz Friedrich, 27. März bis 18. Mai 1812* (Map of the Marching Quarters of the Royal Saxon Infantry Regiment Prince Frederick, 27 March to 18 May 1812). In this case, individual cartographic sketches that were not originally made for this purpose were subsequently joined to form an overall picture. The map is based on drawings from reconnaissance missions that were carried out daily in the field during the campaign. These maps, sketched for practical use in the field, vary widely in size and were drawn using different scales and levels of detail. In order to prepare the representative general

28 Nigel Westbrook, Kenneth Rainsbury Dark and Rene van Meeuwen, "Constructing Melchior Lorichs's Panorama of Constantinople", *Journal of the Society of Architectural Historians*, 69, 1 (2010), pp. 62–87. The observation that Lorch's view was assembled from several individual views is attributed to Karl Wulzinger, "Melchior Lorichs Ansicht von Konstantinopel als topographische Quelle", in *Festschrift Georg Jacob zum siebzigsten Geburtstag*, ed. Theodor Menzel, Leipzig 1932, pp. 355–368 (digitised by ULB Sachsen-Anhalt: URL: https://opendata.uni-halle.de/handle/1981185920/101445, (accessed 15.02.2023).

29 This also shows that the processuality of the topographic recording is an important part of the result. Lorch's drawing "cannot be seen as a freeze-frame view of Ottoman reality, but as a painstaking collection of moments and partial views recorded in field drawings and notes that have been assembled into a whole: it is a pictorialization of successive recordings, perhaps made over many days." Westbrook et al. 2010 (note 28), p. 78.

30 As a result, the spatial representation appears coherent and uniform, but there is no clear viewpoint. Westbrook et al. 2010 (note 28), p. 76.

31 See for example the articles in *Die Werkstatt des Kartographen. Materialien und Praktiken visueller Welterzeugung* (Laboratorium der Aufklärung 9), ed. Steffen Siegel and Petra Weigel, Munich 2011.

map for printing, it was necessary to adapt and touch up these images. Here, too, all seams and traces of the cartographic process were erased.[32]

The potential of gluing was not only put to use in the production of topographic images. It also proved useful for the marketing of representations of continuous spaces. Complex topographic images were distributed in sections that needed to be assembled by the buyers. For example, Christian Gottlieb Reichard's *Atlas des ganzen Erdkreises* (Atlas of the Whole Circle of the Earth) of 1803 consists of a total of six panels that can be joined together to form a cube of the earth, in other words a square globe.[33] Similarly, the "Earth Globe Segment Map" by Martin Waldseemüller, printed in 1507, had to be assembled by users **(Fig. 3)**.[34] As a woodcut on paper, it was possible to market a globe in flat-pack form. The elliptical, adjoining sections of the globe could be glued together on a round blank of about 10.4 cm in diameter.[35] This assembling of different sections of a map enables the transition from a two-dimensional to a three-dimensional representation, and allows for a more commercially viable form of distribution. Furthermore, this type of topographic representation is characterised by a certain playfulness.

32 Anders Engbert-Pedersen, "Die Verwaltung des Raumes. Kriegskartographische Praxis um 1800", in *Die Werkstatt des Kartographen* 2011 (note 31), pp. 29–48, here p. 46, illustration p. 44 and Tab. II. The sketches are in the map collection of the Staatsbibliothek Berlin (V31167), the map made by Ferdinand Heinrich August von Larisch between 1831 and 1863 in the Hauptstaatsarchiv Dresden (11373, Militärische Karten und Pläne, Sig F. 5, Nr. 49). Engbert-Pedersen points out that there is a fundamental difference between the "empirical vector space" (empirischer Vektorraum) of the underlying, situated map drawings from the campaign and the "panoptic overview map" (panoptische Übersichtskarte) that was derived from them afterwards.

33 See Andreas Christoph, "Vom Atlas zum Erdkubus. Eine kleine Geschichte zur Quadratur des Kreises", in *Die Werkstatt des Kartographen* 2011 (note 31), pp. 49–66. See the article by Amrei Buchholz in this volume, Fig. 4.

34 Rüdiger Finsterwalder, "Peter Apian als Autor der sogenannten 'Ingolstädter Globusstreifen'?", *Der Globusfreund*, 45/46 (1997/98), pp. 177–186; Ute Obhof, "Der Erdglobus, der Amerika benannte. Die Überlieferung der Globensegmentkarte von Martin Waldseemüller aus dem Jahre 1507", *Neue Welt & Altes Wissen. Wie Amerika zu seinem Namen kam. Begleitbuch zur Ausstellung*, ed. Fachbereich Kultur der Stadt Offenburg, Offenburg 2006, pp. 45–54.

35 Charlotte Gray, "Peter Appian (attributed), Terrestial Globe Gores, Ingolstadt, after 1520", Kat. 78 in *Prints and the Pursuit of Knowledge in Early Modern Europe* (exhib. cat. Cambridge, Harvard Art Museums), ed. Susan Dackerman, New Haven/London 2011. It has been suggested that such globes were intended as inexpensive illustrative material for school lessons.

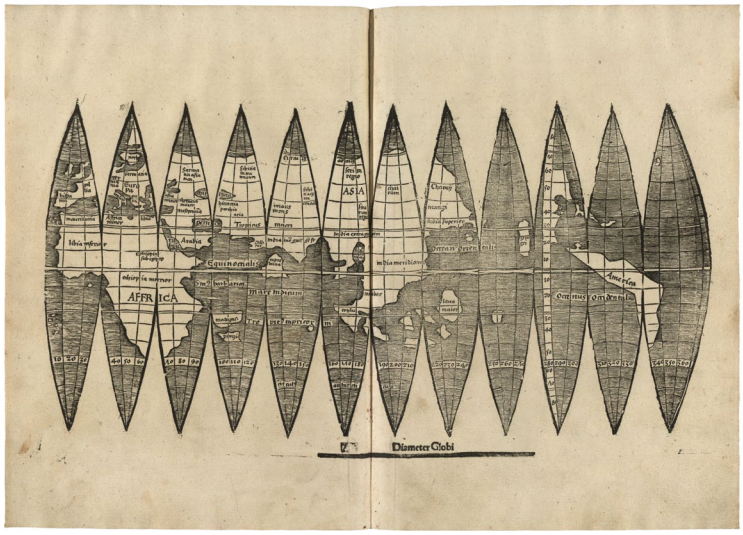


Fig. 3
Martin Waldseemüller [Matthias Ringmann], Globe Segments, ca. 1507, woodcut, 18 × 35 cm, Munich, Ludwig-Maximilians-Universität, Cim. 107#2 (=2 Math. 499#2)

Spatial imaginaries in assemblages of individual images in albums

Gluing is further used to assemble and organize individual images on a common medium. Individual spatial arrangements are created by combining topographic images, especially in photo albums or albums of prints and drawings.[36] In the making of such albums, processes of production

36 As early as the 15th and early 16th centuries, Jacopo Rubieri and Hartmann Schedel pasted prints from their collections, mostly featuring ecclesiastical iconographies, into books. By no later than the 16th century, so-called paper museums had been created both south and north of the Alps. These were single or multi-volume albums in which drawings and prints were collected – either inserted between the pages or mounted with glue – and ordered by motif. On Rubieri see David S. Areford, *The Viewer and the Printed Image in Late Medieval Europe*, London 2016 (2010), pp. 104–163. On Schedel see *Die Graphiksammlung des Humanisten Hartmann Schedel*, ed. Béatrice Hernad (exhib. cat. Munich, Bayerische Staatsbibliothek), Munich 1990, p. 11. Such collections were encyclopaedically oriented and covered one or more subjects. These ranged from topography, through to antiquarian subjects, natural history or architecture, to portraits and costume studies.

and reception are intertwined; finished images from different contexts are selected, combined and thereby interpreted, while at the same time a new order of images is generated.

An early, no longer extant example of such a topographic album was the *Wolf Dietrich-Klebeband Städtebilder*, produced around 1600, which was probably created by Prince-Archbishop Wolf Dietrich von Raitenau (1559–1617) in Salzburg.[37] It originally included 148 prints and 14 drawings, mainly vedute and maps. The term "Städtebilder" ("cityscapes") is somewhat inadequate here, as the volume contained architectural and town vedute as well as views of rural areas, fortresses, harbours and historical battles. This example can serve to illustrate the practice of ordering topographic images as well as the fragility of the result. Based on what could be reconstructed using the numbering of the surviving individual sheets, the volume's original arrangement of the cityscapes corresponded to the route of a journey from Austria via Switzerland, Burgundy and Alsace, the Netherlands, France and Italy to the Mediterranean.[38] In the early 20th century, Ernst von Frisch, the librarian and director of the Salzburg Study Library, had all the prints removed from the volume as he did not consider their arrangement worth preserving. He disapproved strongly of the treatment of the individual sheets, which he regarded as works of art in their own right, as well as of the gluing itself:

> The barbaric method of forcing sheets of art of various formats into a folio volume, where those sheets that protruded beyond the edges were folded by bare hands or even trimmed, was unfortunately very popular particularly during the culture-destroying seventeenth century. It is partly out of carelessness, partly out of false reverence, that these monstra [the albums], true monuments to ignorance, have survived to the present day. Our album is also distinguished by the ruthless treatment of its individual sheets; moreover, it was inhabited by a worm, whose favourite food, the paste, was to be found in abundance here in the album.[39]

37 Christoph Brandhuber and Roswitha Juffinger, "Faszination Stadt. Rekonstruktionsversuch des Klebebands der Städtebilder in der Universitätsbibliothek Salzburg", in *Zentrum der Macht. Die Salzburger Residenz 1668–1803* (exhib. cat. Residenzgalerie Salzburg), ed. Roswitha Juffinger, Salzburg 2011, wpp. 511–535.

38 Brandhuber/Juffinger 2011 (note 37), p. 513.

39 Ernst von Frisch, "Eine graphische Sammlung des Erzbischofs Wolf Dietrich von Raitenau", *Salzburger Museumsblätter*, 7, 4 (1928), pp. 1–2, here p. 1: "Die barbarische Methode, Kunstblätter verschiedenen Formats in einen Folioband hineinzuzwingen, wo jene Blätter,

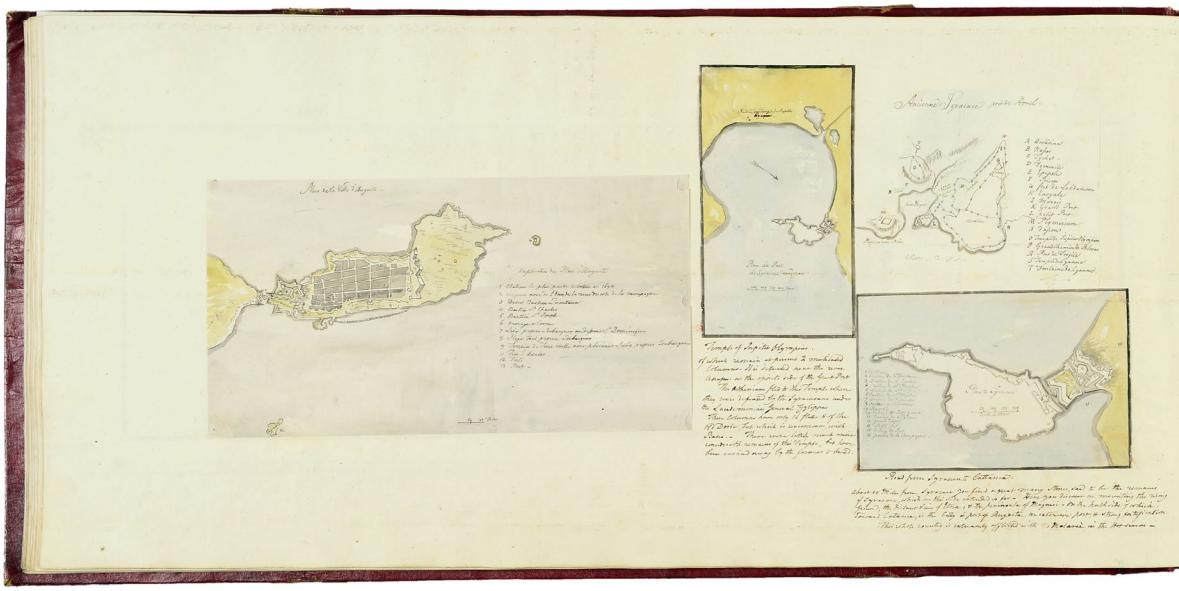


Fig. 4
Charles Gore, Pages from the album *Voyage de Sicile*, 1777 (drawings) / after 1790 (album), blacklead, pen and ink, watercolour, ca. 164,8 × 39 cm (double album page), Klassik Stiftung Weimar, Museen, Identification numbers: 325010, 325011, 325012, 325013 and 325014, 325015, 325016, 325017

This attitude towards albums is typical of the late 19th and early 20th centuries, when many of them were taken apart, with the extracted sheets filed in libraries, graphic collections or archives, according to classifications such as author or motif. In this process, the specific conceptualisation of space inherent in the medium of the book, as well as its particular sequence of images, were lost.

A further, particularly widespread ordering principle for topographic images is found in printed travel reports or guides, which became customary in Europe from the 15th century onwards. Through this medium, a standard of pictorially documenting travel regions with maps and landscape views was introduced. This practice was fully established in the 17th century, and gave rise to manuscript travel albums in the 18th and

19th centuries **(Fig. 4)**.[40] Often, these would retrace the route of a journey in images, with early versions using pasted drawings and prints, and later versions containing photographs. Eventually ready-made books with blank pages or specially created albums made it possible to represent the topography of a journey and the places visited. Such albums often also featured a so-called stub binding, which enabled the users to glue in materials

die übers Maß hinausgingen, von roher Hand gefaltet oder gar beschnitten wurden, diese Methode war leider – und besonders in dem kulturvernichtenden siebzehnten Jahrhundert – sehr beliebt. Teils aus Achtlosigkeit, teils aus falscher Pietät, hat man diese Monstra, wahre Denk-mäler des Unverstandes, bis in die Gegenwart gerettet. Auch unser Klebeband zeichnet sich durch rücksichtslose Behandlung der einzelnen Blätter aus, überdies hauste der Wurm darin, dessen Leibspeise, der Kleister, gerade hier im Klebeband reichlich zu finden war." See also Brandhuber/Juffinger 2011 (note 37), p. 513.

40 Jordana Dym, *Mapping Travel. The Origins and Conventions of Western Journey Maps*, Leiden/Boston 2021, pp. 51–66; Annette Kranen, *Historische Topographien. Bilder europäischer Reisender im Osmanischen Reich um 1700*, Paderborn 2020.

easily. In this context, the connection between the individual images results from both the geographical arrangement of the places shown and the personal memory of the journey. Through the sequence of images, the viewer can form a coherent mental image of the perambulated space.

Glued-on papers: trying out, experimenting, making alternatives visible

Gluing and pasting techniques not only allow the combination of partial views, but also the layering of alternative views. For example, flaps can be added, allowing to visualise a place at different moments in time, different urban planning scenarios, or different layers of space. A drawing by Hans Vredeman de Vries for the reconstruction of the fortifications of Antwerp of 1577 provides a good example of such an operation **(Fig. 5a–f)**. Onto a basic plan of the existing citadel, he pasted five smaller drawings showing variations for the reconstruction, superimposing them on one another so that they could each be lifted up in turn.[41] We can presume that Vredeman de Vries used this method to either try out the different options for himself, or to present them to the decision-makers involved in the reconstruction.

The application of flaps was not only used to plan future changes, but also to represent historical events, such as a landslide that almost completely buried the Alpine town of Piuro in 1618 **(Figs. 6a–b)**. A paper flap in the form of the fallen masses of earth and rubble was applied to an etching of the town before the catastrophe. It shows how the small river flowing through the town was dammed up by the fallen layer of slope.[42] By opening and closing the flap, the event can be replayed and, by comparing the before and after, the change in the landscape and thus the extent of the disaster become apparent.

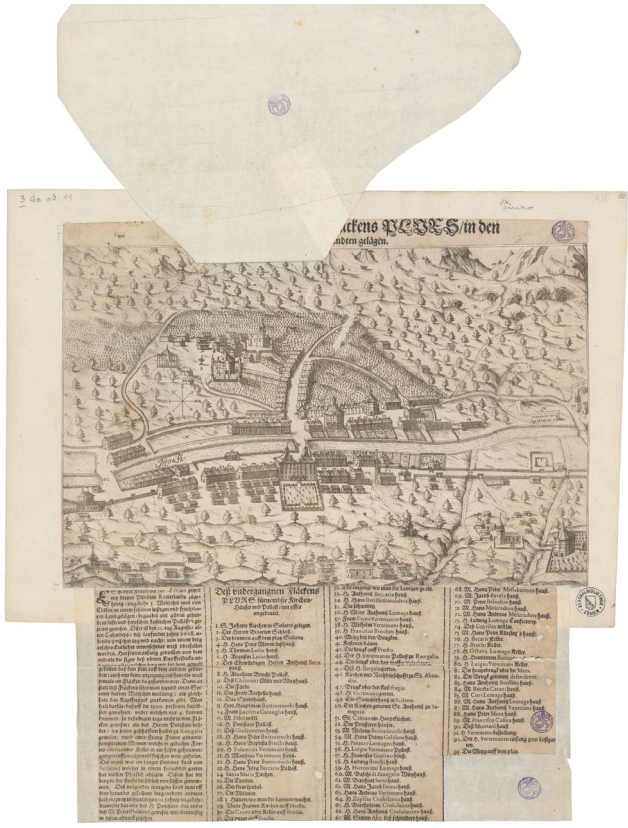
Another form of experimentation with flaps can be found in Alexander von Humboldt's scientific work. His technique allows for different aspects of

41 See Charles van den Heuvel, "Cutting and Pasting Fortifications. Vredeman de Vries and the Plans for the Insertion of the Partially Dismantled Citadel of Antwerp", in *Hans Vredeman de Vries and the Artes Mechanicae Revisited*, ed. Piet Lombarde, Turnhout 2005, pp. 83–99, pp. 92–95.

42 On this print see Bruno Weber, "Das Elementarereignis im Denkbild", in *Naturkatastrophen. Beiträge zu ihrer Deutung, Wahrnehmung und Darstellung in Text und Bild von der Antike bis ins 20. Jahrhundert*, ed. Dieter Groh, Michael Kempe and Franz Mauelshagen, Tübingen 2003, pp. 237–259, pp. 241–248.

Fig. 5a – 5f
Hans Vredemann de Vries, Designs for the dismantling of the citadel of Antwerp, pen, ink and watercolour, 1577, 44 × 60 cm, Antwerpen, FelixArchief/Stadsarchief, 12#10825

Fig. 6a, 6b (closed)/(open)
[Johann Hardmeyer?], *Warhaffte Abbildung des Fläckens Plues: in den Grawen Pündten gelägen*, ca. 1618, etching, 26 × 40 cm, Zentralbibliothek Zürich, 3 Ge 03:11



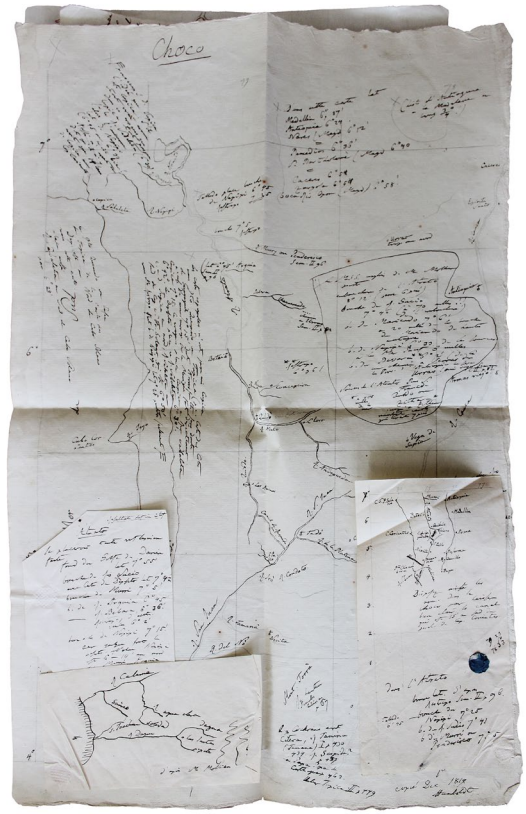


Fig. 7
Alexander von Humboldt, sketch for the *Carte hydrographique de la Province du Chocó*, pen and pencil on paper, between 1825 and 1831, Biblioteka Jagiellońska, Krakau, Berol. Ms. Nachlass von A. v. Humboldt, 8

a topography to be made visible. Humboldt's scientific archive contains several examples in which images of past geological events, geological layers or topographic formations can be combined **(Fig. 7)**. The naturalist mounted drawings on papers on top of each other, sticking them together at one or several points, in order to be able to visually compare alternative theories. Here then, we can observe gluing at work as a heuristic technique that facilitates the thought process. In such contexts, glued topographies are ephemeral intermediary products in practical working or thinking processes, and do not usually survive.[43]

43 Most of Alexander von Humboldt's scholarly archive is kept in the manuscript department of the Staatsbibliothek zu Berlin and is also available in digital form. Further information at URL: https://humboldt.staatsbibliothek-berlin.de/#toggle-id-1 (accessed 12.12.2022).

Conclusion

The three categories of gluing and pasting topographic image media proposed here – gluing together as a prerequisite for larger representations of spatial continua, the arrangement of individual images in books, and the visualisation of spatial alternatives – relate to the production of topographic visual media in different but fundamental ways. The option of gluing facilitates specific topographical representations on paper, thus also shaping our ideas of geographical space. Our analytical focus here is on the material production process and thus on the "madeness" of spatial representations, i.e. on operations that are usually hidden. This approach enables us to address the cultural dimension of technical procedures: gluing allows the joining, overlapping or interlocking of parts that are ultimately conceived as a whole. It facilitates representations of spatially and temporally uniform, wide-ranging topographies, making them seem manageable and controllable for the purposes of travel, planning, surveillance, surveying and knowledge transfer (even if this does not correspond to our everyday physical experience of spaces, which is rather partial and fragmented). The concrete implications of the cultural technique of gluing for the representation of spaces need to be considered anew and on a case-by-case basis within its different contexts – this is precisely what the contributions in this volume do for their respective fields.

PAVING THE WAY WITH SNIPPETS
PASTING AS A METHOD OF INNOVATION AND AUTOMATION IN THE ROUTE SCROLLS OF AUGUST, ELECTOR OF SAXONY

Annette Kranen

Introduction

In the years around 1575, Elector August of Saxony (1526–1586) produced six route maps on which he recorded journeys he had undertaken. They represent the routes from Annaburg to Schwerin (scale 1:27 000), from Belzig to Havelberg (1:30 500), from Schwerin to Torgau (1:22 500), from Dresden to Letzlingen (o.A.), from Mühlberg to Regensburg (1:35 500) and from Regensburg to Augustusburg (1:30 500).[1] It is not known exactly when and for what reasons August undertook these journeys. Only the travels recorded in the last two route scrolls can be proven and dated, as they chart August's outward and return journey to the Electors' Convention in Regensburg in 1575.

The route scrolls consist of strips of paper or parchment about 10 centimetres wide and of varying lengths, from about 3.7 metres to over 19 metres **(Fig. 1)**. The strips are rolled up on wooden spools and kept in

1 The route scrolls are digitally accessible at www.deutschefotothek.de. Their signatures at the SLUB Dresden are: Mscr. Dresd.L.456, Mscr.Dresd.L.455, Mscr. Dresd.L.453, Mscr.Dresd.L.452, Mscr. Dresd.L.451, Mscr.Dresd.L.454. They were already listed in the first inventory of the Dresden Kunstkammer. On the inventory, see Martina Minning, "Das Inventar der kurfürstlich-sächsischen Kunskammer von 1587, zur Einführung", in *Die kurfürstlich-sächsische Kunstkammer in Dresden. Das Inventar von 1587*, ed. Dirk Syndram, Martina Minning and Jochen Vötsch, Dresden 2010, n.p.

Annette Kranen: Paving the Way with Snippets. Pasting as a Method of Innovation and Automation in the Route Scrolls of Augustus, Elector of Saxony, in: PASTED TOPOGRAPHIES (TERRAIN. STUDIES ON TOPOGRAPHIC VISUAL MEDIA 1), eds. Boskamp, Braun, Buchholz and Kranen, Heidelberg: arthistoricum.net, 2023, pp. 23–47, https://doi.org/10.11588/arthistoricum.1323.c18464

Fig. 1
Elector August of Saxony / Heinrich Göding / Friedrich Bercht, Route Scroll of the Journey from Mühlberg to Regensburg, 1575, pen and ink drawing and pasted vignettes on vellum, 1336 × 10.5 cm. Saxon State Library – Dresden State and University Library (SLUB), Manuscript Collection, call number: Mscr.Dresd.L.451 (photo: Margot Schaal)

Fig. 2
Elector August of Saxony / Heinrich Göding / Friedrich Bercht, Route Scroll of the Journey from Mühlberg to Regensburg, 1575, pen and ink drawing and pasted vignettes on vellum, 1336 × 10.5 cm, Saxon State Library – Dresden State and University Library (SLUB), Manuscript Collection, Mscr.Dresd.L.451 (photo: Regine Richter)

cardboard sleeves **(Fig. 2)**. In the centre of each strip, the route taken is drawn in ink as a simple line. Changes in direction are indicated by compass roses, glued on at different angles to signal the corresponding compass bearing **(Fig. 3)**. Landscape elements are added in the form of glued-on snippets of paper imprinted with pictures: the route leads past villages, towns and country estates, over bridges and through forests **(Fig. 4)**. Place names are handwritten, and rivers and streams drawn on, in pen.

The route scrolls are the product of Elector August's intensive involvement with geodesy and cartography and his great interest in surveying technology and instruments, evidenced not only in the large cartographic projects that he commissioned, but also in mapping operations which he carried out himself.[2] The Saxon court's interest in geodesy and cartography aligned with a European trend: as Richard L. Kagan and Benjamin Schmidt summarise, an increasingly territorial understanding of rule became established in the modern era, with rule over land replacing rule over people. In the course of this "rise of territorial consciousness", knowledge about space became an essential constituent of power.[3] At the courts, mathematics, surveying and geography became subjects of princely education and expertise in these areas was encouraged. The study of mathematics, instrument making, land surveying and cartography had practical political functions of a military and economic nature, since they were relevant to warfare and territorial expansion, military security and fortress construction as well as to the economic use of land and resources, the stipulations of forestry rights, taxes and transport routes.[4] At the Electoral Court in

2 Among August's most remarkable cartographic commissions are the "Duringische und Meisnische Landtaffel" by Hiob Magdeburg, 1566, and the forest maps by Georg Öder the Younger between 1554 and 1571. Regarding August's own cartographic productions, the "16 kleine Landtafeln" from the year 1584 are best known. See Wolfram Dolz, "Kurfürst August als Geodät und Kartograph", in *Fürstliche Koordinaten. Landesvermessung und Herrschaftsvisualisierung um 1600*, ed. Ingrid Baumgärtner, Leipzig 2014, pp. 69–86; Ludwig Schmidt, *Kurfürst August von Sachsen als Geograph,* Dresden 1898*; Kursächsische Kartographie bis zum Dreißigjährigen Krieg*, ed. Fritz Bönisch, Berlin 1990, 214–217 u. 228–229; Axelle Chassagnette, *Savoir géographique et cartographie dans l'espace germanique protestant (1520–1620)*, Geneva 2009, pp. 386–388.

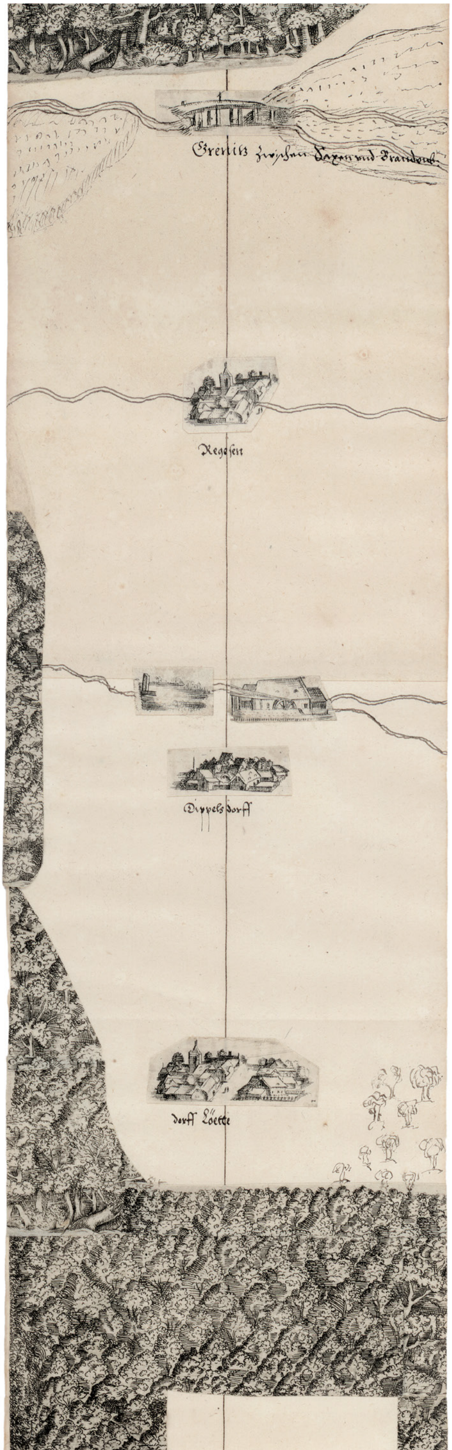
3 Richard L. Kagan and Benjamin Schmidt, "Maps and the Early Modern State. Official Cartography", in *The History of Cartography*, 6 vols., Chicago et al. 1987–, vol. 3: Cartography in the European Renaissance, ed. David Woodward, 2007, Part 1, pp. 661–679, pp. 662–665, quotation p. 663.

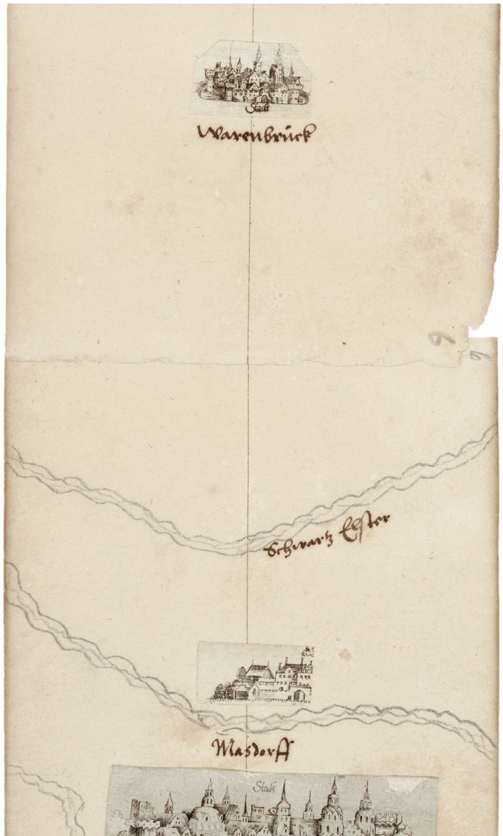
4 Bruce T. Moran, "German Prince-Practitioners. Aspects in the Development of Courtly Science, Technology, and Procedures in the Renaissance", *Technology and Culture*, 22 (1981), p. 253, p. 259.

Fig. 3
Detail from: Elector August of Saxony / Heinrich Göding / Friedrich Bercht, Route Scroll of the Journey from Mühlberg to Regensburg, 1575, pen and ink drawing and pasted vignettes on vellum, 1 336 × 10.5 cm, Saxon State Library – Dresden State and University Library (SLUB), Manuscript Collection, Mscr.Dresd.L.451
(photo: © SLUB Dresden / Deutsche Fotothek)

Fig. 4
Detail from: Elector August of Saxony / Heinrich Göding / Friedrich Bercht, Route Scroll of the Journey from Annaburg to Schwerin, ca. 1575, pasted vignettes and pen and ink drawing on paper, 1 030 × 10.5 cm, Saxon State Library – Dresden State and University Library (SLUB), Manuscript Collection, Mscr.Dresd.L.456
(photo: © SLUB Dresden / Deutsche Fotothek)

Fig. 5
Detail from: Elector August of Saxony / Heinrich Göding / Friedrich Bercht, Route Scroll of the Journey from Dresden to Letzlingen (Nötzlingen), ca. 1575, pasted vignettes and pen and ink drawing on paper, Saxon State Library – Dresden State and University Library (SLUB), Manuscript Collection, Mscr.Dresd.L.452
(photo: © SLUB Dresden / Deutsche Fotothek)


Grenitz zwischen Sachsen und Brandenb.
Regesen
Dippelsdorff
dorff Loette


Stadt
Warenbruck
Schwartz Elster
Masdorff
Stadt
Oertlung
Libenwerda

Dresden under August, interest in surveying and cartography was particularly strong, not least because Saxony's prosperity depended on mining, the use of waterpower and forestry.[5]

Numerous sources on the cartographic projects in early modern Saxony were made accessible in Sophus Ruge's 1881 *Geschichte der sächsischen Kartographie im 16. Jahrhundert* (History of Saxon Cartography in the 16th Century), a study on which much of the historical research in this field continues to draw today. In the context of the recent growing interest in early modern collections, Elector August's geodetic and cartographic activities have also been examined more specifically within the material framework of the Kunstkammer in Dresden. Its particular and – compared to other princely collections – unusual focus was on tools and scientific instruments, which accounted for about eighty percent of the collection.[6] The centrepiece of the seven rooms was the so-called "Reißgemach". The name itself indicates the central role played by the activity of drawing (*Reißen*) plans (*Risse*) here.[7] In the first inventory of the collection, compiled in 1587, shortly after August's death, the entries for this room begin with the "beautiful artful writing tables" ("schönen kunstreichen schreibetischen") and "writing instruments" ("schreib zeugen")[8] which were located there. All the other rooms also contained desks, writing and drawing tools,[9] indicating that an important function of the *Kunstkammer* was to produce records, plans and sketches. It was in this spatial and intellectual

5 Chassagnette 2009 (note 3), pp. 374–376.

6 Joachim Menzhausen, "Elector August's Kunstkammer. An Analysis of the Inventory of 1587", in *The Origins of Museums. The Cabinet of Curiosities in 16th and 17th century Europe*, ed. Oliver Impey and Arthur MacGregor, Oxford 1985, pp. 69–75; Peter Plaßmeyer, "Christoph Schissler: The Elector's Dealer", in *European Collections of Scientific Instruments, 1550–1750*, ed. Giorgio Strano, et al., Leiden 2009, pp. 15–25, p. 16. The Dresden Kunstkammer was founded by Elector August, whose interest in innovative instruments ca be traced back to the 1550s. It is mentioned for the first time in official documents from the year 1572. See Minning 2010 (note 1).

7 The original meaning of "reiszen" or "reißen" was to write, but in the early modern period, its meaning narrowed down to refer to drawing, etching etc. See, *Deutsches Wörterbuch*, ed. Jacob Grimm and Wilhelm Grimm (1852–1961), digital edition, URL: https://woerterbuchnetz.de/?sigle=DWB#2 (accessed 12.04.2023), vol. 14, columns 754–755.

8 Syndram, Minning and Vötsch (ed.) 2010 (note 1), fol. 5r.

9 Among them were reduction measuring rods, angles and rulers as well as drawing instruments ("Reißzeug"). See Klaus Schillinger, *Zeicheninstrumente. Katalog: Staatlicher Mathematisch-Physikalischer Salon Dresden Zwinger*, Dresden 1990.

context that Elector August made and stored his route scrolls.[10] The inventory registers all of them individually and records them as "voyages" ("Reisen") without specifying their format, appearance or conception. All six recorded scrolls have been preserved and can be identified because the entries include the individual points of departure and the destinations, e.g. "Reise von der Annaburgk nach Schwerin".[11]

If we take a closer look at the way the route scrolls were made, gluing proves to be an essential element. The narrow strips of paper or parchment that form the base are made up of several strips glued together **(Fig. 5)**. The topographies drawn on them are composed of small printed images of landscape elements that had been cut out and glued onto the long strips of supporting material. Pre-printed pictures of forests, city views, ponds, bridges, mills, houses, castles, etc. were combined in this way to form individual topographic images. This method of manufacturing maps by gluing pieces together is unique and will form the starting point of the following investigation. The study will show that gluing was a means to implement and to demonstrate innovation and automation in mapping processes.

Characteristics of route maps

The route scrolls are representations of the Elector's travel routes. In her seminal article *Milieus of Mobility: Itinieraries, Route Maps, and Road Maps*, Catherine Delano-Smith defines the concept of a route as follows: "[A]route is not a road, nor in itself a physical feature, but a direction, an imaginary line linking a point of departure with a destination. Only its description gives it tangible form in speech or gesture, writing or image. A route may relate to a journey already undertaken or to one in the future."[12] This is exactly what the route scrolls do. They document the movement of Elector August from a starting point to a destination, recording details such as the course of the journey, stopovers and various features of the

10 According to Wolfram Dolz, the measuring as well as the route scrolls were done by the Elector himself. Wolfram Dolz, "Kurfürst August von Sachsen (1553–1586) als Vermesser und Kartograph", *Dresdener Kunstblätter*, 51 (2007), pp. 25–35, p. 30.

11 Syndram, Minning and Vötsch (ed.) 2010 (note 1), fol. 75r.

12 Catherine Delano-Smith, "Milieus of Mobility. Itineraries, Route Maps, and Road Maps", in *Cartographies of Travel and Navigation*, ed. James R. Akerman, Chicago 2006, pp. 16–68, p. 32.

places passed, whilst omitting others, e.g. information on the condition of the roads or on altitude. The scrolls record the routes in a graphically elaborate manner and can be seen as posterior medial addenda to the journeys already undertaken, since they are based on data collected during the journeys themselves, as will be explained in more detail below.

It is likely that the routes had already been described in other media in advance of the Elector's journeys. The journeys were probably planned on the basis of road books, itinerary collections, distance tables or other, including non-written, knowledge sources, and noted down in the form of itineraries. Itineraries, simple lists of place names in the order of travel, had been a common means of describing routes since antiquity. Sometimes they also contained additional information, such as distances and accommodation facilities. In order to find their way to the next place on the list, travellers had to rely on signposts and oral communication. Itineraries remained the principal medium for planning and orientation on journeys in Europe until the 19th century.[13]

The elaborate design of Elector August's route scrolls is very unusual for the recording of journeys, and examples of similar, visually enhanced route representations are rare. The few existing examples suggest that route maps were not made to provide information for wayfinding purposes, but rather fulfilled other functions. One such example are the maps made by the monk Matthew Paris, who lived in the British Benedictine monastery of St. Albans in Hertfordshire from 1217 until his death in 1259. They are part of a monastic chronicle written by Paris and show the route from London via Rome to the port cities of southern Italy, followed by a map of the Holy Land.[14] The route is marked as a line on wider strips that are to be read vertically **(Fig. 6)**, and usually number four to a page. Important landmarks such as towns, monasteries, etc. are represented along the line in the form of small drawings. Another example of a pictorial route map is John Ogilby's road atlas *Britannia*, which first appeared in

13 Delano-Smith 2006 (note 12), 34–46, 57. In the 19th century, maps came to be used as wayfinding aids.

14 Matthew Paris, *Chronica majora*, ca. 1250, Corpus Christi College, Cambridge, ms 26.

1675 and was later republished in various versions. In Ogilby's work, too, the roads are arranged in the form of several vertical strips placed side by side on the pages of a book, except that in this case they are illusionistically depicted as strips of paper with tears and curled ends **(Fig. 7)**. Compass roses indicate the compass bearing and settlements, towns, rivers and other landmarks are mapped. Researchers have recently argued in connection with both examples that, contrary to earlier assumptions, they were not intended for orientation purposes on actual journeys.[15] With regard to Matthew Paris's maps, it has convincingly been suggested that they served as a meditative medium which allowed the monks in St. Albans to undertake a mental pilgrimage to Rome or Jerusalem.[16] Ogilby's road maps, it is argued, especially given that they were published in a very large, heavy volume, served a representative function of visually demonstrating England's prosperity and infrastructure to their readers.[17]

In view of these examples of graphically elaborated route maps, it seems reasonable to assume that Elector August's route scrolls were not intended for practical use in planning and carrying out journeys; rather their function must be determined differently. Their production demanded a remarkable amount of effort. This is related to the function of the route scrolls themselves, which, as will be argued in the following, lay in the testing, application and further development of surveying technologies, from data collection to the method of representation, and in their execution with the help of gluing.

15 In older literature, it is assumed that route maps were used as means of wayfinding. See e.g. Gregory Johnson, "The Evolution, Application and Implications of Strip Format Travel Maps", *The Cartographic Journal*, 24 (1987), pp. 147–158.

16 Daniel K. Connolly, "Imagined Pilgrimage in the Itinerary Maps of Matthew Paris", *The Art Bulletin*, 81 (1999), pp. 598–622.

17 Delano-Smith 2006 (note 12), pp. 50–54; Gordon C. Dickinson, *Britannia's roads. An introduction to the strip maps of John Ogilby's Britannia, 1675*, Leeds 2019, pp. 12–13.

Fig. 6
Matthew Paris, detail of the map of the route from London to Naples, in Matthew Paris, Chronica maiora I, ca. 1200–1299, ca. 26 × 19.5 cm, Cambridge, Corpus Christi College, MS 026, f. iiv

Fig. 7
John Ogilby, The continuum of the road from London to Frambrugh, in Britannia, volume the first [...] By John Ogilby, Esqr; his Majesty's Cosmographer, etc., London 1675, British Library, C.6.d.8., pl. 42

Automation and technology in surveying instruments at the Dresden court

The route scrolls serve not only as a document of August's travel itineraries, but also of his geodetic skills. August seems to have understood and used his journeys, such as those to and from the Electors' Convention, as opportunities to carry out land surveys, i.e. to use his instruments, to test their functions and to record data. The act of surveying itself can be seen as a confirmation of the Elector's claim to power, as Barbara Marx notes, as he thereby performed the "meticulous penetration and control of a dominion territory".[18] This was also part and parcel of August's *Kunstkammer* collection, which included numerous precious, representative

18 Barbara Marx, "Ergreifen, Begreifen. Das Reißgemach des Kurfürsten August in der Kurfürstlichen Kunstkammer im Residenzschloss Dresden", in *Fürstliche Koordinaten. Landesvermessung und Herrschaftsvisualisierung um 1600*, ed. Ingrid Baumgärtner in Zusammenarbeit mit Lena Thiel, Leipzig 2014, pp. 31–68, p. 67. (Original German: "minutiöse[n] Durchdringung und Kontrolle eines Herrschaftsterritoriums").

surveying instruments. The Elector himself collaborated with eminent scholars on technical improvements, showing particular interest in automating processes and in consolidating multiple individual operations into a single process.[19] A step towards simplified distance measurement was enabled by the change from measuring chains and rods to odometers, which registered wheel rotations or steps and could be used when travelling in a carriage as well as on foot or horseback.[20] Over the years, the Elector repeatedly commissioned improved odometers from instrument makers based in centres such as Augsburg and Leipzig or employed directly at Court. The *Kunstkammer* inventory of 1587 lists a total of twelve odometers from August's possessions.[21] Most of them could be installed directly in the Elector's carriage and connected to one of the carriage wheels.

The idea of integrating a recording function into the surveying apparatus also played a role from early on. In 1564, August wrote to the Leipzig-based mathematics professor Valerius Tau (1531–1575) that Tau's suggestion to have an automatic odometer built for his carriage appealed to him, yet he also wished that he could use the device to "not only measure distances and changes of direction while driving, but also to accurately record them according to their geographic situation and to bring them into a certain delineation".[22] In doing so, it was August himself who articulated the objective of integrating a technical system into the carriage odometer, which would record the route graphically. An odometer designed by the instrument maker Thomas Rückert from Dresden, which can be dated to around 1575, fulfilled such a function **(Fig. 8).**[23] Here, compass

19 Marx 2014 (note 18), pp. 64–65; Schmidt 1898 (note 2), pp. 9–10; Dolz 2007 (note 10), p. 26.

20 See Uta Lindgren, "Land Surveys, Instruments, and Practitioners in the Renaissance", in *The History of Cartography*, 6 vols., Chicago et al. 1987–, vol. 3: Cartography in the European Renaissance, ed. David Woodward, 2007, Part 1, pp. 477–508, p. 490. Ropes, chains and poles of a certain length were used for measuring distances in the field. However, due to the sag, ropes and chains were prone to produce false results. The odometer (from the Greek οδός = road and μέτρον = measure) is a measuring wheel with a certain circumference. By registering the number of rotations, it enables the user to calculate distances.

21 Plaßmeyer 2009 (note 6), p. 23.

22 Original German: "im fahren nit allein messen sondern auch irer gelegenheit nach rechtschaffen deliniiren und in einen gewissen riss bringen konte." Quoted from: Schmidt 1898 (note 2), p. 9.

23 Wolfram Dolz, "Kurfürst Augusts Wegmesser und Reiseroutenrollen", in *Genau messen=Herrschaft verorten. Das Reißgemach von Kurfürst August, ein Zentrum der Geodäsie und Kartographie*, ed. Wolfram Dolz and Yvonne Fritz, Berlin 2010, pp. 44–53, pp. 46–48.

Fig. 8
Thomas Rückert, Waywiser, 1575, brass (cast, etched, gilded), iron, case: 11 cm (diameter) × 6.3 cm (depth), base: 7.1 cm (width) × 9.5 cm (depth), V 443 (photo: GRASSI Museum für Angewandte Kunst, Leipzig)

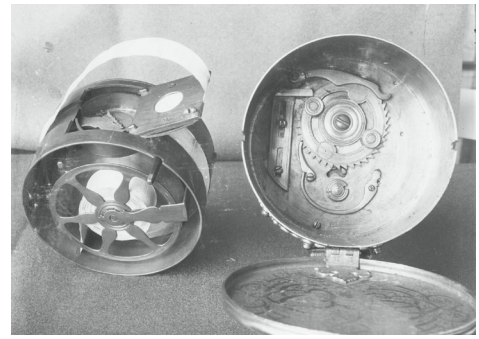


Fig. 9
Thomas Rückert, Waywiser, 1575, brass (cast, etched, gilded), iron, case: 11 cm (diameter) × 6.3 cm (depth), base: 7.1 cm (width) × 9.5 cm (depth), GRASSI Museum, Leipzig, V 443 (opened) (photo: GRASSI Museum für Angewandte Kunst, Leipzig.)

readings, i.e. directional information, are mechanically imprinted on a paper strip that is rolled out automatically by the measuring mechanism while the carriage is in motion **(Fig. 9)**.

However, the instruments that August probably used during his journey to the Electors' Convention in Regensburg did not yet have an automatic recording function.[24] The Elector noted the distances he measured and his compass readings by hand, as shown by the preserved survey list of

24 These were an odometer produced by an unknown manufacturer (Sächsische Kunstsammlungen Dresden, Mathematisch-Physikalischer Salon, Inv. C III a 1) and a nautical compass with gimbal, dated around 1560 (Sächsische Kunstsammlungen Dresden, Mathematisch-Physikalischer Salon, Inv. C VI 2). See Dolz 2014 (note 2), pp. 74–77.

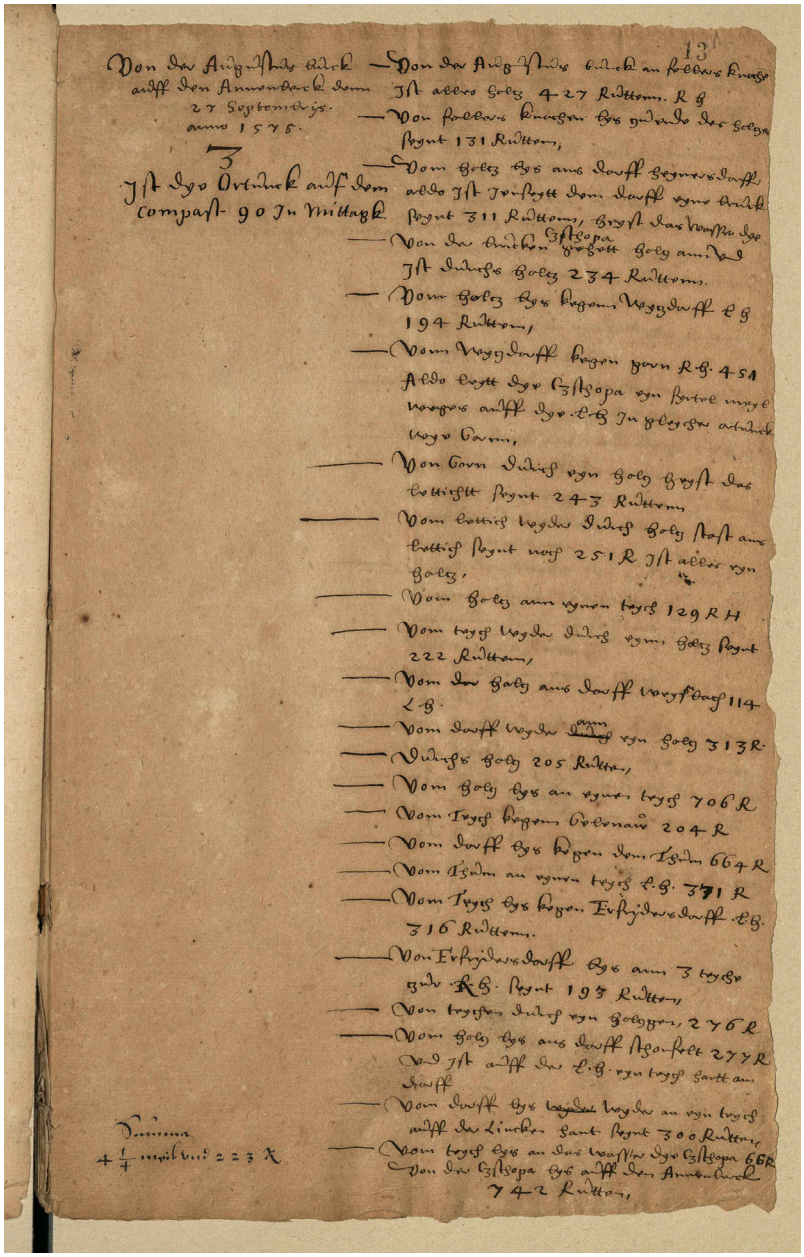


Fig. 10
Elector August of Saxony, Von der Augustusburck auf den Annaburck den 27 Septembris 1575, manuscript, Sächsisches Staatsarchiv, Hauptstaatsarchiv Dresden, 10024 Geheimer Rat (Geheimes Archiv), Loc. 09762/04, Bl. 13

Fig. 11
Christoph Trechsler, Waywiser, 1584, brass (gilded, etched, engraved, punched), steel, total height 42 cm, total depth 38.5 cm, Staatliche Kunstsammlungen Dresden, Mathematisch-Physikalischer Salon, C III a 4

the routes from Augustusburg to Regensburg and from Regensburg back to Augustusburg **(Fig. 10)**. The list records the distances covered each day, subdivided into numerous intermediate sections, with the distances given in rods ("Ruten").[25] August subsequently translated the notes he made during his journeys into a coherent graphic format on the route scrolls. In doing so, he transformed his measurement results into impressive and entertaining *Kunstkammer* objects that may well have been shown to high-ranking guests. The unique shape of the scrolls, which had to be handled in an unusual way, added to their appeal.

In the following years, August worked on developing his surveying instruments, overseeing the incorporation of additional functions. August's best-known waywiser, designed by Christoph Trechsler in 1584, not only measured travelled distances particularly reliably; it also indicated the direction of movement using an in-built compass **(Fig. 11)**, and marked

25 Survey list of August's journey to the Electors' Convention in Regensburg 1575, Sächsisches Staatsarchiv, Hauptstaatsarchiv Dresden, 10024 Geheimer Rat (Geheimes Archiv), Loc. 09762/04, Bl. 13–33; see also Dolz 2014 (note 2), p. 76.

both automatically on a continuous paper strip.[26] Unfortunately, the additional parts that made this function possible – "a plate with a winding device for a paper strip and with a small compass needle for marking the angles" as well as an "angle disc with alidade, with the help of which one could determine the numerical value of the angle by means of the compass points pressed in"[27] – were among the wartime losses of the Mathematisch-Physikalischer Salon. One component that did survive is the small drawing board integrated in this waywiser, in which a wooden plate covered with paper could be inserted.

The fragmentary remains of the *Kunstkammer's* historical collections make it impossible to judge how far the technical possibilities of recording measurements automatically practically extended at this time. For example, an odometer by Martin Feyhel (active in Augsburg 1577–1602) from around 1580/1585 was lost in the Second World War.[28] However, a short text by the Elector under the heading "What I can show and do with my newly invented instrument" gives an impression of its use. Here August emphasised in particular that the waywiser enabled exact orientation in unknown terrain and also mentioned that a map could be made directly en route with the help of the instrument: "[...] in this way the road can be observed by this instrument and what is on both sides as far as one can see ahead, towns, castles, water, passes, villages, mountains or woods or fields can all be made like a map in a single operation".[29] Unfortunately,

26 Wolfram Dolz, "The Waywisers of Elector Augustus of Saxony and their New Use in the Survey of Saxon Postal Roads", in *European Collections of Scientific Instruments, 1550–1750*, ed. Giorgio Strano et al., Leiden 2009, pp. 43–59, pp. 48–52.

27 Dolz 2007 (note 10), p. 29. Original German: "eine Platte mit einer Wickelvorrichtung für einen Papierstreifen mit kleiner Kompassnadel zum Markieren der Winkel"; "Winkelscheibe mit Alhidade, mit deren Hilfe man den Zahlenwert des Winkels an Hand der eingedrückten Kompasspunkte bestimmen konnte".

28 There is evidence that the Elector paid a sum of 200 Taler for this instrument in 1585. See Dolz 2010 (note 23), p. 47.

29 Original German: "[...] so kann durch dis instrument der weg observirt unnd was auff beiden seittenn so weit mann sehen kan vor stäte, schlösser, wasser, pässe, dorffer, gebirge oder ebent holtz oder felldt gelegen alles einer mappenn gleich in einem durchzuge gemacht werdenn." Elector August, "Was ich mit meinem neuwerfundenen Instrument zeigen unnd darthun kann", SLUB Dresden, Mscr. Dresd. K A 928 (= K.449). See Dolz 2014 (note 2), pp. 78–79; first published by Schmidt 1898 (note 2), pp. 10–11.

the extent to which the device's functions described here actually worked in practice and what the resulting maps looked like remains unclear, since no traces of its usage appear to have survived. Nevertheless, the tendency is clear: instruments were developed with the aim of automating and improving surveying techniques; this also included the integration of systems that enabled the immediate recording of measurements. Ultimately, the possibility of surveying and producing a detailed cartographic recording in one single process was devised.

In his continual efforts to improve surveying apparatuses, Augusts' aim was to integrate several functions (measuring distance and direction) as well as to automate the measuring process and cartographic recordings. The fact that automatic recording procedures were integrated into the odometers shows that surveying and its medial documentation formed one coherent effort.

Pasting as a method of innovation and automation in the production of maps

Even though the route scrolls were produced by hand in a separate work step, they are nevertheless characterised by the same demand for technical improvement, and can thus be seen as testing sites for geodesy and cartography at the Saxon court. The development of pre-printed landscape vignettes that could be cut and pasted to create the cartographic image can be understood under the same aspect that was pivotal for August's measuring instruments: automation. Gluing is an essential part of the technical enhancement of the medium, bringing with it several benefits: it makes it possible to maintain a certain qualitative standard of representation, while at the same time enabling fast and efficient work. In addition, the use of printed images remains visible in the final product, thus emphasising the technical control and advancement of the mapmaking process.

By commissioning the printed landscape elements from his court painters Friedrich Bercht and Heinrich Göding, August made sure that his cartographic efforts resulted in professional images of high quality. Immediately before setting out on his journey to the Electors' Convention

in Regensburg, in a letter dated 7 September 1575, August communicated his instructions for the artist Friedrich Bercht:

> L. G.! Our most gracious request and wish is that you commission our painter Friedrich Berchte of Dresden on our behalf, to engrave on a sheet of copper, estates, castles, fortresses, villages, forges, barns, taverns or inns, mills, busy waterways, common rivers, streams, ponds, woods, likewise a compass rose, divided into 90 parts, to be engraved in the most careful and subtle manner, so that one may inscribe under each, whatever it may be, and from the impressions one may cut off each without compromising the other. When such engravings are ready, you should prepare four imprints on paper used for books and send them to us in the most expedient manner ... Date Mulberg 7 Sept. anno 75.[30]

It would seem that Bercht carried out the order immediately, whereupon the Elector once again asked for modifications, for thirteen days later August wrote another letter, this time directly to Bercht:

> We have received the other copperplate engravings sent to us after the first lot, and we like them better than the first ones, therefore we request that you print more of the same copperplate engravings and send them to us together with the copperplate, in return for which we will order and present you with a tribute from our chamber in Dresden, [...]. Datum et supra [i.e. Mühlberg, 20 Sept. 1575].[31]

30 Original German: "L. G.! Vnser gnädigstes begeren vnnd beuhelich ist du wolltest vnsern Mahler Friedrich Berchte zu Dresden von vnseretwegen beuhelen, Vff ein Kupferblech, Stedte, Schlösser, Merckte, Dorffer, forwerge, Scheffereien, Krüge oder Wirdtshäuser, Mühlen, Schiffreiche Wasser, Gemeine ströme, Beche, Teiche, Holz, desgleichen eine Compassscheibe, vff 90 getheilt, vfs gefugste vnd subtilste als sich leiden will, dermassen vnterschiedlich zu stechen, das vnter ein Jdes, was es sei, gezeichnet werde vnd man auss den Abdrücken ein Jdes sonderlich unuerletzt des andern abschneiden könne. Wann solche Kupferstich fertig, wolltest du vonn vier Buch Pappier abdrücke machen lassen vnd vns förderlichst zufertigen ... Datum Mulberg den 7. Sept. Anno 75". Letter to Barthel Stark, quoted in: Sophus Ruge, *Geschichte der sächsischen Kartographie im 16. Jahrhundert*, Lahr 1881, p. 230. Ruge gives the following reference: Hauptstaatsarchiv Dresden, Cop. 404, fol. 215b.

31 Original German: "Wir haben die anderen nachgeschickten Kupferstich empfangen vnd haben vns dieselbigen besser dann die ersten gefallen, begehren derhalben, du wolltest vns derselben Kupferstich mehr drucken vnd sampt dem Kupferblat anhero schickenn, dargegen wollen wir dir eine Verehrung aus vnserer Cammer zu Dressden verordnen vnd geben lassen, [...]. Datum et supra [d. h. Mühlberg, 20. Sept. 1575]". Letter to Friedrich Bercht, quoted in Ruge 1881 (note 30), p. 230.

This process shows that August was just as concerned with improving the images as he was with the waywisers, in order to ensure the quality and functionality of the materials intended for his route maps. The map symbols could be reproduced easily, quickly and consistently and they were readily available in sufficient quantities, particularly since the Elector secured ownership of the printing plate for himself.

An unused, complete print of such landscape elements, though probably not by Bercht but by Heinrich Göding, is preserved in the Dresden Kupferstich-Kabinett **(Fig. 12)**.[32] This print provides an impression of the repertoire of motifs that the Elector had at his disposal when assembling the route scrolls. It contains villages, larger and smaller fortified towns, monasteries, various princely residences, transport ships, a raft, fish ponds, farm buildings and barns, water- and wind-powered mills, a blast furnace (?), a garden, a field, a vineyard, a bridge, a town featuring raised hills in the foreground (perhaps entrances to mining tunnels?), a watchtower, an elevated road and a place of execution. From the route scrolls themselves, we know that August used images of forests printed as patterns on larger surfaces, which allowed him to paste on expansive forested areas. In terms of a political iconography of landscape, this gives a fairly complete picture.[33] The pre-printed sheets provided compact iconographic abbreviations to mark relevant infrastructure, as well as political, legal, ecclesiastical institutions and economic features.[34] In contrast, larger geographic elements such as mountains are not mentioned in the wording of the commission, nor do they appear in Göding's sheet, or in the completed route scrolls. Instead, the landscape elements of the route scrolls reflect

32 See Andreas Dubslaff, "Soweit das Auge reicht – die Welt en miniature. Kurfürst August, Friedrich Bercht und Heinrich Göding d. Ä.", *Denkmalpflege in Sachsen. Mitteilungen des Landesamtes für Denkmalpflege Sachsen* (2016), pp. 43–51. Dubslaff argues that, due to the order made by August – mentioned above –, the print must have been made by Friedrich Bercht. This is not convincing, because for the route scroll of the journey to Regensburg, for which the order was given in the first place, another set of landscape vignettes was used.

33 Martin Warnke, *Politische Landschaft. Zur Kunstgeschichte der Natur*, München et al. 1992.

34 Compared to signs on printed maps, the small images were still quite complex, which accounts for the relatively rich visual representations of landscapes in the route scrolls. See for comparison Catherine Delano-Smith, "Signs on Printed Topographical Maps, ca. 1470–ca. 1640", in *The History of Cartography,* 6 vols., Chicago et al. 1987–, vol. 3: Cartography in the European Renaissance, ed. David Woodward, 2007, Part 1, pp. 528–590.

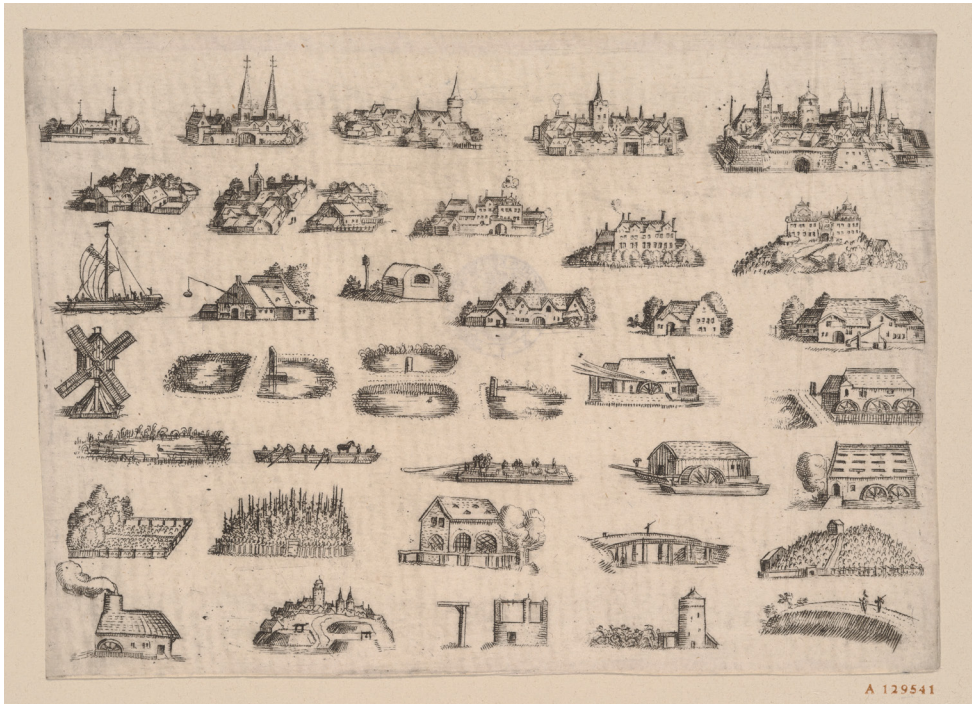


Fig. 12
Heinrich Göding, Various vignettes, 2nd half of the 16th century (before 1586), etching, 13.5 × 18.6 cm, Staatliche Kunstsammlungen Dresden, Kupferstich-Kabinett, Inv. A 129541 (photo: Andreas Diesend)

what was in close range, i.e., what could be precisely surveyed from the carriage en route. August's goal seems to have been to have at his disposal a comprehensive stock of high quality images suited to map the specific political landscape that he saw on his travels.

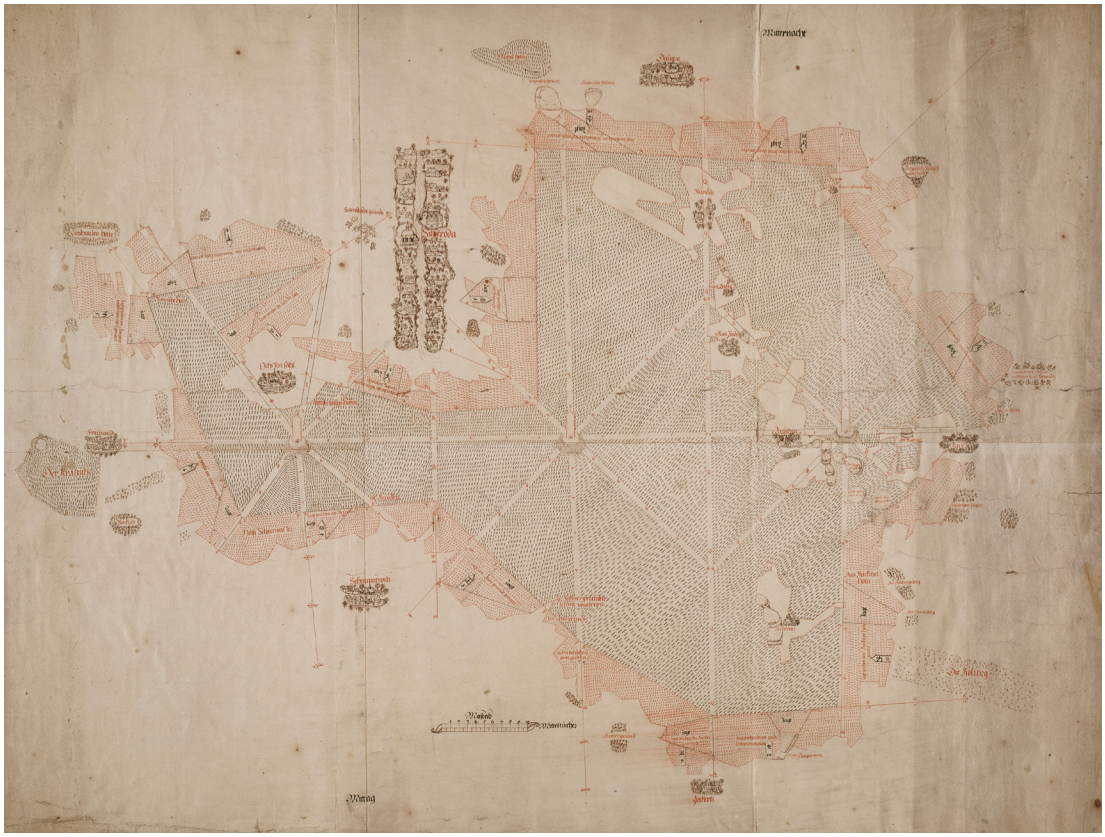
In addition, gluing made it possible for August to work with greater efficiency: the flexibility of using sets of pre-printed images made work easier, faster and generally more sophisticated than the drawing of landscape elements individually by hand. As becomes apparent when compared with other maps produced in the immediate environment at the Saxon court, the route scrolls follow the model of drawn maps in the formal design of the map symbols and landscape elements. For example, a map of

Oberheide and Sitzenroder Forest by the mining engineer and surveyor Georg Öder III, dated around 1570 and thus just a few years older than the route scrolls, is drawn entirely in ink and features small, unspecific village views identified by inscriptions **(Fig. 13a)**.[35] Formally, the village views as well as the drawing of the manor house in Sitzenroda **(Fig. 13b** and **Fig. 13c)** strongly resemble the printed vignettes used in the route scrolls **(Fig. 14)**. The etchings of landscape elements commissioned by August, it can be assumed, were based on this or similar drawn models. An intermediate stage between the completely hand-drawn map and the map made from pre-printed pieces can be discerned in an earlier route scroll made by the Elector that has not survived. The scholar Ludwig Schmidt referred to this scroll in 1898 as the "oldest one", noting that pieces of paper with hand-drawn landscape elements were pasted on the long paper strip.[36] According to Schmidt, "the journey Dresden – Grossenhain – Liebenwerda – Herzberg – Lochau – Mühlberg – Grossenhain" was recorded on it.[37] Even if it is no longer possible to examine how exactly this scroll was made, it can be concluded from the description that the map symbols were designed in advance by a draftsman and then cut out and glued on as required. The further development of this production principle with the creation of reproducible prints of landscape elements to be glued on can be understood as a rationalizing step in the interest of greater speed, efficiency and standardization. The use of technology was deliberately deployed and visibly emphasised on the medial level.

35 Georg Öder III., *Karte Oberheide und Sitzenroder Forst*, around 1570, Hauptstaatsarchiv Dresden, Schr. 6, F. 78, Nr. 6 (MF 18886).

36 Schmidt 1898 (note 2), p. 13. In contrast to the six route scrolls that this article deals with, this one belonged to the collections of the Mathematisch-Physikalischer Salon and was lost during an air raid in the Second World War. I thank Wolfram Dolz, curator at the Mathematisch-Physikalischer Salon, for this information.

37 Schmidt 1898 (note 2), p. 13. This scroll was possibly one of the "Compass-ortungen" that had been stored in the same tray as the route scrolls, according to the Inventory of 1587.



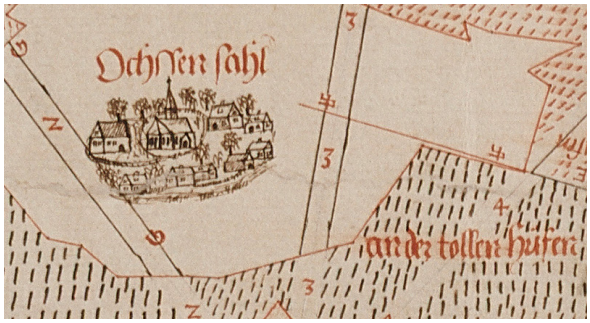


Fig. 13a–c
Georg Öder III, map of Oberheide and Sitzenroder Forest, details, c. 1570, Sächsisches Staatsarchiv, Hauptstaatsarchiv Dresden, Schr. 6, F. 78, No. 6 (MF 18886)

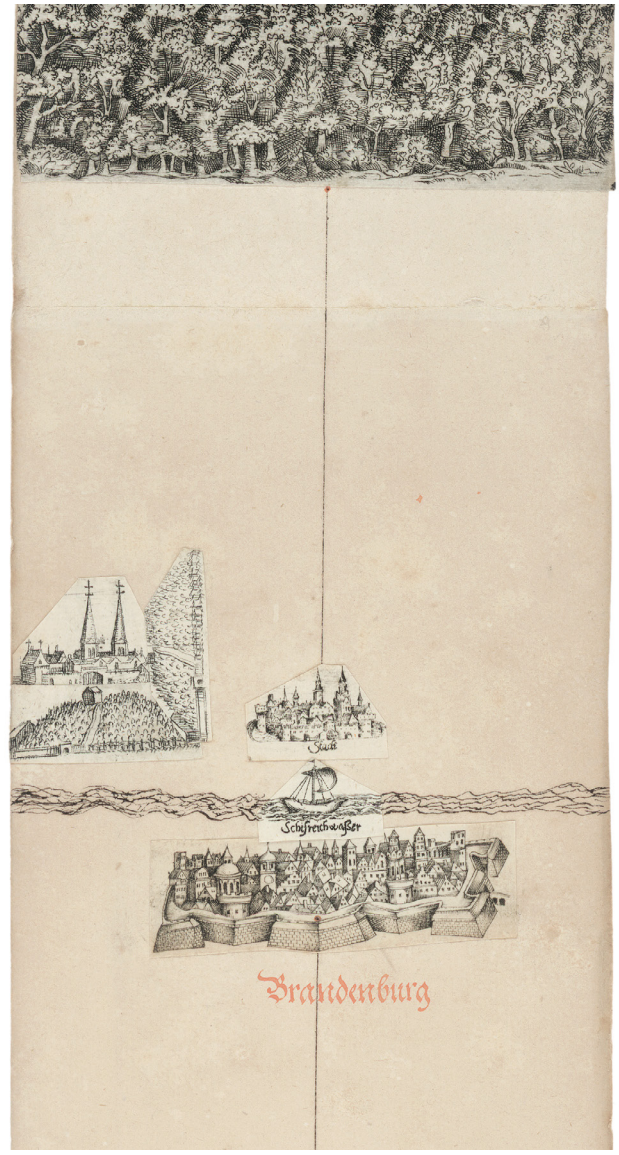


Fig. 14
Detail from: Elector August of Saxony / Heinrich Göding / Friedrich Bercht, Route Scroll of the Journey from Belzig to Havelberg, c. 1575, pen and ink drawing and pasted vignettes on paper, 376 × 10.5 cm, Saxon State Library – Dresden State and University Library (SLUB), Manuscript Collection, call number: Mscr.Dresd.L.455 (photo: © SLUB Dresden / Deutsche Fotothek)

Conclusion

The route scrolls demonstrate by their design that the Elector had sovereign control over the technical processes, instruments and the human resources needed to develop them. This applied both to the surveying operations and to the production of the route scrolls. To assemble them, he made use of artists and instrument makers, odometers, printing presses, drawing tools, cutting instruments and glue. All this was part of the thematic orientation of the Electoral *Kunstkammer* towards technical processes, instruments and tools. The Elector's own handiwork, repeatedly mentioned and emphasised in the inventories of 1587 and 1595, is also significant in this context. The section of the 1587 inventory in which the route scrolls are listed indicates several times that August had made many of the maps himself.[38] The Elector's knowledge and skills can be understood as an elementary part of his reign with respect to his specific political agenda. In contrast to his brother Moritz, whom he had succeeded to the throne after the latter's death in 1553, August focused less on opportunities for influence in the Holy Roman Empire and more on administration and economy within Saxony. Knowledge of the territory was central to harnessing water power and maintaining control of forests. In addition, the art of mine surveying (*Markscheidekunst*), i.e. determining the boundaries and ownership of mines, was fundamental to the mining industry.[39]

Unlike the surveys and mappings of forests that August also carried out,[40] the route scrolls did not generate any directly useful knowledge about territories or economically relevant land that was pertinent to his reign. Rather, they are a by-product of the Elector's mobility – and perhaps for that very reason were suitable for testing and developing new surveying technology and new methods of medial representation. Nevertheless, the route scrolls hold a certain semantic value that results from their special

38 Syndram, Minning and Vötsch (ed.) 2010 (note 1), fol. 73r–fol. 75v. The title of this part is "Ahn allerley mappen und compaß ortungen".

39 Menzhausen 1985 (note 6); Peter Plaßmeyer, "'Churfürst August zu Sachßen etc. Seligen selbsten gemacht'. Weltmodelle und wissenschaftliche Instrumente in der Kunstkammer der sächsischen Kurfürsten August und Christian I.", in *Kunst und Repräsentation am Dresdner Hof*, ed. Barbara Marx, Munich 2005, pp. 156–169, p. 167; Plaßmeyer 2009 (note 6), p. 23.

40 Syndram, Minning and Vötsch (ed.) 2010 (note 1), fol. 74r.

format, their pictorial design and the production process. The way that the pictorially represented landscape gradually reveals itself in a linear manner as the scroll is unrolled evokes the idea that the viewer is visually retracing the Elector's journeys. Unlike area maps, the route maps show only a limited section of space that can be perceived in the temporal sequence of a movement. They thus imply a punctual, physical presence in the depicted space. The Elector's presence, his perceptions and his measuring activities are inscribed in the route scrolls. August's travels were thus to an enormous extant technologically framed. He himself can be understood as a hybrid of a traveller, surveyor and cartographer, analogous to the itinerant photographer and itinerant map user described by John Urry as fundamental to the visuality of mobility in modernity.[41] In contrast to the average, modern, Western tourist to whom Urry refers, however, the Elector moved in a highly exclusive context of technology, visuality and mobility. The route scrolls helped to mark his special status and role as an active producer of knowledge, and more precisely, spatial knowledge. The media-technological specificity of the glued maps additionally demonstrated efficiency, quality and innovation in August's efforts.

41 John Urry, *Sociology Beyond Societies. Mobilities for the Twenty-First Century*, New York et al. 2000, p. 87.

PLACES GLUED TO PAGES
THE MATERIAL EPISTEMOLOGY OF TOPOGRAPHICAL ALBUMS IN THE COLLECTION OF JOHANN GOTTFRIED SCHULTZ

Tabea Braun

Today, Görlitz lies at the very border of Eastern Germany, while 200 years ago, in the 18th and early 19th centuries, it constituted a centre 'in the middle of nowhere', somewhere between the larger cities of Dresden, Leipzig, Wroclaw, Prague and Berlin. From the depths of rural Lusatia, the ambitious and enterprising bourgeoisie of Görlitz spun a transregional network of correspondence. Wilhelm von Humboldt, Jakob Grimm and August Heinrich Hoffmann von Fallersleben, among others, were listed as members of the Oberlausitzische Gesellschaft der Wissenschaften[1] – a learned society dedicated to the sciences.[2] A large library was founded by this association as well as collections of scientific instruments, minerals, archaeological objects, art, etc., all preserved until today. Among the many

1 *Handbuch der historischen Buchbestände in Deutschland*, digitalised by Günter Kükenshöner, ed. Bernhard Fabian, Hildesheim 2003, web version by Annerose Klammt, 1996, URL: https://fabian.sub.uni-goettingen.de/fabian?Oberlausitzische_Bibliothek_Der_Wissenschaften_(Goerlitz), (accessed 13.03.2023).

2 For an overview of the history of the Oberlausitzische Gesellschaft der Wissenschaften see Tino Fröde and Steffen Menzel, "Ein Streifzug durch die Geschichte der Oberlausitzischen Gesellschaft der Wissenschaften", in *Kunst und Wissenschaft um 1800. Die Sammlungen der Oberlausitzischen Gesellschaft der Wissenschaften zu Görlitz*, (FORUM 43), ed. Städtische Sammlungen für Gechichte und Kultur Görlitz, Bielefeld 2011, pp. 20–47.

Tabea Braun: Places Glued to Pages. The Material Epistemology of Topographical Albums in the Collection of Johann Gottfried Schultz, in: PASTED TOPOGRAPHIES (TERRAIN. STUDIES ON TOPOGRAPHIC VISUAL MEDIA 1), eds. Boskamp, Braun, Buchholz and Kranen, Heidelberg: arthistoricum.net, 2023, pp. 49–82, https://doi.org/10.11588/arthistoricum.1323.c18465

treasures in these collections is an impressive bundle of 13 volumes with drawings pasted (or in some cases directly drawn) onto their pages, and 38 volumes furnished with prints by Johann Gottfried Schultz (born in 1734 in Görlitz and died in 1819 in Niesky). These albums represent his topographical, antiquarian, artistic, architectural and historical interests.[3]

Such *Klebebände* (the German technical term for albums)[4] were a popular medium for storing prints and drawings throughout the early modern period. Like Johann Gottfried Schultz, numerous scholars, artists, and collectors pasted and organised their pictorial holdings in individually sampled books, or in multi-volume collections. In the following, we will take a closer look at three books from Schultz's collection. They represent different types of (topographical) albums: one album of drawings made by Schultz himself, one album of prints by other artists, and one album with texts. The first and the second album, which contain mainly views of rural areas, towns and architecture, are titled *Mahlerische Reisen von Schultz* (Picturesque Travels by Schultz) and *Mahlerische Reisen von Günthern und Veit und anderen* (Picturesque Travels by Günther and Veit and Others), while the volume containing texts remained without a title. Considered together, the three albums tell us about the materiality, the making and the associated epistemic functions of such books in which contents such as prints and drawings were pasted down in the late 18th and early 19th century. It will be shown how the basic operation of gluing transforms loose images into elements of knowledge and taste, and a private intellectual activity into a public work, constituting a collection in the best sense.

3 For the questions discussed here, it is interesting that a large part of the volumes cover topographical subjects. The volumes with drawings contain almost exclusively topographical views, except for one volume with drawings of churches, two volumes called *Antiquitäten* (Antiquities) and one volume called *Dürfftige Anfänge im Zeichnen,* (Poor Early Drawings) documenting Schultz's exercises in drawing. Among the volumes with prints, the emphasis is different. Of these, six volumes feature mostly topographical views or descriptions of places.
In order to describe the mounting in Schultz's volumes, the terms to paste and to glue are used largely synonymously in this paper. The distinction between the two terms mentioned in the introduction to this book cannot be made, as Schultz's method is unknown.

4 The technical terms and their implications will be further explained in the section "Contextualising Schultz: what about topographical albums?".

Mahlerische Reisen von Schultz: an album of drawings

The volume with drawings, bearing the short title *Mahlerische Reisen von Schultz*, is carefully laid out, particularly coherent, and holds finished topographical views of towns, buildings and the countryside, which were all made by Schultz himself.[5] He took the views on several trips to the border regions between Prussia, the Habsburg monarchy and Saxony, present-day Germany, the Czech Republic and Poland, while most of the drawings were made in Teplice. Two small groups of images show Karlovy Vary and Tharandt near Dresden. Furthermore, the region around Görlitz towards the Krkonoše (the Czech Giant Mountains) is depicted in several views. Leafing through the album, the portrait of a large region is conveyed to the viewer in a strikingly precise and focused manner: the drawings are characterised by richness of detail, mostly heavily inked outline drawings and a sparing use of colour, their connection with a precisely determinable geographic point of view from which they were taken, and the provision of legends, captions, and paratexts.

The book opens with a watercolour drawing of Kyšperk Castle near Teplice **(Fig. 1)**. In a picturesque manner, it shows a curved path, on which in the foreground an ox cart moves out of the dark forest, up the mountain into the open. The view falls on this scene from a higher place, while behind it the castle ruins rise out of the forest. Beneath the mountain, in the middle ground, extended fields and woods are bordered in the background by a mountain range. At the right edge of the image, dark trees and large stones form a side screen. The compositional treatment of space and the shading here show the impact of the landscape artist Adrian Zingg, who worked as a professor in Dresden and whose work Schultz is known to have taken careful note of.[6] Only the well-ordered farmland in the middle ground disturbs the picturesque scheme and a text below the image emphasises its not only aesthetic but also informative character.

5 On pages 70 and 71 are two drawings that were drawn after sketches by the Görlitz-based artist Christoph Nathe (1753–1806) as the commentaries underneath the images state.

6 See Anke Fröhlich, "Johann Gottfried Schultz und die Landschaftsmalerei seiner Zeit", in *Johann Gottfried Schultz (1734–1819). Görlitzer Stadtbeamter – Oberlausitzer Zeichner – Herrenhuter Bruder*, ed. Kulturhistorisches Museum Görlitz, Görlitz 2005, pp. 26–27.

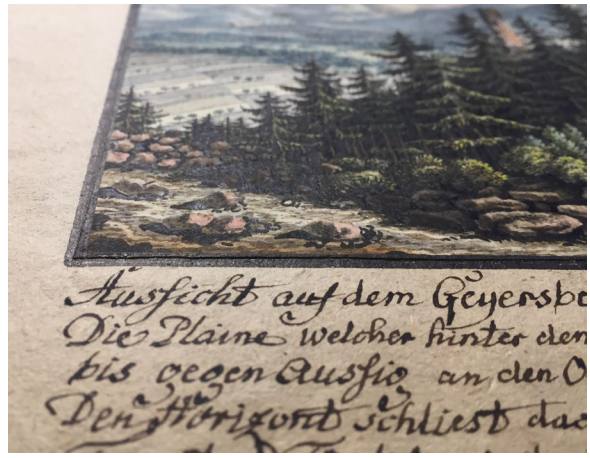
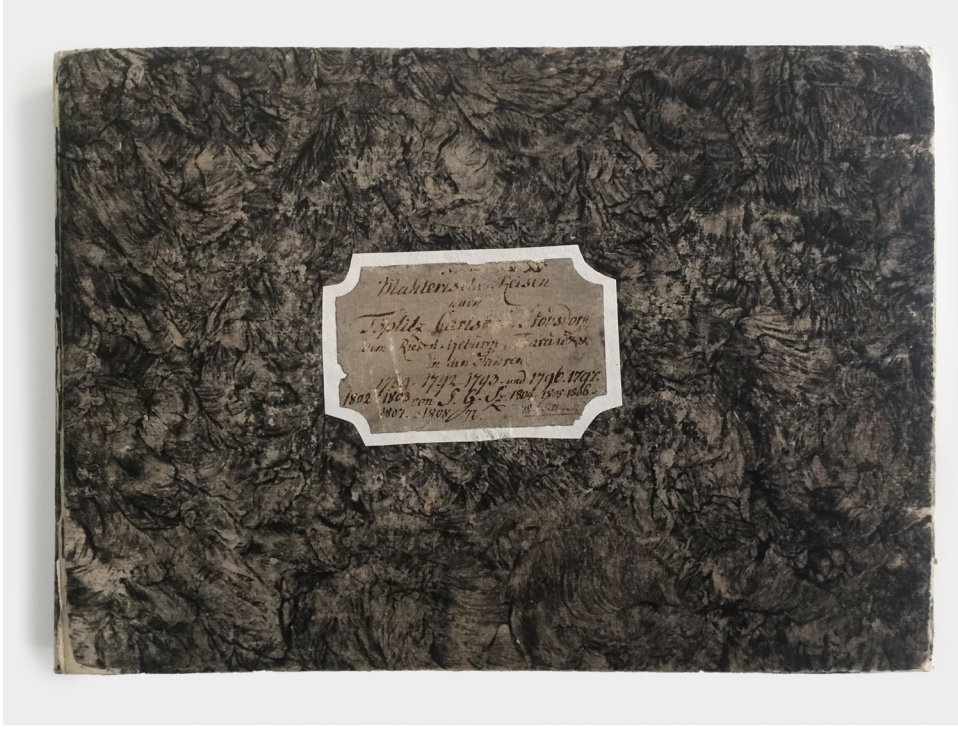


Fig. 1
Johann Gottfried Schultz, View of Kyšperk Castle (1796) in the volume of drawings *Mahlerische Reisen* […] *von J.G. Schultz*, between 1808 and 1819, pen and ink, watercolour, Görlitzer Sammlungen für Geschichte und Kultur

Fig. 2
Johann Gottfried Schultz, Detail from the view of Kyšperk Castle (1796) in the volume of drawings *Mahlerische Reisen* […] *von J.G. Schultz*, between 1808 and 1819, pen and ink, watercolour, Görlitzer Sammlungen für Geschichte und Kultur

Fig. 3
Johann Gottfried Schultz, *Mahlerische Reisen nach Töplitz, Carlsbad und Stonsdorff, dem Riesen-Gebürge, Tharand in den Jahren 1769, 1792, 1793 and 1796, 1797, 1802, 1803, 1804, 1805, 1806, 1807, 1808 von J.G.Sz.*, between 1808 and 1819, 26.4 × 36.5 cm, Görlitzer Sammlungen für Geschichte und Kultur



While the drawing is glued to the book page, the inscription was applied directly to the page. However, the contrast between pasted and non-pasted content is concealed by a frame drawn with ink. It is spread on both the pasted sheet and on the book page, hiding the border between both papers **(Fig. 2)**. This first page, combining different materials, i.e. papers, image and informative text, is prototypical for the rest of the volume.

Let us step back, then, and take a look at the cover that ties the album's content together. The book measures 26.4 cm in height and 36.5 cm in width and is bound into a pasteboard cover. Observing the cover **(Fig. 3)** it can be recognised from its subtle but delicate decoration and slight obliquities, that the book has been carefully crafted by hand. It is laminated with so-called paste paper, which was made by putting patterns into dyed wet glue. In this case the glue was blended with black colour turning out in different shades of grey. A label made from two papers is glued onto the decorative cover. The label's bottom layer is made from white paper. It is hand-cut into a rectangle, and the corners are cut into concave arches. The blending colour highlights the overlying grey sheet which bears the same shape and carries the full title of the book.[7] The volume contains a book block of 78 pages, paginated throughout, as well as additional endpapers and a stub binding in order to provide the necessary space in between the pages for incorporating a correspondingly large number of pasted drawings. The drawings are generally mounted on the right-hand page of the book, the recto, and provided with a frame painted with ink. Below each drawing, sometimes also above or beside it, a short explanation is given, commenting on the drawing's subject and its date of origin.

7 The original title is German and reads *Mahlerische Reisen nach Töplitz, Carlsbad und Stonsdorff, dem Riesen-Gebürge, Tharand in den Jahren 1769, 1792, 1793 and 1796, 1797, 1802, 1803, 1804, 1805, 1806, 1807, 1808 von J.G.Sz.* It can be translated as *Picturesque Travels to Teplice, Karlovy Vary and Staniszów, the Krkonoše, Tharand in the years 1769, 1792, 1793 and 1796, 1797, 1802, 1803, 1804, 1805, 1806, 1807, 1808 by J.G.Sz.*

Johann Gottfried Schultz's collection of drawings enters the book

Mahlerische Reisen von Schultz was presumably created after 1808,[8] at a point when Schultz had already retired. He can rightly be called a man of many talents, who made a name for himself as a Görlitz city official, architect, planner, surveyor and administrator of estates belonging to the protestant community Herrnhuter Brüdergemeinde, and also as an antiquarian, a topographical draughtsman and a drawing master.[9] As a child and young man Schultz had received sporadic and rudimentary drawing lessons,[10] regretting at an advanced age the absence of suitable drawing masters and also a shortage of high-quality works of art to copy after during his youth in his home town.[11] Nevertheless, some talented or even trained draughtsmen who had also turned to topographical drawing and landscape art later crossed Schultz's social circles. As Schultz states in a note from 1795, he had collected his own drawings and unfinished sketches from an early age, which he organised and finished after his retirement.[12]

As a draughtsman, Schultz initially pursued an antiquarian focus. His early drawings built the foundation for his later and thematically broader collection. As a child he had accompanied his father on trips and drawn the churches he encountered, their monuments and the coats of arms depicted on them.[13] We do not know if these drawings had been kept loose or on pages of sketchbooks. From the collected materials he produced his first book with drawings in the 1750s. However, Schultz's autobiographical notes do not indicate whether he pasted the drawings into the book or whether he drew or copied them directly onto the pages. Since this early

8 The drawings within the volume that date most recently are from 1808.

9 A substantial account on Johann Gottfried Schultz's life and work is provided by the volume *Johann Gottfried Schultz (1734–1819). Görlitzer Stadtbeamter – Oberlausitzer Zeichner – Herrenhuter Bruder,* ed. Kulturhistorisches Museum Görlitz, Görlitz 2005.

10 Schultz gives account on his drawing education in his personal testimonial "Nachrichtlich", in Kulturhistorisches Museum Görlitz 2005 (note 9), pp. 82–84.

11 Kulturhistorisches Museum Görlitz, Johann Gottfried Schultz, "Zur Nachricht", in his *Ansichten einiger Ober-Lausitzischen und Schlesischen Kirchen gezeichnet in der Mitte des 18ten Jahrhunderts, Zeichnungen, vol. 6*, quoted here after Kulturhistorisches Museum Görlitz 2005 (note 9), p. 81.

12 Johann Gottfried Schultz "Zur Nachricht" (note 11).

13 Johann Gottfried Schultz "Zur Nachricht" (note 11).

book was later cut up and rearranged by himself,[14] we can only speculate about the way Schultz proceeded. The two rearranged volumes of this first edition, *Antiquitäten, Teil I* and *Teil II* (Antiquities, part I and II), feature both: drawings adhered by glue onto the pages as well as others drawn onto them.

Later, Schultz turned from recording churches to other buildings, to sites, and their surroundings. His focus developed in the direction of topography. When he arranged his drawings during his retirement from the 1790s onwards, he also went through numerous prints he had collected during his lifetime, both single sheets as well as sheets cut from books. He supplemented the collected images with explanatory texts and compiled them into the volumes. Since the appearance of the albums, especially on their insides, varies greatly, it is likely that Schultz made them at longer intervals.[15] Furthermore, he had a custom-made wooden cabinet built to accommodate the volumes.[16] This cabinet did not only protect them from dust and wear. Two handles on the sides also made it possible to carry and thus rescue the collection in case of fire. This precaution illustrates the value that Schultz placed on his collection, even if he always rated its artistic merit as low.

14 Kulturhistorisches Museum Görlitz, Johann Gottfried Schultz, "Vorbericht", in his "Die Sammlung von Ober-Lausitzischen, Schlesischen, Sächsischen und Böhmischen Alterthümer und Denckmähler, part 1",quoted here after Kulturhistorisches Museum Görlitz 2005 (note 9), p. 85.

15 The 51 volumes in total differ greatly in terms of their format, papers, layout and contents. Looking only at the volumes of drawings, it is noticeable that the books hardly differ thematically. Except for one volume with drawings of churches, most volumes contain topographical views. Some of the places depicted recur in different volumes. Yet the formats of the drawings within the individual volumes are often similar. It is thus possible that the size was a criterion for the placement of individual sheets in specific albums.

16 Archiv Oberlausitzische Gesellschaft der Wissenschaften, Görlitz, Johann Gottfried Schultz, "Vermächtnis", in his "Da meine Sammlung von Denckmahlern...", Akte der Oberlausitzischen Gesellschaft der Wissenschaften, VA 137, quoted here after Kulturhistorisches Museum Görlitz 2005 (note 9), p. 88.

> Da meine Sammlungen von Denckmählern, Urkunden, topographischen Zeichnungen und alten Kupferstichen in Zeit von zwey Menschenaltern aus mancherley Orten und Quellen hergeholt, entstanden ist, so wird mirs wohl kein billig denkender Mann verargen, wenn der Gedanke und Wunsch in meiner Seele aufsteiget: Es wäre doch Schaden, wenn dies selben zerrissen oder gar verlohren gingend, da sie zum Theil nicht wieder ersetzt werden können. So kann ich auch nach aller meiner Selbsterkenndnüß ieden sich klug dünckenden Kunstrichter versichern, daß ich diesen Sammlungen keinen Werth in Ansehung der Kunst beylege. Aber es ist doch nun einmal eine Collecktion die ihr eigenthümliches hat [...].[17]

If one grants this self-assessment at least a certain sincerity alongside its obvious display of modesty, in Schultz's eyes it is above all the documentary value that makes the collection historically valuable.[18] In addition, he seems to have been interested in tapping into the picturesque qualities of the local countryside and making them visible. This is at least suggested by the title of the volumes examined here, *Mahlerische Reisen*. Before his death Schultz bequeathed the cabinet and the collection it contained to the earlier mentioned Görlitz-based Oberlausitzische Gesellschaft der Wissenschaften.[19]

Thus, in its final state, the collection consisted of a cabinet containing the ordered, multi-volume work. All alterations and enrichments had come to an end, the collection was immobilised in more or less heavy books. A certain state was layed down, the work became comprehensively accessible to potential viewers in the bound volume, while in a loose state or in sketchbooks, the sheets of paper had been free to be cut out, arranged and rearranged, given away, circulated, and copied over and over again –

17 Johann Gottfried Schultz "Vermächtnis" (note 16), pp. 85–86. The quote can be translated as follows: "Since my collections of monuments, documents, topographical drawings and old engravings have been collected from various places and sources in the time of two centuries, no man who thinks favourably will blame me if the thought and wish rises in my soul: It would be a pity if these things were torn apart or even lost, since part of them could not be replaced again. Thus, with all my self-knowledge, I can assure every judge of art who thinks he is wise that I attach no value to these collections in terms of art. But it is, after all, a collection that has its own peculiarities [...]." (Translation by the author).

18 See for example Johann Gottfried Schultz "Vermächtnis" (note 16), p. 86.

19 Johann Gottfried Schultz "Vermächtnis" (note 16), pp. 85–88.

actions that are closely connected to the antiquarian-topographical culture and in a sense constitute it. For this reason, Sigmund Jacob Apin, for instance, had criticised the Klebeband (album) as a medium of collecting in an instructional treatise from 1728. In this essay on how to collect portrait prints, he argues that pasting prints into books makes it impossible to lend individual images to other people.[20] As mentioned above, the final nature of the album as a medium had earlier in his life posed problems for Schultz as a collector, too. It had prompted him to cut up and remake his first volume, *Antiquitäten* (Antiquities). We do not know of any statement in which Schultz explains why he still pasted his drawings into albums. However, he followed the convention of the early modern era, in which books were widely valued as a storage medium because they provided a way to organise, annotate, protect, and present images.[21] At the same time, the problems associated with this practice were well known. The instructional literature addressed the disadvantages of gluing, but in many collections of *Klebebände* (albums) traces of detaching, cutting, and rearranging can be found.[22]

20 Jacob Siegmund Apin, *Anleitung wie man die Bildnüsse berühmter und gelehrter Männer mit Nutzen sammlen und denen dagegen gemachten Einwendungen gründlich begegnen soll*, Nuremberg 1728, p. 20, online: URL: http://haab-digital.klassik-stiftung.de/viewer/epnresolver? id=3667313489 (accessed 15.05.2023). There it says: "Nicht besser sind diejenigen, welche sich Bände von leeren Pappier machen lassen, und alle Kupffer, wie sie solche bekommen, groß und klein, darein kleben. Denn zu geschweigen, daß solche Collection nicht wol ausiehet, so ist vieles beschwerlich, daß alles unordentlich, und man nicht im Stande ist, einen guten Freund damit zu dienen, man schicke ihm dann den ganzen Band, und lasse ihm suchen, was er zu finden begehret." English translation: "No better are those who have volumes of empty sheets made, and glue into them all the engravings they get, large and small. Besides the fact that such a collection does not look appealing, it causes a lot of inconvenience that everything is messy, and one is not able to serve a good friend with it, so one has to send him the whole volume and let him search for what he desires to find." (translation by the author).

21 More information on such albums is given later in this article (see "Contextualising Schultz: What about topographical albums?").

22 Only one example of this are six albums by Charles Gore which too have a topographical focus. They were made around 1800 and are today held by the Graphische Sammlungen, Klassik Stiftung Weimar.

Cutting, pasting, adapting

When Schultz glued the drawings into the album, they were altered in many ways. First and foremost, they were physically modified. While being attached to each other, the sheet and the book had to adapt.

The original drawings had probably not all been made with a later album in mind. There are good reasons to believe that the drawings in the album are original sketches that were made during Schultz's lifetime on the spot in different places and had been finished later.[23] It would have been possible to draw copies of the original drawings directly on the book pages in order to ensure uniformity in size and style throughout. However, the original sketches made on site seem to have been of irreplaceable value to Schultz. He not only noted the place and date of their production, but often even the day when he tinted or colourised a particular drawing (which could be years later).[24] Therefore, the book format had to be chosen according to the sizes of the already existing drawings. The volume *Mahlerische Reisen von Schultz* must have been minutely planned: Its 78 pages are precisely dimensioned for the 82 drawings, which are mostly similar in size. Only one drawing in the volume was inserted horizontally, because otherwise it would not have fit into the book. All others match perfectly and leave room for comments.

Nevertheless, the original drawings likewise had to be altered in order to adapt them to the book. We do not know of enough loose drawings made by Schultz to deduce anything from them, but may assume that the drawings were probably made on larger sheets of paper or in sketchbooks before they found their way into the albums. Therefore, the sheets were trimmed (often to the very edges of the images). Glued to the page and framed, the images form a symbiosis with the book. Their external origin

23 This becomes particularly clear in other volumes with drawings by Schultz (for example, in *Band 5, No 32 Ober-Lausitzsche nach der Natur in den Jahren 1775, 1776 und 1777 gezeichnete Prospecte worunter zwey aus der Graffschafft Barby befindlich*). There, he used the so-called inlay method, i.e. he glued sheets onto a cut-out square in the page. In this way, the reverse side of the pasted sheet can be seen. Older inscriptions are visible here, showing that the sheets had previously been used loosely and had not been made specifically for the book.

24 Examples are the Prospect von Görlitz drawn by Schultz in the year 1770 and tinted in 1793, *Zeichnungen vol. 1*, fol. 11, or a view *Kirche zur lieben Frau in Görlitz*, drawn by Schultz on October 26 in 1771 and tinted in January 1796, *Altertümer, part II*, fol. 325.

is concealed. Sometimes it is hardly noticeable that the sheets are pasted at all. In other cases, the original sheets already included framings and, in some cases, also comments which Schultz incorporated into the book. In whatever state (annotated/unannotated, framed/unframed) the original was transferred, Schultz strove for symmetry, cleanliness, straight pastings and lettering. Delicate marks drawn with graphite document that he had marked the position of the insertions and the lines for his inscriptions in advance.

By being pasted into the book, the drawings are accessible for the viewer. The frames enclose them and make them easy to grasp, the backgrounds highlight them, the texts explain them. At the same time, the book pages protect them from dust, light, abrasion and hand sweat, and make them convenient to handle. The last two aspects are by no means trivial. The size of the book, and thus the decision to place one picture on one page in most cases, is a decisive factor in ensuring that the book is pleasant to look at and leaf through. Furthermore, it is known that one of the main reasons for pasting images into books was to protect them from environmental influences.[25]

Bringing individual drawings into a series

By pasting his drawings to the volume, Schultz transformed them not only materially but also semantically. As he rarely grouped several drawings on one page, but usually dedicated a single sheet to each drawing, the images are isolated. Before the viewer's eyes, the images change in a long succession as the pages are turned **(Fig. 4)**. When a page is flipped, a new image appears as in a slide show, and the question of coherency arises. To the viewer, the drawings form a linear series that in a sense spins a route through the geographical space, which is explored in a kind of circular

25 This advantage of the album is for example brought forward by Giulio Mancini in his treatise *Considerazioni sulla Pittura*, which has been analysed by Michael Bury, "Giulio Mancini and the organisation of a print collection in early seventeenth-century Italy", in *Collecting Prints and Drawings in Europe, c. 1500–1750*, ed. Christopher Baker, Caroline Elam and Genevieve Warwick, Aldershot et. al 2003, pp. 79–84.

motion. There are centres which are left behind, only to be approached again in later drawings. Individual places are shown in several views from the distance, in close-ups and from different angles. This spatial and serial logic evokes the illusion of an imaginary tour, which leads through five different geographic regions **(Fig. 5)**.

The regions are each shown in one stretch with one exception: According to a purely spatial logic, three views of Tharandt raise questions. The views portraying the church, the castle ruins and a nearby prominent rock shaped like a human face interrupt a sequence of other views connecting to the region of Bohemia, splitting it in two parts. However, the views of Tharandt, which date from August 1796, follow on from a drawing dated to the same month. The order of the images thus results from a combination of geographical and chronological criteria that have been carefully balanced, with the spatial logic dominating. For example, the city Teplice and its environs were documented over a period of more than ten years. On his several trips to Teplice, Schultz seems to have systematically sketched

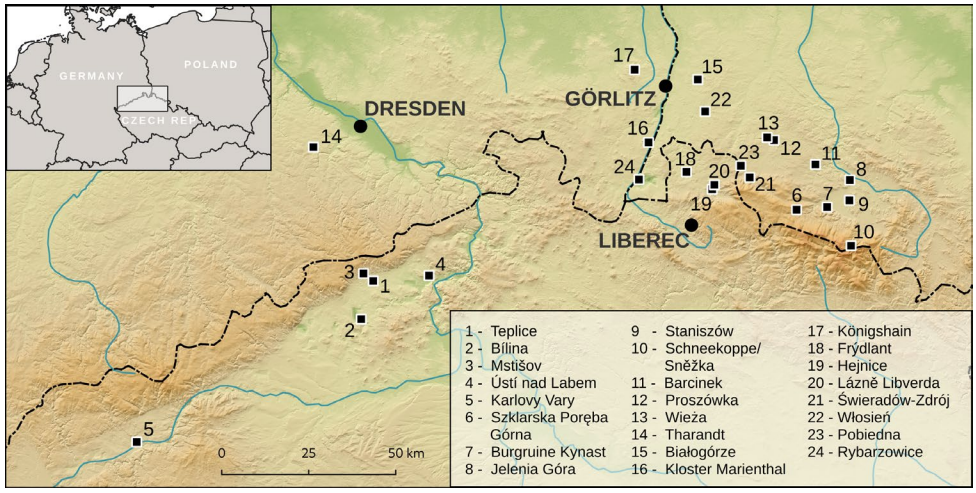


Fig. 5
Map showing the locations of the views in Johann Gottfried Schultz's volume of drawings *Mahlerische Reisen* […] *von J.G. Schultz*, data: SRTM, NaturalEarth

certain areas, such as the princely garden, the castle hill or the most important municipal buildings of the city. During later visits he added what was still missing in his collection of images.
In order to decipher the topographical relationships of the images, it is necessary to study the depicted landmarks and the inscriptions while continually flipping back and forth. As will be shown in the next section, different strategies are pursued in the texts and images to support this interpretive process. Nevertheless, the study of the images is in some ways constrained by their insertion into the book and their consequent immobility, while it is at the same time secured and structured in the long term. By placing the images in a series, the former collection of loose sheets or sketchbooks is transformed into a finalised work. It is classified, ordered and, thanks to the book title and pagination, its contents can be found and referred to.

Making use of pages: relations of place, image and text

While loose drawings can serve as a rich source of coincidental or encyclopedic information, the selection and compilation of material in one book suggests that the various elements are connected by a general idea and interrelationships. In order to spatially locate the views and understand their geographical connections and contexts, the viewer is dependent on further information, such as can be supplied by text, map, or oral commentary, in addition to textual references inherent in the image which can be frequently found in Schultz's work, as will be shown. Schultz met this demand largely through written comments. In doing so, he took advantage of the *Klebeband* (album) as a medium of collecting. The large, blank sheets of such a volume made it possible to supplement images with annotations, as for example references according to the user's wishes. By gluing the images into the album, which forms a capacious background, he gains space for written comments.

Schultz guides the viewer through the book not only with captions, but with visually recognisable interrelationships between the images. For example, on one page of his volume *Mahlerische Reisen von Schultz*, he assembled two views of the same tower near Meffersdorf (Polish:

Pobiedna) **(Fig. 6)**.[26] The title indicates its place and the date of its erection. Two captions underneath the images clarify from which directions the tower is viewed (from north and from east), and the date when the drawings were made. Ten days lie between the creation of the two images. Consequently, Schultz must have returned to the tower to draw a second view. His commentaries also elaborate on what one would see if one were to look down from the tower in the corresponding directions, thereby adding to the depicted view the idea of another view based purely on the written description, weaving a web of views already recorded and potentially to be captured. Some places are mentioned in the description whose images are displayed earlier or later in the same album. Thus, it is the written annotations that geographically locate the pictured tower and create cross-connections to other images or serve as placeholders for missing visual material. This is just one example of how Schultz understood text as a possible supplement when images are lacking.

Another example of linked perspectives onto the same subject, which is again combined with written explanations relating to missing visual data, illustrates that the method of making spatial relations comprehensible applies throughout the volume: Two views show a lake in the princely gardens of Teplice. While the first drawing **(Fig. 7)** displays the lake with a small temple on the opposite shore, the second drawing **(Fig. 8)**, which is called "Rück-Ansicht" (literally a "back view", to which Schultz also refered to as a "Vis à Vis")[27], is taken from the site of the temple and directs the view back to the earlier viewpoint. The comments state the directions of sight, locate the buildings in the topography of the surrounding princely park and explain the landscape elements visible in the image. Moreover, Schultz subsequently added information underneath his earlier comments. Here, he described what he saw during a later visit: the architecture had changed and trees had suffered in their growth while others in reverse had grown, now obscuring parts of the topographical view taken earlier.

26 The tower had been built by one of the founders of the Oberlausitzische Gesellschaft der Wissenschaften, Adolf Traugott von Gersdorf, in 1804. Von Gersdorf shared Schultz's topographical interests. The tower named Mon Plaisir was built to house an observatory and was further used as an observation tower.

27 On page 20 Schultz notes for example: "Diese Ansicht ist das Vis à Vis von dem vorhergehenden Blatte." ("This view is the vis à vis of the previous sheet", translation by the author).

Fig. 6
Johann Gottfried Schultz, Views of the tower near Meffersdorf/Pobiedna (1804) in the volume of drawings *Mahlerische Reisen* […] *von J.G. Schultz*, between 1808 and 1819, pen, brush and ink, Görlitzer Sammlungen für Geschichte und Kultur

Fig. 4
Johann Gottfried Schultz, *Mahlerische Reisen nach Töplitz, Carlsbad und Stonsdorff, dem Riesen-Gebürge, Tharand in den Jahren 1769, 1792, 1793 and 1796, 1797, 1802, 1803, 1804, 1805, 1806, 1807, 1808 von J.G.Sz.*, between 1808 and 1819, 26.4 × 36.5 cm, Görlitzer Sammlungen für Geschichte und Kultur

Fig. 7
Johann Gottfried Schultz, View of the lake and park in Teplice (1796/1807) in the volume of drawings *Mahlerische Reisen* […] *von J.G. Schultz*, between 1808 and 1819, pen, brush and ink, Görlitzer Sammlungen für Geschichte und Kultur

Fig. 8
Johann Gottfried Schultz, View of the lake and park in Teplice (1796) in the volume of drawings *Mahlerische Reisen* […] *von J.G. Schultz*, between 1808 and 1819, pen, brush and ink, Görlitzer Sammlungen für Geschichte und Kultur

In such details, Schultz revealed himself to be a meticulous documentarian, aware that his drawings attest to a historical state. Throughout the paratext Schultz strove for precision, by declaring what the images state and what they cannot state, when they were made (and in which steps) and what validity they can thus claim.

Schultz used a wide range of methods to explain and locate the views contained in his album. A further, very specific method is a tabular index, which is featured in two drawings. It makes pictorial parts referenceable. One of the drawings shows the Giant Mountains seen from Schreiberhau (Polish: Szklarska Poręba) **(Fig. 9)**, another the landscape seen from the Kynast near Hermsdorf (Polish: Sobieszów) **(Fig. 10)**. In both examples, small numbers are inserted in the frame of the drawing on the left and right as well as at the bottom, which divide the image into a grid. By means of the vertical and horizontal numbers, image points can be identified for which the explanatory text gives names and explanations. However, in many other drawings Schultz used a more conventional method for indexing which can be found in many early modern topographical views. Here, small numbers in the image mark important locations, for which names are given in the legend. In still other cases, place names were written directly above their representations in the image.

All in all, Schultz proves to be a resourceful topographical draughtsman, who seeks sophisticated ways to advance topographical images for scholarly use.[28] He achieves this firstly through the explanatory texts, secondly through the sheer quantity and the deliberate assembly of the drawings themselves, and finally through elaborated visualisation and indexing strategies. Schultz's approach is also characterised by the density and combinatorial nature of the drawings: individual images refer to the broader landscape from which they were taken and thus identify it as a coherent whole. As individual images extracted from their context, they nevertheless refer to it and require other images like stones of a jigsaw puzzle.

28 The fact that Schultz pursues topographical drawing as a scholarly endeavour by no means excludes the fact that he simultaneously strives for an artful rendering of the landscape and highlights and reveals the depicted areas as an worthy subject for art. This becomes particularly clear in the example of an oval and yellow-tinted drawing of Schreiberhau (Polish: Szklarska Poręba), which is reminiscent of the view through a Claude glass.

As cohesive as the volume *Mahlerische Reisen von Schultz* is, due in part to these consistent representational strategies and internal references, it by no means stands alone. Certain principles regarding design, materiality and representation as well as subjects appear again in other volumes of Schultz's collection. A net of references and similarities spans the various volumes.

Mahlerische Reisen von Günthern und Veit und anderen
Transferring prints into books

As already mentioned, *Mahlerische Reisen von Schultz* is one of 13 volumes of drawings (*Zeichnungsbände*) made by Schultz. The functions that this album, and the collecting and pasting of images in general, served for Schultz can only fully be understood by consulting other parts of his collection. Therefore, we shall look at two further volumes that stand in contrast but are at the same time also dedicated to topographical topics. Both volumes contain printed images and texts by other artists and authors. It should be remembered that such albums of printed material (*Sammelbände/Grafikbände*), which Schultz derived from different sources, make up the largest part of Schultz's collection, 38 volumes overall. While the volumes contain predominantly pictorial material, it is striking that Schultz also integrated text sheets into his albums.

The volumes to be considered in the following are, firstly, *Mahlerische Reisen von Günthern und Veit und anderen* (with the accession number SB4a),[29] and secondly, a volume containing texts that has remained untitled and will therefore here be referred to by its accession number, SB4.[30] In a sense SB4 is *the* text volume to *Mahlerische Reisen von Günthern und Veit und anderen*.

29 The full German title is *Mahlerische Reisen von Günthern und Veit / Das Alderspacher Gebürge von Baltzern / desgl. von Carlsbad von denselben / Töplizen von Darnstedt / Königshayner Felsen v. Zink u. Nathe*. English translation: *Picturesque Travels by Günther and Veit / the Adersbach mountains by Baltzern, likewise of Calsbad by those same / Teplice by Darnstedt / Königshain Rocks by Zinck and Nathe*.

30 The volume only carries a number inscribed onto the book cover: "No. 4 [I]".

Fig. 9
Johann Gottfried Schultz, View of the Giant Mountains from Schreiberhau/ Szklarska Poręba (1768) in the volume of drawings *Mahlerische Reisen* [...] *von J.G. Schultz*, between 1808 and 1819, pen, brush and ink, Görlitzer Sammlungen für Geschichte und Kultur

Fig. 10
Johann Gottfried Schultz, View of the Giant Mountains from the Kynast near Hermsdorf/Sobieszów (1768/1797) in the volume of drawings *Mahlerische Reisen* [...] *von J.G. Schultz*, between 1808 and 1819, pen, brush and ink, Görlitzer Sammlungen für Geschichte und Kultur

From the outside *Mahlerische Reisen von Günthern und Veit und anderen* (SB4a) **(Fig. 11)** resembles the previously described volume *Mahlerische Reisen von Schultz*. The book measures 27.5 cm in height and 32.5 cm in width, and it contains mainly prints by the artists referred to in the title. Most of these images are topographical views of places, architecture, and natural monuments within Saxony (including the earlier mentioned Tharandt), but also from today's Czech Republic (including a view from Teplice).

Despite obvious similarities to *Mahlerische Reisen von Schultz*, the volume *Mahlerische Reisen von Günthern und Veit und anderen* (SB4a) is based on a completely different concept. In contrast to Schultz's own drawings, which were brought into an order, here sequences of images were cut out of the original works and compiled in one volume, preserving the pre-existing order. Thus, sequences of images were not torn apart in favour of an overriding principle of order, but rather arranged in blocks one after the other. The 122 topographical prints as well as several title pages (some of which are also illustrated) originate from 25 sources, from almanacs, illustrated travel reports or published (sequences of) prints. Altogether, the assembled views are much more heterogeneous in terms of their sources or producers, their arrangement and presentation in the book,[31] and the places depicted than those in *Mahlerische Reisen von Schultz*.

It is not possible to fully comprehend this book without taking into account SB4 **(Fig. 13)**,[32] which contains text pages from ten different publications, including five from which images were taken and pasted into *Mahlerische Reisen von Günthern und Veit und anderen* (SB4a).[33] Thus, images and text are neatly separated into the two volumes, SB4a and SB4 which is quite different from the album of drawings *Mahlerische Reisen von Schultz* in which text and image are symbiotic.

In the eighteenth century, books were generally sold unbound. Text and illustrations were usually printed separately on different paper. The

31 For example, the series of images are either arranged together on one page or on a few consecutive pages. In some cases, a title page separates them, while other individual images or series follow one another directly without any reference to the source.

32 Like the other volumes, SB4 is covered with dark grey paste-paper, but is of vertical format (36.2 × 24.5 cm).

33 Other texts are from publications whose illustrations were pasted into another volume with the accession number SB5, see Kulturhistorisches Museum Görlitz 2005 (note 9), p. 91.

illustrations were then bound into the book at the appropriate places.[34] Schultz could have had his books – that is, the almanacs and picturesque travelogues – bound and kept in this way as separate media alongside the collection. What were the reasons for the permanent separation of texts and images? Here, a closer look at the two volumes is necessary.

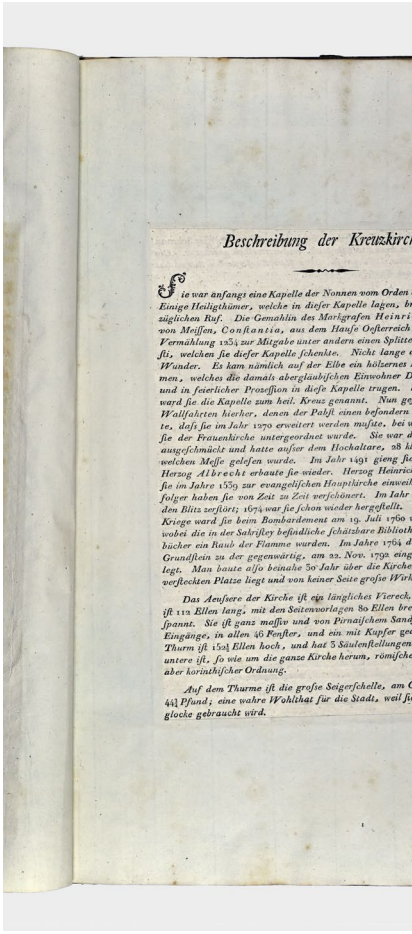
Obviously, the books are crafted quite differently. While in SB4a the inserted prints were glued onto the pages **(Fig. 12)**, in the text volume SB4 Schultz used a combination of different techniques, for example the so-called inlay method **(Fig. 14)**. Here, the text pages of the publications were embedded in to the pages of the book. Windows were cut out of the pages that were minimally smaller than the inserts. These were treated with glue on the edges and pasted into the free areas. In this way, the front and back of the original book pages remain visible in the new book object. In other cases, squares of paper were glued to the sheets from other books to resize them according to the larger dimensions of the new book **(Fig. 15)**. A third method of insertion in volume SB4 consists of simply pasting pages from small-format publications onto the pages of the new book. Here, only a side strip was glued down so that the original book pages could continue to be turned over and read from both sides even after being affixed to the new book page **(Fig. 16)**. All methods have in common, that the inserted sheets in the text volume were embedded in the white book block and disappear into it, while in contrast the illustrations in *Mahlerische Reisen von Günthern und Veit und anderen* (SB4a) were glued onto blue coloured pages and stand out physically as well as visually. One can say that in the first case the included contents are the book. They merge with the book pages. In contrast, in the second case, the book is a container for the images and a space where they are stored, edited, and displayed.[35] Here,

34 For the history of printing, selling and binding books in the eighteenth century see for example Helmut Hilz, *Buchgeschichte. Eine Einführung*, (Bibliotheks- und Informationspraxis 64), Berlin/Boston 2019, pp. 80–81.

35 If further volumes by Johann Gottfried Schultz are taken into account, this observation must be further differentiated. The inlay method, for example, can also be encountered in Schultz's volumes of drawings. Nevertheless, the text volume exhibits a completely different character. While in the topographical volumes of drawings, the images are arranged on the pages according to a uniform scheme and displayed in their own right, in the text volume, the texts of very different formats are practically absorbed by the book. The original sheets are (by whatever method) brought to one format. Thereby the format of the text volume SB4 is defined by the largest inserted pages, which stem from *Mahlerische Skizzen von Teutschland* (by Christian August Günther and Friedrich

Fig. 11
Johann Gottfried Schultz, *Mahlerische Reisen von Günthern und Veit, Das Alderspacher Gebürge von Baltzern, desgl. von Carlsbad von denselben, Töplizen von Darnstedt Königshayner Felsen v. Zink u. Nathe*, 27.5 × 32.5 cm, Görlitzer Sammlungen für Geschichte und Kultur, SB 4a

Fig. 12
Christian August Günther, Views from *Reise durch die Meisnischen Lande*, Issue III., ed. Johann Jacob Brückner and Christian August Günther, etchings, pasted onto a page in Johann Gottfried Schultz, *Mahlerische Reisen von Günthern und Veit* [...], 1805, Görlitzer Sammlungen für Geschichte und Kultur, SB 4a



Beschreibung der Kreuzkirc

Sie war anfangs eine Kapelle der Nonnen vom Orden
Einige Heiligthümer, welche in dieser Kapelle lagen, b
zuglichen Ruf. Die Gemahlin des Markgrafen Heinri
von Meissen, Constantia, aus dem Hause Oesterreich
Vermählung 1254 zur Mitgabe unter andern einen Splitt
sti, welchen sie dieser Kapelle schenkte. Nicht lange
Wunder. Es kam nämlich auf der Elbe ein hölzernes
men, welches die damals abergläubischen Einwohner D
und in feierlicher Prozession in diese Kapelle trugen.
ward sie die Kapelle zum heil. Kreuz genannt. Nun ge
Wallfahrten hierher, denen der Pabst einen besondern
te, dass sie im Jahr 1270 erweitert werden mußte, bei
sie der Frauenkirche untergeordnet wurde. Sie war
ausgeschmückt und hatte ausser dem Hochaltare, 28 li
welchen Messe gelesen wurde. Im Jahr 1491 gieng sie
Herzog Albrecht erbaute sie wieder. Herzog Heinric
sie im Jahre 1559 zur evangelischen Hauptkirche einwei
folger haben sie von Zeit zu Zeit verschönert. Im Jahr
den Blitz verstört; 1674 war sie schon wieder hergestellt.
Kriege ward sie beim Bombardement am 19. Juli 1760
wobei die in der Sakristey befindliche schätzbare Bibliothe
bücher ein Raub der Flamme wurden. Im Jahre 1764 d
Grundstein zu der gegenwärtig, am 22. Nov. 1792 eing
legt. Man baute also beinahe 30 Jahr über die Kirche
versteckten Platze liegt und von keiner Seite grosse Wirk

Das Aeussere der Kirche ist ein längliches Viereck,
ist 112 Ellen lang, mit den Seitenvorlagen 80 Ellen bre
spannt. Sie ist ganz massiv und von Pirnaischem Sand
Eingänge, in allen 46 Fenster, und ein mit Kupfer ge
Thurm ist 152½ Ellen hoch, und hat 3 Säulenstellungen
untere ist, so wie um die ganze Kirche herum, römische
aber korinthischer Ordnung.

Auf dem Thurme ist die grosse Seigerschelle, am G
4½ Pfund; eine wahre Wohlthat für die Stadt, weil sie
glocke gebraucht wird.

Fig. 13
Johann Gottfried Schultz, Volume with text from different sources (without a title), 36.2 × 24.5 cm, Görlitzer Sammlungen für Geschichte und Kultur, SB 4

Fig. 14
Inlay method on a page from Johann Gottfried Schultz, Volume with text from different sources (without a title), Görlitzer Sammlungen für Geschichte und Kultur, SB 4

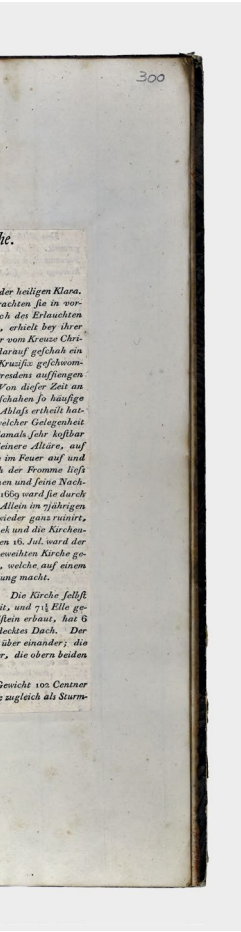
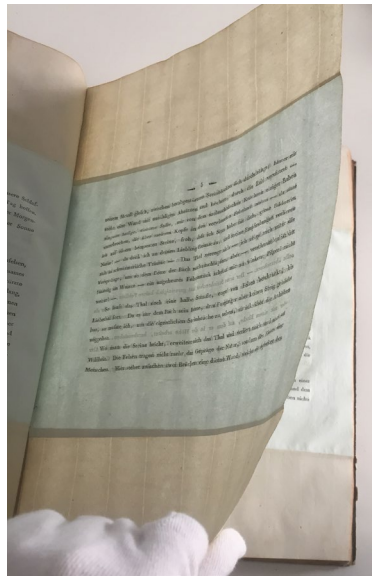
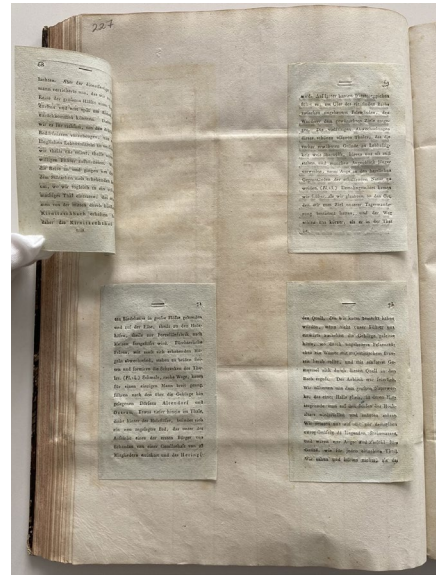


Fig. 15
Wing-like inlay method on a page from Johann Gottfried Schultz, Volume with text from different sources (without a title), Görlitzer Sammlungen für Geschichte und Kultur, SB 4

Fig. 16
Papers glued on one side on to a page from Johann Gottfried Schultz, Volume with text from different sources (without a title), Görlitzer Sammlungen für Geschichte und Kultur, SB 4





the book is a medium for collecting and presenting in the tradition of the early modern paper museums.[36]

Apparently, for Schultz, images and texts served different functions or required different modes of reception. Schultz's collection is first and foremost a collection of images. This is evident from the sheer quantity of images in the collection, juxtaposed with significantly less text and, more importantly, few examples of text that do not directly relate to an image. Clearly it is primarily the images that Schultz wanted to incorporate into his collection and which he inserted into the volumes in a similar way to his own drawings in the album of drawings *Mahlerische Reisen von Schultz*. They are also pasted onto a heavy and toned (or in the case of *Mahlerische Reisen von Schultz* at least not purely white) paper. Instead of drawn frames, in the volume of prints, SB4a, a generous white paper margin was left beyond the edge of the images. Captions are sparse, but definitely present. Here, as in *Mahlerische Reisen von Schultz*, the pages are used for Schultz's annotations. Thus, Schultz appropriated the printed images. With scissors, glue, and paper, the externally derived material was integrated visually and classificatory into the body of his hand-made book collection.

The presentation of the texts is quite different. Unlike the images, the texts were not embellished or underscored by decoration, framing, or explanation. It was not presented against a background, nor was it supported by handwritten comments. The text volume SB4 itself also comes without a title and is less decorative. Nevertheless, Schultz definitely did not want to relinquish the texts, from which the images had been separated. They possessed an independent value for him, and the methods by which he glued them into the book were taken together even more laborious and time-consuming than the methods applied for inserting his drawings and prints. This indicates that for Schultz, images were by no means

Christian Schlenkert, 1795). These pages are bound directly into the book block without further gluing.

36 Representative collections of books filled with drawings were described as paper museums in the early modern era. Cassiano dal Pozzo's Museo cartaceo is perhaps the most prominent example. Dal Pozzo's collection has been profoundly analyzed and described in *The paper museum of Cassiano dal Pozzo. A catalogue raisonné. Drawings and prints in the Royal Library at Windsor Castle, the British Museum, the Institut de France and other collections*, ed. Royal Library at Windsor Castle, London 1996.

self-sufficient. They go hand in hand with written information. At the same time they require a nexus with other images and an organisation, based on the visual. This is at least suggested by the way Schultz separated printed texts and images, as will be further illustrated by the following example.

Only in a few places are there additions to the book pages in the text volume SB4, but not in written form. Here, the pictorial rather breaks through the text, which otherwise stands on its own: For example, between the pages of the first text, the *Mahlerische Skizzen von Teutschland* by Christian August Günther and Friedrich Christian Schlenkert (1794, *Erstes Heft*), five copperplate engravings are inserted.[37] They depict tombstones from the monastery of Alt-Zella, which is described in the text. The written account thus in turn – as has been described earlier with respect to the images – proves to be an encyclopedic link to which visual material can be attached. Apparently, it seemed more compelling to Schultz to insert the images here than in the album of prints, *Mahlerische Reisen von Günthern und anderen* (SB4a), which is dedicated purely to topographical views of places. In SB4a, the series of images taken from *Skizzen von Teutschland*, which includes the view of the monastery ruins of Alt-Zella, was inserted without interruption and without further additions. It is thereby integrated into a larger collection of images, which is compiled strictly according to the subject of the images (i.e. topographical views). Likewise, in this volume of prints, there is an insertion that sheds light on the criteria Schultz followed in compiling content. While the volume contains predominantly views from areas that belong to Saxony, two individual etchings and a series of 12 etchings show the formations of the Adršpach-Teplice Rocks, which lie about 180 kilometres to the southeast in Bohemia. However, they are embedded between preceding and following views of rock formations of the region around the Saxon capital Dresden.

The fact that the medium of the album is open to many different forms of compiling content reveals a fundamental challenge of encyclopedic collecting: individual elements of knowledge (whether pictorial or written)

37 The engravings are taken from Heinrich Friedrich Otto, *Thuringia sacra sive historia monasteriorum, quae olim in Thuringia floruerunt*, Frankfurt 1737 and from Sigmund von Birken, *Königlich-Polnischer, Chur- und Fürstlich-Sächsischer Helden-Saal*, Nuremberg 1718.

offer a multitude of possible links. These can be topographical references, thematic or visual similarities, or chronological successions. The linkage chosen in an individual case may well appear erratic in the overall picture. The effort to create a classificatory ordered collection of images leaves a surplus that does not exactly fit in. In the case described, images are stored away in the text volume; conversely the insertion of text sheets is not to be found in the volumes with topographical images.

Contextualising Schultz: what about topographical albums?

Research on such albums and collections as Johann Gottfried Schultz's is sparse but has increased in recent years.[38] The objects are scattered in a wide variety of collections throughout Europe, often in smaller towns such as Görlitz. It is therefore difficult to gain an overview or even a typology of this book type, the *Klebeband* (album).

In Schultz's case the collection's holdings of the Kulturhistorisches Museum Görlitz have not yet been made available to the public in the form of a digital collection. However, the volume *Johann Gottfried Schultz (1734–1819), Görlitzer Stadtbeamter – Oberlausitzer Zeichner – Herrnhuter Bruder* (2005) edited by this institution provides an overview of Schultz's life and work and contains a written catalogue of the oeuvre, legacy and biographical sources. In it, the volumes of drawings (listed as "Zeichnungsbände") and the volumes of printed matter (listed as "Sammelbände") are listed separately. This is remarkable as not even the descriptive terminology for such book objects is clear or even consistent. In English they are referred to in such vague terms as "folio" or "albums". In German, the terms "Zeichnungsband" (volume of drawings), "Grafikband" (volume of prints) and "Sammelband" (collection volume) or "Album" refer to the functions and contents of such books, while "Folioband" or "Klebeband" indicate the material constitution. Specifically, the notion of "Klebebände"

38 Existing research on books filled with drawings or prints is mostly restricted to case studies. Barely any overviews exist. An exception is Hanna Lehner, "'Cut and Paste' in der Frühen Neuzeit. Aspekte von Geschichte, Materialität und Funktion des Klebebands", in *Imprimatur – ein Jahrbuch für Bücherfreunde* 26 (2019), pp. 11–38.

brings into focus a historical practice and materiality, which are concealed by the history of collecting, academic terminology and the ways these objects are digitised. In museum catalogues general terms such as "folio", "volume with drawings", "Album" or "Band" are very regularly used. Often it remains unclear whether the images of such a volume are pasted or directly drawn onto the page. Furthermore, it can be observed that, unlike in Schultz's case, *Klebebände* (albums) often do not have an individual accession number, unlike the drawings they contain. This is especially true for museum collections, less so for libraries and archives. In addition, photographic digitisation of museum collections often captures only the individual images and not the entire book.[39] As Christian Speer regrets in a review of the catalogue on Schultz, the included illustrations likewise primarily feature the drawings, with the accompanying commentaries and book pages truncated.[40]

Though it is difficult to find and trace topographical albums of the 18th century, these books were not the isolated inventions of individual people like Schultz but a widespread cultural phenomenon. In the eighteenth and nineteenth centuries manuscript books flourished, especially those into which things like drawings, prints or pressed flowers, etc. were glued. Apparently at the same time, many people compiled collections

39 Julia Rössel, Ein Album und sein Digitalisat – Fragen zum Begriff des Hyperimage, *Kunsttexte,* 3 (2016), pp. 1–12. It does not seem of great interest to many curators and authors that the prints and drawings were mounted in a book at all, or what the inner logic of such books is. This disinterest is a result of collecting practices dating back to the 19th century. When public libraries and museums spread in the Western world, and art history established itself as an academic discipline, early modern books were torn apart. Many prints and drawings that were classified as 'art' were cut out from the pages and sorted into museum collections, while other books containing images that were classified as 'scientific' were shelved in libraries as manuscripts, as for example Hartmann Schedel's library, which contained numerous graphics pasted into the books, some of which were extracted in the 19th century and transferred to various graphic collections (on this, see *Die Graphiksammlung des Humanisten Hartmann Schedel*, ed. Béatrice Hernad (exhib. cat. Munich, Bayerische Staatsbibliothek), Munich 1990, p. 11). A specific value of Schultz's collection therefore lies in the fact that it has been preserved as a whole.

40 Christian Speer, review of „Johann Gottfried Schultz (1734–1819). Görlitzer Stadtbeamter, Oberlausitzer Zeichner, Herrnhuter Bruder" ed. Kulturhistorisches Museum Görlitz, Görlitz 2005, *Neues Lausitzisches Magazin*, 10 (2007), p. 171.

of topographical views or other visual material and kept them in books in a very similar way.[41] Taking a look at early modern German (and other European) collections we find examples of similar *Klebebandsammlungen* (collections of albums).[42] Collecting images in books was just as integral a part of early modern knowledge culture as, for example, creating excerpt books, or building up collections of objects, cabinets of curiosities, or libraries. Rulers, nobles or members of the educated classes often created these collections between book covers. For topographical collections in particular, it can be noted that their creators often had a connection to the military or to surveying.

A distinctive characteristic of Schultz's collection is that volumes with drawings and volumes with prints were assembled alongside each other. Many collections of albums were restricted to one medium, while collections of prints are usually much more extensive and thematically broader than those containing drawings.[43]

41 This is obvious especially when looking to Great Britain, where not only the interest in the antiquarian and topographical traditions is somewhat more pronounced than in many other countries, but the amount of collections is also very high. M. W. Barley, *The Guide to British Topographical Collections*, Nottingham 1974, in which a large part of the topographical and antiquarian collections in Great Britain are listed and cursory described, illustrates the quantitative dimension of relevant collection holdings.

42 Examples from the German-speaking region are the collection of Ferdinand Friedrich von Nicolais (1730–1814) consisting of 155 volumes with maps and topographical views, Württembergische Landesbibliothek Stuttgart; the earlier-mentioned collection of five volumes with topographical views and marine drawings by Charles Gore, Klassik Stiftung Weimar; three no longer existing albums from the Salzburger Hofbibliothek reconstructed in research by Christoph Brandhuber and Roswitha Juffinger, "Faszination Stadt. Rekonstruktionsversuch des Klebebands der Städtebilder in der Universitätsbibliothek Salzburg", in *Zentrum der Macht*, 2 vols., ed. Roswitha Juffinger, Salzburg 2011, vol. 2: *Die Kunstsammlungen der Salzburger Fürsterzbischöfe. Gemälde, Graphik, Kunstgewerbe*, pp. 511–535; two albums with city views by Johann Stridbeck the younger, Staatsbibliothek Berlin.

43 An introduction to the (mostly multi-volume) collections of prints is given in Lehner 2019 (note 38). A corresponding overview of albums of drawings is not known to the author. However, there are numerous individual case studies. Examples of case studies which aim to paint a broader picture are: Michael Thimann, "Encyclopaedic projects of humanist draughtsmen in the 16th century", in *Linea*, 2 vols., Venice 2008–2012, vol. 1: Grafie di immagini tra Quattrocento e Cinquecento (Studi e ricerche, Kunsthistorisches Institut in Florenz, Max-Planck-Institut, 4), ed. Marzia Faietti and Gerhard Wolf, pp. 135–161; Florike Egmont, "A collection within a collection. Rediscovered animal drawings from the collections of Conrad Gessner and Felix Platter", *Journal of*

Conclusion: The open collection

The three exemplarily selected volumes from Schultz's collection provide insights into different types of albums, the applied gluing methods and resulting intermedial constellations. It has been pointed out that this collection focuses on the visual. Following a scholarly impulse, the images are enhanced by words, numbers and comments and relate to other images and to texts. This also applies to the volumes that complement each other, just as the collection refers to the visual and intellectual discourses of their time. In the course of the 18th century and during Schultz's lifetime, the landscapes of Saxony had become a popular subject of veduta, even beyond the princely city of Dresden.[44] The same can be said to a somewhat lesser extent for Lusatia and Bohemia. Numerous painters, draughtsmen, engravers and publishers served the demand. Schultz's volumes SB4a and SB4 bring together some of the most active in the sector of high-circulation prints, such as the print-makers Christian August Günther, Anton Balzer and Günther Johann Adolph Darnstedt, and the publishers Wilhelm Gottlieb Becker and Georg Voss. Schultz regarded the individual or serial topographical views and the written descriptions of these printmakers, publishers and authors as mobile, relocatable, and augmentable elements of knowledge that can be infinitely docked onto other relatable elements of knowledge or new descriptions of states. The single view could be extended by as many close-ups, counter views, interior views and shifted perspectives as there were locations in space. If a view changes over time, new state descriptions become necessary. Johann Gottfried Schultz (as other contemporaries interested in topography, such as the earlier-mentioned

the History of Collections, 25, 2 (2013), pp. 149–170. Furthermore, in an essay on the history of drawing in early modern collections, Christien Melzer addresses, among other things, drawing albums as a medium of collecting (Christien Melzer, "Die Inventare schweigen. Zeichnungen im Kontext frühneuzeitlicher Sammlungen", in *Jenseits des 'disegno'. Die Entstehung selbstständiger Zeichnungen in Deutschland und Italien im 15. und 16. Jahrhundert*, ed. Daniela Bohde and Alessandro Nova, Petersberg 2018, pp. 295–311).

44 For this see Anke Fröhlich, *Landschaftsmalerei in Sachsen in der zweiten Hälfte des 18. Jahrhunderts. Landschaftsmaler, -zeichner und -radierer in Dresden, Leipzig, Meißen und Görlitz von 1720 bis 1800*, Weimar 2002.

Adolf Traugott von Gersdorf)[45] proves to be a meticulous collector who worked with great dedication to compile the names and views of as many landmarks as possible. In addition to excursions undertaken specifically to document the territory, journeys undertaken for other reasons always served him as an opportunity to collect topographical knowledge and documents, and thus to record the landscape in painstaking detail.

This project, which could not have been accomplished by a single person, required the incorporation of existing elements of knowledge into larger, again ordered, collection contexts. By combining cut-out prints with his own drawings, Schultz created such an assemblage. Finally, after his death, following his will, his own pasted collection was integrated into the context of the larger and further growing scientific collection of the Oberlausitzische Gesellschaft der Wissenschaften. Through pasting, the lifelong scholarly activity had become a comprehensible collection, which after Schultz's death became a quasi-public work, accessible to a local, elite audience and ready to be supplemented by further documentation.

45 Kai Wenzel, "'Die ganze Zeit war ich beschäftigt mit Zeichnen'. Ansichten aus der Schweiz von Adolf Traugott von Gersdorf und Karl Andreas von Meyer zu Knonow", in *Adolf Traugott von Gersdorfs Schweizer Reise 1786*, ed. Vanja Haug, Martin Schmid and Gerd Folkers, Zürich 2018, pp. 207–236. The way in which Gersdorf recorded the landscape in his drawings and collected associated geographical knowledge demanding the highest level of accuracy is described in particular on pages 214 to 230.

ON CUTTING FORESTS AND AVOIDING PASTING
HEINRICH COTTA'S FOREST MAPS

Lisa Cronjäger

Forest maps have long been neglected in the history of cartography. At the end of the 18th century, land surveys were conducted throughout Europe and forest maps were drawn for this purpose. Often only the most impressive exemplars have been preserved in state archives, and in most cases they have been separated from contextual documents. Forest-assessment maps (*Forsttaxationskarten*), or, as they were later called, forest-management maps (*Forsteinrichtungskarten*), are a type of thematic map.[1] They were an important administrative medium and had the purpose of providing an overview of forested areas, their characteristics, and their wood resources. At the same time, they served as planning devices for defining the right logging time for each area and for anticipating future wood yields. This article shows that the way assessors dealt with the maps' materiality had a direct impact on forest environments. The methods, for instance, of subdividing the paper, cutting out parts of the map, and pasting new sheets of paper under it determined the system of how trees were felled and how regrowth was initiated afterward. Ultimately, the drawn, subdivided, cut, and pasted topographies on paper shaped how foresters managed forests *in situ*.

In order to reconstruct the historical techniques of forest mapping and the long-term planning of forest topographies, this paper draws on textbooks as the main source material. In contrast to the isolated forest maps preserved in archives, printed textbooks contain maps, legends,

1 For translations of these terms, see Karl Philipp, *Dictionary of German and English Forest-Terms*, Neudamm 1900, p. 44. In the following, I will use the general term forest map, or, to be more specific, forest-management map. I would like to thank the members of the Topographic Visual Media Network, Mirjam Hähnle, Anthony Mahler, and Stephan Meyer, for valuable comments and editing.

Lisa Cronjäger: On Cutting Forests and Avoiding Pasting. Heinrich Cotta's Forest Maps, in: PASTED TOPOGRAPHIES (TERRAIN. STUDIES ON TOPOGRAPHIC VISUAL MEDIA 1), eds. Boskamp, Braun, Buchholz and Kranen, Heidelberg: arthistoricum.net, 2023, pp. 83–105, https://doi.org/10.11588/arthistoricum.1323.c18466

descriptions, charts, and calculations as a complete conglomerate. In most cases, the authors of textbooks meticulously described all the working steps involved. Consequently, forestry textbooks provide important information on mapmaking strategies that cannot be gleaned from the maps themselves when they are isolated from their functional contexts. However, it has to be acknowledged that forest maps in textbooks were model maps and not authentic working results. The suggested procedures were taught in classes as ideal cases. Notwithstanding, textbooks serve as a helpful starting point for shedding light on forest maps as a neglected type of thematic cartography.

This paper analyses how forest maps were conceived as instruments for representing and managing forest topographies. The central question is: What role did paper techniques have in developing schedules for when to cut areas of the forest? How do practices such as drawing, cutting, pasting, and subdividing forest topographies on paper affect the function of maps as an epistemic device? After analyzing the strategies of visual representation in two examples of forest maps, I investigate how such maps impacted land-use practices. How were forest environments affected by the aesthetics of forest maps? Is there even a parallel between how pieces of paper were cut out of maps and how trees were cut in the forest?

First, I provide a short introduction to the context of forestry academies, where cartographic techniques were taught and published in textbooks. A significant example is the Royal Saxon Academy of Forestry in Tharandt, whose founder, Heinrich Cotta (1763–1844), became widely known for a supposedly sustainable technique of forest management.[2] In the second section, a close reading of one of Cotta's textbooks highlights practices of cutting and pasting on forest maps. Even though Cotta claimed that

2 In retrospect, Cotta's method of forest-management cartography was defined as "Flächenfachwerk", a method of determining the time to fell trees by area, in contrast to a "Massenfachwerk", a method of determining the time to fell trees by volume, which was elaborated by the forestry scientist Georg Ludwig Hartig and his colleagues. The distinction in the terminology is based on the prioritization of same-sized areas as the decisive unit for forest management in contrast to the estimated volume of wood yields, which was supposed to remain constant over time. For definitions and more information on forestry terminology, see Karl Hasel, *Forstgeschichte. Ein Grundriss für Studium und Praxis*, Hamburg et al. 1985, pp. 232–234. This differentiation is not key to the interests of this paper. Both Cotta's and Hartig's methods of forest-management cartography were regarded as sustainable forestry in spite of differences in the execution.

these paper techniques should be abandoned for a more durable method of representing forest landscapes, his arguments show that as former working practices, cutting and pasting had already shaped the logic of forest maps. In the last part of this article, I will describe a land-use conflict that was concomitant with the mapping of forests.

The forestry academy in Tharandt as a centre of knowledge and of map production

At the beginning of the 19th century, methods of forest mapping were standardized in many parts of Europe. State administrations were establishing and financing schools and academies of forestry. For instance, the Royal Saxon Academy of Forestry and Agriculture in Tharandt was officially inaugurated in 1811. Heinrich Cotta and his coworkers developed a method for making forest-management maps and a program for teaching it. The Tharandt Forestry Academy, which was close to Dresden, and its director Cotta were known throughout Europe for their methods of sustainable forestry.[3] Forestry academies served as centres of knowledge production where there were diverse interactions between foresters, artists, writers, and other scholars. Tharandt, for instance, was a popular place for outdoor landscape painting. Renowned engravers and artists from Dresden, such as Caspar David Friedrich, Johan Christian Dahl, Carl Blechen, and other representatives of the Romantic era, regularly visited the region.[4] Johann Gottfried Schultz's *Malerische Reise*, which is discussed in Tabea Braun's

3 On the history of sustainability in forestry, see Richard Hölzl, "Historicizing Sustainability. German Scientific Forestry in the Eighteenth and Nineteenth Centuries", *Science as Culture*, 19, 4 (2010), pp. 431–460; Paul Warde, *The Invention of Sustainability. Nature and Destiny, c. 1500–1870*, New York 2018; Ulrich Grober, *Sustainability: A Cultural History*, trans. Ray Cunningham, 1st ed. 2010, Totnes 2012; Roderich von Detten, "Waldwirtschaft/Forstplanung", in *Nachhaltigkeit interdisziplinär. Konzepte, Diskurse, Praktiken*, ed. Ursula Kluwick and Evi Zemanek, Wien et al. 2019, pp. 70–89.

4 Compilation of drawings, lithographs, and etchings of Tharandt can be found in Christian Friedrich Traugott Voigt, *Tarants schöne Natur in geselligen Liedern gefeiert*, ed Christoph Richter, 1st ed. 1806, Tharandt 2016; Dahl und Friedrich, Romantische Landschaften (exhibition catalogue Dresden/Oslo), ed. Petra Kuhlmann-Hodick et al., Dresden 2014; and Iris Berndt and Helmut Börsch-Supan, *Carl Blechen. Innenansichten eines Genies*, Berlin 2017, p. 20 (on Carl Blechen's painting of Tharandt Castle).

paper in this volume, also includes a drawing of Tharandt Castle, which was a popular motif among artists and writers.[5]

In the course of the 19th century, Tharandt became a well-known destination for students and scholars. Students came from Russia, Scandinavia, France, Spain, Portugal, Italy, Switzerland, Austria, Poland, Greece, Romania, and even Japan and the United States, as can be seen from diplomas, entry exams, and inquiries held by the archive of the Dresden University of Technology.[6] The foreign students were not only interested in forestry. Education reformers such as Anna and Elisabeth Blomqvist from Finland also stopped over in Tharandt, after visiting schools for women in Dresden.[7] And Cotta was not only an expert in forestry and agriculture, he also owned a mineral collection that was the subject of many scholarly conversations, including with Johann Wolfgang von Goethe.[8] After Cotta's death in 1844, Alexander von Humboldt arranged for Cotta's mineral specimens to be included in the Prussian Royal Minerals Cabinet, which is now an important collection in the Natural History Museum in Berlin.[9]

Due to these processes of knowledge transfer, the Forestry Academy in Tharandt was highly relevant in the international development of thematic cartography in the 19th century. But while map production in Gotha and Alexander von Humboldt's famous maps have received significant attention, the research on forest cartography in Tharandt is limited.[10] And this

5 See Tabea Braun's paper in this issue.

6 University Archive of the Technische Universität Dresden (UATUD), collection of the Forestry Academy in Tharandt, 007–010, "Aufnahme der Akademisten an der Forstakademie und landwirtschaftlichen Lehranstalt 1833–1878". For the diplomas of students from abroad, see 069 "Studienorganisation 1830–1873," 184–186, and 203–205. For the inquiries, see 076 "Anfragen zum Studium 1898–1917".

7 Helena Westermarck, Elisabeth Blomqvist, *hennes liv och gärning. En biografisk studie, enligt brev och dagboksanteckningar*, 2 vol., Helsinki 1917, vol. 2, 1917. On the education reformers' stay in Tharandt and the forestry education of their brother Anton Gabriel Blomqvist, see Anders Benjamin Helander, *Anton Gabriel Blomqvist ja hänen aikalaisensa*, Helsinki 1936, p. 15; Schweitzer, Robert, "'In Tappes Tapfen' oder 'von Berg zu Berg'? Verbindungen zwischen Finnland und der Forstakademie Tharandt (Sachsen) im 19. Jh. Ein Beitrag zur Geschichte des Auslandsstudiums der Finnen", in *Finnland, das Zarenreich und die Deutschen. Gesammelte Studien zum europäischen Nordosten. Festgabe zum 60. Geburtstag des Verfassers*, ed. Uta-Maria Liertz, Helsinki et al. 2008, pp. 327–348.

8 See Maria Wagner, *Goethe und die Forstwirtschaft*, 1st ed. 2007, Remagen 2011.

9 Alexander von Humboldt. *Minerale und Gesteine im Museum für Naturkunde Berlin*, ed. Ferdinand Damaschun and Ralf Thomas Schmitt, Göttingen 2019.

10 On the Perthes publishing house in Gotha, see Petra Weigel, "Geographische Wissensproduktion – Reflexionen aus

is despite the fact that one of Humboldt's early academic career steps had been in the mining administration close to Tharandt. In 1791 and 1792, Humboldt was a student at the Freiberg Mining Academy for eight months. Freiberg and the nearby mining districts, which relied on steady wood supplies, were located close to Tharandt.[11] It can be assumed that Humboldt was influenced by diverse scholarly interactions at both academies. In particular, he might have been inspired by thematic maps as they were developed at mining and forestry academies. The forest maps discussed in this paper could be compared to plant distribution maps and petrographic maps, whose logic was important for Humboldt.[12] However, in contrast to plant-distribution maps in botany, forest-management maps represent not only tree species but also soil types, topographic features, wood yields, and past and future times of logging. In fact, this type of thematic cartography combines different symbolic systems to draw connections between various kinds of information. In addition, it is a type of map that faces the

der Perspektive der geographie- und kartographiehistorischen Sammlung Perthes der Forschungsbibliothek Gotha", *Berichte zur Wissenschaftsgeschichte*, 40, 1 (2017), pp. 86–90; Philipp Felsch, *Wie August Petermann den Nordpol erfand*, München 2010; Nils Güttler, "Unsichtbare Hände. Die Koloristinnen des Perthes Verlags und die Verwissenschaftlichung der Kartographie im 19. Jahrhundert", *Archiv für Geschichte des Buchwesens*, 68 (2013), pp. 133–153. On Alexander von Humboldt's cartographic techniques, see Amrei Buchholz, *Zwischen Karten. Alexander von Humboldts "Atlas géographique et physique des régions équinoxiales du Nouveau Continent"*, Berlin et al. 2020; Dominik Erdmann and Oliver Lubrich, *Das zeichnerische Werk. Alexander von Humboldt*, Darmstadt 2019; Lorraine Daston, "The Humboldtian Gaze", in *Science as Cultural Practice. Cultures and Politics of Research from the Early Modern Period to the Age of Extremes*, ed. Moritz Epple and Claus Zittel, Berlin 2010, pp. 45–60.

11 On the history of mining in Saxony, see Sebastian Felten, "The History of Science and the History of Bureaucratic Knowledge. Saxon Mining, circa 1770", *History of Science*, 56, 4 (2018), pp. 403–431.

12 On plant-distribution mapping, see, for instance, Janet Browne, *The Secular Ark. Studies in the History of Biogeography*, New Haven et al. 1983; Nils Güttler, "Drawing the Line. Mapping Cultivated Plants and Seeing Nature in Nineteenth-Century Plant Geography", in *New Perspectives on the History of Life Sciences and Agriculture*, ed. Denise Phillips and Sharon Kingsland, Cham 2015, pp. 27–52; Patrick Anthony, "Mining as the Working World of Alexander von Humboldt's Plant Geography and Vertical Cartography," *Isis*, 109, 1 (2018), pp. 28–55. On different types of thematic cartography, see Arthur Howard Robinson, *Early Thematic Mapping in the History of Cartography*, Chicago et al. 1982; Josef Wolf Konvitz, *Cartography in France, 1660–1848. Science, Engineering, and Statecraft*, Chicago 1987.

challenge of representing changes in the landscape over time. Foresters had to renew or revise maps in predefined time intervals and would then send the results to different offices that were subordinate to state treasuries. The representational strategies and epistemic functions of forest maps are therefore of interest to the history of topographic visual media.

The necessity to cut and paste maps

While research has been carried out on paper techniques as "tools of knowledge,"[13] little attention has been paid to forest maps and the paper techniques that bring them into being.[14] Neither art and visual historians nor historians of science have scrutinized forest-management maps. Most edited volumes on the history of cartography, too, do not treat forest mapping separately.[15] In the course of the 19th century, however, textbooks on forest-management cartography were published in considerable numbers and many languages. Among the circulating textbooks,

13 On the concepts of tools of knowledge and paper knowledge, see Peter Becker and William Clark, *Little Tools of Knowledge. Historical Essays on Academic and Bureaucratic Practices*, Ann Arbor 2001; Anke te Heesen, *Cut and Paste um 1900: Der Zeitungsausschnitt in den Wissenschaften*, Berlin 2002; Lisa Gitelman, Paper *Knowledge. Toward a Media History of Documents*, Durham 2014; the special issue "Histories of Bureaucratic Knowledge", ed. Sebastian Felten and Christine von Oertzen, *Journal for the History of Knowledge*, 1, 1 (2020); Christine von Oertzen and Lotte Schüssler, "Für, mit und auf Papier. Papiertechnologien und ihre Versorgungsketten," *Zeitschrift für Medienwissenschaft*, 14, 2 (2022), pp. 119–30. On recent praxeological approaches in the history of science, knowledge, and media, see, among others, the special issue "Cultural Techniques", ed. Geoffrey Winthrop-Young et al., *Theory, Culture & Society*, 30, 6 (2013); *Connect and Divide. The Practice Turn in Media Studies*, ed. Erhard Schüttpelz et al., Zurich 2021.

14 Henry E. Lowood, "The Calculating Forester. Quantification, Cameral Science, and the Emergence of Scientific Forestry Management in Germany", in *The Quantifying Spirit in the Eighteenth Century*, ed. Tore Frängsmyr et al., Berkeley 1990, pp. 315–342; James C. Scott, *Seeing like a State. How Certain Schemes to Improve the Human Condition Have Failed*, New Haven et al. 1998. See the chapter "Nature and Space", pp. 11–52, for an analysis of forest maps and their consequences. However, both publications do not trace the techniques of forest mapping.

15 See *The History of Cartography*, ed. Matthew H. Edney and Mary Sponberg Pedley, 6 vol., Chicago et al. 1987–2020, vol. 4: *Cartography in the European Enlightenment*, 2 parts, 2020; *Die Werkstatt des Kartographen. Materialien und Praktiken visueller Welterzeugung*, ed. Steffen Siegel and Petra Weigel, München 2011.

Heinrich Cotta's *Systematische Anleitung zur Taxation der Waldungen* was a central reference.[16] In his book, Cotta reflects on strategies of mapmaking and dedicates a whole chapter, "On Drawing Forest Maps," to the topic.[17] In the following quotation, he explains how foresters had created and used maps in the past, before pointing out the advantages of one standardized method. Cutting and pasting maps play a vital role in this passage. These practices result from the continuous necessity to revise maps, for instance after the felling of trees.

> If such a forest map did not already become incorrect after a few years, the dark coloring of the map would have to turn into light wherever cuttable wood had been cleared. But the inventive spirit still knew what to do even in these situations. One cut the part with the cleared area out from the map and placed a blank sheet of paper underneath, so in a manner of speaking, a cutting was performed on the map, too.[18]

As we can read in Cotta's textbook, the act of cutting trees not only creates cleared areas in the landscape but also renders forest maps inaccurate. Cotta explains that the darkly colored areas of a map that used to represent dense forest cover suddenly has to be switched to a bright color indicating empty space. The necessary change of color from dark to white is practically impossible unless the cartographers excise the dark areas out of the paper and paste a blank sheet of paper under it, realizing an act of hewing on the map. According to Cotta, however, indicating felled forest areas by cutting and pasting paper does not turn out to be a good solution.

16 For example, students of the French National School of Forestry in Nancy read Cotta's and Hartig's textbooks in their first semesters. See Charles Guyot, *L'Enseignement Forestier en France. L'École de Nancy*, Nancy 1898. European textbooks on forest-management cartography often quote Cotta's and Hartig's publications. See, for instance, Claes Wilhelm Gyldèn, *Suomalaisen Metsänhoidon Opas*, ed. and trans. Matti Leikola, 1st ed. 1853, Helsinki 1998, p. 14.

17 Heinrich Cotta, *Systematische Anleitung zur Taxation der Waldungen*, Berlin 1804.

18 Cotta 1804 (note 17), p. 67; all quotations translated by L. C. Original quotation: "Wenn nämlich ein solcher Forstriß nicht nach den ersten Jahren schon unrichtig werden sollte; so mußte da, wo haubare Hölzer abgetrieben worden waren, die dunkele Farbe des Risses nun mit Einemmale ins Lichte übergehen. Doch auch hier wußte der Erfindungsgeist noch Rath. Man schnitt die Fläche des abgetriebenen Schlages aus dem Risse heraus, und unterlegte die Stelle mit weißem Papier; so daß auch auf dem Riß gleichsam eine Hauung geführt wurde."

Over time, the map suffers from repeated collages. Even if the responsible foresters try to conduct this method as accurately as possible, it jeopardizes the accurate depiction of the forest.

Unfortunately, an example of such a forest map has not yet been found. The paper practices of cutting and pasting were probably less common than Cotta suggests. His description of the disadvantages of cutting and pasting forest maps could be an exaggeration intended to support his arguments in favor of a new standardized system of annotation. Nevertheless, there is a high possibility that most pasted-over hand-colored forest maps from the 18th century were not considered to be of archival value. The few archived forest maps from before 1800 possess extraordinary characteristics or are parts of state surveys that were not meant to be revised. Cutting and pasting maps could have played, however, a role in the working routines of smaller administrations, whose materials did not enter archives. Without doubt the practices of cutting and pasting maps point at a general problem in cartography: the impossibility of representing the temporality of topography on a single map. Changes in the landscape and complex interrelations within socionatural systems could not be sufficiently grasped on conventional two-dimensional maps.

One 18th-century method for dealing with this problem—which probably resembles the cutting and pasting Cotta criticized—can be found in a book on arithmetic and geometry for forestry by Johann Ehrenfried Vierenklee from 1767. Since it belongs to the early canon of forestry text-books, it saw several reprints.[19] It includes model maps and illustrations. Although Cotta does not mention Vierenklee's maps, the book can illustrate what was new about standardized methods of forest maps that remained up to date over a long period of time.

In a map from Vierenklee's textbook **(Fig. 1)**, the richly colored topography with a lake and a hill is structured by a geometrical grid of 50 consecutively numbered squares. The map resulted from assessments undertaken in the forest district of Freudenberg close to Berlin. The map's template-like title—"Plan of the royal (seigneurial) forest N. N. under the

19 Johann Ehrenfried Vierenklee, *Mathematische Anfangsgründe der Arithmetik und Geometrie, in so fern solche denjenigen, die sich dem höchstnöthigen Forstwesen auf eine vernünftige und gründliche Weise widmen wollen, zu wissen nöthig sind*, Leipzig 1767.

commission of N.N., measured and subdivided by N.N."—indicates that it served as a model for forest assessments. The legends at the margins are rich in detail. Numerous pictograms and symbols resemble those used by Cotta around 1800. Of particular interest are the color patterns defined in the legend at the bottom.

Every color stands for a type of tree. Pine trees are represented by grey, checker trees and other foliage trees by green, birch trees by red, oak trees by yellow, and beech trees by brown. Moreover, each color is subdivided into shades or patterns: dark brown represents beechwood that can be logged soon, while light brown represents young beech. Stripes of dark brown and light brown indicate forest areas with a mix of young trees and old-growth trees. White areas with a brown edging indicate young beech seedlings. The stronger colors thus draw the observer's attention to places where cuttable trees are growing. On the upper part of the map, one can find old oak trees of high quality in yellow right next to cuttable birch trees in a strong reddish brown. However, the colors and color intensities only represent the condition of the wood in these locations in the year the map was made. As soon as the trees were logged, the darkly colored areas would have had to be changed to a bright color again. Vierenklee does not explain how to solve this problem and whether he recommends cutting and pasting. But the logic of Vierenklee's 1767 map perfectly illustrates the practical problems of forest cartography that Heinrich Cotta addressed around 1800.

Heinrich Cotta's forest maps

Cotta's method of mapmaking is characterized by a distinction between general maps and specialized maps. A general map should provide an overview of the area and its surroundings, while a specialized map focuses on one particular forest district and the exact depiction of its parts. The two types of thematic maps offer different kinds of information. With their larger scales, general maps represent important topographical features, such as the altitude, the course of hills, and the dominant tree species, which were depicted with the help of colors. All in all, general

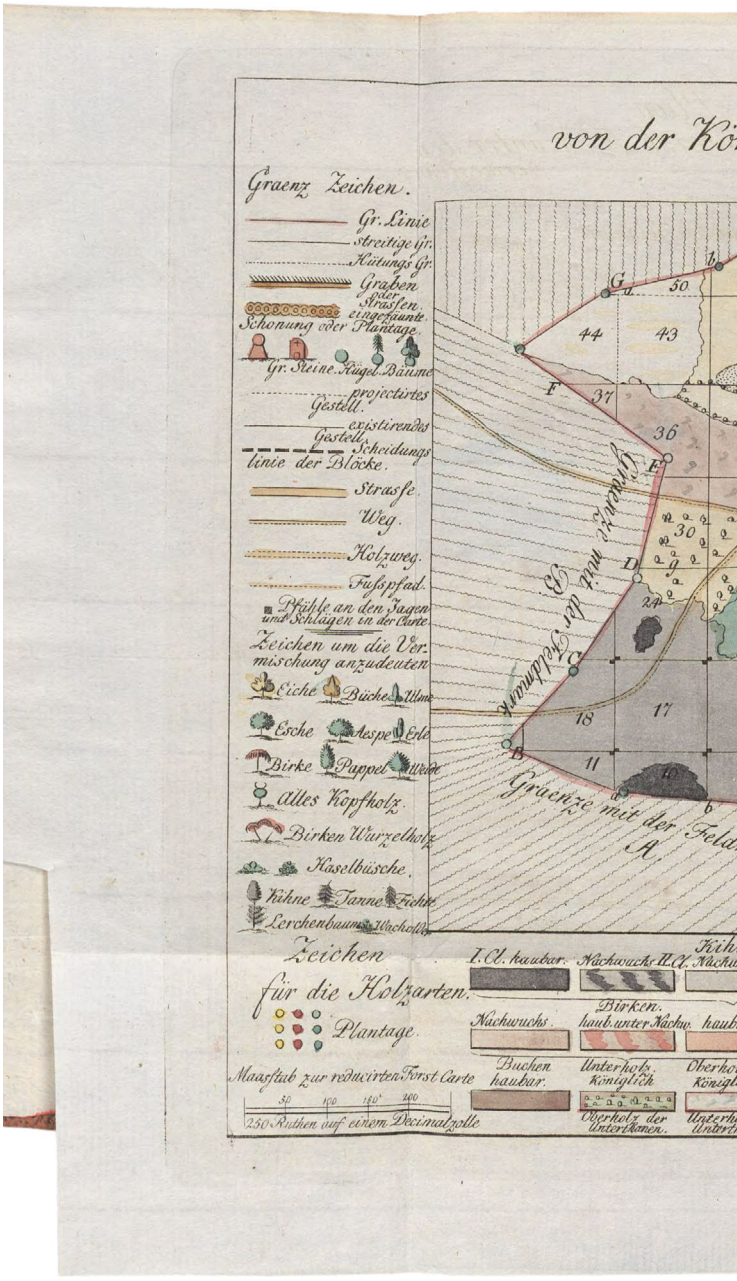
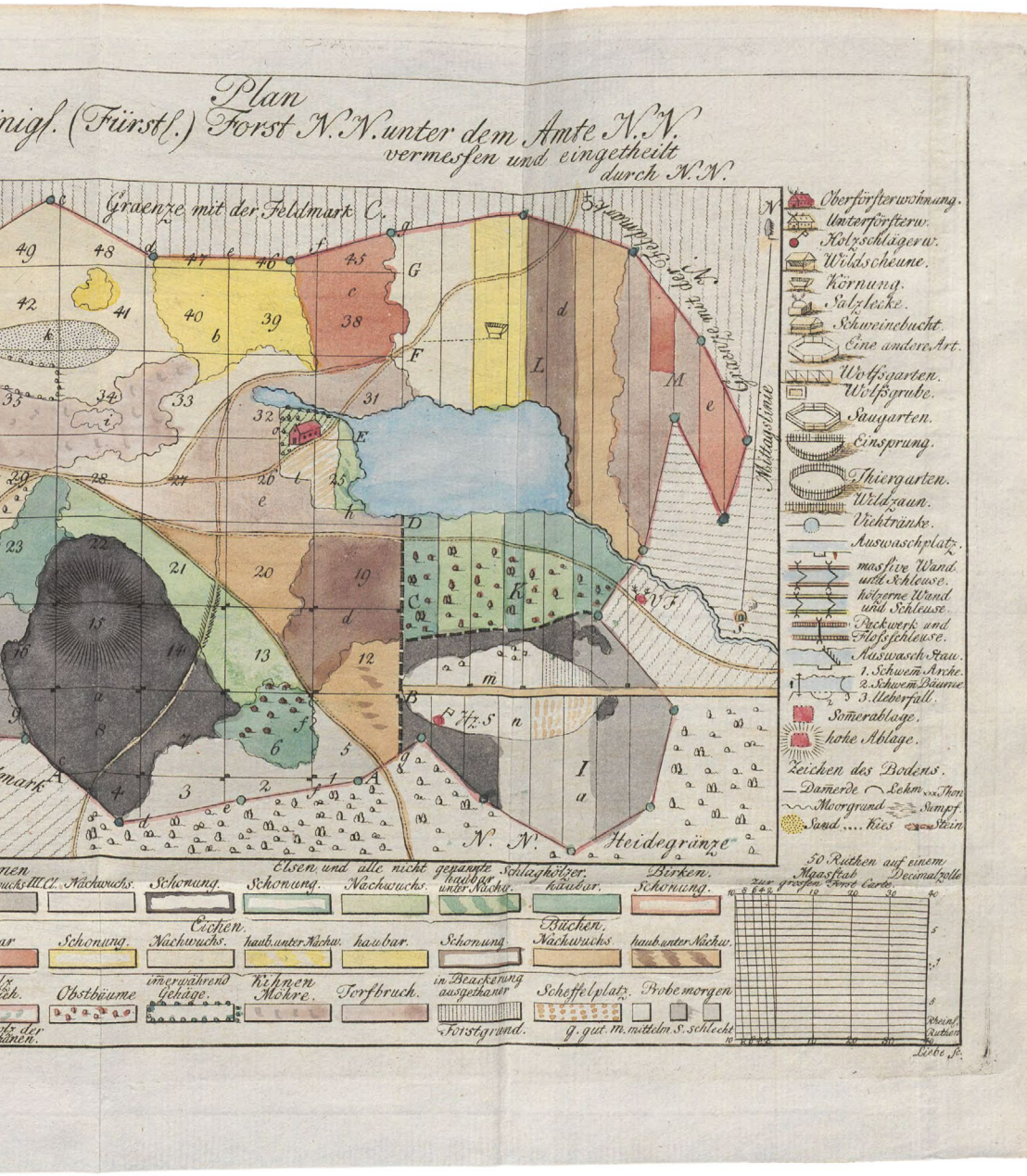


Fig. 1
Johann Ehrenfried Vierenklee, Plan of the Royal (Seigneurial) Forest N.N. under the commission of N.N., measured and subdivided by N.N., from his *Mathematische Anfangsgründe der Arithmetik und Geometrie, in so fern solche denjenigen, die sich dem höchstnöthigen Forstwesen auf eine vernünftige und gründliche Weise widmen wollen, zu wissen nöthig sind* (1767), ed. Friedrich Meinert, Leipzig 1797, appendix, unpaginated


Plan
nigl. (Fürstl.) Forst N.N. unter dem Amte N.N.
vermessen und eingetheilt
durch N.N.
Graenze mit der Feldmark C.
Oberförsterwohnung.
Unterförsterw.
Holzschlägerw.
Wildscheune.
Körnung.
Salzlecke.
Schweinebucht.
Eine andere Art.
Wolfsgarten.
Wolfsgrube.
Saugarten.
Einsprung.
Thiergarten.
Wildzaun.
Viehtränke.
Auswaschplatz.
massive Wand und Schleuse.
hölzerne Wand und Schleuse.
Packwerk und Flossschleuse.
Auswasch-Stau.
1. Schwem-Arche.
2. Schwem-Bäume.
3. Ueberfall.
Somerablage.
hohe Ablage.
Zeichen des Bodens.
Damerde
Lehm
Thon
Moorgrund
Sumpf
Sand
Kies
Stein
Eichen.
Buchen.
Schonung.
Nachwuchs.
haub. unter Nachw.
haubar.
Kiehnen Möhre.
Torfbruch.
Obstbäume
Scheffelplatz.
Probemorgen
Forstgrund.
50 Ruthen auf einem Maasstab
Decimalzolle
Heidegränze
N. N.

and specialized maps were meant to complement each other. For this reason, foresters had to assemble them in the same folder.[20] In his book, Cotta emphasizes the advantages of these rather small maps: they did not have to be rolled out and rolled up. Using two kinds of maps made it possible to provide accurate details on specialized maps and to compare them to a broader overview of the area on the general map.

The "General map of the first section of the forest district of Buchenau under the higher forest commission of Tanneberg" **(Fig. 2)** was printed as an example in the book chapter "On Drawing Forest Maps." The map's title contains administrative information that facilitates locating the depicted area within the forest bureaucracy. Section 1 with all its subsections is located on the right bank of the river Werra, south of the villages of Holzhausen, Herrenstein, and Veltheim and west of Buchenau, where the higher forest commissioner's house was located. When the map was produced in 1802, these places belonged to the principality of Saxony-Weimar-Eisenach.

At first glance, the different colors catch our attention. A red line distinguishes the multicolored forest section 1 in the middle from the surrounding area in black and white. In addition, a net of brown meandering lines represent the internal division of the forest section. If we zoom in on the map, there are various pictograms whose meaning is explained in the legend. As is typical of general maps, it provides extensive practical information that helped foresters orientate themselves in the area. Different pictograms and signs depict different kinds of mills, furnaces, and mining facilities. All in all, the general map contains condensed information on the economic uses of the forest.

But how were the timber resources represented and managed with the help of the map? Similar to Vierenklee, Cotta employs colors to depict tree species. But in contrast to the preceding model map, bold colors do not stand for areas that are ready for immediate logging. Instead, the brightness of the colors indicates whether the trees in the area belong to a timber forest (*Hochwald*) or a coppice forest (*Niederwald or Schlagholz*).[21] Coppice

20 Cotta 1804 (note 17), p. 69.

21 Cotta 1804 (note 17), p. 82. On the terminology, see Matthias Bürgi, "How Terms Shape Forests: 'Niederwald', 'Mittelwald' and 'Hochwald', and their Interaction with Forest Development in the Canton of Zurich, Switzerland", *Environment and History*, 5 (1999), pp. 325–344.

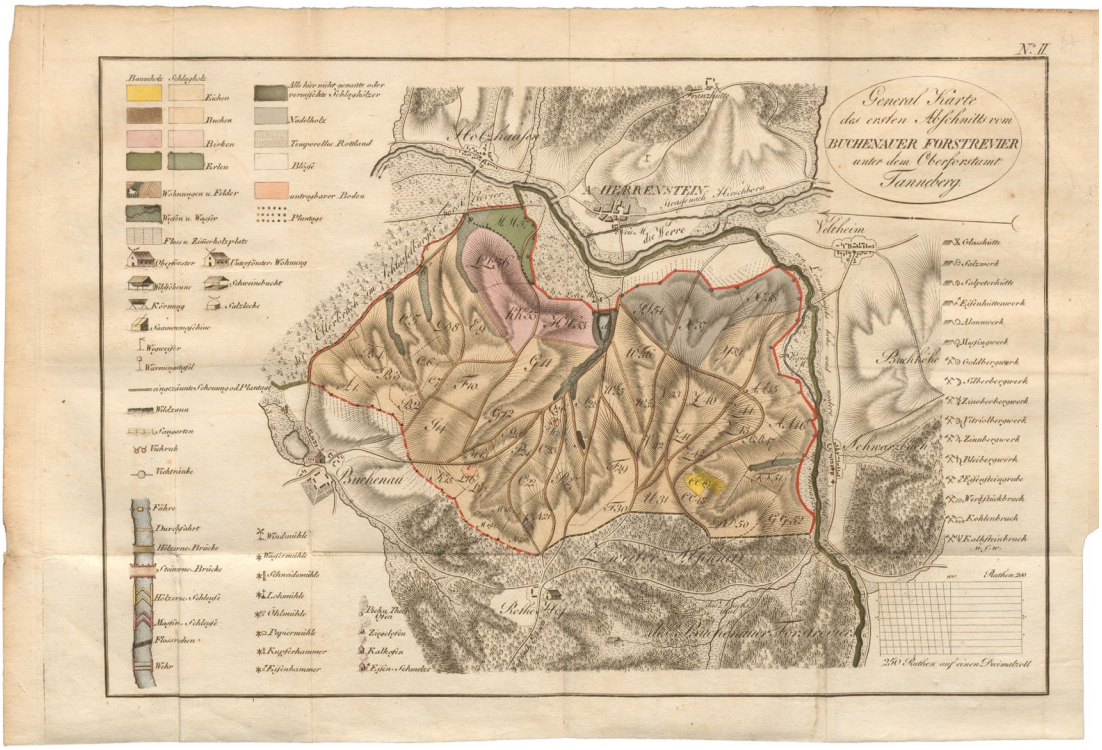


Fig. 2
Heinrich Cotta, General map of the first section of the forest district Buchenau under the Higher Forest Commission of Tanneberg, from his *Systematische Anleitung zur Taxation der Waldungen*, Berlin 1804, between p. 82 and p. 83

forests were common in many parts of Germany until the 19th century. This particular type of forest consists of rather small foliage trees that are cut down to the trunk and sprout up again. The bendable branches of, for example, willow and birch trees were useful in the household economy, such as for making furniture, baskets, fences, and roofs, and also as firewood.[22] There was a tendency in 19th-century forestry to try to convert

22 Alicia Unrau, Gero Becker and Raffaele Spinelli, *Coppice Forests in Europe*, Freiburg (Breisgau) 2018, URL: http://www.eurocoppice.uni-freiburg.de/coppice-forests-in-europe (accessed 01.04.2021).

coppices into timber forests that promised huge amounts of valuable wood. We can even conjecture this prioritization of high timber forests on the general map provided by Cotta.

Apparently, the symbolism of the colors implies an assessment of value. The intensive color leads the viewer to expect lumber of high quality grown in the timber forest. However, in 1802, the year the maps were completed, the forests close to Buchenau mainly consisted of not-so-valuable beech coppices, as indicated by the light brown. How long had the beech trees already been growing at Buchenau? How much yield could be expected from these rather small trees compared to high forests? Answering questions like these was the purpose of the specialized map **(Fig. 3)**.

Specialized maps focus on the internal organization of a forest section, and they serve as historical records of when each subsection was cut last. Color use on specialized maps differs from that on general maps. On specialized maps, the colors depict different soil types and their qualities. Additionally, there are densely written words, capital letters, Arabic numbers, small letters, and dots in some subsections; they indicate different tree species and their proportions in the forest cover. Each subsection is marked with a combination of capital letters and numbers. In the eastern corner of the Buchenau forest district, the counting starts with A1, followed by B2, B3, and B4, which together form a section that could also be treated as a compound cluster. Then there are C5, C6, and C7 right next to the latter area. The counting continues until subsection Z44, which was located on a mountain called the Hengstberg. Then the alphabet begins anew at the neighboring sections with the indexes AA45, AA46, and so on, until finally MM57 is reached at the top of the forest district. The numbers indicate the year in which the specific forest subsection should be logged, so foresters were supposed to cut A1 in the first year, followed by A2, and so forth. After fifty-seven years, cutting could start again at forest section A1, which would then consist of trees that would have regrown. In the logic of the forest map, each of the subsections would always provide fifty-seven-year-old trees after the first round had been completed. The alternation of logging and a regrowth period of fifty-seven years could, theoretically, be repeated eternally. The only condition was that everyone involved adhered to the plan.

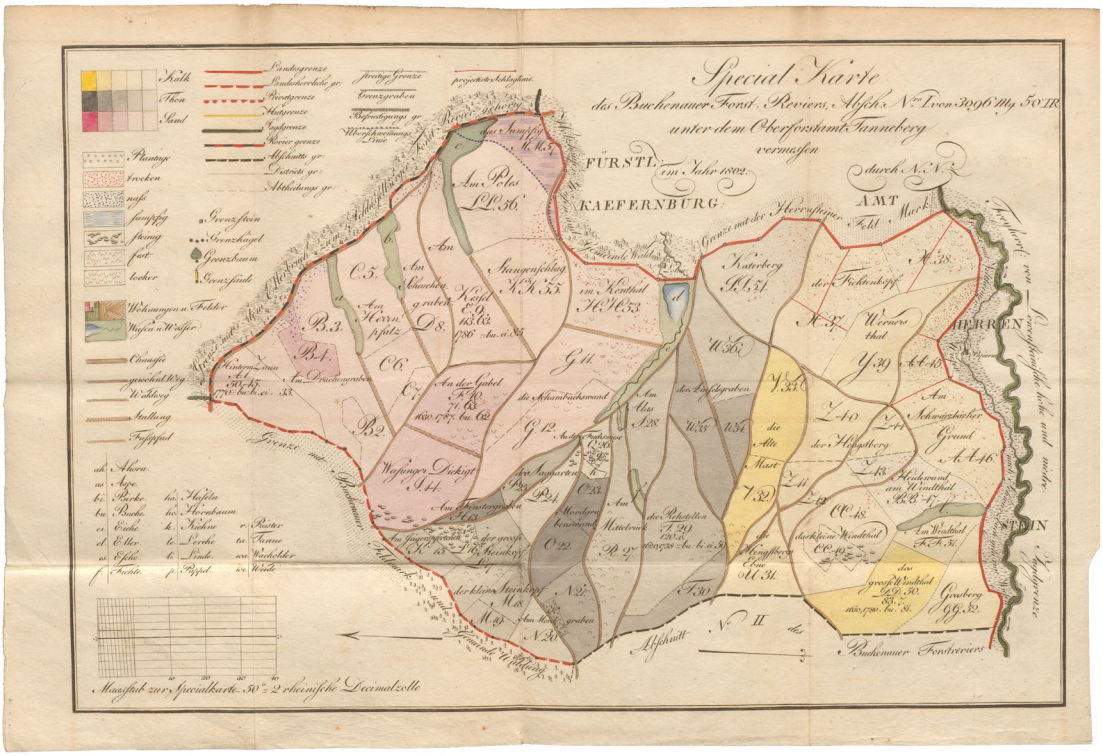


Fig. 3
Heinrich Cotta, Special map of the forest district Buchenau. Section No. I, from his *Systematische Anleitung zur Taxation der Waldungen*, Berlin 1804, before the title page.

The growing period of the trees was called the "Umtriebszeit," or "Umtriebsperiode," which translates as "rotation time" or "rotation period."[23] The forester's task was to define the rotation periods of each forest section by calculating the year in which logging would produce the highest possible timber yield based on local conditions. Cutting trees in an area whose turn had not yet arrived could endanger this system of "sustainable" forest management, as Cotta and other forestry scientists called it. Rotation periods have a long tradition in the history of forests. The practice of

23 Philipp 1900 (note 1), p. 46. For a contemporaneous definition, see "Umtrieb", in *Forstliches und forstnaturwissenschaftliches Conversations-Lexikon. Ein Handbuch für Jeden, der sich für das Forstwesen und die dazu gehörigen Naturwissenschaften interessirt*, ed. Georg Ludwig Hartig and Theodor Hartig, Berlin 1834, pp. 127–128.

subdividing a forest according to time periods may have been developed in the cultivation of coppice forests. On common land in Europe, a multiplicity of land-use practices usually coexisted. There was often a rotation cycle consisting of strictly clocked phases. For example, after trees were cut, the remaining bushes were burned and then the users of the shared coppice forests ploughed the fertile soil. The entitled community of users treated the area as agricultural land until the trees started to regrow after two or three years. Then sheep, cows, goats, or pigs were herded among the trees, until the wood had grown enough to be cut again. There were various historical systems of rotating land use on forest land that was common property.[24] But neither the general nor the specialized map in Cotta's textbook indicate the use of forest land as a pasture or for agricultural purposes.

Although the system of rotation cycles was probably inspired by rotating land-use practices in common forest land, forest maps solely depict aspects of land-use that were important for the mining industry, which was above all the production of timber and fuel. Even though, there is one pictogram on the legend called dwellings and fields ("Wohnungen und Felder"), the specialized map does not use this pictogram. Within the borders of the forest district Buchenau, all subsections are dedicated to the production of wood, and no space is left for pastures, agriculture, or other forest uses that were typical in coppice forests.

Before returning to land-use practices that were mainly excluded from wooded areas during the enclosure of common land, we should examine the other numbers noted on some of the subsections. The purpose of these numbers was to provide detailed information about how much and what kind of wood could be expected when the time for logging came.[25] Consider the area A1 as an example. It bears the name "Hinterm Zaun," meaning behind the fence. The numbers "50.45" indicate the size of the surface area in the local units of morgen and rods. The year when this coppice forest area was last cut is indicated with the number "1770," so thirty-two years

24 For an overview, see M. P. Eichhorn et al., "Silvoarable Systems in Europe – Past, Present and Future Prospects", in *Agroforestry Systems*, 67, 1 (2006), pp. 29–50; *Kollektive Weiden und Wälder. Ökonomie, Partizipation, Nachhaltigkeit – Pâturages et forêts collectifs. Economie, participation, durabilité*, ed. Anne-Lise Head-König et al., Zürich 2019.

before the map was created. The abbreviations "bu," "bi," and "ei" stand for beech trees, birch trees, and oak trees. The dots indicate that there are nine out of twelve parts beech trees, two out of twelve parts birch trees, and one part oak trees. The number at the end of this line indicates the amount of timber per acre estimated for the first round of cutting.

Cotta's intention was that these maps would remain usable for a considerable period. He also tried to make it easy for foresters to add new information without having to erase or paste over older calculations. For instance, it was possible to alter the proportions of tree species by adding new dots above or under the letters. In addition, Cotta propagated the advantage of adding the actually measured amount of timber after cutting was complete. The specialized map would thereby provide a means of "instructive control."[26] The calculations made in advance could be compared to the actual wood yield, resulting in what Cotta calls a "dense chronic of an area's forest economy and its success."[27] All in all, the system of annotation and cartographic representation served as an epistemic tool. It simultaneously contained knowledge about the depicted forest areas, their conditions, recent and anticipated changes in the forest topography, and the estimated and actual wood yields.

This meticulous system of annotation raises a number of questions. How were forest administrators trained to address land-use practices that actually disturbed the logic of the forest map? What practices defied the logic of strictly divided forest parcels that were mainly dedicated to the long-term production of timber? What happened when practices negatively impacted the amount of timber that could be felled at the end of one rotation period? Although the cyclical organization of coppice forests might have originally been an inspiration, Cotta's maps leave no space for alternating land-use practices. This is rather surprising if we consider some of his many other publications. A small essay from 1819, entitled *Die Verbindung des Feldbaues mit dem Waldbau*, advocates the combination of agriculture with forestry.[28] Cotta recommends planting fruit-bearing

25 Cotta 1804 (note 17), p. 73.
26 Cotta 1804 (note 17), p. 79.
27 Cotta 1804 (note 17), p. 80.
28 Heinrich Cotta, *Die Verbindung des Feldbaues mit dem Waldbau, oder die Baumfeldwirthschaft*, Dresden 1819.

trees at the borders of fields and on river banks. Indeed, he even suggests transforming forested areas into fields mixed with trees. But this publication was not successful in the scientific community. Instead, the plea for high timber forests with long rotation periods gained acceptance.[29] Using forests for agricultural purposes, which had been common, was forbidden for the sake of protecting timber forests that had to remain standing for long time periods in order to produce higher amounts of timber.

Land-use conflicts in the forests of Tharandt: collecting litter

Banning coppice forests with their alternating land-use practices led to conflicts. One such land-use conflict can be found in an archival document from 1830, entitled *Allgemeine Beschreibung vom Tharanter Walde*. In this general description of the Tharandt forest, Heinrich Cotta's son Wilhelm complains that the soil "has suffered from the practice of litter collection."[30] This argument was dominant in 19th-century forestry literature. Removing leaves, needles, and brushwood was said to result in a loss of nutrients in the soil, which in turn negatively influenced the growth of timber.

In fact, the collection of brushwood, ground litter, and tree leaves within the forest was a controversial agricultural practice in the 18th and 19th centuries.[31] Such ground litter, in German *Waldstreu*, was used to feed cattle in the stable during winter or as a means to collect farm animals'

29 On the impact of long-term forestry planning on biopolitics and current debates, see Julia Nordblad, "Time for Politics. How a Conceptual History of Forests Can Help Us Politicize the Long Term", *European Journal of Social Theory*, 20, 1 (2017), pp. 1–19.

30 Original quotation: "Obschon der Boden – wie dies bei einer so großen Fläche kaum anders zu erwarten steht – mitunter sehr dürftig ist, zum Theil durch Streunutzung ausserordentlich gelitten hat." Wilhelm Cotta, *Allgemeine Beschreibung vom Tharanter Walde*, 1830, UATUD, collection of the Forestry Academy in Tharandt, 753, fol. 3 (unpaginated).

31 On conflicts over the collection of ground litter in other German regions, see Bernd-Stefan Grewe, *Der versperrte Wald. Ressourcenmangel in der bayerischen Pfalz (1814–1870)*, Köln et al. 200; Christoph Ernst, *Den Wald entwickeln. Ein Politik- und Konfliktfeld in Hunsrück und Eifel im 18. Jahrhundert*, München 2000; Uwe Eduard Schmidt, "Waldfrevel contra staatliche Interessen. Die sozialgeschichtliche Bedeutung des Waldes im 18. und 19. Jahrhundert", *Der Bürger im Staat*, 51 (2001), pp. 17–23.

excretions to use them as manure on the field.[32] To some extent, peasants depended on ground litter to complement the hay produced on the fields. Laws that animals be housed in stables were another reason why the need for brushwood increased. Before the prohibition of forest pastures, it was common to bring cattle and pigs into the forest where they could forage and where their manure was left behind, thereby returning nutrients to the forest ground.

In Saxony, a forest ordinance from 1822 officially defined wood theft. According to the first paragraph, green wood, dry wood, trees growing on other tree's roots, wood already cut, and wood blown down by the wind should not be taken out of the forest without permission. In addition, this law banned the collection of resin, moss, and brushwood. Depending on the worth of the stolen forest products, convicted wood thieves had to go to prison for twelve days to three weeks.[33] The penalty reveals the highly controversial context of these criminalized practices of forest use.

Criminal records throughout Germany and Switzerland show a rise in the prosecution of people involved in wood theft in the first half of the 19th century. As a Prussian state, Saxony was affected by the Prussian law of 1822 that defined wood theft.[34] While this law abolished corporal punishments for forest offences, it also denied the accused the right to legal defense, because the courts were clogged with too many wood-theft cases. The trial records for wood theft often mention women. The French historian Michelle Perrot has pointed out that women often initiated and carried out conflicts and rebellions against forest officials.[35] However, women's involvement in 19th-century forest conflicts remains

32 For a description of litter-collection practices in Switzerland, see Martin Stuber and Matthias Bürgi, *Hüeterbueb und Heitisträhl. Traditionelle Formen der Waldnutzung in der Schweiz 1800 bis 2000*, Bern 2011.

33 Friedrich August von Sachsen, *Mandat über die Bestrafung der Holzdiebstähle und Baumfrevel*, 22.11.1822, UATUD, Institut für Waldpolitik, Forstgesetzgebung Sachsen (Abschriften 1821–1898), 270, § 1 Holzdiebstahl.

34 The trial records for wood theft in the Prussian Privy State Archives in Berlin-Dahlem have been analysed by the social historian Dirk Blasius in *Kriminalität und Alltag zur Konfliktgeschichte des Alltagslebens im 19. Jahrhundert*, Göttingen 1978, pp. 81–82.

35 Michelle Perrot, "Rebellische Weiber. Die Frau in der französischen Stadt des 19. Jahrhunderts", in *Listen der Ohnmacht. Zur Sozialgeschichte weiblicher Widerstandsformen*, ed. Claudia Honegger and Bettina Heintz, Frankfurt (Main) 1981, pp. 71–98, especially p. 84.

rather underrepresented in German social history.[36] At any rate, the mass prosecution of wood theft encouraged Karl Marx to publish several critical articles in the *Rheinische Zeitung* in 1842.[37] According to the young Marx, who had just graduated in philosophy, it was unfair to charge the poorest part of the population for delicts they depended on to have firewood and to feed their livestock. Furthermore, he pointed out, collecting brushwood and ground litter on someone else's property had been a customary right before it was abolished in the course of the enclosure of the commons. It is crucial to point out that these supraregional conflicts were caused by the mass prosecution of wood-theft cases and the abolishment of a variety of previously legal forest-use practices. Consequently, it is worth asking how the causes of wood-theft conflicts were related to methods of forest cartography.

When Wilhelm Cotta wrote *Allgemeine Beschreibung vom Tharanter Walde* in 1830, he had just graduated to the status of a master and was given the leadership position at the Institute for Forest Surveying at the Tharandt Forestry Academy. In the preceding years, he had gained working experience on land surveys in the Kingdom of Saxony and was then responsible for teaching forest management to international students.[38] In this position, Heinrich Cotta's son advocated forest-management maps for protecting the forests of Tharandt from destruction and exploitation. As Wilhelm Cotta puts it, the forester in command—who carried out forest mapping as recommended in textbooks—"diligently strove for the

36 There are several studies on the role of women and exhibited femininity in forest conflicts in the history of France. See, for instance, Chandra Mukerji, "The Great Forestry Survey of 1669–1671. The Use of Archives for Political Reform", *Social Studies of Science*, 37, 2 (2007), pp. 227–253; Peter Sahlins, *Forest Rites. The War of the Demoiselles in Nineteenth-Century France*, Cambridge 1994. On wood theft as a strategic form of social protest carried out by women and unmarried men, see Andreas Suter, *"Troublen" im Fürstbistum Basel (1726–1740). Eine Fallstudie zum bäuerlichen Widerstand im 18. Jahrhundert*, Göttingen 1985.

37 See Karl Marx, "Verhandlungen des 6. Rheinischen Landtags. Von einem Rheinländer. Debatten über das Holzdiebstahlgesetz", *Rheinische Zeitung* 298 (25 October 1842); Peter Linebaugh, "Karl Marx, the Theft of Wood, and Working-Class Composition. A Contribution to the Current Debate", *Social Justice*, 40, 1–2 (2014), pp. 137–161.

38 On the history of the application of forest management in Tharandt, see Wilhelm Cotta, "Ueber die Entwickelung des Taxationswesens in Sachsen", in *Forstliches Cotta-Album*, ed. J. von Pannewitz, Breslau et al. 1844, pp. 85–99.

regulation of ground litter collection in the forest in a more sustainable and ordered way."[39] This quotation reveals that forest-management maps were seen as a means for exercising control over land-use practices such as ground-litter collection that were considered a threat to the forest.

After the analyses of the maps taken from two different textbooks, I would claim that the paper practices involved in making forest maps have to be considered in the context of land-use conflicts in the first half of the 19th century. In the history of topographic media, it is of importance to attend to the epistemic violence that can be exerted through maps.[40] The aesthetics of Heinrich Cotta's maps captured and confirmed the ideal that forests should consist of strictly divided parcels. As scientific illustrations, forest maps made similarities between areas visible, such as similar soil conditions or stocks of trees. At the same time, the maps legitimated scientific arguments, for instance, in favor of timber forests that should be logged after predefined periods of rotation and that should produce a determined amount of timber. Ultimately, forest maps exercised epistemic violence against the knowledge and traditions of local people—in particular against land-use practices that did not fit the plan, such as collecting ground litter, practices that were regulated or banned in the process of making forest-management maps.

Conclusion

Cutting paper leads to multiple pieces or to an explicit division of the material. In the case of forest maps, the strict internal divisions of forest sections and subsections obviously resulted in a land-use regime that rendered it impossible to preserve a diversity of silvicultural practices. Cotta describes cutting out an area of a paper map and pasting a new sheet of paper under the maps as a typical 18th-century method for revising maps. He calls it an act of "hewing on paper." It seems as if this performative

39 Original quotation: "Er [...] trachtete überhaupt auf das eifrigste und gewissenhafteste dahin, die Streunutzung der Forste regelrechter und nachhaltiger zu gestalten." Cotta 1830 (note 30), fol. 13 (unpaginated).

40 For an overview on theories on epistemic violence, see Claudia Brunner, Epistemische Gewalt. Wissen und Herrschaft in der kolonialen Moderne, Bielefeld 2020.

act affirms the capacity to substitute one type of landscape with another one: a white sheet of paper that can be designed according to the planner's needs or a clearing where foresters can plant seedlings of one tree species and age class.

White spaces have a long tradition in the history of cartography as *terra incognita*—the land marked as unknown by mapmakers. Alexander von Humboldt also made use of white areas on his maps, not in the sense of terra incognita, but as an epistemic tool for drawing connections between different topographic aspects, as Amrei Buchholz has shown.[41] For Vierenklee, too, white spaces on forest maps played an important role as epistemic devices: blank spaces could be colored and, afterwards, the color intensity could be increased in the course of time according to the growth of the trees. The mapmaking strategy presented by Cotta with its system of rotation periods relied on white spaces as well. On specialized maps, white areas provided space to add notes, such as the actually measured amount of timber at the end of one rotation period or the year in which the last hewing took place.

According to the thesis of this paper, the possibility of pasting blank paper parts onto maps encouraged foresters to imagine and initiate abrupt changes in forest landscapes. Whenever the end of one rotation period was approaching, the cutting of trees would be repeated as an act of cutting and pasting inside the map. Heinrich Cotta strove for methods of mapmaking that would ensure the map's long-lasting adaptability. That is why he suggested an annotation system that would make cutting and pasting unnecessary. However, this new system builds on the modes of cartographic representation established under the influence of cutting, pasting, and dividing paper. Eventually, Cotta's efforts were linked to the aim of sustainable forestry to guarantee stable wood yields over long periods. But according to this system of topographic visualization, perfect control over forest growth could only be achieved in forest landscapes that had the same characteristics: one tree species and one age class per area. In the 19th century, forest maps in Europe were meant to represent and plan this kind of sustainable timber forest. Mixed forests and diverse

41 Buchholz 2020 (note 10), pp. 90–91.

land-use practices would not only jeopardize the aim of maintaining stable wood yields over long time periods; they would also disturb the system of rotation periods and the annotation system developed by Cotta and other forestry scientists. Taken all together, agrosilvopastoral land-use systems, with their interdependencies and fluent transitions, would have required different strategies of representation than the ones that were standardized during the foundation period of forestry schools after 1800.

To conclude, forest maps and the involved paper techniques did not merely represent the forest; they rather served as tools of knowledge that made forests legible and utilizable according to state administrations' priorities on wood-consuming economic sectors. The aesthetics of strict divisions on forest maps can be interpreted as a consequence of cutting and pasting as well as of adjustments to methods of subdividing paper in order to prescribe specific rotation periods to forest areas. These seemingly neutral paper practices thus facilitated politics of land-use that relied on strict boundaries between land parcels and that only allowed one land-use practice per area.

PASTE – PAPER – SCISSORS
GEOGRAPHICAL ASPIRATION MEETS HOBBYIST'S AMUSEMENT IN PHILIPPE VANDERMAELEN'S *ATLAS UNIVERSEL* (1825–1827)

Amrei Buchholz

Between 1825 and 1827, the Belgian amateur cartographer Philippe Vandermaelen (1795–1869) published the *Atlas universel de géographie physique, politique, statistique et minéralogique*, a project that was as fascinating as it was megalomaniacal **(Fig. 1)**.[1] The six volumes containing a total of 379 maps showed the entire surface of the earth at a scale of 1:1 641 836, which was unusually large at the time.[2] Moreover, the maps could be detached from the volumes, their margins cut away and the maps pasted together in such a way that the result was a huge model of the earth – a globe with a diameter of about 7 755m.[3]

The volumes of the *Atlas universel* cover, in the order in which they are numbered, Europe, Asia, Africa, North America, South America and Oceania, and include different numbers of individual maps, depending on the size of the continent. Vandermaelen also supplemented the first

1 Philippe Vandermaelen, *Atlas universel de géographie physique, politique, statistique et minéralogique*, 6 vols., Brussels 1825–1827. As closed books, the volumes have dimensions of approx. 56 × 41 cm each, which means that the lower edge of the sheets, when unfolded, measures around 80 cm in length.

2 This scale is comparable to that of today's common road maps of larger regions, such as in maps of England.

3 Examples of Vandermaelen's giant globe have not survived. However, the Princeton University Library has created a virtual 3D version, which can be accessed via the library's website: URL: https://lib-dbserver.princeton.edu/visual_materials/maps/websites/vandermaelen/video.mov?Submit=Video (accessed 30.05.2022).

Amrei Buchholz: Paste – Paper – Scissors. Geographical Aspiration meets Hobbyist's Amusement in Philippe Vandermaelen's *Atlas universel* (1825–1827), in: PASTED TOPOGRAPHIES (TERRAIN. STUDIES ON TOPOGRAPHIC VISUAL MEDIA 1), eds. Boskamp, Braun, Buchholz and Kranen, Heidelberg: arthistoricum.net, 2023, pp. 107–127, https://doi.org/10.11588/arthistoricum.1323.c18467

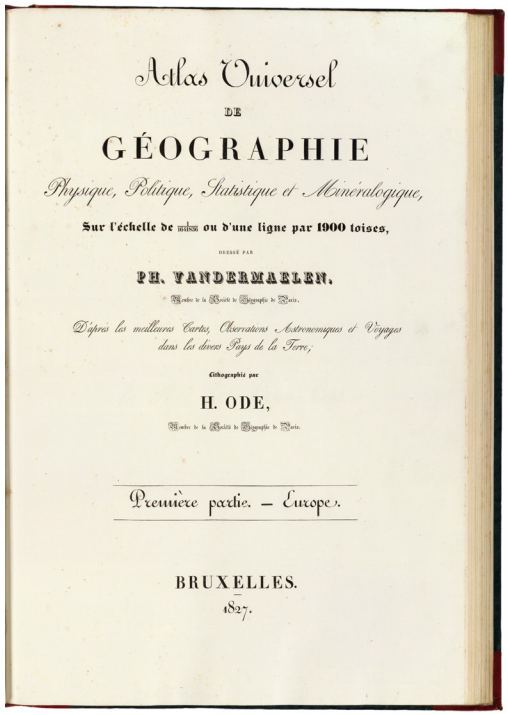

Atlas Universel
DE
GÉOGRAPHIE
Physique, Politique, Statistique et Minéralogique,
Sur l'échelle de millimètres ou d'une ligne par 1900 toises,
DESSINÉ PAR
PH. VANDERMAELEN,
Membre de la Société de Géographie de Paris.
D'après les meilleures Cartes, Observations Astronomiques et Voyages dans les divers Pays de la Terre,
Lithographié par
H. ODE,
Membre de la Société de Géographie de Paris.
Première partie. — Europe.
BRUXELLES.
1827.

Fig. 1
Philippe Vandermalen, title page from the *Atlas universel de géographie physique, politique, statistique et minéralogique*, vol. 1: *Europe*, Bruxelles 1827, lithography, 54 × 36 cm, David Rumsey Map Collection

volume with statistical tables featuring data on the areas, population sizes and troop strengths of various central European countries.[4] Each volume opens with a special map, a *Carte d'assemblage*, which assembles on one sheet all the maps contained in the volume in a single map **(Fig. 2)**. The maps are referenced with differently coloured and consecutively numbered contiguous rectangles, their numbering corresponding to that of the subsequent individual maps (**Fig. 3, Fig. 5**). The interconnectedness of the *Cartes d'assemblage* suggests that they can be understood as instructions on

4 The first volume of the *Atlas universel* additionally contains a dedication leaf for King William I of the Netherlands and a *Tableau comparatif* (comparative table) of mountain attitudes.

how to use the *Atlas universel*. They show how its maps can be assembled, first into images of the continents and finally into a coherent geographic model of the earth.

If all the maps of the six volumes are joined together, the result is a huge overall view of the earth's surface, comprising 30 maps from one pole to the other and 60 maps in the equatorial zone. Sea areas and poles remain blank in this overall view, since none of the atlas' volumes contains maps of these areas. However, as Vandermaelen explains in an accompanying sales brochure, these supplements could be acquired upon request: "Those of the gentlemen subscribers who wish to build a globe [...] are requested to let us know, and we will deliver to them all the sheets necessary to cover the surface of the globe [...]. These sheets, provided with the degree grid lines and meridians, will be provided for only 35 cents."[5]

In order to provide the final product, i.e. the globe composed of individual maps pasted together, the necessary stability, Vandermaelen advised users in the same brochure on the construction of a substructure on which the maps were to be fixed. The most suitable would be a wooden sphere that would protrude five centimetres at the equator to make it easier to distinguish the hemispheres. In order to protect the sensitive paper surface from the weather, it was further explained, the sphere should be placed indoors, in a room with a minimum size of 12 × 12 metres. Ideally, this room would be equipped with a gallery that could be accessed on both sides and that would also run around the centre of the globe to allow not only detailed observation from below, but also a close study of the northern hemisphere.[6]

5 Philippe Vandermaelen, *Atlas universel de géographie physique, politique, statistique et minéralogique. Prospectus*, Brussels 1827, pp. 6–7: "Ceux de MM. les Souscripteurs qui désireraient former un globe au moyen de la réunion des cartes, sont priés de nous en prévenir, et nous leur livrerons toutes les feuilles nécessaires pour couvrir la surface d'un globe du diamètre annoncé ci-dessus. Ces feuilles qui présenteront les parallèles et les méridiens, ne couteront que 35 cents". Cited from: Liliane Wellens-De Donder, "Le globe géant de Philippe Vandermaelen a l'Établissement géographique de Bruxelles", *Der Globusfreund*, 18, 20 (1970), pp. 130–133, here p. 130. The prospectus of the *Atlas universel* appeared in 1827 together with one part of the maps of the atlas in French and two years later also in English.

6 Wellens-De Donder 1970 (note 5), p. 131. The cost of building the globe was 2 947 guilders and 50 cents, plus the price for cardboard and copper circles; these were of a special kind which meant that their price could not be estimated in advance. The cost of building a gallery was estimated at 2 080 Dutch guilders.

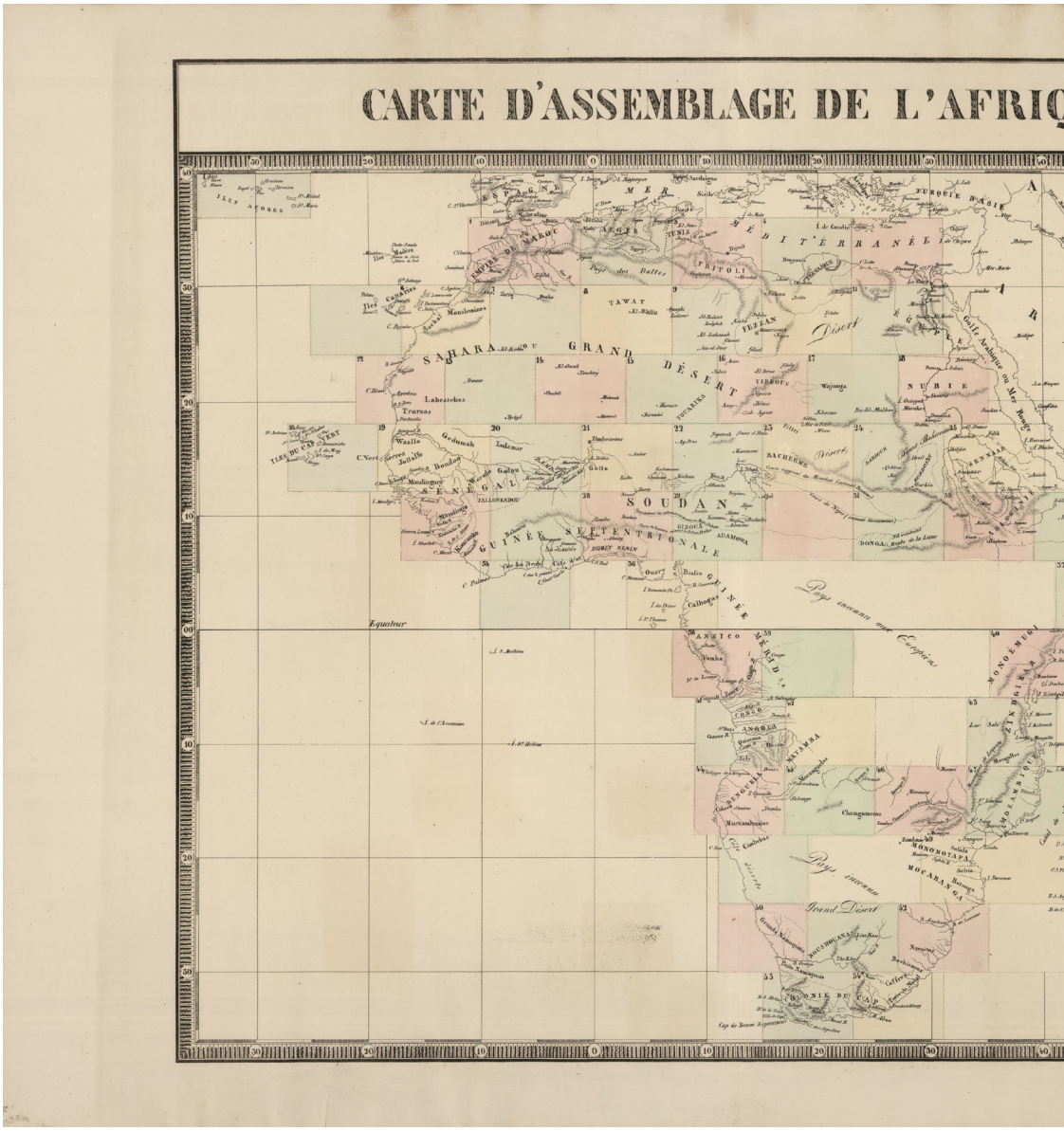
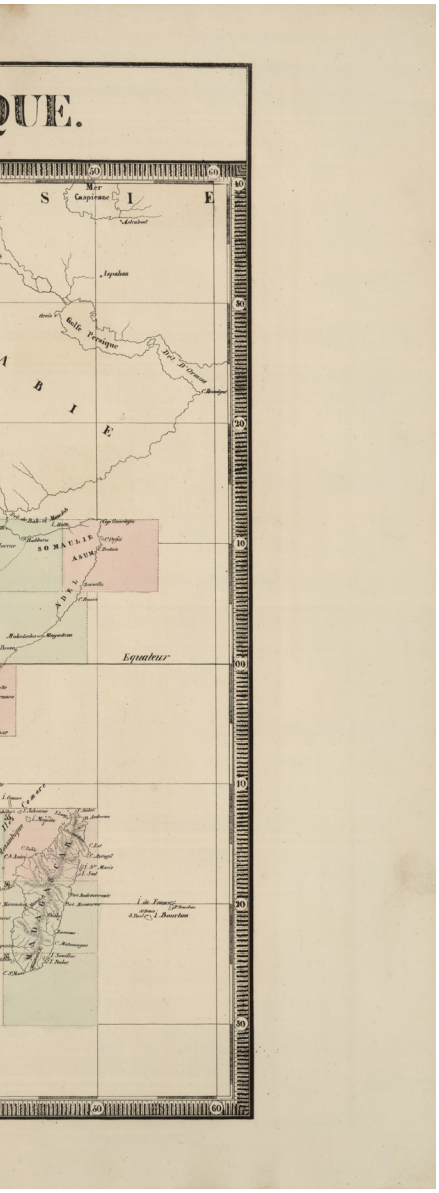


Fig. 2
Philippe Vandermaelen, Carte d'assemblage de l'Afrique, from his *Atlas universel de géographie physique, politique, statistique et minéralogique*, vol. 3: *Afrique*, Bruxelles 1927, lithography, 48 × 54 cm, David Rumsey Map Collection



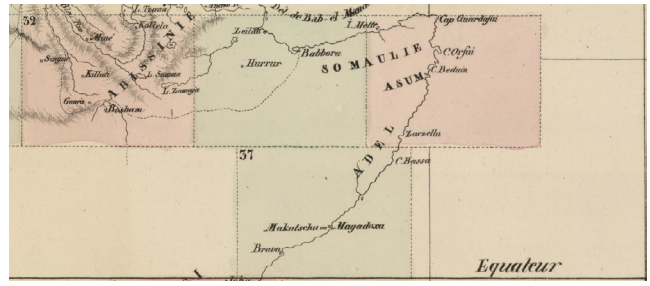


Fig. 3
Detail from Fig. 2

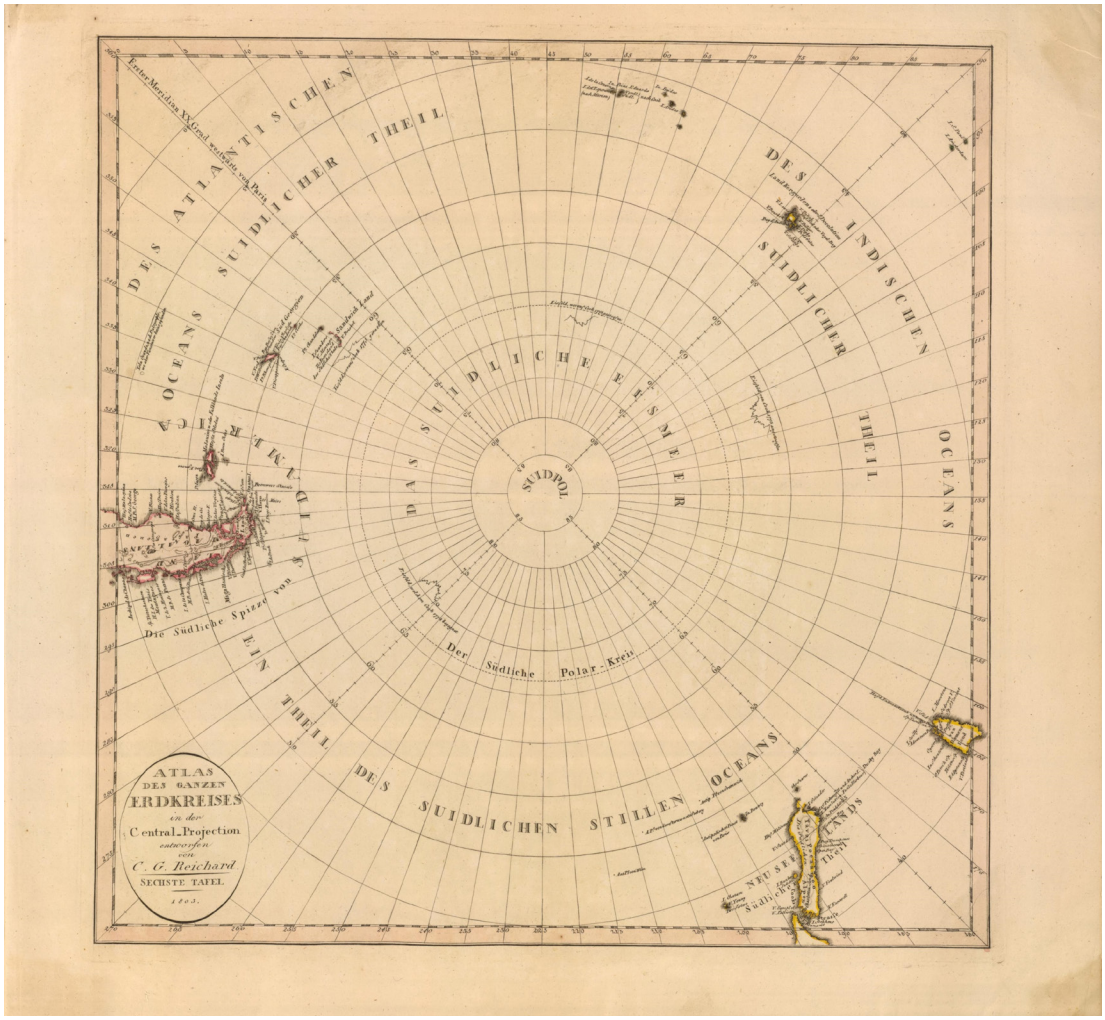


Fig. 4
Christian Gottlieb Reichard, Tafel 4 (map 4) from his *Atlas des ganzen Erdkreises, nach den besten astronomischen Bestimmungen, neuesten Entdeckungen und eigenen Untersuchungen in der Central-Projection auf VI Tafeln*, Weimar 1803, 43 × 43 cm, David Rumsey Map Collection

The sheer dimensions of this globe, and the enormous effort required for its construction, make Vandermaelen's project seem extraordinary, if not absurd. However, as a geographical product, it can be linked to a tradition of geographical representational practices in which maps could be assembled by consumers to construct a model of the earth. This tradition can be traced back about 500 years in Europe; the first samples date back to the early 16th century. Thus, they appeared only slightly later than the first known models of the *globus terrestris*, that is, three-dimensional models of the earth's sphere.[7] One of the best known early examples of a model of the earth that had to be assembled via gluing is Martin Waldseemüller's segment map of the globe of 1507, which, when glued on to a wooden sphere, results in a globe of almost 30 cm in diameter **(**Introduction of this volume, **Fig. 3).** Today, it is still possible to buy kits containing printed sheets of paper that can be used to construct a geographic model of the earth; these are introduced in more detail at the end of this article **(Fig. 6).**

A particular eagerness to experiment with the development of topographical paper models that were to be glued together by the consumer can be observed in the first half of the 19th century and thus during Vandermaelen's lifetime. In 1803 for example, only a few years before the publication of the *Atlas universel*, Christian Gottlieb Reichard (1758–1837) published his *Atlas des ganzen Erdkreises, nach den besten astronomischen Bestimmungen, neuesten Entdeckungen und eigenen Untersuchungen in der Central-Projection auf VI Tafeln* (Atlas of the Entire Circle of the Earth, According to the Best Astronomical Determinations, Latest Discoveries and his Own Investigations in the Central Projection on VI plates), whose six sheets could be glued together to form a cubic model of the earth **(Fig. 4).** The reasons behind the large number of such experimental self-assembly earth models at this time lie in a number of social and technical developments which began with the Age of Enlightenment and continued

7 Examples of celestial globes nevertheless date back much earlier, namely to the 2nd century, which is when our calculation of time originated. Although descriptions and calculations of the globe are also known from antiquity, there is no evidence of any terrestrial globes from this time. One of the earliest, if not the earliest example is a model made by Martin Behaim (c. 1459–1507) in Nuremberg in 1492 after Christopher Columbus reached the American coast. See Sylvia Sumira, *Globes: 400 years of exploration, navigation, and power*, Chicago 2014; *Die Welt in Händen: Globus und Karte als Modell von Erde und Raum*, ed. Lothar Zöger, Berlin 1989.

in the following decades. They affected geography, primarily, on account of the significant increase in the recording of geodata. Furthermore, new printing techniques made it possible to produce geographic products much more cheaply, and printed products could be distributed more easily and widely due to faster means of transportation. The target audience of the products also became more diverse: geographic products of various kinds were now no longer developed only for experts and specialized enthusiasts, but also for hobbyists and children.[8]

The *Atlas universel*, too, is an object that was evidently intended to appeal not only to a niche group, but to as broad an audience as possible. For whilst Vandermaelen clearly asserted its scientific value, as is expressed in particular by its dedication to the specialist world of geography, the demands it makes on consumers' own initiative as a self-assembly model points to its ludic, handcrafted quality. However, the purpose of either of these qualities was never truly achieved: while the time-consuming assembly of the giant globe was basically an impossibility, at least for private users, the atlas also missed the mark in terms of its scientific, geographical interest, for the geographic information contained in the maps was in large parts inaccurate.

This aside, what role is played by the practice of gluing in Vandermaelen's atlas and its classification? The assumption of this essay is that gluing is the key to approaching this contradictory project analytically, to locating its emergence in a particular time period, and thus to making it tangible as a historical phenomenon. The process of gluing is central here in that it can be linked to various developments at the time of the atlas' creation, both in terms of distribution and the incentive to buy. A wider audience wanted access to geographic products, which provided incentives for higher print

8 Maps were now in much greater demand for private use, for example, for travel undertaken for private purposes that was now taking place more frequently. Maps also fulfilled a new function in education, for example, where they were used as illustrations in books for children and young people. One example of this is Joachim Heinrich Campe, Robinson der Jüngere. On Enlightenment pedagogy see Jürgen Overhoff, *Die Frühgeschichte des Philanthropismus (1715–1771). Konstitutionsbedingungen, Praxisfelder und Wirkung eines pädagogischen Reformprogramms im Zeitalter der Aufklärung*, Tübingen 2013 [2004]. An unsurpassed overview of the development of cartography in the Enlightenment is provided by *The History of Cartography*, vol. 4: *Cartography in the European Enlightenment*, ed. by Matthew H. Edney and Mary Sponberg Pedley, Chicago 2020.

runs, increased the radius of distribution, and also led to creative and innovative product developments. Three aspects – the economic, the ludic and the scientifically educational – intertwine here and find a common denominator in the gluing process. This will be examined in more detail below in connection with the *Atlas universel*.

Production and distribution of the *Atlas universel*

Vandermaelen was not a professional cartographer, but from his youth he had taught himself cartographic drawing.[9] He came from a wealthy merchant family and was himself successfully involved in trade throughout his life. This enabled him to pursue his passion for geography, build up a large collection of geographic books and maps, and issue his own cartographic publications. In 1830, Vandermaelen also established his own geographic institution, the *Établissement géographique de Bruxelles*, which included a library, a map printing press, a museum and a planetarium.[10]

The *Atlas universel* was Vandermaelen's cartographic debut – and an extraordinary economic success. By 1829, 810 buyers had bought a copy, despite the steep price of 600 gold francs.[11] To attract buyers, Vandermaelen promoted his atlas widely, in Belgium and abroad, even before it was published. The first so-called delivery of the *Atlas universel* was

9 On the biography of Philippe Vandermaelen see Marguerite Silvestre, *Philippe Vandermaelen, Mercator de la jeune Belgique. Histoire de l'Etablissement géographique de Bruxelles et de son fondateur*, Brüssel 2016. According to an anecdote, Vandermaelen initially developed his enthusiasm for maps by tracing Napoleon Bonaparte's campaigns on maps and manually tracing the troop movements. Charles Sury, "Philippe Vander Maelen et l'établissement géographique de Bruxelles", *Ciel et Terre* (*Bulletin of the Société Belge d'Astronomie*) 40 (1924) , pp. 173–195, here p. 173.

10 Vandermaelen was honoured many times during his life for his geographic works, and he was also a member of numerous scholarly societies in Belgium and abroad. Despite these achievements, the *Établissement géographique* was closed and its collection distributed only a few years after Vandermaelen's death, in 1878. In 1880, large parts of the collection were transferred to the Royal Library of Belgium and to the Belgian *Institut géographique*. See Omer Tulippe, "Philippe Vandermaelen, cartographe et géographe 1795–1869", in *Florilège des sciences en Belgique*, ed. Académie royale de Belgique, Bruxelles 1968, pp. 531–549.

11 E. Gilbert de Cauwer, "Philippe Vander Maelen (1795–1869). Belgian map-maker", *Imago Mundi*, 24 (1970), pp. 11–20, here pp. 11–12.

finally launched in 1825, followed by 39 more until 1827.[12] In publishing it, Vandermaelen followed the then-common distribution method for expensive publications: several maps of the atlas were combined into bundles of maps that were delivered at the same time. It was only after a certain period of time, when all maps had been delivered, that the buyer had access to the publication in its entirety. Mostly, each of the deliveries was invoiced individually. In this way, Vandermaelen only had to pre-finance the production in stages, and the buyers could convince themselves of the quality of the maps before they accepted the next delivery. In addition, other factors supported the distribution of the atlas. Vandermaelen, for instance, benefited from the technical innovation of lithography: his maps were produced using this comparatively low-cost and fast printing technique, which he was apparently one of the first to use for cartography.[13]

A project of such magnitude as the *Atlas universel* was only made feasible by these production and distribution methods. To date, little research has been done on the implications of targeting consumers to actually assemble the giant globe themselves. It is also unclear whether Vandermaelen's intention was to generate consumer curiosity by selling the globe in this format, or whether he hoped it would generate an additional source of income – the construction of the globe required supplementary material, which Vandermaelen also wanted to supply. What is certain is that whilst the atlas became a great commercial success, the same cannot be said for the globe. Only the Royal Bourbon Library in Naples ordered the complete set of atlas sheets, including the oceanic survey maps. However, it is not known whether the globe was actually constructed there.[14]

Following the lack of response to his suggestion of gluing a globe together, Vandermaelen took the initiative himself. Initially, he tried to win over the city of Brussels for his project and have the globe erected for the industrial exhibition of 1830. After initial approval, however, the city administration put Vandermaelen on hold until a later date. Disappointed by this development, he completed his project himself. The plans drawn

12 Precise details of the size of the print runs are not known. Vandermaelen himself mentioned 40 copies in the prospectus of the *Atlas universel* (note 5).

13 De Cauwer 1970 (note 11) , pp. 11–12.

14 Wellens-De Donder 1970 (note 5), p. 131.

in 1831 from his Brussels-based *Établissement géographique* show a huge globe on the second floor. The globe was located in the library, which was housed in a high, domed room. It was mounted on a square map cabinet, three and a half square metres wide and one metre high. This allowed the southern hemisphere to be explored comfortably from a standing position, while a raised gallery that half encircled the globe enabled a closer look at the northern hemisphere.[15]

A pasted globe – crafting with the *Atlas universel*

The development of the *Atlas universel* coincides with the "invention" of leisure time, i.e. the assertion of a concept that distinguishes individual recreational time from working time. Along with the establishment of leisure time, activities to fill non-working time, e.g. tinkering in the field of handiwork, were also differentiated as such. The English term "handicraft" as well as the French term "bricoler" and the German term "basteln" describe these activities. As terms, they can be traced back to at least the 15th century. However, the English term "handicraft" even then included non-professional results of the handiwork produced, and it has not changed its meaning significantly over the centuries. The German and French terms, on the other hand, rooted in other meanings and changed their connotation in the 19th century in order to describe a leisure activity of simple manual work. Through the activity of "handicraft", "bricoler" or "basteln" leisure time was passed through engaging in a haptic, playful activity using various materials. Etymologically, the German term "basteln" contains the image that something is put together in the process: the verb "basteln", deriving from the noun "Bast", goes back to the activities of

15 The globe no longer exists; its fate is unknown. The last known mention of the object dates back to around 1890. The Belgian history professor Charles Terlinden reports that in his childhood he visited a room in the abandoned rooms of the *Établissement géographique* that "was almost filled with a huge globe whose pole almost touched the ceiling. It [...] could be moved by a simple pressure of the hand, despite its enormous mass." The globe thus seems to have lasted for some time after the dissolution of the *Établissement géographique*, perhaps until the death of Joseph Vandermaelen, Philippe's son, in 1894. See Charles Terlinden, "Vieux souvenires bruxellois. L'Institut géographique van der Maelen et ses collections vers 1888–1890," in *Cahiers bruxellois*, 10 (1965), pp. 284–287.

"lacing" or "tying". Gluing, an elementary component of handicrafts, serves precisely this purpose of joining and fixing something together. The clustered development of self-assembly geographic models in the early 19th century suggests that, in terms of cultural history, it was closely linked to the new developments in connection with leisure time in general and handicrafts in particular.[16]

The practice of gluing essentially determines the specific shape of the *Atlas universel* – both the structure of the volumes and the composition of the individual maps. The arrangement of the maps in a bound volume, thus in the form of a book, is always recognisable as only one alternative of two possible ways of presentation. With the visual guidance of the aforementioned *Cartes d'assemblage*, which show how the maps can be transformed into a cohesive unit, i.e. the globe, the conception of the *Atlas universel* is comparable to playful activities such as building paper models or doing a jigsaw puzzle. By means of cutting and gluing, the geographic segments can be transferred into a spatial continuum according to the instructions and assembled to produce such a globe. In this way, the geographic information contained in the map is combined in the *Atlas universel* with geographic pleasure. Due to its enormous dimensions and the effort required to produce the giant globe, it nevertheless pushes the rules for handicrafts that come with explanatory instructions to the limits of what is feasible, if not beyond.

The omnipresence of the practice of "pasting together" in the book form of the atlas is particularly evident in the maps, where the map image that is shown borders on the unintelligible. Thus, some maps mainly show open spaces, such as Map 37 on the Cote d'Ajan from Volume 3 on Africa **(Fig. 5)**. Others feature additional extensive text boxes or illustrations which also or exclusively refer to geographic features that lie outside the geographic section shown on the map.[17] These compositional decisions relating to the individual maps only become apparent when they are understood as parts of the larger order – the globe's surface.

16 See "basteln", in *Etymologisches Wörterbuch des Deutschen*, ed. Wolfgang Pfeifer et al., Berlin 1993, URL: https://www.dwds.de/wb/etymwb/basteln (accessed 02.03.2022).

17 Map 8 of the volume on North America, for example, shows part of the Canadian coast, and contains a profile section of a map of Mexico, originally drawn by Alexander von Humboldt.

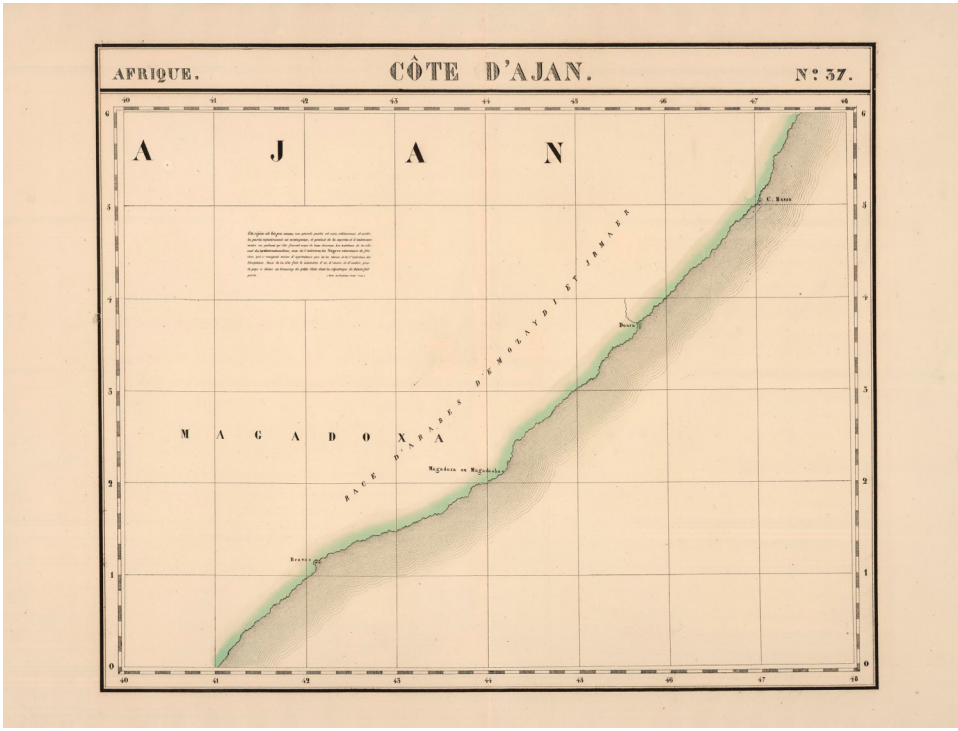


Fig. 5
Philippe Vandermaelen, *Cote d'Ajan* (map 37), from his *Atlas universel de géographie physique, politique, statistique et minéralogique*, vol. 3: *Afrique*, Bruxelles 1927, lithography, 47 × 57 cm, David Rumsey Map Collection

In order to actually make the globe realisable, Vandermaelen matched the maps to each other as if they were a kit. As he himself commented: "By underlaying our work with the conical projection method, we wanted to provide our subscribers a globe [...]; by this means, all the maps will be on the same scale".[18] The chosen scale of the maps also had to ensure their readability in both arrangements – in book form and as a globe – and that they were both visually appealing and rich in detail. This was probably

18 "En donnant à notre travail la projection par développements coniques, nous avons voulu procurer à nos souscripteurs, par la réunion des cartes, un globe [...]; et par ce moyen, toutes les cartes seront sur la même échelle." Vandermaelen 1827 (note 5), pp. 6–7. Cited in: Wellens-De Donder 1970 (note 5), p. 130.

one of the reasons why Vandermaelen decided on a scale that had not yet been used for a topographic representation of the entire surface of the earth of this size. But the large scale also presented Vandermaelen with problems because for some areas there was simply not enough geographic data available.[19] Hence, as contemporary readers noticed, Vandermaelen used geographic information quite freely and distorted it in such a way that it was distributed as evenly as possible on the map surface.[20]

For the sake of the overall project, Vandermaelen also attached little importance to scientific precision in technical decisions. However, great care was required, for example, in the selection of paper and in the printing process in order to ensure uniformity in the representations and scale of each map. The moisture that was produced by the printing process caused the paper to contract in unpredictable ways and to varying degrees as it dried on each sheet. Vandermaelen apparently did not take the necessary care and failed because of the "hygroscopic nature of the paper" ("hygroskopische Natur des Papiers").[21] Thanks to lithography, he was able to achieve rapid printing in large print runs and complete his project quickly at a relatively low cost.[22] However, the maps no longer consistently corresponded to the specified, uniform scale. In the end, even the construction of the globe became problematic because the map images no longer fit together seamlessly when glued together. It is possible that Vandermaelen relied here on the leeway created by the fact that the margins of the map first had to be cut away for assembly. This allowed for the sheets of paper, which had contracted to different degrees during the drying process, to be adjusted in size to ensure that they matched one another.

19 In a review of Vandermaelen's *Atlas universel*, Alexander von Humboldt remarked in this context: "Alone this state of our knowledge is lacking a great deal." ("Allein an diesem Zustande unserer Kenntnisse fehlt sehr viel.") Alexander von Humboldt, review of the "Atlas universel de Géographie physique, politique, statistique et minéralogique, [...] par Ph. van der Maelen, [...]. Lithographié par H. Ode – Erster Artikel", *Hertha – Zeitschrift für Erd-, Völker- und Staatenkunde* 11 (1828), pp. 383–415, here p. 387.

20 Humboldt (note 19), pp. 392–394.

21 Humboldt (note 19), p. 391.

22 Compared to printing with copperplate engraving, lithography did not result in such a clean line pattern, but production was much cheaper and faster. Vandermaelen was thus able to complete the Atlas universel in a manageable period of time despite the magnitude of the project.

Geographical ambition of the *Atlas universel*

The fact that Vandermaelen subordinated scientific precision to his gigantic handicraft project did not go down well with contemporary critics.[23] The reviews were largely unanimous in saying that the atlas could only be used by amateurs, not experts. Alexander von Humboldt, in particular, sharply attacked its neglect of geographic accuracy. Vandermalen had sent Humboldt copies of all volumes, hoping for a favourable review. Humboldt, however, criticised not only the data's lack of accuracy, but also the commercial character of the work, which in his view set it apart from what he considered to be a truly scientific product. Thus, while the speed of execution of the *Atlas universel* was to be admired, it was not a "true advancement of geographical science" ("[keine] wahre Förderung der geographischen Wissenschaft"). If Vandermaelen wanted to be recognised as a scientist, he should deliver "something efficient and good in the next of his works" ("in dem nächsten seiner Werke etwas Tüchtiges, Gutes [liefern]"). Its quality would then require no pompous advertising, i.e., no "sample riders [who] went out from Brussels in every possible direction [...] to offer for sale the atlas discussed here, as if it were like a new calico pattern, a practice in the distribution of literary-artistic products that, to use the general terms that prevail in Germany, would be beneath the dignity of even the most speculative buyer."[24]

23 Critics highlighted in particular its topographical inaccuracies, the irritating layout of the maps and the poor print quality. The *Atlas universel* was reviewed, among others, in the *Hertha*, in four separate parts, in the *Europäische Annalen* by Ernst Ludwig Posselt, the *Blätter für literarische Unterhaltung*, and in the *Isis*. The review in the *Hertha* of the first four volumes was written by Alexander von Humboldt, maybe co-authored with the journal's co-editor, Heinrich Berghaus. Vandermaelen himself had sent Humboldt each volume of the *Atlas universel* immediately after its publication.

24 Original German: "Musterreiter, die von Brüssel nach allen Windstrichen [...] ausgingen, um den hier besprochenen Atlas, gleichsam wie ein neues Kattunmuster, feil zu bieten, ein Verfahren bei dem Vertriebe von literarisch-artistischen Produktien, das nach den in Deutschland allgemein herrschenden Begriffen unter der Würde selbst des spekulativsten Kaufherrn seyn dürfte." All quotes: Alexander von Humboldt, review of the "Atlas universel de Géographie physique, politique, statistique et minéralogique, [...] par Ph. van der Maelen, [...]. Lithographié par H. Ode – Vierter und letzter Artikel", in *Hertha – Zeitschrift für Erd-, Völker- und Staatenkunde* 13 (1829), pp. 122–180, here p. 180. "Musterreiter" is probably a neologism of Humboldt's, which may be traced to the idiom "to ride the sample card" ("die Musterkarte reiten"). Merchants pinned samples

Vandermaelen himself obviously regarded his atlas as a scientific project, dedicating it to numerous geographical societies and making long lists of the works from which he had compiled the information for the atlas. Humboldt's assessment was nevertheless harsh and perhaps all the more critical because geography as a professional discipline was just beginning to emerge at this time. The professional community was striving to establish and legitimise it as a specialist area with its own scientific rules. In 1821, only shortly before the *Atlas universel* was published, the *Société de Géographie de Paris* was founded by 217 scientists with the goal of tracking, collecting and advancing developments in geography. Humboldt, who was a leading member of the society, even dismissed the *Atlas universel* as a joke:

> Mr. v[an] d[er] M[aelen] [has] made the suggestion [...] to unite the individual parts into a whole, i.e. to construct a globe. However, it seems to us that he was only joking when he asked his buyers to really glue all the sheets together. Are we to think the technical difficulties and the considerable costs, which are connected with the construction of an artificial globe of almost 24 Paris feet in diameter, have escaped him? For the installation of such a machine, a separate building would be necessary, and for its use the construction of galleries and other instruments, in order to be able to accomplish the journey around this world (in the small or in the large sense, as one wants to take it)! But no, Mr. v. d. M. does not mean it jokingly, but quite seriously [...].[25]

The severity of Humboldt's judgment seems to be based on his conviction in the clear separation between the world of science and that of the ludic.

of cloth, buttons or silk to card for customers to choose from. "Riding the sample card" meant moving across the country and selling textile goods using sample cards.

25 Original German: "Hr. v[an] d[er] M[aelen] [hat] den Vorschlag gemacht [...], die einzelnen Theile in ein Ganzes zu vereinigen, d. h. einen Globus zu konstruiren. Indessen will es uns bedünken: er habe nur einen Scherz getrieben, als er an seine Käufer das Ansinnen richtete, die sämmtlichen Blätter wirklich zusammenkleben zu lassen. Sollten ihm die technischen Schwierigkeiten und die beträchtlichen Kosten entgangen sein, die mit der Konstruirung einer künstlichen Erdkugel von beinahe 24 pariser Fuß Durchmesser verbunden sind? Zur Aufstellung einer solchen Maschine würde ein eigenes Gebäude erforderlich sein, zu ihrer Benutzung die Erbauung von Gallerien und anderen Vorrichtungen, um die Reise um diese Welt (im Kleinen oder im Großen, wie man's nehmen will) vollführen zu können! Doch nein, Hr. v. d. M. meint es nicht scherzhafter-, sondern ganz ernsthafterweise [...]." Humboldt 1828 (note 19), pp. 390–391.

The determination of the geographic society around 1800, expressed here, to assert itself in its scientific integrity against the ludic, can also be explained in terms of the history of science. Around 1800, older encyclopaedic knowledge orders were still making an impact, and their methods were now increasingly perceived as imprecise and unscientific. Their method of collecting items relating to nature, the sciences and the arts in so-called *Kunstkammern*, which since the Renaissance had been held predominantly in rulers' houses, had united the pillars of a (European-shaped) knowledge of the world. The idea of a *ludi naturae* had been fundamental to the formation of such collections.[26]

Geographical representations, especially maps and globes, had already played an important role in the *Kunstkammer*, and the scientific collections contained numerous geographical surveying instruments. By representing the opening up and exploration of the earth's surface, they symbolically gestured to the controllability of the world. The practice of gluing is also to be found in the *Kunstkammer* in this context. Among the experimental geographic representations was a celestial globe made for Kurfüst August von Sachsen (1526–1586) by the scholar Tilemann Stella (1525–1589) in 1553. The sheet, now lost, probably hung in the elector's *Kunstkammer* and apparently consisted of printed planispherical segments that could be mounted on a wooden cube.[27] Here, in a playful mode, the act of being able to assemble the globe itself and thus obtain an overview of the arrangement of the heavenly bodies in the sky enabled the ruler to comprehend the mastery and controllability of the cosmos.

26 A recent publication is the comprehensive anthology *Die Berliner Kunstkammer: Sammlungsgeschichte in Objektbiografien vom 16. bis 21. Jahrhundert* ed. Marcus Becker et al., Petersberg 2022; see also: Horst Bredekamp, *Antikensehnsucht und Maschinenglauben. Die Geschichte der Kunstkammer und die Zukunft der Kunstgeschichte*, Berlin 2007; Hartmut Böhme, "Ludi Naturae. Transformationen einer Denkfigur. Vorwort", in *Ludi naturae. Spiele der Natur in Kunst und Wissenschaft*, ed. Natascha Adamowsky et al., Paderborn 2011, pp. 1–15.

27 Barbara Marx, "Ergreifen, Begreifen. Das Reißgemach des Kurfürsten August in der Kurfürstlichen Kunstkammer im Residenzschloss Dresden" in *Fürstliche Koordinaten. Landesvermessung und Herrschaftsvisualisierung um 1600*, ed. Lena Thiel et al., Dresden 2014, pp. 31–68, here p. 60; for further details on Stella see: Ruthard Oehme and Lothar Zögner, *Tilemann Stella* (1525–1589). *Der Kartograph der Ämter Zweibrücken und Kirkel des Herzogtums Pfalz-Zweibrücken*, Koblenz 1989.

Vandermaelen seems to have pursued this idea, but in his project the idea of mastery and control gave way to a sense of overwhelm in three respects: the globe is neither intellectually nor physically easy to assemble; the end result of its heavy, gigantic round body can only be mastered with effort, and the abundance of data that the maps were supposed to show in order to meet the scientific demands of the time also apparently overwhelmed Vandermaelen in production. Although he never tired of emphasising the geographical merits of his project, he ultimately failed in the task of combining its playful and scientific aspects. Their separation manifests itself, as it were, in the gluing: as a comparatively simple and often imprecise technique that could also be carried out by the (lay) public, it conflicted with the scientific approach and ultimately led Humboldt to his judgment that Vandermaelen's proposal "to let the buyers of his atlas [...] really glue the entire sheets together" was most likely a joke.[28]

At this point, it is fair to say that a closer look at the practice of gluing in relation to the *Atlas universel* does indeed highlight the three aspects of the economic, the ludic and the educational, mentioned at the beginning of this article. However, upon assessment, it is clear that the three aspects do not stand alongside one other as equal or even complementary. Even in the atlas' contemporary reception, there was widespread unanimity that reaching for the scissors and glue amounted to a handicraft, a ludic product that strayed from scientific aspiration.

Pasted geographies – a geographical gimmick

Geographic and topographical-themed handicrafts are still widespread today in the sphere of leisure, and apparently quite in demand. Products are offered in numerous forms and sold in museum and stationery shops and online, among other places. One product is the "globe based on satellite photos" by the brand Schreiber **(Fig. 6)**, which entails the construction of a round body with a diameter of 38 cm and guarantees, according to the manufacturer, "for young and old [...] model building fun on rainy days."

28 Original German: "als er an seine Käufer das Ansinnen richtete, die sämmtlichen Blätter wirklich zusammenkleben zu lassen." Humboldt 1828 (note 19), p. 391.

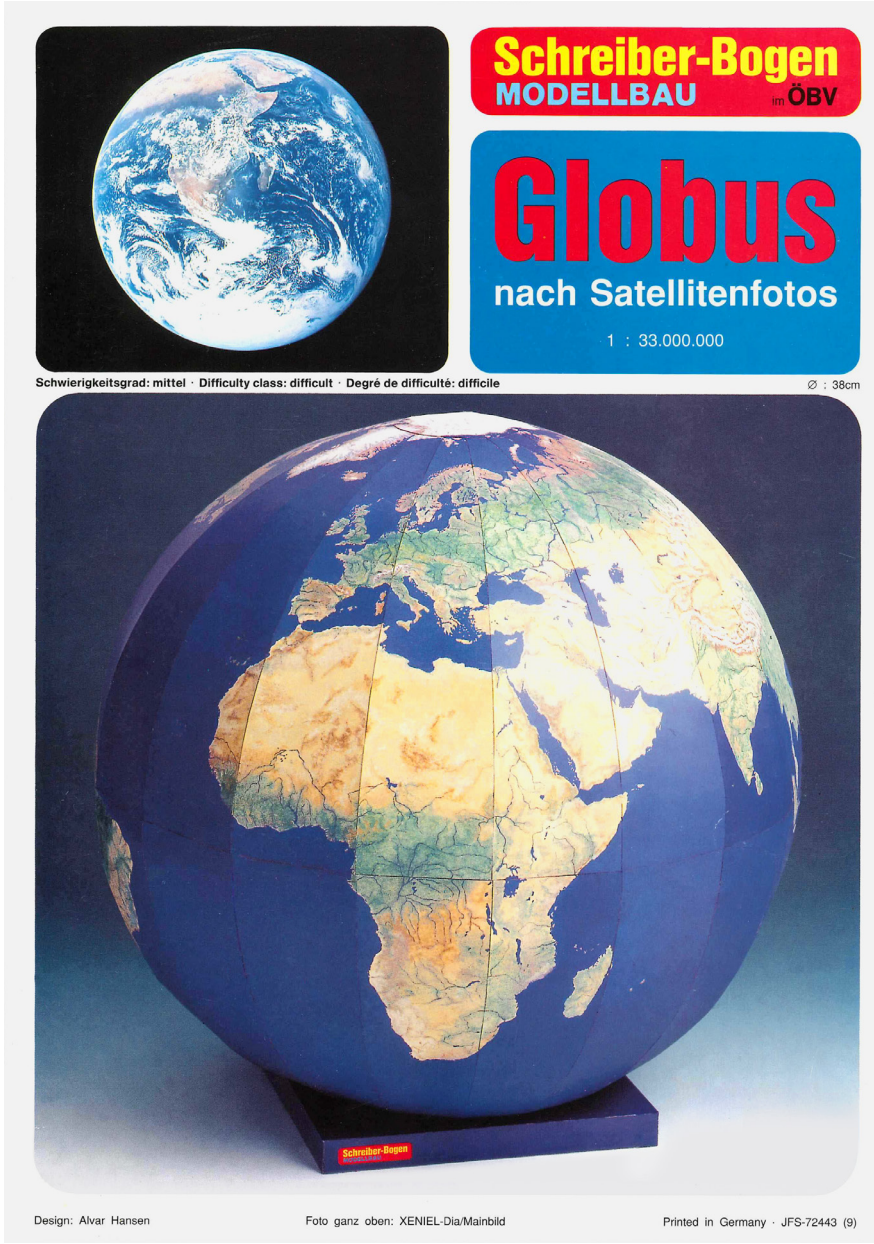


Fig. 6
Schreiber-Bogen Modellbau: *Globus nach Satellitenfotos*, design: Alvar Hansen, ed. Aue Verlag, Möckmühl: no date, paper, scale 1:33 000 000, 38 × 38 × 38 cm (dimensions of the assembled model)

The note that "patience and precision" are required presupposes a certain ambition on the part of the model-makers. Even reading the assembly instructions, which contain detailed information on how the total of 38 printed cardboard elements must be cut out, folded and glued together to form a model of the earth body, is time-consuming.[29]

The additional materials supplied with this product also provide access to more in-depth geographical knowledge. For example, a separate cardboard strip can be used to measure lengths and widths on the paper globe. Another strip features images of a ship and an aeroplane and indicates which average distance each means of transport can cover in a day (the ship) or in an hour (the plane). Holding the strip up to the paper globe enables the user to make imaginary journeys through space. The fact that historical geographical changes should also be taken into account on this mental journey is underlined by a note on the back of the cardboard strip: "In your imagination you can travel around the Earth in modern or nostalgic style. [...] If you [...] decide to sail with a historic vessel, please take into consideration the circumstances of the epoch, for example the opening dates of the Suez and the Panama Canals (1869 and 1914 accordingly)."[30] With a little effort, the globe can also be contextualized as a planet. The model kit comes with instructions that can be used to get "an exact idea of the size of the celestial bodies and the distance between the moon and the earth". For this purpose, the user needs to make a moon disk with a diameter of about 10 cm out of aluminium foil or cardboard and place it at a distance of 10 m from the earth model – for example in the garden or in a large hallway.[31] In this way, Schreiber's cardboard model provides the basis for an acquaintance with popular scientific geographic knowledge.

Unlike Vandermaelen's, Schreiber's globe is conceived from the outset as a purely recreational activity. Thus, it shows – and particularly clearly – the extent to which self-assembly is also bound up with a value judgement: the practice of gluing entails an imprecise process that is located in the

29 *Globus nach Satellitenfotos*, Schreiber-Bogen Modellbau, design: Alvar Hansen, ed. Aue-Verlag, no date, scale 1:33 000 000. The quotations are taken from the assembly instructions.

30 *Globus nach Satellitenfotos* (note 29).

31 Two "drawings" furthermore illustrate the vulnerability of the Earth's atmosphere, the relatively narrow thickness of the ozone layer compared to the Earth's diameter, and the altitude of satellite orbits. See *Globus nach Satellitenfotos* (note 29).

realm of leisure. Here is an important reason why the *Atlas universel* was not evaluated positively by the scientific community and failed to fulfil Vandermaelen's scientific claim. The glued-together globe and the materials required to build it meant that the precise representation of geographical data – unavoidable in the scientific field – was no longer possible. The type of presentation also plays a decisive role here. This is noticeable even in modern-day topographic projects like *Eartha*, for example. This huge rotating globe with a diameter of 12 metres, which is located in Yarmouth (Maine) at the headquarters of *DeLorme*, a producer of satellite and navigation technology, is surprisingly reminiscent of the dimensions of the *Atlas universel*. Here, too, it is clear that *Eartha*'s immense globe belongs to the realm of the fascinating, and of the amateur. Scientific data, on the other hand, require a medium that enables their precise inspection and transparency regarding not only how they were collected, but also their further use. Thus, the geographic gluing work required by the *Atlas universel* marks it out as belonging to the realm of the amateur, where geographic data are adapted in such a way that they correspond to an overarching whole that satisfies the hobby geographer, and where material and intellectual gaps – adhesive seams – do not necessarily have to be closed.

PICTURE-EDITING AS SPYWORK
EMILE LACHAUD DE LOQUEYSSIE'S PAPERS FROM HIS MISSIONS TO BRITAIN (1857–1861)

Ulrike Boskamp

The pictorial material this essay deals with would normally not have been preserved, as it was merely preliminary work used for further processing. Also it was sensitive material that was not meant to fall into the hands of others, in order to keep the activities that led to their production confidential. France's military archive holds three large sheets used by the reconnaissance officer Francois-Henri-Jean-Baptiste-Emile Lachaud de Loqueyssie as supports on which drawings and notes in pencil, ink, and watercolours, featuring views, maps, plans and sections of British landscapes, towns and military architectures as well as field notes were compiled.[1]

Loqueyssie produced this material on various espionage missions to southern England, undertaken on behalf of the French military between 1857 and 1861. Upon his return, in the course of preparing his final reports, he glued or pasted these papers onto the large sheets. Their subject matter concerns various regions of military interest in England: Portsmouth and its environs (*Portsmouth, Portsea et Gosport*, **Fig. 1**),[2] the fortifications and

1 Loqueyssie's missions were first mentioned in Sébastien Laurent, *Politiques de l'ombre. État, renseignement et surveillance en France*, Paris 2009, pp. 164–165, p. 203.

2 *Notes sur Portsmouth en 1860 / Gosport / Ayant servi aux redactions faites en 1861*, Portsmouth folder, Paris, 1VM 326.

I thank my friend Aude Gobet who provided me with invaluable help with the archival research at the SHD in Paris-Vincennes during and also after the pandemic.

Ulrike Boskamp: Picture-Editing as Spywork. Emile Lachaud de Loqueyssie's Papers from his Missions to Britain (1857–1861), in: PASTED TOPOGRAPHIES (TERRAIN. STUDIES ON TOPOGRAPHIC VISUAL MEDIA 1), eds. Boskamp, Braun, Buchholz and Kranen, Heidelberg: arthistoricum.net, 2023, pp. 129–155, https://doi.org/10.11588/arthistoricum.1323.c18468

emergency port of Portland (*Chateau de Portland et Port de Refuge*)[3] and the British defences along the Thames (*Angleterre-Tamise / Ft. Tilbury, batteries de Gravesend, &c.,* **Fig. 2**).[4] The folders in which these sheets are kept contain a great many other very similar but loose pictorial and textual materials from Loqueyssie's missions that represent different stages of his editorial processes.

These materials shed light on two steps in the production of pictorial knowledge by the French military: firstly, the making of spy drawings and notes in the field by a reconnaissance officer travelling abroad, and secondly, the editing work he undertook upon his return. For military purposes it was only the final products, the edited reports, that were of interest. The task of composing these, and especially of producing the accompanying visual materials, was completed after the missions in the Paris office of the *Dépôt des fortifications*. The fact that the ephemeral materials used for the preparation of such reports still exist is remarkable. In military archives of the period, great importance was attached to the economical handling of stored information, so as to ensure it was as quickly accessible and as comprehensible as possible in the case of a military emergency. Raw image and text materials such as these were therefore usually not kept after the final drawings and reports were completed.[5]

However, the extraordinary surplus of information in the present case study also comes with an absence: of the final report that Loqueyssie prepared, only the texts have survived. The pictures, maps and plans, which were the final products of the picture edits investigated here and are referred to several times throughout the written report, were separated from the texts at an unknown time and have so far remained untraceable in the archive. The direct connection between the preparatory sheets and the final clean drawings can therefore not be established.

3 *Chateau de Portland et Port de Refuge*, Paris, SHD, 1VM 326.

4 *Angleterre / Tamise (Ft. Tilbury, batterie de Gravesend, &c)*, Paris, SHD, 1 VM 326.

5 It is possible that the papers described in the following form part of Loqueyssie's estate. When an engineer deceased, his family was obliged to hand over his private portfolios to the military without inventorising them, in order to protect the secrecy of the informations they might contain. See Emilie d'Orgeix, "Collections et portefeuilles de plans: projets et dessins d'ingenieurs militaires en Europe du XVI^{e} au XIX^{e} siècle", in *Portefeuilles de plans. Projets et dessins d'ingenieurs militaires en Europe du XVI^{e} au XIX^{e} siècle*, ed. Vincent Maroteaux and Emilie d'Orgeix, Bourges 2001, pp. 5–11, here pp. 9–11.

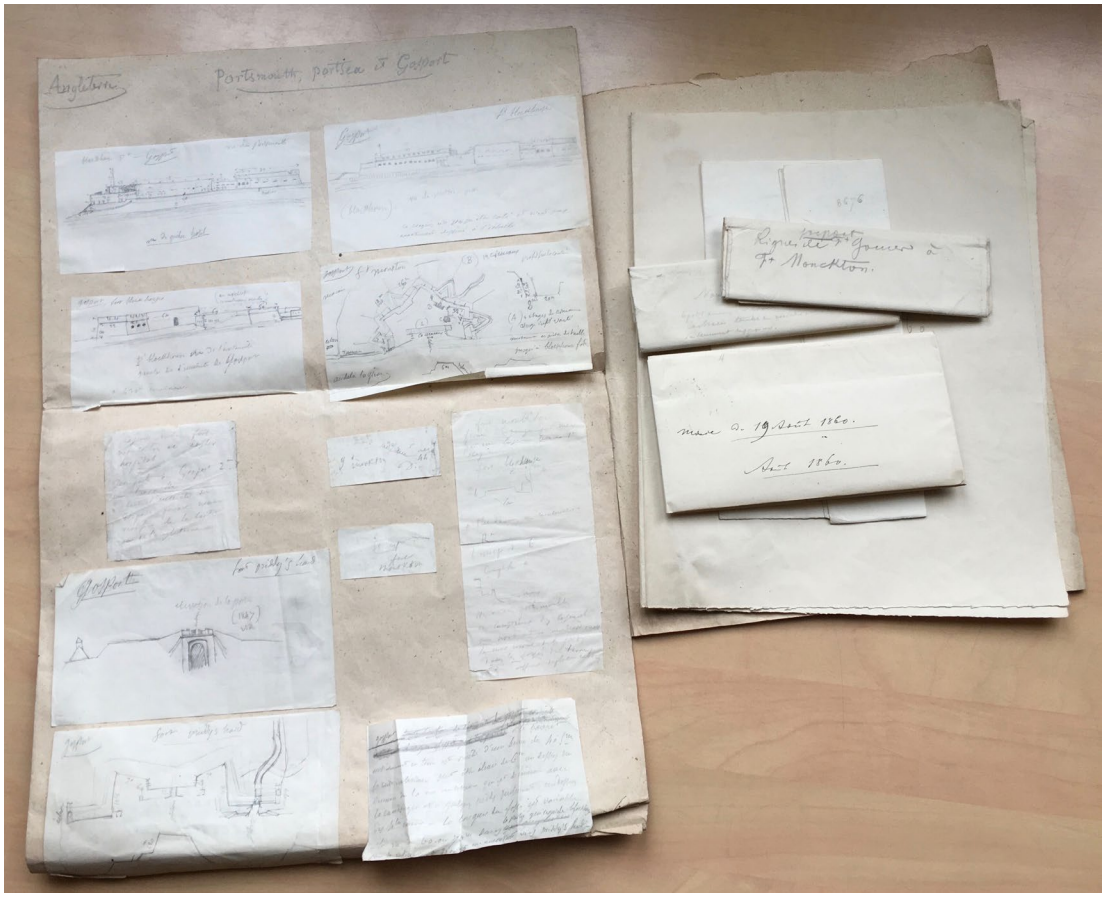


Fig. 1
Emile Lachaud de Loqueyssie, Preparatory sheet *Portsmouth, Portsea et Gosport* and other papers, © Service historique de la Défense, 1 VM 326

In this article, Loqueyssie's preparatory sheets are presented, analysed and contextualised as unusual and rare materials, in which the technique of pasting or gluing together, facilitating the compilation of images and notes, is one step in the working process of military image production. They provide an exemplary case for analysing this process in the French military in the 19th century.

François Henri Jean-Baptiste Émile Lachaud de Loqueyssie (1815–1874) was an exceptionally successful spy. He was the son of the German artist

Fig. 2
Emile Lachaud de Loqueyssie, Preparatory Sheet *Angleterre-Tamise / Ft. Tilbury, batteries de Gravesend, &c.*, inside, 32.8 × 47.7 cm,
© Service historique de la Défense, 1 VM 326

Emilie Hebenstreit (1788–1863)[6] and the French nobleman Antoine Jean-Baptiste Lachaud de Loqueyssie (1782–1872).[7] The couple lived in Dresden after their marriage in 1814,[8] but Loqueyssie was born in Paris, in 1815. After a childhood and youth probably spent in Dresden, he attended the military academy in Lyon in France, followed by a four-year training as a military engineer, first at the *École polytechnique* in Paris (1838/39)[9] and then at the *École d'application de l'artillerie et du génie* in Metz (1840/41). Loqueyssie seems to have been involved in surveying, cartography and topographical mapping from the beginning of his military career. He was stationed in 1843 as an engineering officer in Oran in present-day Algeria, which had been mapped as a French colony by the occupying forces since 1830.[10] In 1851, he married Jacqueline Chas (b. 1828),[11] a Parisian living in Oran. He returned to France a year later and, after two more postings, was appointed chef de bataillon at the *Dépôt des fortifications* in Paris in 1856. Loqueyssie became a reconnaissance officer, i.e. a military spy sent

6 There is evidence of a number of portraits and miniatures by Emilie Lachaud de Loqueyssie, née Hebenstreit in the Dresden collections and in the sales of various auction houses. A brief entry in Thieme-Becker hardly does her justice. She regularly contributed paintings to the exhibitions of the Dresden Art Academy between 1808 and 1812. For references see *Journal des Luxus und der Moden*, 23 (1808), p. 415; 25 (1810), p. 314 and p. 350; 27 (1812), p. 361.

7 The couple's wedding took place in Dresden on 18 April 1814. Loqueyssie's father probably came to Dresden with Napoleon in 1813.

8 Loqueyssie's parents founded a school for girls in Dresden in 1828; cf. Emilie Lachaud de Loqueyssie, "Prospectus einer Erziehungsanstalt für Töchter in Dresden, unter der Leitung der Frau Loqueyssie", *Allgemeine Schulzeitung*, 126 (24 October 1829), cols. 1001–1007.

9 Loqueyssie's professional curriculum vitae is preserved in his personnel file of the French military, Paris, SHD, GR 4YF 97 455. He is mentioned as a pupil in *Annuaire de l'École royale polytechnique*, 6 (1838–1839), p. 71.

10 Saddek Benkada, "Savoirs militaires et modernité urbaine coloniale. Le rôle des ingénieurs du génie dans la transformation des villes algériennes: le cas d'Oran (1831–1870)", *Insaniyat / تايناسنإ : Revue algérienne d'anthropologie et de sciences sociales*, 23–24 (2004), pp. 135–150, URL: https://doi.org/10.4000/insaniyat.5478, paragraphs 4–12. Loqueyssie's tasks included the translation of a document from the Spanish War Ministry on the historical fortifications of Oran and its harbour Mers-El-Kebir. A copy of this document from 1772 had been transmitted from Spain to Oran via the French embassy in Madrid; see Benkada 2004, paragraphs 15–20. For the document itself see "Description générale des places d'Oran et de Mers-El-Kébir et de leurs chateaux et forts. Traduction des capitaines Cassaigne et de Loqueyssie 1851. Préface de M. le Commandant G. Pellecat", *Bulletin trimestriel de géographie et d'archéologie (Société de géographie et d'archéologie d'Oran*), 47, 44, fasc. 67 (1924), pp. 91–130.

11 The marriage certificate of Loqueyssie and Joséphine Chas, dated 9 January 1851, is kept in Paris, SHD, GR 4YF 97 445.

on missions abroad. Between 1857 and 1872 he went to a large number of European countries on such missions. In addition to England, his destinations included Belgium, Holland, Prussia, Italy, Corfu, Malta and Gozo.[12] He usually travelled in the summer or autumn for a period of one to three months. In 1867, Loqueyssie reconnoitered the German border regions along the Rhine and thereby acquired a specialised knowledge of the topography there.[13] Shortly afterwards, he took part in the Franco-Prussian War, having risen to the rank of colonel. In October 1870 he was wounded in the siege of Metz, became a German prisoner of war and was interned in Dresden until April 1871. After his return to Paris, he undertook at least one more mission to Sicily, but died in 1874 from the after-effects of an illness contracted during the war.[14] Loqueyssie's training at the engineering school and his military experience were probably not the only factors that enabled him to pursue his profession. It is likely that the knowledge acquired from growing up in two cultures, a bilingual upbringing and also probably an early artistic education from his mother contributed to his success.[15]

12 In July 1859, Loqueyssie travelled to the Isle of Wight (Paris, SHD, 1 VM 326). In 1867 he travelled to the Prussian border regions of the Rhine and to England, Italy, Corfu, Malta and Gozo. From July to September 1868 he travelled to England, Prussia and Italy. In 1869, he went to England, focussing on trains, and to Prussia, focussing on fortresses (Paris SHD, 1 VM 301, folder "1861–1869").

13 In 1867, Loqueyssie's missions took him to Mayence and to other parts of the border region; see folder "1861–1869", Paris, SHD 1 VM 301, and "Rapport sur les différentes places de guerre dans les pays Voisins du Rhin" of 28 April 1867 in Paris, SHD, GR 1M 1539.

14 For Loqueyssie's biography, see for example the obituary in *Le petit Journal* (21.12.1874), p. 3: "M. Emile Lachaud de Loqueyssie, colonel du génie, officier de la légion d'honneur, vient de mourir à Fontainebleau, à la suite d'une longue et cruelle maladie dont il avait contracté le germe pendant le siège de Metz, que rendit incurable son transport, comme prisonnier en Allemagne, et qui l'avait obligé, il y a deux mois, à prendre sa retraite. M. de Loqueyssie était un des officiers les plus instruits et les plus distingués de l'arme (sic!) du génie. Attaché au dépôt des fortifications pendant de longues années, il fit preuve, en cette qualité, de connaissances speciales très étendues qui lui valurent d'Etre chargé par l'empereur de recherches scientifiques et archéologiques qui furent d'une grande utilité pour l'Histoire de Jules César. [...]" Other obituaries with the same or slightly abbreviated text appeared for example in the following three journals: *Le Journal de l'Ain* (23.12.1874); *La France: politique, scientifique et littéraire* (21.12.1874); *Journal de Toulouse: politique et littéraire* (02.01.1875); *Le Républicain de la Loire* (24.12.1874).

15 On this see also Ulrike Boskamp, *Gefährliche Bilder. Zeichnerinnen und Zeichner unter Spionageverdacht*, Berlin 2022, pp. 213–220. Loqueyssie seems to have spoken several languages. In the course of his career, he translated Spanish and English-language military literature on the construction of fortifications into French. An example is

Founded in 1791, the *Dépôt des fortifications* where Loqueyssie was employed until the end of his career had its headquarters in the Hôtel du Comité at 84 rue Saint-Dominique in Paris.[16] This institution oversaw the documentation of military architecture and fortifications both in France and abroad and maintained the historical collection of pictures and maps of the French kings.[17] One of its central tasks was to procure information on foreign fortifications, their architecture, armament and personnel. This task was fulfilled by reconnaissance missions undertaken by specialised officers.

Loqueyssie's pasted preparatory sheets date from the time of his intensive reconnaissance of the British south coast around 1860. The French interest in Britain's coastal defences and topography at this specific period was caused by the British government's decision to improve its defence infrastructure on the south coast. In British politics, the fear of an invasion from France had begun to spread in the 1840s.[18] Although relations between France and the United Kingdom, consistently at war throughout the 18th century, had been good since 1830, the rivalry between the two great European powers persisted. The basic military set-up of each country had changed little over the years: while Britain relied on its fleet and acted primarily as a naval power,[19] France's relationship with Britain had, owing to its strong land force, since the 18th century been characterised by the fantasy of invasion, and thus driven by the continuing challenge of how to get its army across the English Channel. From 1847, the British began

his French-language summary of a "Rapport sur un ouvrage américain trainant des embrasures des casemates" by the American military author J. Cotten from 1757, dated 25 January 1860, Paris, SHD, GR 1M 1681.

16 The Hôtel du Comité was built for this purpose between 1826 and 1829; cf. Nicole Salat and Emmanuel Pénicaut, *Le dépôt des fortifications et ses archives (1660–1940): Archives du génie, répertoire numérique détaillé de la sous-série 1V du Service historique de la Défense*, Paris 2011, p. 77.

17 On the history and organisation of the *Dépôt des fortifications* see Salat and Pénicaut 2011, pp. 21–87; Michael Bourlet, "Les périphéries européennes dans les archives de la guerre (1850–1914)", in *La France face aux crises et aux conflits des périphéries européennes et atlantiques du XVII^e au XX^e siècle*, ed. Frédéric Dessberg and Éric Schnakenbourg, Rennes 2010, pp. 183–190.

18 Freddy Woodward, *Forts or Follies? A History of Plymouth's Palmerston Forts*, Tiverton 1997, pp. 34–36.

19 On this constant in British military policy, cf. Norman Longmate, *Island Fortress. The Defence of Great Britain 1603–1945*, London 1993.

to reinforce the fortifications on the south coast, partly extending them in the manner of the Prussian system of fortification with detached ring or girdle forts built around the main fortresses, as for example in Portsmouth, Plymouth, Portland and Pembroke.[20] This construction activity was prompted by two contemporary military and technical developments that had been tested in the Crimean War in 1855. The first of these was the improvement of long ranged weapons, and the second the invention of steamships. New long-range grenade launchers had been in use by both the French and the British to arm warships since the late 1830s.[21] While it had initially been assumed that they would render older defences obsolete, in the Crimean War it became clear that stable fortifications were still very effective, even when confronted with modern weaponry.[22] Equally, the efficiency and resilience of metal-clad steamships had been proven during the Crimean War. So when in November 1859 the French launched *La Gloire*, their first steam-powered, iron-clad warship equipped with grenade launchers, this signalled a clear threat to the United Kingdom. Because these steamships were only designed for short distances – unlike the British wooden fleet –, they could be used as a "steam bridge" across the English Channel by French invasion troops.[23]

When Lord Palmerston (1784–1865), the most zealous herald of a French attack, was elected British Prime Minister in 1858, he immediately appointed a commission "to Consider the Defences of the United Kingdom".[24] Their work resulted in the recommendation not to fortify the entire south coast, but only to selectively strengthen the defences of the most relevant locations.[25] In February 1860, Parliament approved an exceptionally large budget for these new fortifications. They were named "Palmerston Forts", but due to their high cost were soon popularly renamed "Palmerston Follies". It was these new and renewed defences that Loqueyssie was entrusted with scouting over several years. In his report on a three-month reconnaissance trip in 1858, he described his assignment:

20 Woodward 1997 (note 18), p. 46.
21 Woodward 1997 (note 18), p. 35.
22 Woodward 1997 (note 18), p. 42.
23 Woodward 1997 (note 18), pp. 43–44.
24 David Brown, "Palmerston and Anglo-French Relations, 1846–1865", in *Anglo-French Relations since the late 18th Century*, ed. Gwyn Stone and Thomas G. Otte, London 2007, pp. 41–58; Woodward 1997 (note 18), p. 45.
25 This concerned the military dockyards at Portsmouth, Plymouth, Chatham and Pembroke, the arsenal at Woolwich and the emergency ports at Dover, Portland and Cork set up for the withdrawal of the fleet.

> The itinerary presented to me in 1858 for the reconnaissance of the fortresses, ports of refuge and beaches of England includes the following:
> 1. With regard to the coasts of the English Channel:
> Portsmouth, the Isle of Wight, the coasts between Southampton, Poole and Weymouth, the work on the harbour of refuge and the fortifications of the Portland peninsula, the coasts between Exmouth, Torbay and Berryhead, and finally the reconnaissance of the fortress of Plymouth and its surroundings.
> 2. With regard to the Thames estuary:
> Reconnaissance of the forts and batteries of Gravesend, the Chatham Fortress and the investigation of the right bank of the Thames Estuary from Gravesend to Ramsgate.[26]

So the aim of this mission was twofold: firstly, to spy out British defences on the south coast opposite France and on the Thames, the main waterway to London, and secondly, to study two other coastal regions, doubtlessly in order to identify those stretches that might be suitable for the landing of steamships. In the following years, the ongoing construction work on the British defences resulted in further targets for reconnaissance trips, until the attention of French politics and military turned to the German border areas in the late 1860s.

In order to understand the role of Loqueyssie's preparatory sheets in the working context of the *Dépôt des fortifications*, I will first briefly look at how the results of a French reconnaissance mission around 1850 were generally processed and recorded. Usually, various visual media ("feuilles de dessin", "plans", "cartes") were appended to a written report ("mémoire" or "notice"). General instructions for writing such final reports, dated to

26 Original French: "L'Itinéraire qui m'a été presenté en 1858 pour la reconnaissance des places, des ports de refuge et des plages de l'Angleterre, comprend 1. Pour les côtes de la Manche: Portsmouth, l'Ile de Wight, les côtes comprises entre Southhampton, Poole et Weymouth; puis les travaux du port de refuge et les fortifications de la presqu'ile de Portland; les côtes comprieses entry Exmouth, Torbay et Berryhead; enfin la reconnaissance de la place de Plymouth et de ses environs. 2. Pour l'embouchure de la Tamise: la reconnaissance des forts et batteries de Gravesend, la place de Chatham et l'examen de la rive droite de l'embouchure de la Tamise depuis Gravesend jusqu'à Ramsgate." Lachaud de Loqueyssie, *Rapport Sommaire sur les reconnaissances faites en Angleterre pendant les mois de Juillet, Aout et Septembre 1858* (draft), dated October 1858, 9 pages, Paris, SHD, 1 VM 301, folder "1845–1860", p. 1.

Fig. 3
Emile Lachaud de Loqueyssie, Papers from a notebook with drawings from a paper sleeve, inscribed "Gosport, Lignes de Ft. Gomer à Ft. Monckton", each ca. 4.1 × 8.3 cm, Folder Portsmouth, © Service historique de la Défense, 1 VM 326

1868, make it clear that the main focus lay on the production of pictorial information, especially maps and plans.[27] The written reports were meant to supplement these, and were to be strictly limited to information that could not be communicated by a plan or map, like for example ground conditions: "The notes are purely complementary to the maps. They must not contain anything that can be seen with ease on the map. When dealing

27 *Notes et Instructions pour les officiers envoyés en Mission ou en reconnaissances pour la Redaction des Notices et Itineraires, Instructions pour la rédaction des notices*, 1868, Paris, SHD, 1M1577.

with the geographical details, one will indicate where possible only those topographical details that cannot be shown on the maps."[28] The pictorial and cartographic material is thus given paramount importance, presumably based on the assumption that in military practice, the pictorial transmission of information is more efficient than the textual.

Using the sketches and texts he made during his missions, it is possible to partially reconstruct Loqueyssie's working process in the field. He drew and wrote in pencil on very small pieces of paper measuring between about 4 × 8 cm and 8 × 15 cm, some of which appear to have been taken from tiny notepads **(Fig. 3)**.[29] These miniature drawings are labelled with additional information and explanations about directions, measurements, distances or the nature of materials or soils. Other sheets contain only written notes. The location of the recording is indicated on almost every single one of these tiny slips of paper. Those belonging to the same place were numbered consecutively as a series, then folded in half, and wrapped in small piles in a protective sheet of paper which was then inscribed with the name of the place.[30] It is likely that Loqueyssie arranged his papers in this way on his trips. Their miniature format made it possible to hide them in his clothing. In the above-mentioned rules of conduct for French reconnaissance officers, it was recommended that, as a matter of principle, they should always carry all relevant documents with them: "As far as possible, they will keep their maps, photographs and notes with them and not in their suitcases."[31] Hiding small notes close to the body was a common espionage practice. A hundred years earlier, two French engineers arrested on the Isle of Wight were found to have concealed the results of their

28 "Les notices sont seulement un complement des cartes. Elles ne devrant rien contenir de ce qu'on peut voir facilement sur la carte. On entrera dans les details géographiques et on ne donnera autant que possible que les détails topographiques qui ne peuvent être marqués sur les cartes." *Notes et Instructions pour les officiers envoyés en Mission ou en reconnaissances pour la Redaction des Notices et Itineraires, Instructions pour la rédaction des notices*, 1868 (note 27).

29 See also Boskamp 2022 (note 15), pp. 217–219.

30 In the "Portsmouth" folder in Paris, SHD, 1 VM 326, there are several such series of small drawings, for example of the forts of Priddy's Hard, Fort Gomer and Fort Elson near Gosport, as well as of the fortifications in Gosport itself.

31 Original French: "Autant que possible, ils conserveront sur eux et non dans leurs valises, leurs cartes, leurs photographies, et leurs notes." *Notes et Instructions pour les officiers envoyés en Mission ou en reconnaissances pour la Redaction des Notices et Itineraires, Recommandantions Verbales*, 1868, Paris, SHD, 1 M 1577.

mission, small-format plans and notes, by sewing them into the lining of their clothes.[32]

Loqueyssie's editing of his sketches after his return to Paris was no doubt a lengthy task. Due to the extremely high importance attributed to pictorial information in the *Dépôt des fortifications*, probably a large number of images was produced during reconnaissance missions. A military spy who successfully returned to Paris had to sift through and organise the documents he had brought back with him in order to put the information into the conventionalised pictorial and textual form of a military report. This involved neatly drawn ground plans and elevations as well as sections, maps and views showing the location of the structure in the terrain. The accompanying text – to be kept as short and precise as possible – was to explain the (construction) history and special features, and to provide additional information about the type and extent of the fortification's armament and personnel, as well as an assessment of the possibility of its military capture.

The pictorial results of the reconnaissance missions were filed in the *Dépôt des fortifications* together with the final text reports. They were ordered under the heading "places étrangers" – foreign fortresses – alphabetically by town (not by country), or by the name of the fortress itself. Within these files, one or more sheets contained a table of contents for each fortress or fortified place, documenting all the espionage missions that had been undertaken there; these were numbered consecutively, and the dates and the names of the reconnaissance officers responsible were provided. Also, the content sheets list and describe each individual archived document on the place in question.

A good example of the structure and scope of such a report is that of Loqueyssie's most intensive reconnaissance trip in England, a three-month

32 *The London Magazine, or Gentleman's Monthly Intelligencer*, 26 (1757), p. 543: "[...] upon searching them, in the linings of their coats were found draughts of all our harbours and rivers, plans of all our fortifications on the sea coasts, finely executed, with the number of guns and weight of metal in every fortified place; a book, in manuscript, with their remarks on the above scheme for landing of troops, where most practicable; a list of all our men of war which went on the secret expedition, with their number of guns, men, and troops."

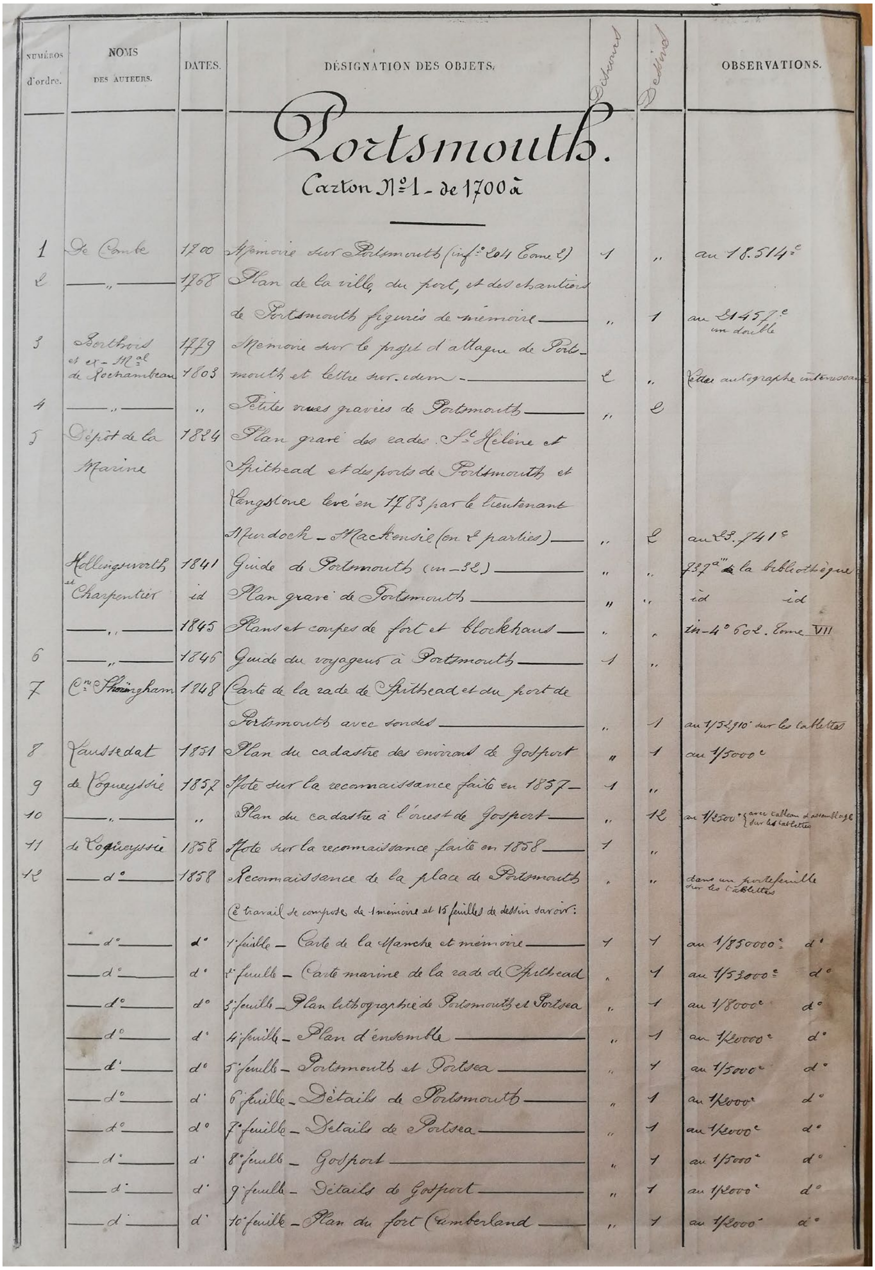
mission in 1858 which concentrated on the region of Portsmouth.[33] Portsmouth was the most important place on the English Channel for the British fleet. Not only was there a large natural harbour, the entrance to which was protected on the south side by the fortified town of Portsmouth and on the north side by the equally fortified town of Gosport. Portsmouth was also home to a large military dockyard and the British Naval Academy. In addition, the waters between Portsmouth and the Isle of Wight, the "Spithead", served as a retreat for the Channel Fleet, which was responsible for the defence of the English Channel. Several additional fortifications were built in the late 1850s to protect this extremely important military area. The table of contents for the spy reports from Portsmouth in the archive **(Fig. 4)** shows that Loqueyssie travelled to Portsmouth on twelve different reconnaissance missions between 1857 and 1868.

Loqueyssie's very detailed report combining the results of the 1858 and the shorter 1857 missions to the Portsmouth area is preceded by an extensive list of the weapons as well as the personnel of 15 individual forts.[34] In the report itself, there are practical chapters on the attack possibilities and the defence of this specific military topography, as well as remarks on the history of the region. The table of contents lists and describes 15 illustrations ("feuilles de dessin") appended to the report. Despite the fact that they are now missing, the list is illuminating: the pictorial materials were archived and ordered according to the size of the (map) section, from a large-scale overview of the whole region to small-scale plans of the forts. The first sheet is a map of the English Channel, followed by a map of a sub-area, the Straits of Spithead, then by two lithograph maps of Portsmouth and the adjacent Portsea at a scale of 1:8 000,[35] then by more

33 *Mémoire sur les Reconnaissances faites à Portsmouth en Aout 1857 et en Juillet 1858*, Paris, SHD, 1 VM 237. On the key role of the Portsmouth region for the British defence see Ulrike Boskamp, "Suspected Prospects. Art, Topography and Identity in the Portsmouth Area around 1800", in *The Itineraries of Art. Topographies of Artistic Mobility in Europe and Asia 1500–1900*, ed. Karin Gludovatz, Juliane Noth and Joachim Rees, Ostfildern 2015, pp. 259–286.

34 This "Legende génerale de la place de Portsmouth" is chapter 1 of *Mémoire sur les Reconnaissances faites à Portsmouth en Aout 1857 et en Juillet 1858*, Paris, SHD, 1 VM 237.

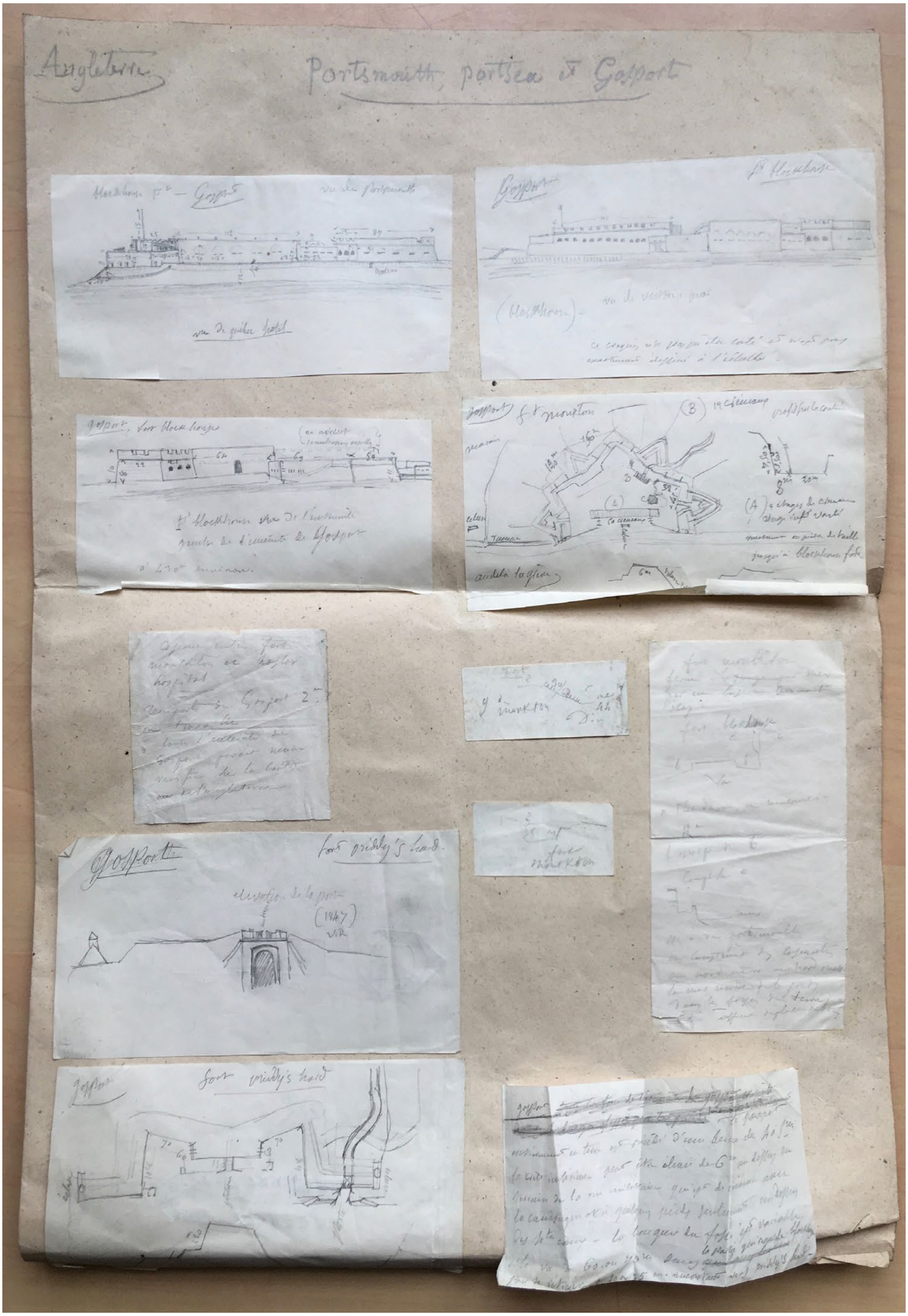
35 This printed map, probably made or commissioned by Loqueyssie himself, was certainly not a one-off. Such maps were printed in order to have up-to-date map material on hand for the troops in the event of war.



NUMÉROS d'ordre.	NOMS DES AUTEURS.	DATES.	DÉSIGNATION DES OBJETS.	Écrits	Dessinés	OBSERVATIONS.
			Portsmouth. Carton N°1 – de 1700 à			
1	De Combe	1700	Mémoire sur Portsmouth (in-f° 204 Tome 2)	1	,,	au 18.514e
2	——,,——	1768	Plan de la ville, du port, et des chantiers de Portsmouth figurés de mémoire ——	,,	1	au 21457e un double
3	Borthois et ex-Mal de Rochambeau	1779 1803	Mémoire sur le projet d'attaque de Portsmouth et lettre sur idem ——	2	,,	Lettres autographe intéressante
4	——,,——	,,	Petites vues gravées de Portsmouth ——	,,	2	
5	Dépôt de la Marine	1824	Plan gravé des rades S.te Hélène et Spithead et des ports de Portsmouth et Langstone levé en 1783 par le lieutenant Murdock – Mackensie (en 2 parties) ——	,,	2	au 23.741e
	Hollingsworth et Charpentier	1841	Guide de Portsmouth (in-32) ——	,,	,,	737e à la bibliothèque
		id	Plan gravé de Portsmouth ——	,,	,,	id id
	——,,——	1845	Plans et coupes de fort et blockhaus ——	,,	,,	in-4° 602. Tome VII
6	——,,——	1846	Guide du voyageur à Portsmouth ——	1	,,	
7	Cne Sheringham	1848	Carte de la rade de Spithead et du port de Portsmouth avec sondes ——	,,	1	au 1/52910e sur les tablettes
8	Laussedat	1851	Plan du cadastre des environs de Gosport	,,	1	au 1/5000e
9	de Loqueyssie	1857	Note sur la reconnaissance faite en 1857 —	1	,,	
10	——,,——	,,	Plan du cadastre à l'ouest de Gosport ——	,,	12	au 1/2500e {avec calque d'assemblage sur les tablettes
11	de Loqueyssie	1858	Note sur la reconnaissance faite en 1858 ——	1	,,	
12	—— d° ——	1858	Reconnaissance de la place de Portsmouth (Ce travail se compose de 1 mémoire et 15 feuilles de dessin savoir:	,,	,,	dans un portefeuille sur les tablettes
	—— d° ——	d°	1re feuille – Carte de la Manche et mémoire ——	1	1	au 1/850000e d°
	—— d° ——	d°	2e feuille – Carte marine de la rade de Spithead	,,	1	au 1/53000e d°
	—— d° ——	d°	3e feuille – Plan lithographié de Portsmouth et Portsea	,,	1	au 1/8000e d°
	—— d° ——	d°	4e feuille – Plan d'ensemble ——	,,	1	au 1/20000e d°
	—— d° ——	d°	5e feuille – Portsmouth et Portsea ——	,,	1	au 1/5000e d°
	—— d° ——	d°	6e feuille – Détails de Portsmouth ——	,,	1	au 1/2000e d°
	—— d° ——	d°	7e feuille – Détails de Portsea ——	,,	1	au 1/2000e d°
	—— d° ——	d°	8e feuille – Gosport ——	,,	1	au 1/5000e d°
	—— d° ——	d°	9e feuille – Détails de Gosport ——	,,	1	au 1/2000e d°
	—— d° ——	d°	10e feuille – Plan du fort Cumberland ——	,,	1	au 1/2000e d°

Fig. 4
Table of content for the reports of French reconnaissance missions to Portsmouth, © Service historique de la Défense, 1 VM 237

Fig. 5
Emile Lachaud de Loqueyssie, Preparatory sheet Portsmouth, Portsea et Gosport, front, 49 × 32.2 cm, © Service historique de la Défense, 1 VM 326


Angleterre
Portsmouth, portsea & Gosport

detailed plans of these two places and of Gosport at an even larger scale, supplemented by sheets with details. Finally, six large-scale plans feature the newly built forts around the town of Gosport.[36]

The three pasted sheets by Loqueyssie in the archive can be identified as preparatory works for the production of the coloured, large-format drawings in the final reports from trips undertaken in different years. This can be inferred from their inscriptions: "Sketches that served for the editing of the 1858 reconnaissance trip to Portland" or "Notes on Portsmouth 1860/ Gosport/ served for the editing undertaken in 1861".[37] The different purposes of these sheets can be deduced, at least in part, even without the final drawings.

I will address the most obvious function of these preparatory sheets first. Papers with images and texts on a specific theme or motif could be

36 Paris, SHD 1V M 237. The heading, entered on a pre-printed sheet, reads: "Portsmouth, Carton No 1 de 1700 à". The columns of the form are headed as follows: "Numéros d'ordre/ Noms des auteurs/ Dates/ Designation des objets/ Discours/ Dessins/ Observations". In the following transcription, these divisions are separated by "/".
"12/ -do-/ 1858/ Reconnaissance de la place de Portsmouth/" /"/ dans un portefeuille sur les tablettes
Ce travail se compose de 1 mémoire et 15 feuilles de dessin savoir:
/-d°-/ d°/ 1.feuille - Carte de la Manche et mémoire/ 1/ 1/ au 1/850000e d°
/-d°-/ d°/ 2. feuille - Carte marine de la rade de Spithead/ "/ 1/ au 1/53000 d°
/-d°-/ d°/ 3. feuille - Plan lithographie de Portsmouth et Portsea/ "/ 1/ au 1/8000e d°
/-d°-/ d°/ 4. feuille - Plan d'ensemble/ "/ 1/ au 1/20000e d°
/-d°-/ d°/ 5. feuille - Portsmouth et Portsea/ "/ 1/ au 1/5000e d°
/-d°-/ d°/ 6. feuille - Details de Portsmouth/ "/ 1/ au 1/2000 d°
/-d°-/ d°/ 7. feuille - Details de Portsea/ "/ 1/ au 1/2000 d°
/-d°-/ d°/ 8. feuille - Gosport/ "/1/ au 1/5000 d°
/-d°-/ d°/ 9. feuille - Details de Gosport/ "/ 1/ au 1/2000 d°
/-d°-/ d°/10. feuille - Plan du fort Cumberland/ "/ 1/ au 1/2000 d°
[end of sheet]
12/ de Loqueyssie/ 1858/ 11. feuille - fort Southsea/ "/ 1/ au 1/1000 dans un portefeuille sur les tablettes
/-d°-/ d°/ 12. feuille - Fort Blockhauss/ "/ 1/ au 1/1000 d°
/-d°-/ d°/ 13. feuille - Fort Monckton/ "/ 1/ au 1/1000 d°
/-d°-/ d°/ 14. feuille - Fort Gomer/ "/ 1/ au 1/1000 d°
/-d°-/ d°/ 15. feuille - Fort Elson/ "/ 1/ au 1/1000 d°"

37 Original French: "Croquis ayant servi à la redaction de la reconnaissance faite en 1858 à Portland"; "Notes et Croquis ayant servi à la redaction de Portsmouth"; "Notes sur Portsmouth en 1860 / Gosport / Ayant servi aux redactions faites en 1861", Paris, SHD, 1VM 326.

stored on them in such a way that they were readily available and visible. This becomes very clear with the sheet on the region of the Thames at Gravesend, the front of which is inscribed with "Angleterre" and "Tamise (fort Tilbury, batterie de Gravesend &c.)". Here, nine completely different pieces of paper in various formats featuring different pictorial media are pasted onto the inside of the sheet **(Fig. 2)**: a general map of the entire reconnoitred region, hand-drawn in colour on tracing paper, three watercolours with panoramic views of various defences, and five individual pencil-drawn details of the fortifications. From the traces of the folds of these papers, which vary widely in terms of quality, it is clear that they were previously stored differently – they may even have come from different journeys.[38] The meaning of the pictorial and textual information compiled here is not comprehensible to outsiders, and the fact that not even all the pieces of paper are glued onto the carrier sheet in a uniform reading direction suggests that immediate legibility or comprehensibility for third parties was not intended. For the same reason, it can be assumed that the gluing process was not driven by aesthetic aims; rather, the compilation seems to have been purely functional. From the wealth of information brought back from the journey, Loqueyssie selected and compiled the most important pieces. The preparatory sheet thus served as a new, open repository for these in the editorial process.

The relevance of this compilation and the clarification of the specific facts it contributed to was probably only understandable to the author. Thus, in a sense, a pasted preparatory sheet such as this was a medium of Loqueyssie's communication with himself. There are frequent examples of this, not only in his materials from the field but also in those from other steps of the editing process. For example, the officer reminded himself in writing of certain documents so that they would not be forgotten in the abundance of papers, or he labelled a folded volume on the outside with: "Different notes about Portsmouth to be taken into consideration".[39]

38 For example, the preparatory sheet *Notes sur Portsmouth en 1860 / Gosport / Ayant servi aux redactions faites en 1861* contains drawings of Fort Blockhouse, which is not represented visually in the 1861 report, but is in the 1858 report. It can therefore be assumed that this sheet was used earlier.

39 Original French: "Notes diverses sur Portsmouth à prendre en Consideration [...]", Paris, SHD, 1 VM 326.

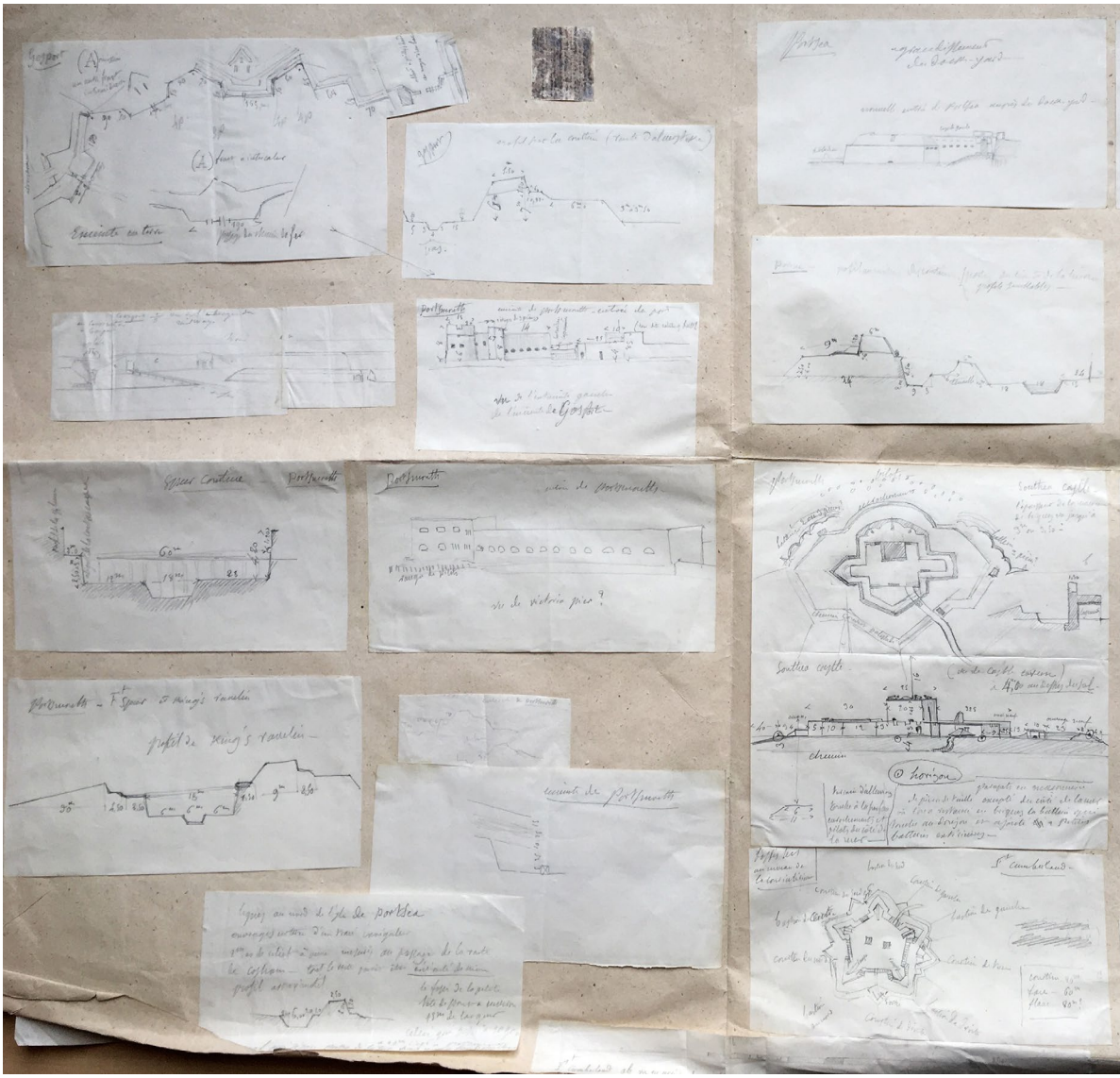


Fig. 6
Emile Lachaud de Loqueyssie, Preparatory sheet *Portsmouth, Portsea et Gosport*, inside, 49 × 64.4 cm, © Service historique de la Défense, 1 VM 326

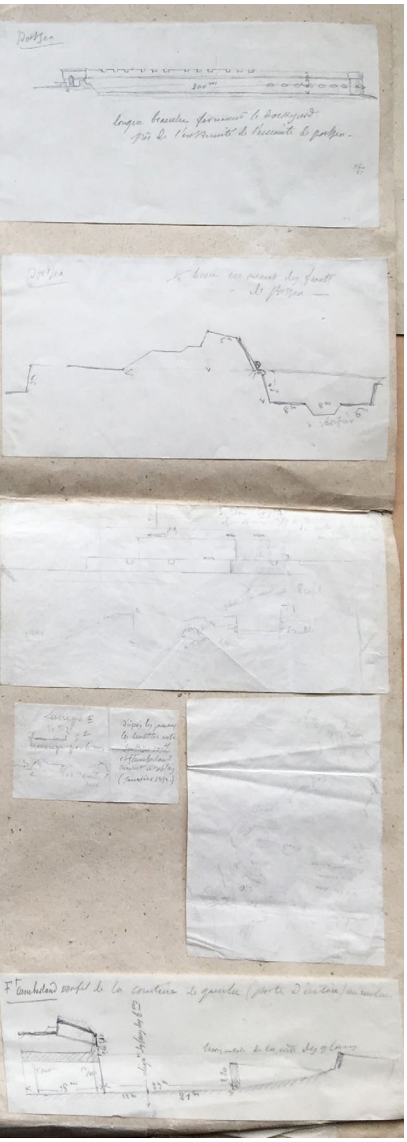
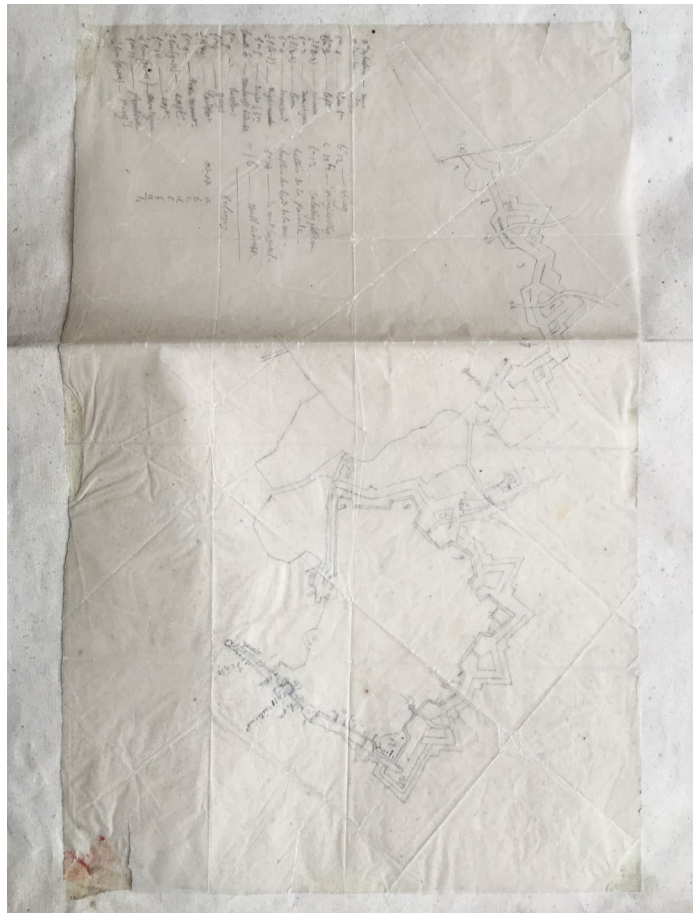
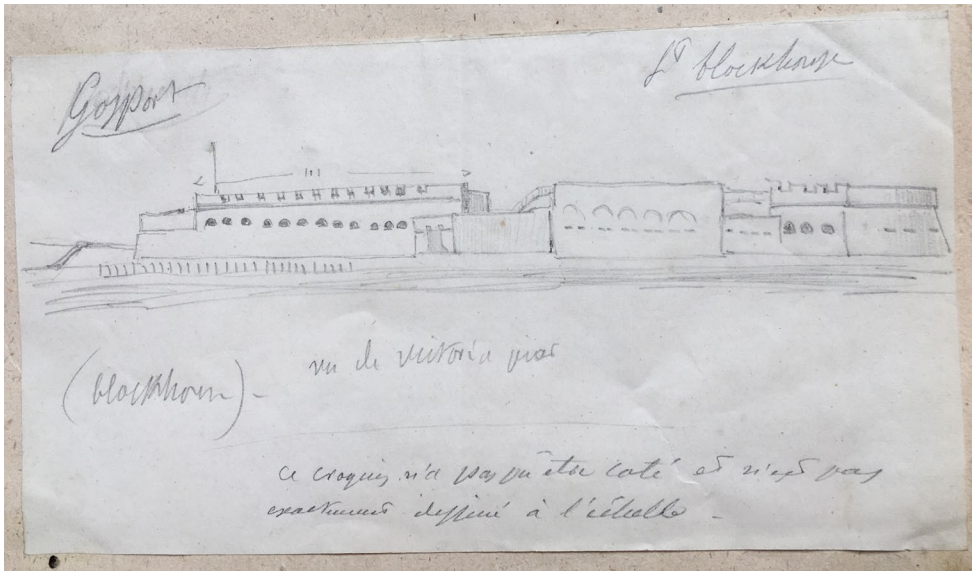


Fig. 7
Emile Lachaud de Loqueyssie, Preparatory sheet *Portsmouth, Portsea et Gosport*, back, 49 × 32.2 cm, © Service historique de la Défense, 1VM 326





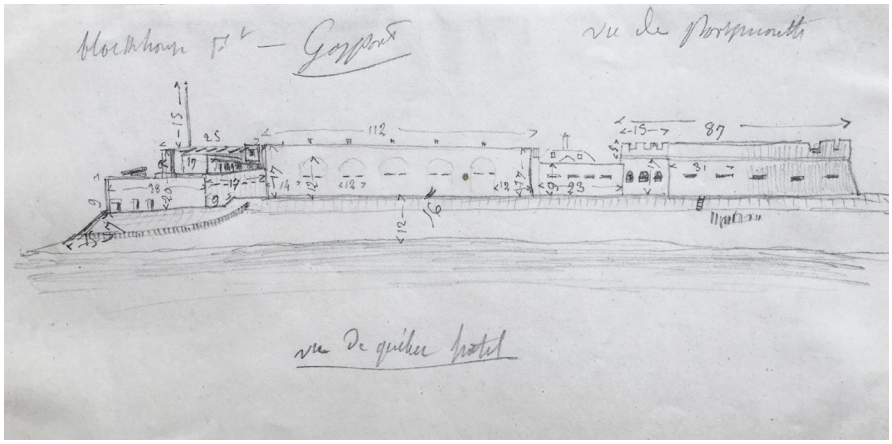


Fig. 8
Emile Lachaud de Loqueyssie, *Gosport, Ft. Blockhouse, vue de Victoria pier*, 8.1 × 14.9 cm, from the Preparatory sheet *Portsmouth, Portsea et Gosport,* © Service historique de la Défense, 1 VM 326

Fig. 9
Emile Lachaud de Loqueyssie, *blockhouse Ft. - Gosport*, vu de Portsmouth, from the Preparatory sheet *Portsmouth, Portsea et Gosport*, 7.5 × 15 cm, © Service historique de la Défense, 1 VM 326

Fig. 10
Rock & Co (publisher), *Victoria Pier, Portsmouth*, 1853, engraving, Royal Collection Trust / © HisMajesty King Charles III 2023, https://www.rct.uk/collection/701523/victoria-pier-portsmouth

Loqueyssie evidently placed some of the drawings next to each other on the preparatory sheets simply for the purpose of synopsis and comparison, as can be illustrated by an example from *Portsmouth, Portsea & Gosport* **(Figs. 5–7)**. This large sheet is folded in the middle and contains a total of 24 slips of paper pasted onto it. On the front, the collection opens with two views of one of the new forts of Gosport, the "Blockhouse" **(Figs. 8, 9)**. Loqueyssie sketched both of them from Portsmouth, on the opposite side of the strait. They were probably used for the editing of the plans for his 1858 report on Portsmouth, as we know from the final report's table of contents that sheet 12 depicted "Fort Blockhauss" at a scale of 1:1 000. On the first of the sketches **(Fig. 8)**, Loqueyssie names the position from which he took the view: "vue de Victoria pier". This pier was open to the public and located directly opposite Gosport **(Fig. 10)**. A note on the sketch, again addressed to himself, declares that the sketch is faulty: "This sketch could

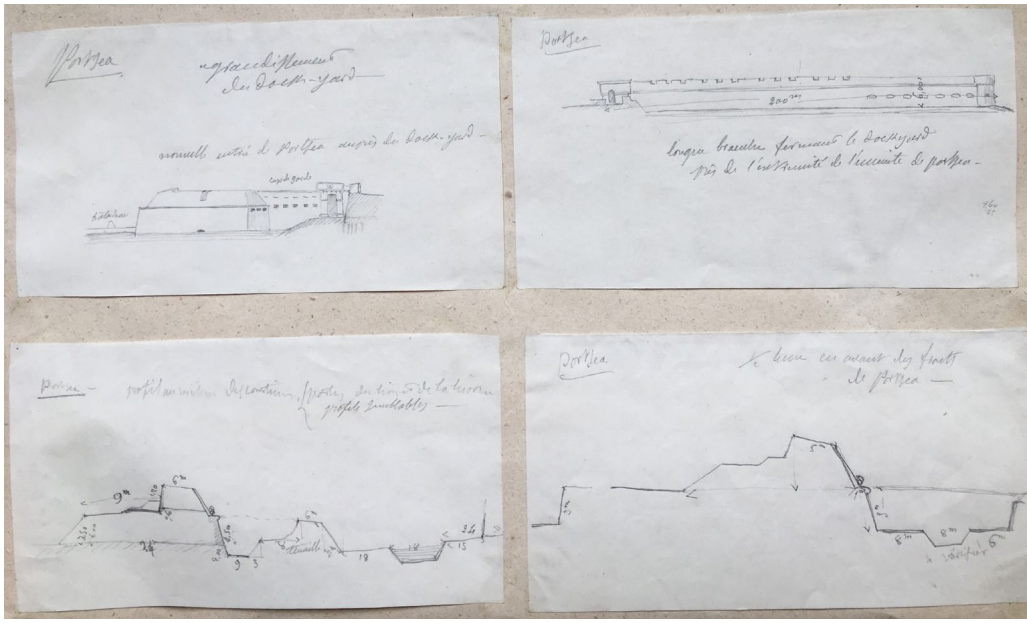


Fig. 11
Emile Lachaud de Loqueyssie, *New gate and fortifications of the dockyards of Portsea* (top), *profile sections through fortifications* (bottom), each 8.2 × 15 cm, from the Preparatory sheet *Portsmouth, Portsea et Gosport* © Service historique de la Défense, 1 VM 326

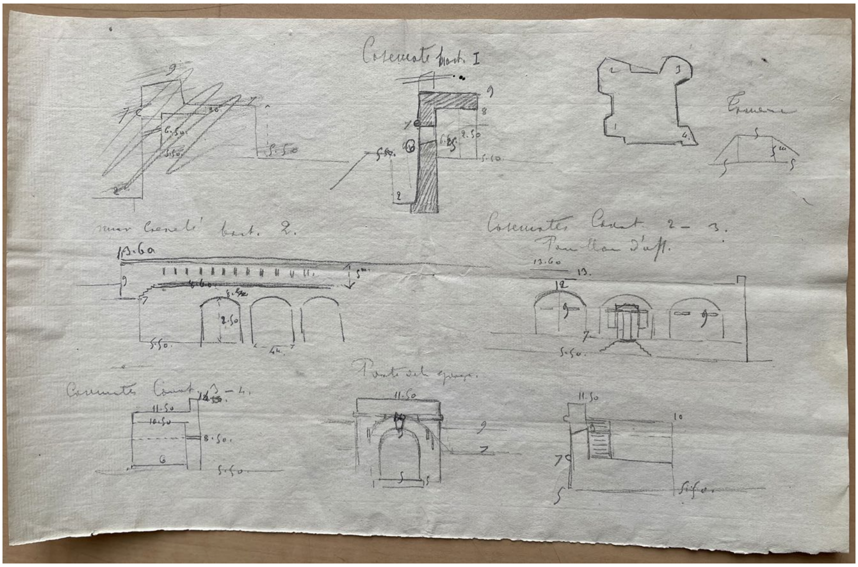
not be dimensioned and is not drawn exactly to scale".[40] Loqueyssie executed the second, evidently more precise view of the fort **(Fig. 9)**, labelled with dimensions, from his hotel room, as is also indicated on the sketch. By pasting the two images side by side, he kept the different items of information they contained present simultaneously. Other drawings on this preparatory sheet are similarly arranged in a comparative manner, such as the several sketches of Fort Monckton, and two others of Portsea showing different attempts to understand a section of the fortifications **(Fig. 11)**. These examples make it clear why Loqueyssie combined the images in this

40 Original French: "ce croquis n'a pas pu être coté et n'est pas exactement dessiné à l'échelle", *Notes sur Portsmouth en 1860 / Gosport / Ayant servi aux redactions faites en 1861*, Paris, SHD 1 VM 326.

way. It was his task to create the most accurate views, ground plans and sections of the fortifications and their position in the surrounding topographies as possible. The basis for these – apart from his own recollections – were solely these on-site drawings and notes that he had brought back with him.

Loqueyssie's preparatory sheets, however, do not only contain drawings but also slips of paper with text and no pictorial representations (e.g. **Fig. 5,** bottom right). If these were inscribed on both sides, then they were carefully glued at one edge so that they could be flipped over to be read from the back. This is in fact strange, because unlike the drawings, these notes, which were often folded several times and quite difficult to read, could have been copied with ease and without any loss of meaning. Instead, just like the drawings, they are presented on the sheets as documents created on site and carried along on the journey. It almost seems that they were not only pasted on for purely practical reasons, but that this gave them an additional meaning as mementos. Preserved in their original form as material remnants and thus evidence of the espionage mission, these pasted notes seem to testify to the paramount importance Loqueyssie attached to his journeys and to his presence in the field.

Loqueyssies pasted sheets were preparatory work for the subsequent stage of image production: preliminary drawings, which Loqueyssie often sketched on the back of already used pieces of paper **(Figs. 12–14)**. Then, in order to transfer finished details drawn to scale, Loqueyssie worked with tracing paper **(Fig. 15)**. After these further intermediate stages, the final drawings were created. Since we do not have the results of Loqueyssie's editorial work on Portsmouth, his slightly later clean drawing of the fortress of Bingen can serve as an example **(Fig. 16)**. It stems from the final report from his reconnaissance of the Rhine area in 1867. Here, it becomes evident that certain parts of the drawing work, such as the careful shading and colouring of the images, were only carried out at the very end. Also, scales, inscriptions and references were added in the final version, and last but not least the dating and signature of the author, Loqueyssie. This does not just attest to his authorship; it also establishes the temporal connection to his commission and the mission. These final clean drawings stand at the end of a visual and medial transformation which renders useless the pasted-on source materials from the preparatory sheets that played their part at the beginning.



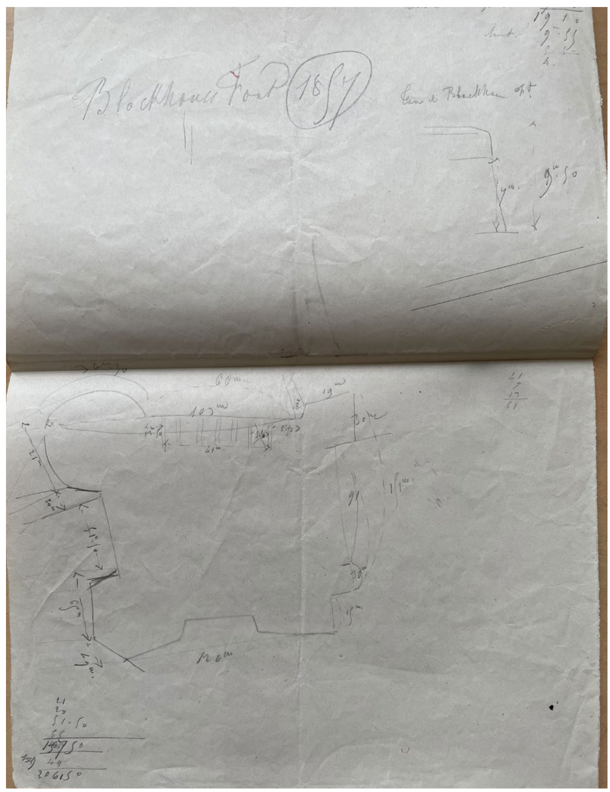
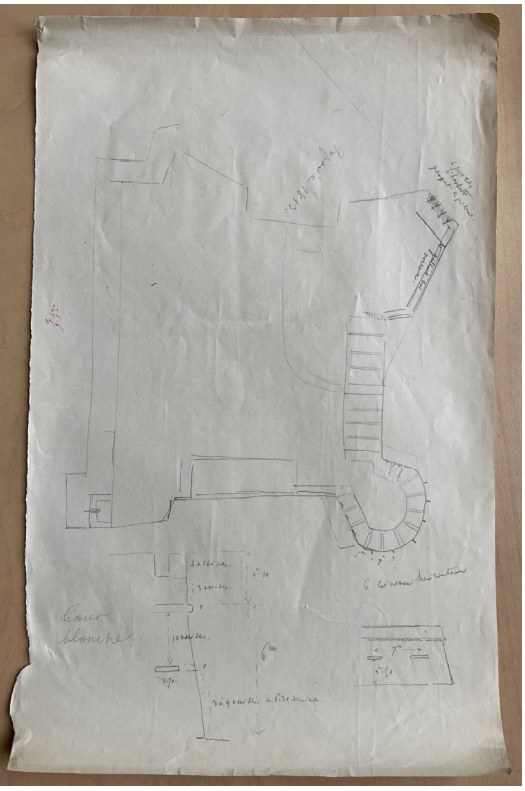


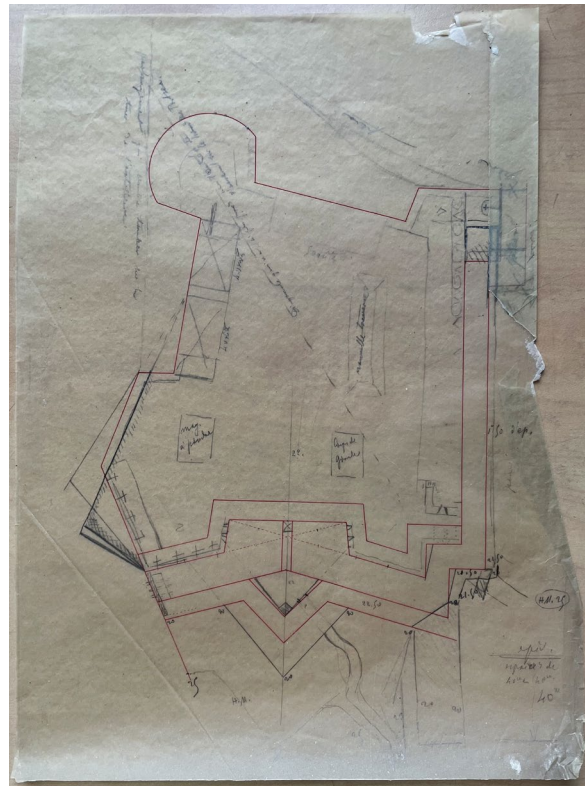
Fig. 12
Emile Lachaud de Loqueyssie, *Sheet with various preliminary drawings for Fort Blockhouse*, 20.5 × 31.8 cm, © Service historique de la Défense, 1 VM 326

Fig. 13
Emile Lachaud de Loqueyssie, *Preliminary drawing of the ground plan of Fort Blockhouse*, 30.5 × 20.3 cm, © Service historique de la Défense, 1 VM 326

Fig. 14
Emile Lachaud de Loqueyssie, *Preliminary drawing of the ground plan of Fort Blockhouse*, 36 × 22.5 cm, Paris, © Service historique de la Défense, 1 VM 326

Fig. 15
Emile Lachaud de Loqueyssie, *Preliminary drawing of the ground plan of Fort Blockhouse*, pencil and red ink on tracing paper, 21 × 33.3 cm, © Service historique de la Défense, 1 VM 326





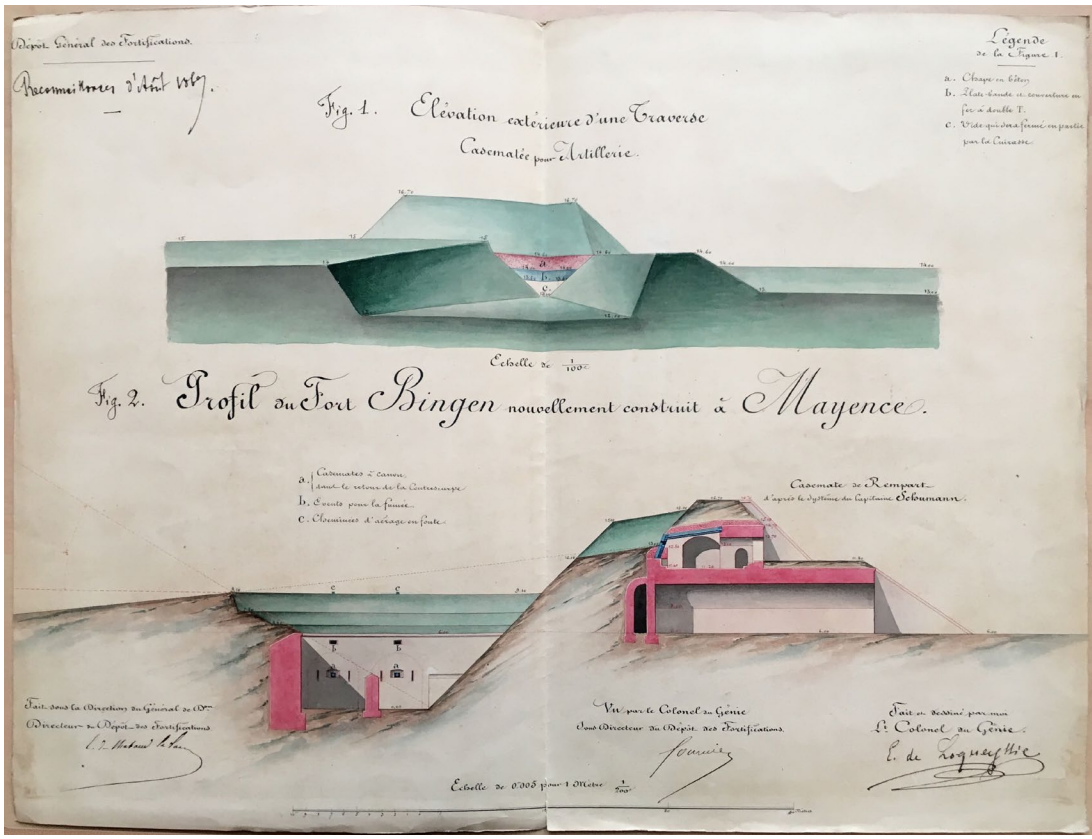


Fig. 16
Emile Lachaud de Loqueyssie, *Fig. 1 Elévation extérieure d'une Traverse Casematée pour Artillerie, Fig. 2 Profil de Fort Bingen nouvellement construit à Mayence, 1867, from his Rapport sommaire sur la mission remplie en Prusse par le Lt. Colonel de Loqueyssie, pendant les mois de septembre Octobre et Novembre*, © Service historique de la Défense, 1 VM 301

While the slips of paper brought back from Loqueyssie's espionage missions make the practice of the military spy abroad somewhat comprehensible, their compilation on the pasted sheets lend an insight into the diligent editing of the results upon return. They remind us that even a high-ranking French military spy, after travelling abroad on an important secret mission, needed to spent months at his desk in Paris processing small pieces of paper in order to meticulously produce final drawings of the places he visited. Loqueyssie's ephemeral preparatory materials document the visual and medial process of clarification that the officer undertook for himself. The pasting of the original materials onto the preparatory sheets was evidently a crucial part of his handling, ordering and processing of the profusion of pieces of paper with visual and textual information that he had mostly recorded in the field on paper. Their contingency and chaos is still clearly perceptible in these compilations. Thus, the pasted sheets enable an understanding of the cumbersome process by which visual knowledge was produced in the context of the well-organised, secret reconnaissance missions of the French military in the 19th century – knowledge that, even when it was ultimately fixed, could very quickly become obsolete again when the military architecture in question or the surrounding terrain were altered in the wake of new defence measures.

FLYING FILMING
DER REIHENBILDNER AND AERIAL PHOTOMONTAGE

Noemi Quagliati

The First World War represents a fundamental step in the history of aerial warfare due to the first employment of military aeroplanes. These machines were initially designed for aerial observation. During the war, aerial photography aided cartographic investigation, as well as intelligence practices, and it assisted the artillery to aim at targets beyond the line of sight. By the end of the conflict, the institutionalisation of aerial photo-reconnaissance as a military discipline was established. Moreover, aerial photography had become a propagandistic medium used to disseminate persuading and aesthetically innovative content to civilians. Frequently, pictures produced for military and surveying purposes that were not classified as top-secret ended up circulating in the press. From this perspective, World War I aerial photography gained a dual role as an instrument of armies' imagery intelligence on the one hand, and an apparatus of governmental propaganda on the other. Among the variety of aerial photographic material produced and published in WWI, this essay analyses the German system of photomapping territories by means of a military serial aerial camera called *Reihenbildner* (Rb), designed by the film pioneer Oskar Messter in 1915. This device made it possible to create an aerial map of a vast area by recording a series of photographic sections of terrain ("strips") through a technique known as photographic mosaic.

The first two parts of this paper analyse the circumstances that led to the development of this German mapping technique and its importance for aerial warfare, focusing on the infrastructures and manual work necessary to make this type of photographic map. The third part investigates how these 'pasted topographies' were popularised outside the military sphere in the final years of the conflict. Finally, the aesthetic and epistemological

Noemi Quagliati: Flying Filming. *Der Reihenbildner* and Aerial Photomontage, in: PASTED TOPOGRAPHIES (TERRAIN. STUDIES ON TOPOGRAPHIC VISUAL MEDIA 1), eds. Boskamp, Braun, Buchholz and Kranen, Heidelberg: arthistoricum.net, 2023, pp. 157–190, https://doi.org/10.11588/arthistoricum.1323.c18469

qualities of these maps are clarified in the final section of the essay, which compares the technique of the military aerial photomosaic with more celebrated forms of avant-garde photomontage in the context of an analysis of modernity.

Film camera: recording topographies

Authors from different fields working on military history agree in recognising the *Reihenbildner* camera as a crucial device for aerial reconnaissance and mapping history.[1] In 1961, the WWI aerial photo officer Carl Fink lamented the absence of this device from the Deutsches Museum's aviation exhibition. In a letter to the museum's management, he described Oskar Messter, the inventor of the *Reihenbildner* camera, as a man who deserved to be honoured for having created the first automatic aerial camera for the German Air Force.[2] According to Fink's description of this device, "[t]he overlapping vertical photographs made it possible to create, as quickly as possible, the best substitute of a map (60 km long, 2.5 km wide, scale 1:10 000), covering theatres of war with very poor or no maps at all. This was a fabulous achievement in 1915. Our opponents were unable to achieve this until 1918!"[3]

1 For an overview of German literature about the *Reihenbildner* camera in different disciplines, cf. Georg Paul Neumann, *Die deutschen Luftstreitkräfte im Weltkriege*, Berlin 1920, p. 167; Hermann Lüscher, *Kartieren nach Luftbildern*, Berlin 1937, pp. 7–8; Helmut Jäger, *Erkundung mit der Kamera*, München 2007, p. 136; Marco Rasch, *Das Luftbild in Deutschland von den Anfängen bis zu Albert Speer. Geschichte und Rezeption des zivilen "Stiefkindes der Luftfahrt"*, Paderborn 2021, p. 74.

2 The German Museum of Masterpieces of Science and Technology in Munich (Deutsches Museum) holds a conspicuous number of Oskar Messter's devices and recordings, see Noemi Quagliati, "Histoire des appareils photographiques aériens. L'exposition Historische Luftfahrt bis 1918 et les collections insulaires du Deutsches Museum", in *L'image Verticale. Politiques de La Vue Aérienne* (Transbordeur: Photographie, Histoire, Société 6), eds. Marie Sandoz and Anne-Katrin Weber, Paris 2002, pp. 98–111. The rest of Messter's legacy is housed in the German Federal Archives (Bundesarchiv).

3 Author's translation; original: "Die senkrechten, übergreifenden Aufnahmen ermöglichten von Kriegsschauplätzen mit sehr schlechten oder gar keinen Karten schnellstens besten Kartenersatz zu schaffen (60 Km Länge, 2,5 Km Breite, Maßstab 1:10 000). Das war 1915 eine fabelhafte Leistung. Die konnten unsere Gegner bis 1918 nicht aufweisen!" Deutsches Museum Archiv, Munich, Korrespondenz zwischen Carl Fink und Deutsches Museum, VA1800/2.

Carl Fink was a central figure in the institutionalisation of aerial photography as a systemic method of imagery intelligence in Germany. He was appointed Photographic Officer in 1915, when Hermann von Lieth-Thomsen became Chief of Field Air Forces. Later, Fink led the Aerial Photography Division of the Commanding General of the Air Forces (*Kogenluft*). Despite initial skepticism by the German High Command, "Luftbild-Fink" (as he became known after the war) promoted the use of photography for supporting aerial monitoring of the enemy positions and advocated the role of recorded images as an essential component of strategic and tactical trench warfare. Having been personally involved in the development of aerial photo-reconnaissance, Fink also knew that correcting perspective distortion in aerial photographs taken with hand-held cameras had been one of the greatest challenges faced by surveying officers in WWI, before Messter's invention of the *Reihenbildner*. In order to solve this problem – inspired by the experimentation carried out by the pioneers of aerial photogrammetry, i.e., Sebastian Finsterwalder and Theodor Scheimpflug – Fink himself had developed the so-called *Grundrissbildner*: a device that automatically rectified aerial photographs taken from an oblique perspective (not perpendicular to the earth's surface) transforming them into planimetries of the terrain.[4] However, straightening and scaling single oblique views with this kind of device, one by one, was a very time-consuming task. Moreover, even if combined, the photos did not offer very extended maps because the pictures were recorded on glass plates at the beginning of the war. These fragile plates allowed only a limited number of snapshots per single flight. Therefore, according to Oskar Messter, the real change in photographic mapping occurred when, for the first time, "the unwieldy, heavy, and splintering glass plate had to give way to the film!"[5]

4 These devices were generally known as *Umbildner* (transformers). Among them, there was the Prussian model *Grundrissbildner*, designed by Fink together with Dresden company Ernemann-Werke, and the Bavarian model *Photokartograph*; see *Die Entwicklung des Militärischen Luftbildwesens in Bayern* (conference proceedings, Deutsches Museum branch Flugwerft Schleißheim 2012), ed. Helmut Jäger, Munich 2012.

5 Author's translation; original: "Die unhandliche, schwere und splitternde Glasplatte mußte dem Film das Feld räumen!" Oskar Messter, *Mein Weg mit dem Film*, Berlin 1936, p. 85.

6 For a complete overview of Oskar Messter's career and his role in the German film industry, see *Oskar Messter – Filmpionier der Kaiserzeit* (exhibition catalogue Potsdam/Munich), ed. Martin Loiperdinger, Basel 1994.

Oskar Messter is considered the "father of German film," or, as the title of the 1994 exhibition at Filmmuseum Potsdam and Deutsches Museum Munich remarks, the "Filmpionier der Kaiserzeit."[6] At the turn of the century, he was a well-established projector producer and successful inventor in the field of film technology. Moreover, he pioneered early German cinema, holding the first sound projection in 1903 by means of his patented *Biophon*. During WWI, Messter served in the press department of the Deputy General Staff in Berlin, regulating censorship, and producing newsreels and entertainment for the soldiers on the Western Front. At the same time, he designed aerial mapping cameras and other devices for the marine and aviation corps. These activities allowed his companies to survive the war times, and the production of aerial cinematographic film during the warfare had positive consequences on the quality of film stock in the motion picture industry of Weimar Germany. The establishment of the Universum-Film AG (UFA), to which Messter contributed by selling several of his film companies at the end of 1917, demonstrates further the cooperation between the military, the state, and German film industrialists. As a state-controlled film corporation, UFA had originally been founded by the Supreme Command under the name Bild- und Filmamt (Bufa) to function as an instrument of visual propaganda.[7]

In this context, the most effective photo-optical device of German aviation, the *Reihenbildner*, was designed by Messter in 1915 **(Fig. 1)**. As Fink recalled in his letter, during a single flight from a height of 2500 metres, the *Reihenbildner* filmed a land surface that measured 60-by-2.5 kilometres at the scale of conventional topographic maps. The device was equipped with a standard cinema film and, by following the principles of a film camera, made roughly 240 photographs on a single film roll of 60 meters.[8] The camera was suspended in the aeroplane, behind the

7 For film propaganda in WWI Germany, see Ulrike Oppelt, *Film und Propaganda im Ersten Weltkrieg. Propaganda als Medienrealität im Aktualitäten- und Dokumentarfilm*, Stuttgart 2002; Christoph Makowski, *Deutsche Filmpropaganda im Ersten Weltkrieg. Entwicklung, Hoffnung, Versagen*, Baden-Baden 2002. Wissenschaftsverlag. For the work of Messter after WWI, see Messter 1936 (note 5); Babett Stach, *Nachlaß Oskar Messter, Bestand N 1275. Findbücher zu Beständen des Bundesarchivs*, Koblenz 1994; *Oskar Messter. Erfinder und Geschäftsmann*, eds. Frank Kessler, Sabine Lenk and Martin Loiperdinger, Basel 1994.

8 For the various patents obtained by Messter concerning the *Reihenbildner* device see Paul Karlson, "Oskar Messters

observer's seat, with the lens facing the terrain through a hole in the fuselage. The film was placed 90 degrees transversely to the flight direction **(Fig. 2)**. Driven by a small air propeller, the device took a rapid sequence of vertical aerial pictures (usually one per second), producing a negative size that curiously measured roughly 5 × 24 cm.[9] Later, the camera was driven by an electric motor connected to a set of gears, whose shifting imparted speed variation. Rubber rollers moved the film, and a yellow glass pressure plate held it during the exposure and served as a colour filter **(Figs. 3a** and **3b)**. By the end of the war, according to the German Army's processing centre (Heeres-Abwicklungsstelle), a total area of 7 202 935 km^2 had been photographed using 933 000 m film of 241 *Reihenbildner* cameras.[10]

Film editing: assembling topographies

The use of film mapping cameras required trained personnel. In Germany, special troops, namely *Reihenbildtrupps*, were responsible for operating these devices, which were permanently installed in reconnaissance aeroplanes, such as the Rumpler C–IV. Sitting behind the pilot, the observer

Arbeiten zum Luftbildwesen", *Zeitschrift der Deutschen Gesellschaft für Photogrammetrie e.V., Bildmessung und Luftbildwesen*, 16, 4 (1941), pp. 146–151. See also Philipp Vogler, *Die deutsche militärische Luftbildaufklärung. Von den Anfängen bis 1945*, Karlsruhe 2020, pp. 127–129; Helmut Jäger, *Luftbilder auf der Karte finden: Luftaufnahmen aus dem Ersten Weltkrieg lokalisieren*, München 2014, pp. 32–33; Jäger 2007 (note 1), pp. 292–95. Karlson's text also summarises the technical specifications of all the models of Messter's serial cameras produced from 1915. The technical details described in this article, as most of the figures, refer to the model Rb. I designed in November 1915. This is one of the few still existing 1915 *Reihenbildner* that the author of this article was able to analyse at the Deutsches Museum Munich, thanks to the help of Thomas Rebényi, head of the museum's Restoration Laboratory for Scientific Instruments and Clocks. The most successful models of *Reihenbildner* were the Rb. II (1916) and the Rb. IV b (1917). Both devices used an image size of 6 × 24 cm. The Rb. IV b allowed the interchanging of lenses (Zeiss-Tessar or the Zeiss-Triplet) with three different focal lengths (F = 25, 50, 70 cm).

9 This size refers to the Rb I model housed at the Deutsches Museum. The very first prototype of *Reihenbildner* designed in May 1915 exposed a negative size that measured 3.5 × 24 cm, but the most common Rb. negative size in WWI became 6 × 24 cm. During the Weimar Republic, the negatives of these kinds of cameras also reached 18 × 24 cm.

10 See Karlson 1941 (note 8), p. 139.

Fig. 1
Oskar Messter, film mapping camera *Reihenbildner* ("Rb I"), 1915, wood and metal, 890 × 860 × 400 mm. Munich, Deutsches Museum, Collection Photography-Cinematography, Inv. No. 56011 (56011_20220524_001_FotoraumSB_ND_KRainer)

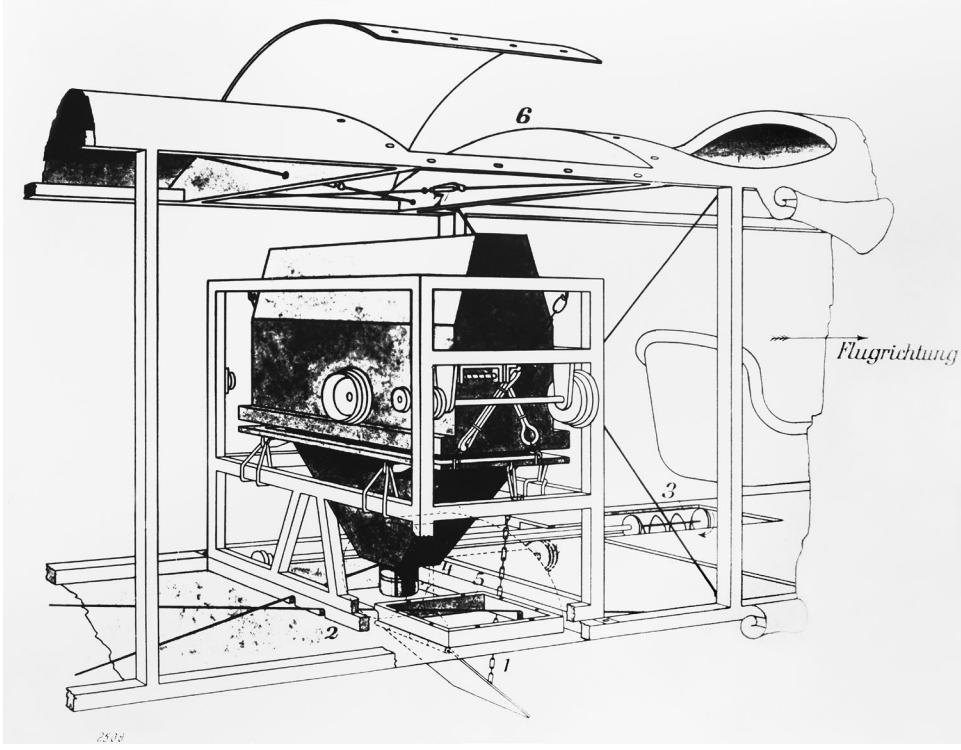
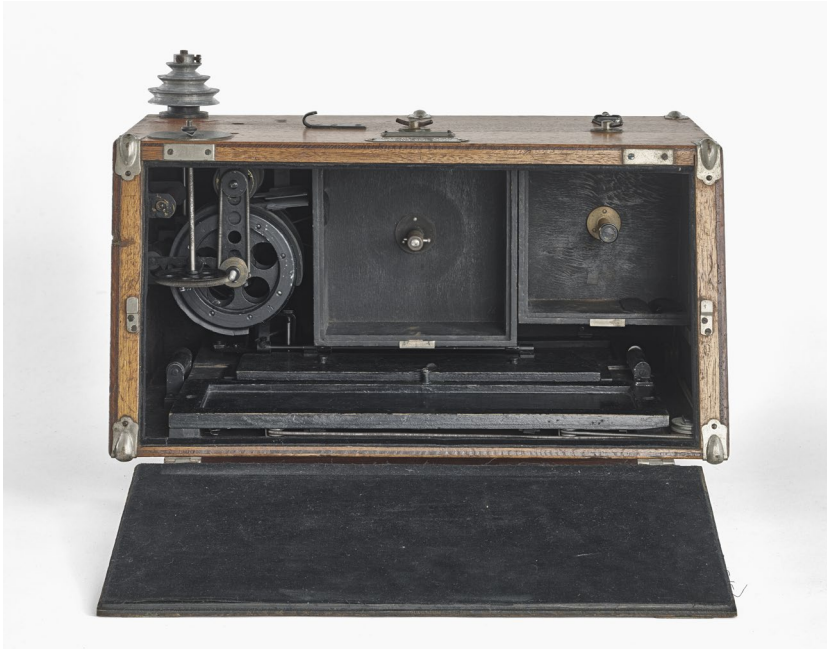


Fig. 2
Messter-Optikon GmbH, diagram of the camera *Reihenbildner* II installed in an airplane's fuselage, ca. 1915, black and white print, 13 × 18 cm. Munich, Deutsches Museum Archive (BN30896)



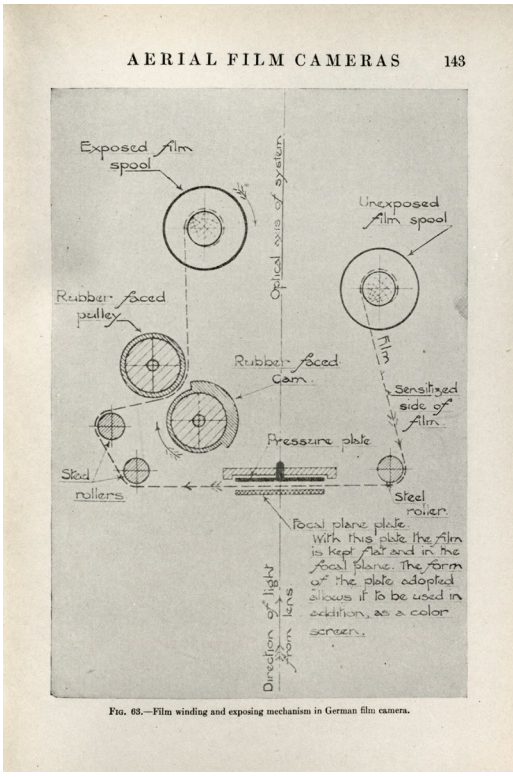


FIG. 63.—Film winding and exposing mechanism in German film camera.

Fig. 3a and Fig. 3b
Oskar Messter, inner mechanism of the Reihenbildner I, 1915, wood and metal. Munich, Deutsches Museum, Collection Photography-Cinematography, Inv. 56011 [3a: Deutsches Museum, 56011_20220524_005_FotoraumSB_ND_Krainer; 3b: see Ives 1920 (note 12), pl. 63]

switched on the camera manually[11] and through an instrument, the *Überdeckungsregler*, regulated the frequency of pictures depending on the aeroplane's speed and flight altitude. Composing the perfect photo map required the precise setting of the time sequence of the film exposure. The aerial photos needed to overlap each other to at least 25% along the longer side to record the terrain without gaps. In 'postproduction,' these overlaps guaranteed that the photo studio operator had enough exposed film negatives to compose the map, even if the plane had curved during the flight. In other words, an excess of exposed film was necessary to find conjunction points for making the map. The film surplus could be cut and removed only when the exact succession of terrain strips was found **(Fig. 11)**. The overlapping pictures obtained through the *Reihenbildner* also served as stereoscopic pairs, a 3D technique that emphasised (unnaturally exaggerating) small details and highlighted volumes to favour the interpretation of aerial photographs and the detection of camouflage.[12]

Even though the automatisation of the recording allowed the observer to keep his hands free for other activities, such as checking the flight route, taking notes, using the machine gun, etc., mapping with the *Reihenbildner* demanded a controlled movement of the aircraft. Pilot Egon Drogosch described the challenges of manoeuvring the plane while taking mosaic maps: "As a pilot, you had to be careful not to take a curved route during the recording of this film, otherwise the film and the surfaces that were to be filmed deviated."[13] This was a particular challenge in wartime. Despite

11 In the 1915 model, as soon as an operator released a brake, the small air propeller started to drive the camera mechanism. Indeed, spun by the plane movement, the air propeller activated both the film transport and the opening of the shutter. The speed of the shutter could be controlled by an internal mechanism, but it was also influenced by the plane speed.

12 For stereoscopic aerial photography used for identifying camouflage in WWI, see Herbert E. Ives, *Aerial Photography*. Philadelphia et al. 1920, pp. 329–350; Paul K. Saint-Amour, "Modernist Reconnaissance", *Modernism/Modernity*, 10, 2 (2003), pp. 357–369; Hanna Rose Shell, *Hide and Seek. Camouflage, Photography, and the Media of Reconnaissance*, New York 2012, pp. 26–77; Noemi Quagliati, "Playing Hide-and-Seek in the German Press: Presence and Absence of Camouflage in WWI Narrations", *Vulcan: The Journal for the History of Military Technology,* 9 (2022), pp. 36–38.

13 Author's translation; original: "Man musste bei diesem Film als Flugzeugführer achten, dass man keine Kurve flog, denn dann verschob sich der Film und die Flächen, die gefilmt werden sollten". Deutsches Museum, Munich, Historische Luftfahrtsammlung, Egon Drogosch Nachlass, *Mein Leben: 1893 Danzig – 1963 Bad Orb*, 1957, p. 48.

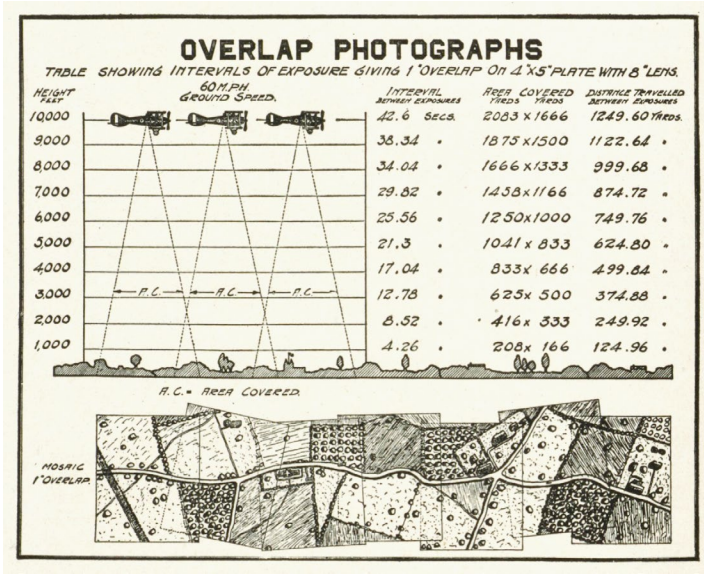


Fig. 4
Allied mapping standard, see Ives 1920 (note 12), pl. 129

the risk of being hit by the antiaircraft and in all weather conditions, the reconnaissance planes needed to follow a straight route in order to create photo maps. The straight line covered by the planes also showed a peculiar aspect of the German way of mapping. As the U.S. Major Herbert Ives noticed in his 1920 book *Airplane Photography*, the size of the pictures produced by the German film mapping camera was "unusual" compared to the Allied standard **(Fig. 4)**. In German military terminology, the resulting map produced with Messter's mapping device was called *Reihenbild* or *Bildfolge* (in-line image), and not "mosaic" as in the Allied tradition. The long strips created with the Reihenbildner camera (literally "serial imager") less resembled the classical mosaic tesserae. However, the practice of combining different photos in order to form a photomap was often referred in WWI German aerial surveillance manuals as tessellated (*mosaikartig*).[14] The long and narrow size of the *Reihenbildner*'s snapshots utilised the

14 Cf. Leutnant d. L. Wecker, *Die Erkundung aus Fliegerbildern*, Wahn 1916, p. 18.

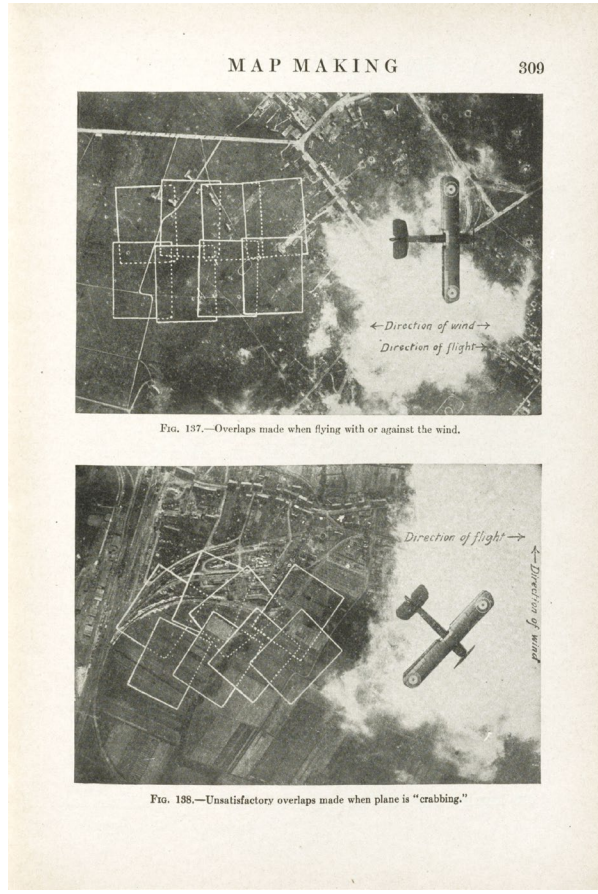


Fig. 5
Making satisfactory overlaps depending on wind directions, see Ives 1920 (note 12), pl. 137–138

maximum width of field covered by the lens. This system necessitated a larger number of exposures to complete a map but made it easy to find precise junctures between the photographs. Only making overlaps on a turn was more complicated using this method, which is why the pilot Drogosch described the need to fly as straight as possible **(Fig. 5)**.

The preceding description shows how the realisation of the photographs during the flight precisely prepared the creation of the photomap. The flight was subordinated to the manual practice of copying, cutting, and pasting, carried out by photographers trained in realising the so-called photo maps, which were a combination of many strips. Messter's company supplied the photographic studios on the war fronts with the specific equipment necessary for the postproduction: wooden drying drums,

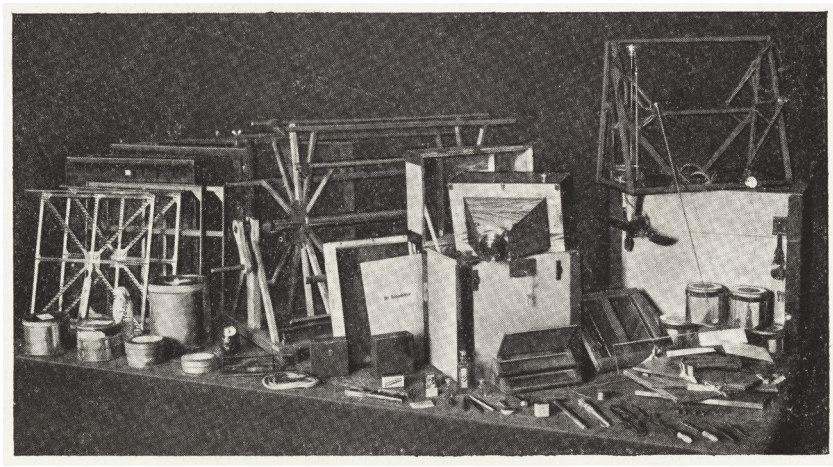


Fig. 6
Messter-Optikon GmbH, equipment for editing the film recorded with the *Reihenbildner* camera, see Karlson 1941 (note 8), pl. 21 (Munich, Deutsches Museum Library, ZB3130/CD89688)

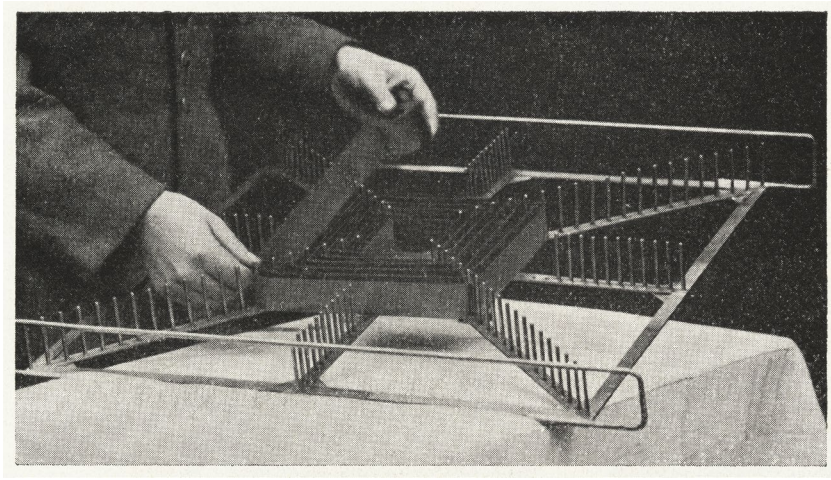


Fig. 7
Messter-Optikon GmbH, developing the Rb film, see Karlson 1941 (note 8), pl. 19 (Munich, Deutsches Museum Library, ZB3130/CD89687)

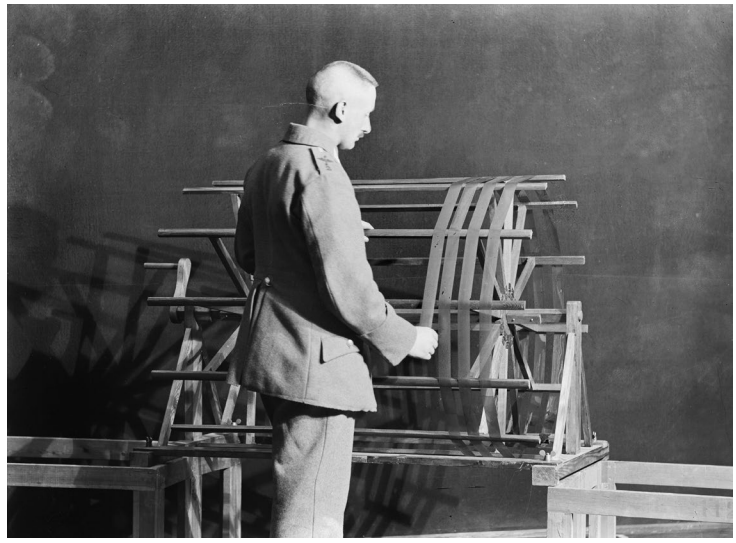


Fig. 8
Messter-Optikon GmbH, drying the Rb film on a wooden drum, ca. 1915, black and white print, 18 × 24 cm. Munich, Deutsches Museum Archive (BN30906)

contact print frames, cutting desks, etc. **(Fig. 6)**. After developing and drying the film **(Figs. 7–8)**, the operator combined a sequence of single snapshots by overlapping the strips using a special desk consisting of a glass frame that made it possible to see different layers of film in transparency **(Fig. 9)**. Once a congruence of terrain features had been identified on two overlapping negatives, the exact conjunction points were realised by clumping the film stripes with a screw-on ruler to the glass desk and precisely cutting them with a blade. A number of these cut negatives (usually ten pieces) were then positioned next to each other on the gluing desk **(Fig. 10)**. Here, they were fixed together with small pieces of sticky tape **(Fig. 11)**. The last step consisted of printing a group of taped negatives on photographic paper measuring roughly 30 × 40 cm by using the contact print process **(Figs. 12–13)**.[15]

15 For a description of the technical steps for arranging an aerial map in the photographic studio, see Karlson 1941 (note 8), p. 135.

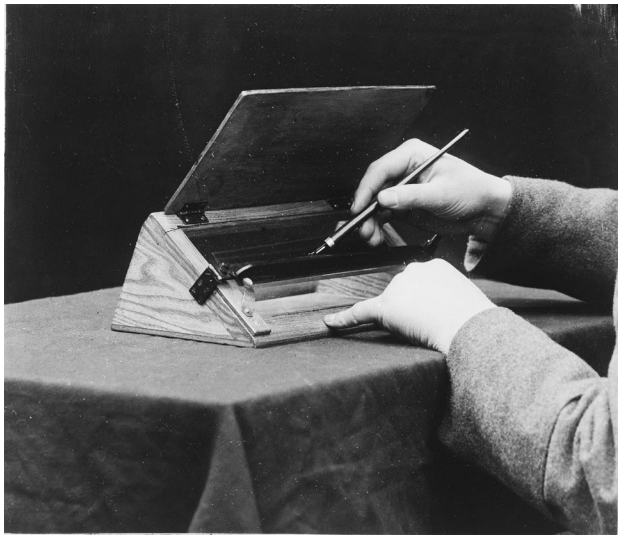


Fig. 9, Fig. 10
Messter-Optikon GmbH, cutting desk (above) and gluing desk (below), ca. 1915, black and white print, 18 × 24 cm. Munich, Deutsches Museum Archive (BN30907)

Small-sized mosaics were included in the aerial reconnaissance weekly report **(Fig. 14)**, but printings of photographic sequences could also be further assembled in larger format wall maps **(Fig. 15)**. Every mosaic, composed of photographic tesserae (called *Reihenbildstreifen*), was classified with all the necessary elements to identify the section of terrain recorded and the context in which the mission took place: the flight number, date, altitude, scale, observer, pilot, aviation department, etc. A political or road map, which always accompanied the photographic mosaic, reported the aeroplane's route and to which sector of this itinerary the photomap corresponded. In the case of Eastern Europe and the Middle East, territories in which the German army lacked cartographic investigation, the photo maps created by *Reihenbildner* constituted the main instrument for designing topographic maps of areas of military interest **(Fig. 16)**.

Film distribution: propagandising topographies

Among the variety of aerial photographic material published in the WWI German press,[16] one could also find mosaic maps taken with the *Reihenbildner*. These particular photographic maps were recognisable by the thin lines that regularly divided the pictures' surface that appeared on the pages of magazines. However, the publication of aerial mosaic maps in the press was only limited to small portions of more extensive mapped areas, and they showed specific cases of target reconnaissance **(Fig. 17)**. The reason for excluding complete maps from the press was that the German General Staff considered cartographic investigation carried out with the *Reihenbildner*, as well as the technology utilised for this innovative kind of mapping, classified information that was censored at the beginning of the war. Only from 1918, when aerial mapping by means of the photomosaic had become a technique amply used by all the countries involved in the conflict, was the German press allowed to propagandise the *Reihenbildner* as an innovative German device that helped the army monitor the enemy and conquest new territories.

16 See Noemi Quagliati, "Training the Eye: Production and Reception of Aerial Photography during the World Wars", *AUC Geographica,* 55, 1 (2020), pp. 93–111.

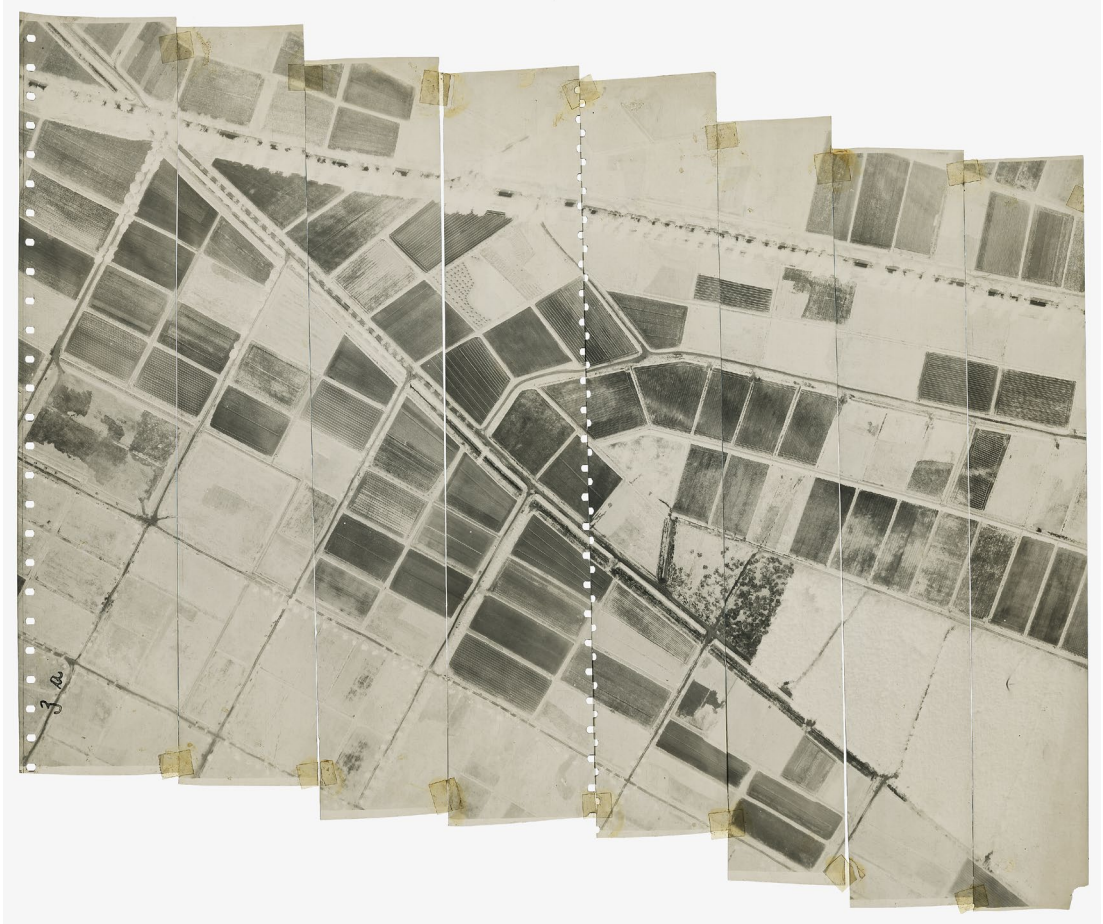


Fig. 11
Messter-Optikon GmbH, Rb film negatives fixed with pieces of sticky tape, prior to 1918, nitrocellulose film, circa 30 × 40 cm. Munich, Deutsches Museum, Collection Photography-Cinematography, Inv. No. 2020-4 (Deutsches Museum Archive CD84681)

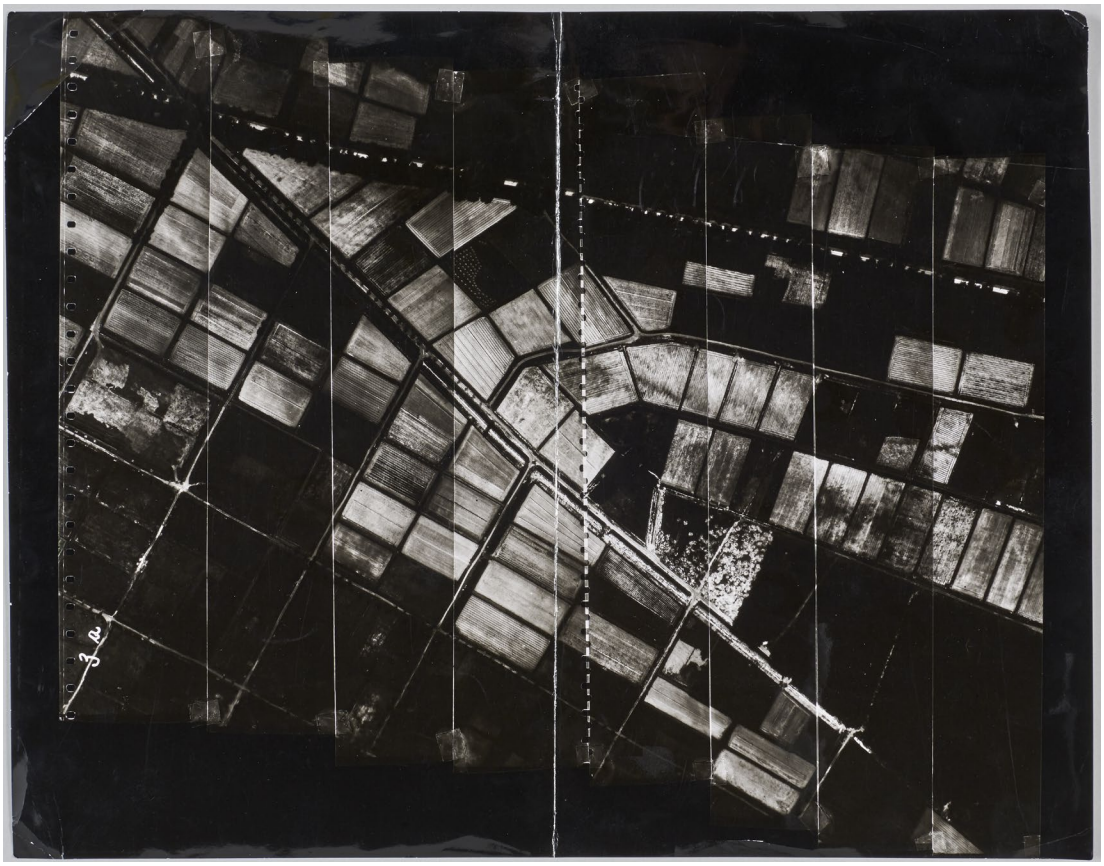


Fig. 12
Messter-Optikon GmbH, Rb film strips printed with contact print process, prior to 1918, black and white print, circa 30 × 40 cm. Munich, Deutsches Museum, Collection Photography-Cinematography, Inv. No. 2020-4Z1 (OI_851077_20190710_001_D10_ND_AGöttert)

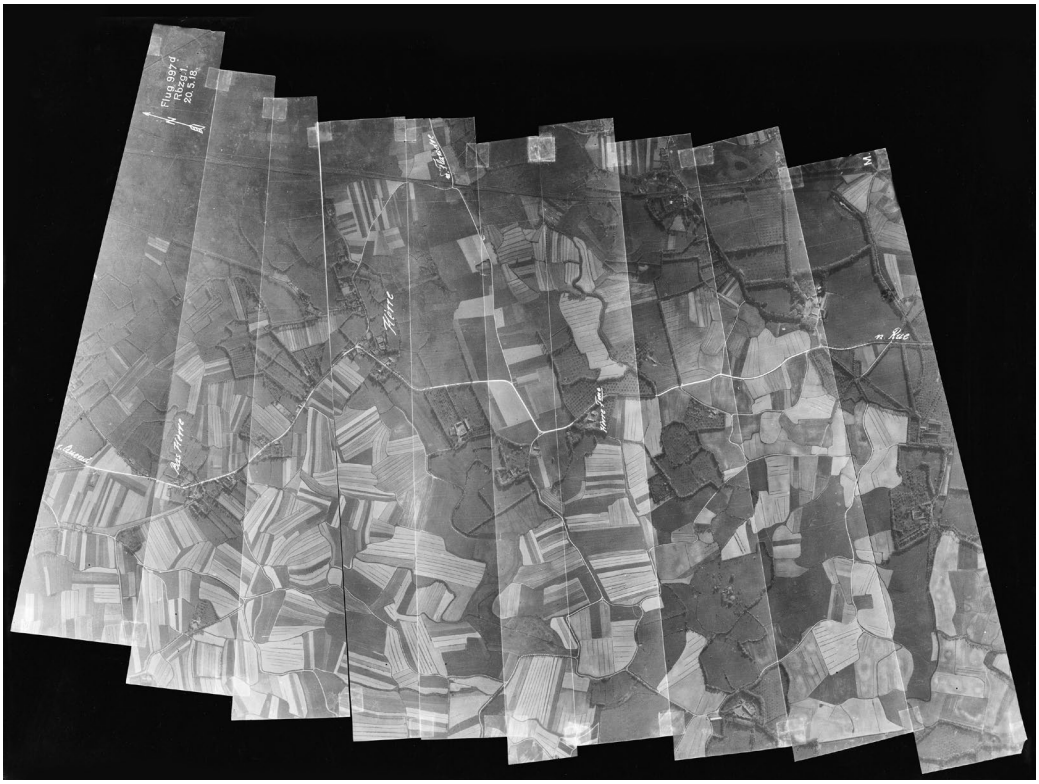


Fig. 13
Messter-Optikon GmbH, aerial map of Hèrre (Hauts-de-France) taken with the *Reihenbildner*, 1918, black and white print, 40,5 × 30 cm. Munich, Deutsches Museum, Collection Photography-Cinematography, Inv. No. 64401T2 (Deutsches Museum Archive, BN44571)

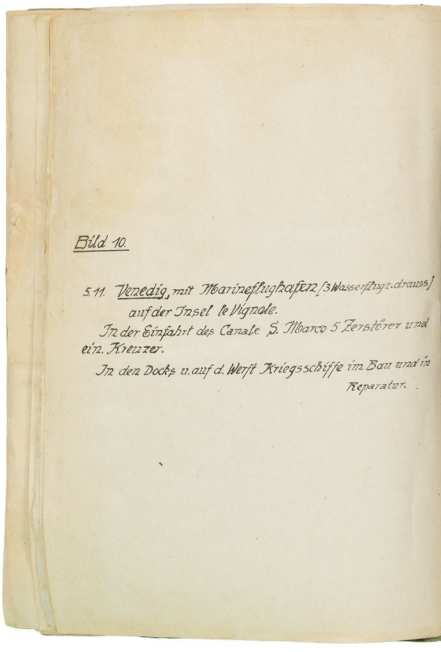


Bild 10.

5.11. Venedig, mit Marineflughafen [3 Wasserflugz. drauss.] auf der Insel le Vignole.
In der Einfahrt des Canale S. Marco 5 Zerstörer und ein. Kreuzer.
In den Docks u. auf d. Werft Kriegsschiffe im Bau und in Reparatur.

Fig. 14
Kommandeur der Flieger 14, map of Venice taken with the *Reihenbildner* and included in the aerial reconnaissance weekly report *Über die Tätigkeit der Fliegerverbände N. 7*, November 1917, paper, ink, and black and white print, ca. 30 × 80 cm. Munich, Deutsches Museum Archive (CD80907)

Fig. 15
Feldflieger Abteilung 31, large-format wall map made with Rb recordings that show four parallel flights following the course of the Berezina river (Belarus) until its confluence with the Neman, 1915, black and white print, 13 × 18 cm (original lost). Munich, Deutsches Museum Archive (BN30897)

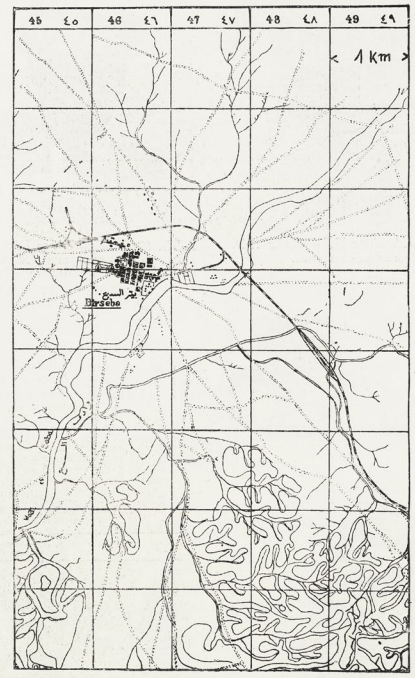


Abb. 25. Ausschnitt einer Karte, Maßstab 1 : 25 000, die im Jahre 1917 in Palästina auf Grund von Reihenbildaufnahmen angefertigt wurde. Die aufgenommene Fläche maß 1500 qkm; der fertige Plan konnte bereits 14 Tage nach dem Bildflug abgeliefert werden.

Fig. 16
Messter-Optikon GmbH, section of a map, scale 1:25 000, which was produced in Palestine in 1917 on the basis of a series of photographs taken with the *Reihenbildner*, see Karlson 1941 (note 8), pl. 25

In November 1918, on the pages of the popular illustrated magazine *Die Woche*, Lieutenant Gehrts announced: "We own this automatic imaging device in our 'Reihenbildner,' the flying cinematograph, with which in a single flight countless square kilometres can be captured in one photo."[17] The expression "der fliegende Kino" (the flying cinematograph),[18] which was also the title of Gehrts' article, emphasised that the military serial camera Reihenbildner took recordings from the most modern flying machine, namely the aeroplane, by using the same principle as a film camera **(Fig. 18)**.

17 Author's translation; original: "Dieses selbsttätige Bildgerät besitzen wir in unserem ‚Reihenbildner', dem fliegenden Kino, mit dem auf einem Fluge unzählige Quadratkilometer in einem Lichtbild aufgenommen werden können." Lt. Gehrts, "Der fliegende Kino", *Die Woche*, 44 (1918), pp. 1092–1095.

18 In the WWI press, the term "der Kino" was the abbreviation of "der Kinematograph," namely the motion-picture camera. Instead, "das Kino" was the short form of "das Kinotheater," which referred to the room used for screening films to the public.

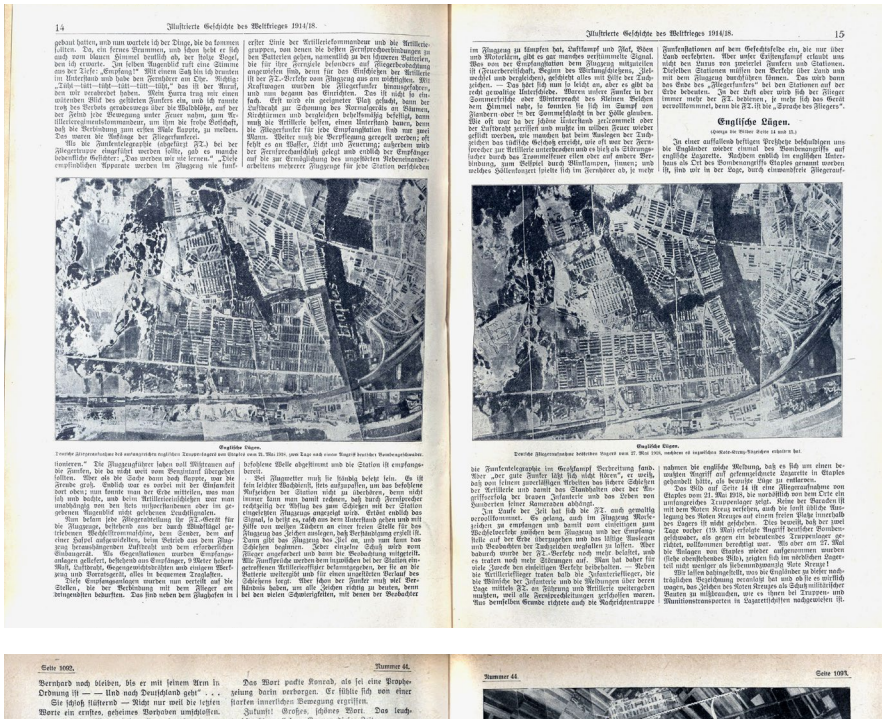


Fig. 17
Details of aerial Rb maps published in *Illustrierte Geschichte des Weltkrieges 1914/18*, Stuttgart et al. 1919, pp. 14–15

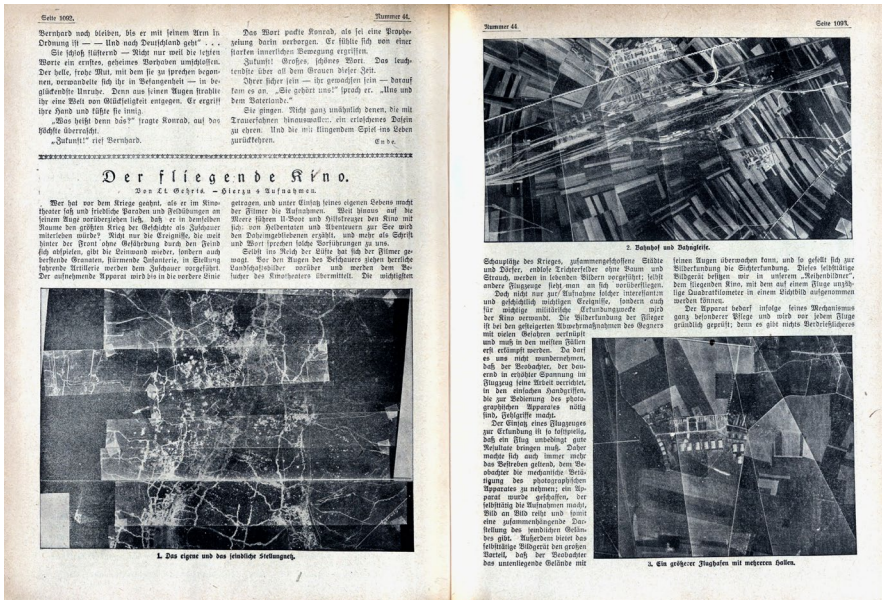


Fig. 18
Die Woche's article "Der fliegende Kino", Lt. Gehrts 1918 (note 17), pp. 1092–1093

Installing a camera that employed an innovative motion picture film mechanism on the fastest aircraft must have been an exciting fact to report in the press.[19] The promise of national technological progress embedded in the "flying cinematograph" perfectly matched with a broad fascination with technology – particularly the thrill of speed – that existed among the German public in the Wilhelmine Period.[20]
Cinematography, just introduced to the general public at the end of the nineteenth century, was considered the most "modern" audio-visual medium available at that time and the perfect tool for boosting the troop's morale in WWI by promoting the heroic achievements of the German army.[21] Combining this medium with the aircraft constituted a further impressive innovation that *Die Woche*'s article introduced in these terms:

> The filmmaker has even ventured into the realm of the air. Before the viewer's eyes, magnificent landscape representations pass by and are presented to cinemagoers. The most important scenes of the war [...] are shown in living pictures.[22]

Recording the war landscape from a vantage point in the sky did not only serve to document historical events through a new perspective but, the article explained, it also assisted military exploration. Thus, photography

19 For a technological history of motion pictures comprising a section on Oskar Messter, see Raymond Fielding, *A Technological History of Motion Pictures and Television. An Anthology from the Pages of the Journal of the Society of Motion Picture and Television Engineers*, Berkeley 1967.

20 For an overview of technological fascination in Wilhelminism, see the DFG project *Technikfaszination in Deutschland 1890–1914* led by Alexander Gall, URL: https://www.deutsches-museum.de/forschung/forschungsinstitut/projekte/detailseite/technikfaszination-in-deutschland-1890-1914#. See also Alexander Gall, "Überwältigt vom Anblick des Kolosses. Kollektive Emotionen und die Landung des Zeppelins in München 1909", in *Technikemotionen*, ed. Martina Heßler, Paderborn 2020, pp. 154–177.

21 As already mentioned, the *Oberste Heeresleitung* (OHL, Supreme Army Command) established the *Bild- und Filmamt* (BUFA), a centralised system of visual propaganda. In order to cover the various theatres of war, BUFA organised twenty troops, each of them composed of an army official, a photographer, a cameraman, and two assistants. Military film productions, feature films, and newsreels were distributed to civilians and troops from 1917.

22 Author's translation; original: "Selbst ins Reich der Lüfte hat sich der Filmer gewagt. Vor den Augen des Beschauers ziehen herrliche Landschaftsbilder vorüber und werden dem Besucher des Kinotheaters übermittelt. Die wichtigsten Schauplätze des Krieges [...] werden in lebenden Bildern vorgeführt." Gehrts 1918 (note 17), p. 1092.

and cinema were not only forms of art and entertainment, but they could produce photo-topography that responded to utilitarian aims, such as measurement of space, calculation of distances, comparison of areas, and monitoring of territories.[23]

By showing some mosaic maps, the magazine described the different phases and skills necessary to produce aerial photo mapping: from the preparation of the device before an aerial mission to the composition and interpretation of the maps. In the first phase,

> The observer lets the serial aerial camera run one more time on a trial basis, sets it to a certain speed, and once again keeps an eye on all directions to see whether "the sky is clear". If there are no enemy aircraft in the vicinity, the work begins. The pilot carefully guides his observer and checks and occasionally corrects the direction of flight.[24]

The article stressed the risks that the crew faced in accomplishing aerial mapping caused by both the antiaircraft and the dogfighting. Highlighting the heroism of the aviators was a common practice in WWI German propaganda. However, the article also showed technical details concerning the practical phases for assembling and interpreting aerial photographic maps in WWI.

This public and rich explanation of the postproduction work for map making is quite singular and is introduced in the 1918 article in these terms: "If the flight completely succeeds despite all the obstacles and dangers, the crew can be proud of the job carried out. But with the completion of the flight, the task is not yet over."[25] No less important than the recordings from the aeroplane was the manual work involved in assembling mosaic

23 Cf. "Doch nicht nur zur Aufnahme solcher interessanten und geschichtlich wichtigen Ereignisse, sondern auch für wichtige militärische Erkundungzwecke wird der Kino verwandt." Gehrts 1918 (note 17), p. 1093.

24 Author's translation; original: "Der Beobachter läßt den Reihenbildner noch einmal probeweise laufen, stellt ihn auf eine bestimmte Geschwindigkeit ein und hält noch einmal Umschau nach allen Seiten, ob 'die Luft auch rein ist'. Ist kein feindlicher Flieger in der Nähe, so geht's an die Arbeit. Sorgfältig winkt der Führer seinen Beobachter ein und überprüft und berichtigt ab und zu die Flugrichtung." Gehrts 1918 (note 17), p. 1094.

25 Author's translation; original: "Gelingt trotz aller Hindernisse und Gefahren der Flug restlos, so kann die Besatzung stolz auf den ausgeführten Auftrag sein. Aber mit der Erledigung des Fluges hat der Auftrag noch nicht seinen Abschluß gefunden." Gehrts 1918 (note 17), pp. 1094–95.

maps. During the postproduction, "[t]he recordings have to be carefully developed, and the individual pieces of film cropped and put together. [...] A special method makes it possible to combine the individual prints of uncut film strips in such a way that the whole gives the impression of a single shot."[26]

As the previous section of this paper has clarified, the correct arrangement of the filmstrips was the necessary prerequisite for interpreting the visual material, which consisted of searching "with the magnifying glass in order to explore all the details of the enemy facilities. It is extraordinarily arduous work that keeps many workers busy until late at night. Only those who spend hours interpreting such images with a magnifying glass can really appreciate them."[27] Here, the roles of the specialised military photographer who worked in the studios and the photo interpreter able to "read" aerial maps were recognised as the essential workforce who, together with the technological infrastructure, made aerial photo-reconnaissance an established discipline by the end of the war. In the last part of the *Die Woche* article, the author foresaw the successful employment of this photographic technology in times of peace. In fact, photo-topography realised through the *Reihenbildner* continued to be used after the conflict to represent planimetries of cities and other non-military sites.[28]

26 Author's translation; original: "Die Aufnahmen müssen sorgfältig entwickelt und die einzelnen Filmstücke beschnitten und zusammengesetzt werden. [...] Ein besonderes Verfahren gestattet, die Einzelabzüge unbeschnittener Filmstreifen so zusammenzusetzen, daß das Ganze den Eindruck einer Einzelaufnahme macht." Gehrts 1918 (note 17), p. 1095.

27 Author's translation; original: "Die fertigen Abzüge werden dann mit dem Vergrößerungsglas abgesucht, um alle Einzelheiten der feindlichen Anlagen genau zu erkunden. Das ist eine außerordentlich mühevolle Arbeit, die bis spät in die Nacht viele Arbeitskräfte beschäftigt. Sie recht zu würdigen weiß nur der, der selbst mit der Lupe stundenlang über solche Bildern saß." Gehrts 1918 (note 17), p. 1095.

28 See Paul K. Saint-Amour, "Applied Modernism. Military and Civilian Uses of the Aerial Photomosaic", *Theory, Culture & Society*, 28, 7–8 (2011), pp. 241–69; Rasch 2021 (note 1).

Aerial photomontage and modernity

The military context, the technical details, and the wartime propaganda described so far allow us to reflect deeply on the aesthetic and material qualities of photo mosaic maps, as well as their practical applications. Nowadays, the use of cameras for military purposes is not surprising. The relationship between image-making and military targeting technology has been amply analysed in recent decades, and it can be summarised with the statement by the media theorist Friedrich Kittler: "the history of the movie camera coincides with the history of automatic weapons."[29] During WWI, however, the reliability of the kinematic 'artificial eye' was presented as an absolute novelty to both the German high command and the general public.

The technique used for mapping territories showed many differences from previous experimentations in motion picture sequences and chronophotography. The famous works of Eadweard Muybridge, Etienne-Jules Marey, and Ottomar Anschütz had demonstrated the capacity of recording locomotion through various techniques. Muybridge used batteries of sequential still cameras to study the motion of humans and animals, presenting the results as separate freeze-frames or displaying moving images through the zoopraxiscope.[30] Similarly, Anschütz studied and recreated movement using a device called an electrotachyscope, also working for the Ministry of War.[31] In France, the scientist Etienne-Jules Marey,

29 Friedrich A. Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz, Redwood City, Stanford 1999 (1986), p. 124. For an analysis of the use of photo-cinematic techniques and war, see also Paul Virilio, *War and Cinema: The Logistics of Perception*, London et al. 1989; Thilo Koenig, "Das Kriegerische Vokabular der Fotografie", *Fotogeschichte. Beiträge zur Geschichte und Ästhetik der Fotografie*, 43, 12 (1992), pp. 39–48; Bodo von Dewitz, "Schießen oder Fotografieren? Über Fotografierende Soldaten im Ersten Weltkrieg", *Fotogeschichte. Beiträge zur Geschichte und Ästhetik der Fotografie*, 43, 12 (1992), pp. 49–60; Susan Sontag, *Regarding the Pain of Others*, New York 2003; Roger Stahl, *Through the Crosshairs. War, Visual Culture, and the Weaponized Gaze*, New Brunswick 2018; Antoine Bousquet, *The Eye of War. Military Perception from the Telescope to the Drone*, Minneapolis 2018.

30 See Hollis Frampton, "Eadweard Muybridge. Fragments of a Tesseract" (1973), in *On the Camera Arts and Consecutive Matters. The Writings of Hollis Frampton*, ed. Bruce Jenkins, Cambridge 2009, pp. 69–80.

31 See Friedrich Tietjen, "Loop and Life. A False Start into Protocinematic Photographic Representations of Movement", *History of Photography,* 35, 1 (2011), pp. 15–22.

who coined the word *chronophotographie*, showed overlapping phases of movement superimposed into one single photograph using a chronophotographic rifle that shot twelve images per second. Based on this last device, Oskar Messter designed the machine gun camera employed to train pilots during dogfights.[32]

Even though the *Reihenbildner* was advertised as a "flying cinematograph," implying the idea of moving images and locomotion, it differed from previous cinematic techniques for two main reasons. First, the recording of snapshot sequences did not create the illusion of movement. From a certain altitude, "the aeroplane eye" flying over the landscape recorded the terrain as a steady object.[33] In the absence of a kinetic object, the moving subject (the flying aircraft with the camera) created an aerial photo mosaic map that was the exact trace of the plane's routes. The flight paths usually followed switchback lanes and could also be recorded in distant moments. This last aspect has led the literary scholar Paul K. Saint-Amour to describe the photo map as a mosaic of temporalities: "[...] the photomosaic offers the distinct vertigo of temporal parallax, one arising from the experience of counterfeiting a spatially self-identical landscape from a constellation of segregated moments".[34] Furthermore, Saint-Amour defined the aerial photomosaic as a form of "applied modernism," namely a tendency, in common with Western modernists' experimentations, to interpret totality as a fragmentary space of partial viewpoints.[35]

Reflecting on this idea of "applied modernism," the last part of this essay investigates another quality that allows associating aerial photomosaic to modernist techniques; this feature is the montage that served to paste the cut strips of photographed land onto a unified picture-space.

32 See Marta Braun, *Picturing Time. The Work of Etienne-Jules Marey (1830–1904)*, Chicago 1992. For Messter's chronophotography, see the slow-motion recordings of a falling cat at Deutsches Museum Archive, Munich, BN12093 (Inv. No. 50238). Messter's machine gun cameras are permanently exhibited in the Deutsches Museum's *Foto und Film* exhibition as well as in the section *Kamerastadt Dresden* of the Technischen Sammlungen Dresden.

33 Cf. Christoph Asendorf, *Super Constellation – Flugzeug und Raumrevolution. Die Wirkung der Luftfahrt auf Kunst und Kultur der Moderne*, Vienna 1997, p. 34.

34 See Saint-Amour 2011 (note 28), p. 246; cf. Laszlo Moholy-Nagy, *Vision in Motion*, Chicago 1947, p. 12.

35 For Applied Modernism see Saint-Amour 2011 (note 28).

Indeed, the second aspect around which *Reihenbildner*'s recordings differed from previous chronophotography is that the printed snapshots (*Reihenbildstreifen*) were not presented as singular entities that could be individually compared, like Muybridge's photographs. By rearranging in line the long strips through the process of cutting and pasting, the military aviation departments created maps that could also be defined as aerial photomontages. According to Robert Sobieszek, the American curator of photography who extensively wrote on both commercial and artistic photomontage, at the heart of this technique there was always "the use of multiple pictures to make up another single picture. Photomontage is the creation of pictures from other pictures".[36] Considering the period between the origin of photomontage in the 1850s until its so-called golden age, with the invention of the Dadaist montage at the end of WWI, Sobieszek described various methods for realising photomontage: combination printing, cutting and pasting and rephotographing, sequentially exposing negatives, etc.[37] By considering these practices, it is possible to classify the creation of the military aerial photomap as a form of photomontage, in which the individual recordings of land became a new unitary object once the map was completed.

Sobieszek has described the history of both modernist photomontage by the avant-garde movements and its precursors by commercial photographers (e.g. André Adolphe-Eugène Disdéri's *carte-de-visite mosaique*). This essay adds new insights into this history of photomontage by showing its military use in wartime as an instrument of German aviation. In other words, photomontage may be interpreted not only as a political, satirical, artistic, and commercial tool but also as a scientific and military technique for copying and pasting topographies. Sobieszek distinguishes two forms of photomontage, which he describes as the naturalistic strain and the formalist strain.[38] In the early tradition of photomontage, professional photographers (e.g. Oscar Gustave Rejlander and Henry Peach Robinson) created true-to-nature scenes. On the contrary, modernist photomontage

36 Robert A. Sobieszek, "Composite Imagery and the Origins of Photomontage, Part II: The Formalist Strain", *Art Forum*, 17, 2 (1978), pp. 40–45, here p. 40.

37 Cf. Sobieszek 1978 (note 36), p. 44.

38 See Robert A. Sobieszek, "Composite Imagery and the Origins of Photomontage, Part I: The Naturalistic Strain", *Art Forum*, 17, 2 (1978), pp. 58–65; Sobieszek 1978 (note 36).

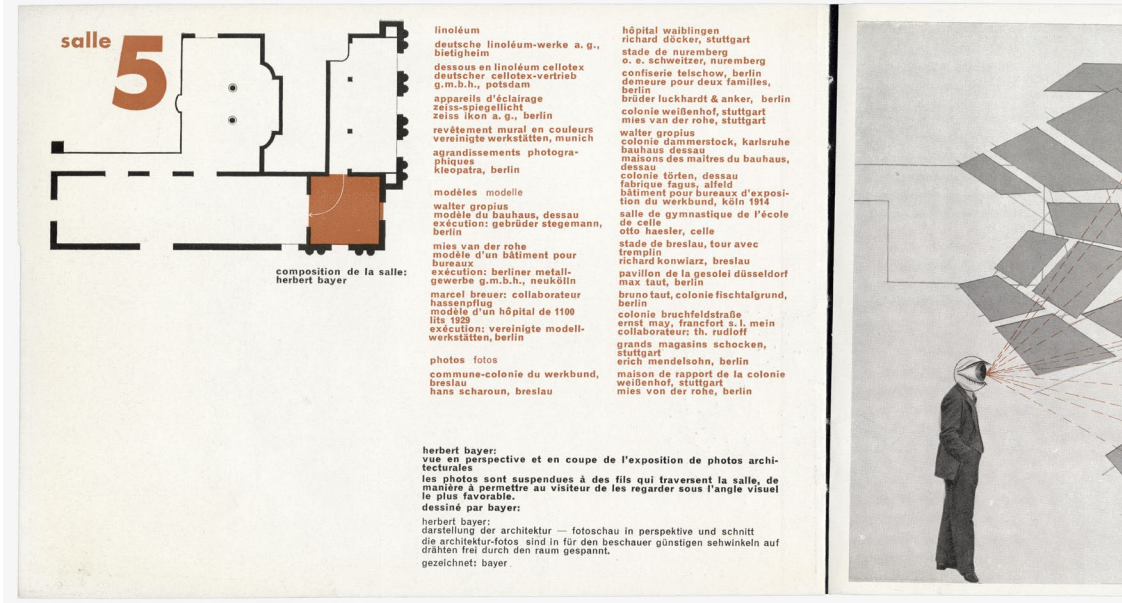
(a practice developed within the fine arts and used by Dada and Surrealism, among others) followed a formalistic imperative by assembling figures in unnaturalistic compositions.

It is challenging to include the aerial mosaic either in the naturalistic tendency or in the formalist tendency of photomontage. At the beginning of the twentieth century, the vertical perspective, from which the earth's surface was photographed perfectly perpendicularly from a great distance, seemed completely unnatural to untrained observers. However, the structure of the aerial mosaic was always dependent on the precise overlapping of the different pieces, in a process of reordering space that prevented any formalist constructions. Moreover, the military technique of photomontage lacked the incorporation of ready-made images, which was a feature of the high culture's modernist photomontage. In the military context, monitoring enemy movements and defences required the constant analysis of territories, and therefore the permanent production of new pictures.

Certainly, the military photomontage followed the idea of "static film" described by Raoul Hausmann, one of the founding members of the Berlin Dada Movement.[39] By mapping with the *Reihenbildner*, the kinetic qualities of both flying machine and flying cinematograph (the controlled and straight movements of aeroplane, camera propeller, film, and shutter) were not recreated through a film projection onto a screen; rather they served to record the terrain as a static and uniform photo paper map. Differently from the modernist photomontage, however, the internal composition of the aerial photomontage did not integrate "heterogeneous, often contradictory structures, [...] the most violent oppositions."[40] It did not even present the simultaneity of different points of view and

39 Cf. Raoul Hausmann,"Fotomontage" (1931), in *Film und Foto der zwanziger Jahre. Eine Betrachtung der Internationalen Werkbundausstellung "Film und Foto" 1929*, eds. Ute Eskildsen and Jan-Christopher Horak, Stuttgart 1979, pp. 132–133, here p. 132. All English translations in the following are taken from the translation of "Fotomontage" in *The Weimar Republic Sourcebook*, eds. and trans. Anton Kaes, Martin Jay and Edward Dimendberg, Berkeley 1994, pp. 651–653.

40 Hausmann 1994 (note 39), p. 652. Cf. Raoul Hausmann's original text: "Sie [die Dadaisten] waren die ersten, die das Material der Fotografie benutzten, um aus Strukturteilen besonderer, einander oftmals entgegengesetzter dinglicher und räumlicher Art, eine neue Einheit zu schaffen, die dem Chaos der Kriegs- und Revolutionszeit ein optisch und gedanklich neues Spiegelbild entriß.", Hausmann 1979 (note 39), p. 132.



the constant alternation of close and distant surfaces that, according to the designer and artist Herbert Bayer (an influential Bauhaus student and teacher), should make the viewer perceive the volume of space **(Fig. 19).**[41] The Dadaist photomontage aesthetic, in particular, included a cacophony of fragments initially devoid of any essential tie. Only when composed together did these fragments acquire meaning in a new image that, without any single-point perspective, led the observer's eye to roam the space. On the contrary, the aerial photomosaic was based on a logical concatenation of the sections which were combined in order to reach a homogeneous rendering of space – this method aimed at creating parallel-projection maps that eliminated the linear perspective effect of photography. Finally, it is interesting to notice that, in describing aerial photomontage, *dynamic*

41 Cf. Herbert Bayer, "Aspects of Design of Exhibitions and Museums", *Curator. The Museum Journal*, 4 (1961), pp. 257–288, here p. 267; *Welt im Umbruch. Kunst der 20er Jahre* (exhibition catalogue Munich), eds. Kathrin Baumstark et al., 2019, p. 235. See also Herbert Bayer, Design for Room 5, *Exposition de la Société des Artistes Décorateurs, Section Allemande* (exhibition catalogue Paris), [Berlin] 1930, n.p.

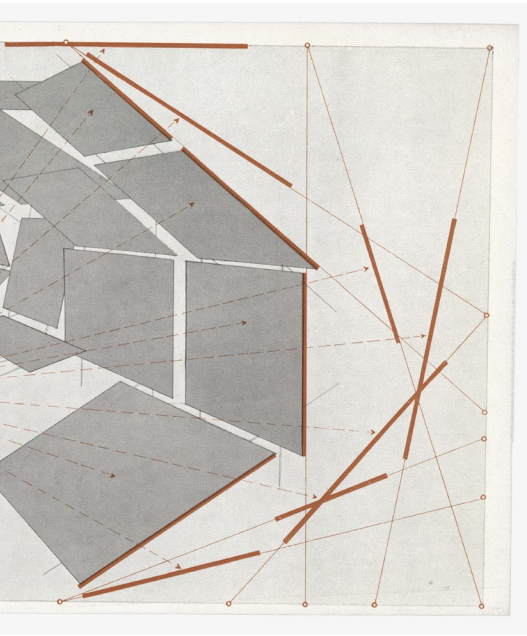


Fig. 19
Herbert Bayer, pages of the catalogue of the *Section allemande* (German section) at the annual exhibition of the *Société des Artistes décorateurs* (Association of French Interior Designers), held at the Grand Palais in Paris, see Bayer 1930 (note 41), room 5

and *static* are not opposite features. Rather they can be considered complementary qualities of the mosaic map.

In the analysis of modernity, montage symbolises the redefinition of time and space that started in the late nineteenth century.[42] Dadaists (re)invented the artistic technique of photomontage after WWI, composing an "explosive image, a provocative dismembering of reality".[43] By the 1930s, the photomontage was considered "the means of expression of our time"

42 A reflection on the concepts of modernism, modernisation, and modernity can be found in Thomas Elsaesser, "Modernity. The Troubled Trope", in *The Visual Culture of Modernism*, eds. Deborah L. Madsen and Mario Klarer, Tübingen 2011, pp. 21–40. For an analysis of the terms "collage", "photomontage", and "montage" as peculiar representations of modernity, see also Francis Frascina, "Collage. Conceptual and Historical Overview", in *Encyclopedia of Aesthetics*, New York 1998, pp. 382–384.

43 Dawn Adès, *Photomontage*, London 1976, p. 7; cf. Bernd Stiegler, "Politische Montage", in *Welt im Umbruch: Kunst der 20er Jahre*, eds. Kathrin Baumstark et al., 2019, p. 212–21. Cf. also Raoul Hausmann's original text: "[d]ie Fotomontage in ihrer frühen Form [war] eine Explosion von Blickpunkten und durcheinandergewirbelten Bildebenen", Hausmann 1979 (note 39), p. 132.

in Germany, omnipresent in political propaganda and commercial advertisement.[44] It is enough to say that the advertising campaign of the famous typeface *Futura*, designed by Paul Renner and released in 1927, waged on the fact that only the geometric sans-serif type could cope with the nature – exact and impersonal – of photomontage, for a perfect unity of word and image. The motto could be summarised: since photomontage is "the means of expression of our time," *Futura* is "the typeface of our time" **(Fig. 20 a, b)**. The montage strategy incorporated the fragmentation and multiperspectivism of the human experience, which resulted from mobility and mass production in the metropolis that created new dynamic imaginaries.[45]

This interpretation of modernity often forgets another use of photographic montage, as shown in the military photo maps. Nevertheless, the form of aerial photomontage that the present essay has analysed is not necessarily an expression of metropolitan modernity.[46] Photo maps composed with the *Reihenbildner* mostly portrayed remote places lacking German mapping coverage or countryside with military instalments and trenches. Moreover, the public that had access to this material was not only the metropolitan audience; war reports in illustrated magazines widely circulated all around Germany due to the general request for information from the various theatres of war.

However, there is another fundamental aspect that differentiates the aerial photo map from other kinds of photomontage. Within the military process, the multi-directional deformations of the images recorded on the

44 At the opening of César Domela-Nieuwenhuis's exhibition *Fotomontage* at the Staatliche Kunstbibliothek Berlin in 1931, Raoul Hausmann's public lecture declared the photomontage a Dadaist invention. However, the artist of the Berlin Dada Movement also recognised the importance this technique acquired in the Weimar Republic as a commercial and political tool. Responding to this most recent scope, Hausmann envisioned a future in which the photomontage loses playfulness and radicalism, gaining simplification, clarity, and constructivism. Hausmann 1979 (note 39), pp. 132–133.

45 For an analysis of the cultural effects of new modes of transport between the 1870s and the 1920s, see Christoph Asendorf, *Ströme und Strahlen*, Gießen 1989, particularly the section "Das nervöse Zeitalter." Here, the role of Futurism in theorising experiences of speed and dislocation is clarified. See also Umbro Apollonio, *Der Futurismus: Manifeste und Dokumente einer künstlerischen Revolution 1909–1918*, Köln 1972.

46 Cf. Frascina 1998 (note 42), p. 383; Elsaesser 2011 (note 42), p. 24.

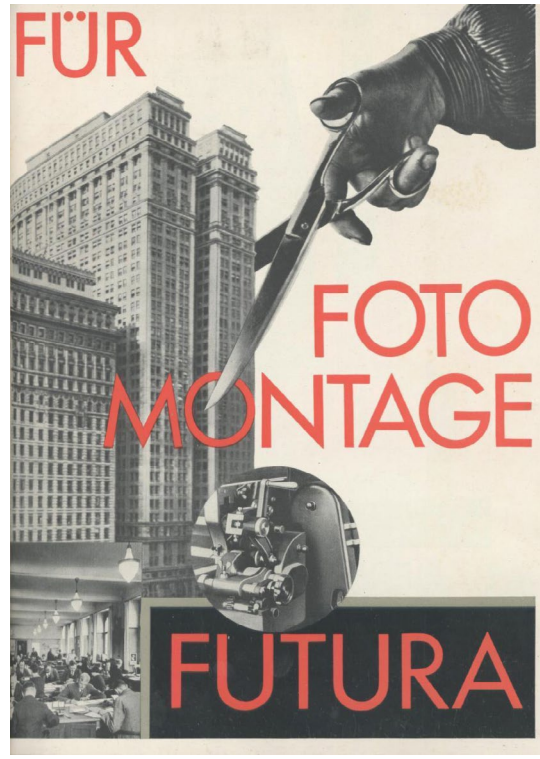


Fig. 20 a, b
Heinrich Jost (Design), Futura. Für Fotomontage, *Gebrauchsgraphik*, 6 (1929)

photographic film – deformations determined by a change of altitude of the plane, movement of the camera axis, etc. – were all calibrated in post-production in order to obtain the most uniform map possible. In this case, the fragments (a synonym for a sense of loss)[47] were replaced by sections (regulated cuttings). Within what we call modernity, the chaotic, nostalgic, and traumatic coexisted with a static and sequential order produced by sectioning rather than by fragmentation.

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47 For shock, trauma, and loss as a Benjaminian version of modernity, see *Walter Benjamin: Critical Evaluations in Cultural Theory*, ed. Peter Osborne, 3 vols., London et al. 2004, vol. 2: *Modernity*.

1

Terrain. Studies on Topographic Visual Media
Terrain. Studien zu topografischen Bildmedien

The joining of individual images or the mounting of papers to form larger sheets can be understood as material responses to the challenges of representing topographies. The combination of topographic images in composite media – albums, travelogues, atlases or picture series coupled with maps – enables complex representations as well as contextualised perceptions of space. This volume brings together case studies in which techniques of gluing and pasting prove essential for the rendering of space in visual media.