Excellence Cluster 264 Topoi

Research Area A – Posters on Research Activities 2007–2009

[1. February 2010]

Impressum

Posters on Research Activities 2007–2009
as of: 1. February 2010

edited by

Excellence Cluster 264 Topoi

represented by its Director

Prof. Dr. Friederike Fless

Administrative Offices:

Topoi-Haus Dahlem
Freie Universität zu Berlin
Hittorfstraße 18
14195 Berlin

Topoi-Haus Mitte
Humboldt-Universität zu Berlin
Hannoversche Straße 6
10099 Berlin

www.topoi.org

Topoi is the joint responsibility of the Freie Universität Berlin and the Humboldt-Universität zu Berlin. Partner institutions are the Berlin Brandenburg Academy of Sciences and Humanities, the German Archeological Institute, the Max Planck Institute for the History of Science and the Prussian Cultural Heritage Foundation. Furthermore Topoi is interlinked with several university institutes as well as other institutions.

RESEARCH AREA A: SPATIAL ENVIRONMENT AND CONCEPTUAL DESIGN

A-I: Central Places and Their Environment

Posters

A-II: Spatial Effects of Technological Innovations and Changing Ways of Life

Posters

A-III: Archäometrie/Archäoinformatik

Poster

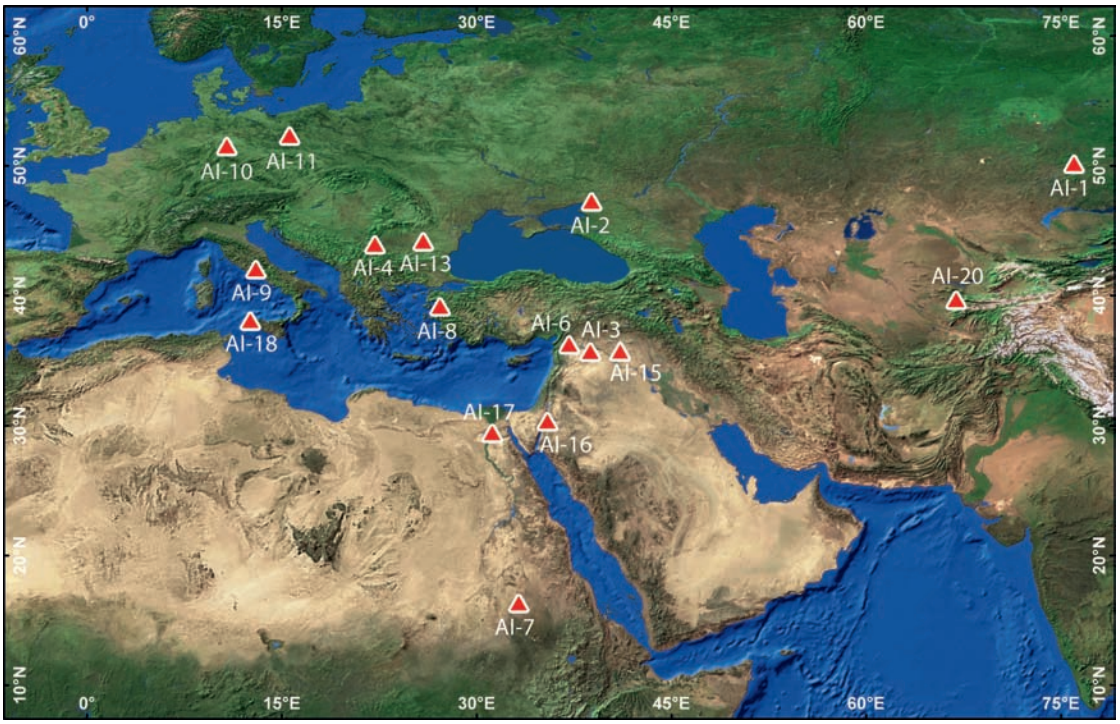
A-I Central Places and Their Environment

GOALS

The primary interest of the Research Group "Central Places and their Environment" concerns individual sites that had the character of central places or were located within limited regions in which networks of settlements were present. Cities, seats of power, and sacred sites are investigated with regard to their significance for, and their shaping influence on, the surrounding regions. Our intention is to study the network of relations between the central site or settlements in spaces of limited extension and their surroundings. This involves reconstructing the development of the respective central site and of the historical landscape, as well as the respective site factors, and analysing the structure of relationships to the surrounding territory and the connecting region. The influence such central places exerted on the surrounding space will be compared in terms of various cultures, regions, and social systems. These objectives are explored at the interface of methods and model building in the Earth Sciences and Archaeology. The investigation focuses on the Mediterranean region, the Black Sea area and the adjoining Eurasian steppes. Our studies include central places for which adequate historical sources are available, but also sites from preliterate epochs.

STRUCTURE

The core of Research Group A-I is the Graduate Group Landscapes, where the basic structure for projects is a tandem approach. Here a team of two scholarship holders, one from both the archaeological and the earth sciences, pursues the common goal of explaining the functioning and functionality of a defined central place and its interactions with its environs. The aim of the close collaboration with, and collective training of, the doctoral candidates is to break down the boundaries of linguistic and methodological competencies. Additionally, individual projects are identified to supplement the research in the Graduate Group Landscapes.



Position of the suprojects of the research group AI- Central Places and Their Environment

A-I-1: Pyramids of the Steppe - Archaeological and Geo-archaeological Investigations in the Land of Seven Rivers, Kazakhstan.
A-I-2: Taganrog - Central Sites of an Early Greek Polis in the Northeastern Black Sea Region.
A-I-3: At the Transition from Late Antiquity to Islam - Resafa in Syria – Cult Site and Center of Power in Relation to Landscape.
A-I-4: Felix Romuliana - A Late Ancient Imperial Palace and its Surroundings.
A-I-6: Archaeological and geoarchaeological invetsigations in the Aleppo region.
A-I-7: Egypt Lies in Africa - Paleoenvironmental Reconstruction in Naga, Central Sudan.
A-I-8: Ancient landscape in the environs of Atarneus.
A-I-9: Monti Navegna e Cervia - Geo-Archaeology and Landscape Development in an Italian National Park.
A-I-10: Settlement History of the South Harz Mountains.
A-I-11: Lossow near Frankfurt/Oder - An Early Iron Age Cult Site of the Ancient Peripheral Zone.
A-I-13: The Copper Age Tell Settlement Pietrele.
A-I-15: Historical Sources in Dur-Katlimmu, Global Climate Change and Climate in Local Perception.
A-I-16: Monumental Architecture in the Nabataean Capital Petra (Jordan): Graves and Palaces.
A-I-17: Paleo-Environmental Reconstruction of the Ancient Landscape at Daschur (Egypt) with its Graves, Sanctuaries, and Settlements.
A-I-18: Punic Settlement Strategies Using the Example of Erice Settlements.
A-I-20: Topographic-Archaeological Documentation and Historical Interpretation of the Central Asian „Long Oasis Walls" Settlements.

Prof. Dr. Brigitta Schütt
Geographische Wissenschaften, Physische Geographie, FU Berlin
brigitta.schuett@topoi.org

A-I Central Places and Their Environment

RESEARCH TOPICS

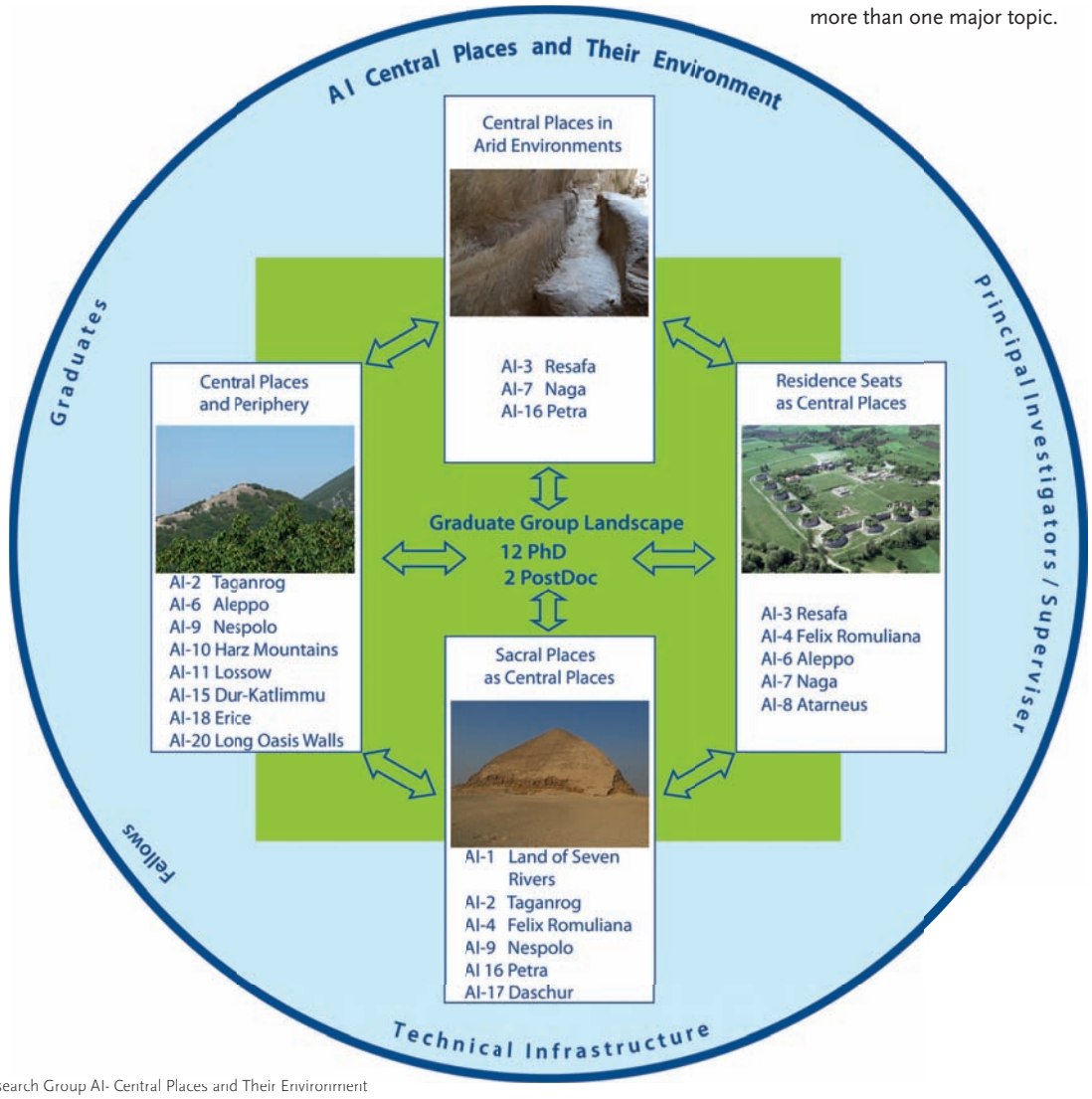
Research plans for the Graduate Group Landscapes were determined during an open discussion conducted within the Research Group. In the final determination of research topics and fields, importance was placed on having a direct connection to ongoing research projects in the archaeological sciences. This has ensured that research and excavation licenses have already been obtained before the start of the respective research. Along with the research plans for the Graduate Group Landscapes, this open discussion in Research Group A-I also identified "individual projects". Thematically, these individual projects are a valuable supplement to the research done in the Graduate Group Landscapes.

THE MEMBERS

The core of the Research Group Central Places and their Environment is the Graduate Group Landscapes, acting jointly with its supervisors and the members of the research group (principal researchers). Fellows supplement the personnel infrastructure of the research group. In addition, the technical infrastructure required to conduct the research is allocated by Topoi (automobiles, pollen laboratory, diverse instrumentation) and the Physical Geographical Laboratory (diverse lab and field instrumentation, corer). Additional expertise is provided by experts invited for lectures, discussion rounds or workshops.

BUNDLING MAJOR TOPICS

Research questions focus on the function (religious-military-economic-administrative), scale (local-regional-supraregional) and locational factors of the central place as well as the relationship between the central place and its environs or urban hinterland. It quickly became evident that all of the central places investigated feature more than one function, emanate on different scales and premise various locational factors. In outlining the projects, we discerned that the distribution of the characteristics varies between the individual sites. On this basis, we identified four major topics, and grouped the characteristics of the sites accordingly. Due to the complex character of the sites, most of them can be assigned to more than one major topic.



Major topics of the Research Group AI- Central Places and Their Environment

Prof. Dr. Brigitta Schütt
Geographische Wissenschaften, Physische Geographie, FU Berlin
brigitta.schuett@topoi.org

Seats of Residence as Central Places

Superordinate Questions and First Results

The link between governance and a distinct spatial place is another category of central places. This connection seems self-evident, thus it was not previously the focus of historical research. In particular, questions concerning the scale and nature of central functions of these seats of residence were neglected.

The various projects of Research Group A-I help to answer these questions for a period extending from the third millennium BC to the time of Islam (Fig. 1). Furthermore, the wealth of projects provides detailed information on selected cultures as well as on different systems of government. The main objective is the analysis of environmental conditions and their influence on the location as well as the design of the seat of governance. In spite of this, the question how these central places changed the settlement system as well as the natural environment should be adressed. Consequently, the methodology does not focus on the seat of residence in the context of architectural characteristics but on its regional integration and wider-scale importance. The central point of interest is therefore the relative importance of the central place for its environment, considered on different scales.

FIRST RESULTS

The first comprehensive results show that some features are of greater importance in the localisation of seats of governance than previously supposed. These include environmental conditions and dynamics (Kaikos Valley, Fig. 2) as well as proximity to important strategic communication roads such as rivers, trade routes or cross-regional roads (Aterneus, Pergamon, Felix Romuliana, Resafa in Roman times, Aleppo).

Additionally, the availability and accessibility of resources (Felix Romuliana) and connection to a sanctuary (Resafa, Aleppo) greatly influence the location of a governance seat.

Examples of the connection of sacral places and residence seats include the ancient Nabataean capital of Petra and Aleppo. Especially the latter helps to understand the link between centrality induced by political and religious conditions.

Results of investigations in Aleppo and its environs show the fluctuating influence of central places with respect to seats of governance and sanctuaries: just as Aleppo lost its dominant political position during the Late Bronze Age, yet remained a central place, because it retained its ancient religious status. The case of northwestern Syria demonstrates the connection of central places, communities and political frameworks.

Furthermore, research shows that there is a link between continued occupation and influence on existing settlement patterns. For instance, surveys around Felix Romuliana show that the palace was occupied too briefly to influence the settlement system and natural conditions. Thus, Felix Romuliana as the seat of a Roman emperor was probably never a cross-regional central place.

Fig. 2: View from the Trajaneum of Pergamon into the Kaikos Valley

By contrast, measures to expand the late ancient pilgrims' city Resafa, especially regarding water supply, changed the environment permanently.

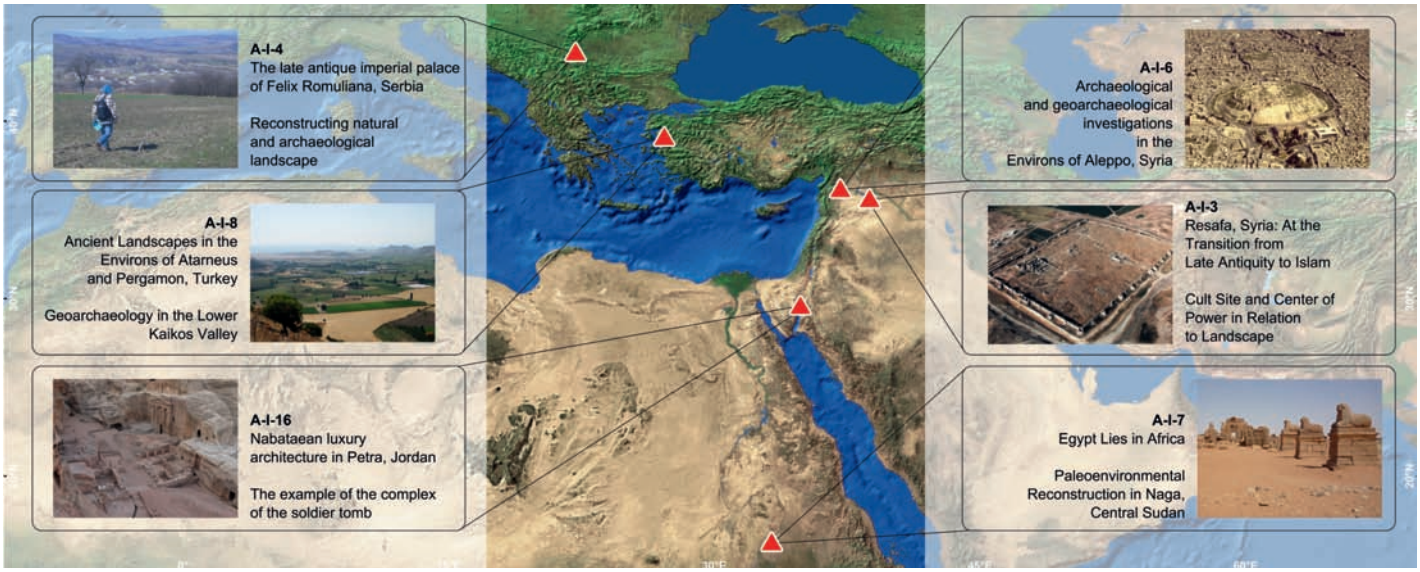


Fig. 1: Research projects of the Research Group A-I investigating residence seats as central places

Prof. Dr. Ulrike Wulf-Rheidt
Architekturreferat, Deutsches Archäologisches Institut
ulrike.wulf-rheidt@topoi.org
+49.(0)30.187711-138

Seats of Residence as Central Places

Representative Projects

A-I-3 Resafa - Rusafat Hisham, Syria: Palaces, Paleoenvironment and water managment systems

Resafa was founded as a fortress at the eastern Roman border in the 1st century AD. At the beginning of the 6th century, the fortress became a city of pilgrimage, as it was said to cover the relics of the Roman saint Sergios. Because of this sanctuary, the Umayyad Caliph Hisham ibn ʿAbd al-Malik (724-743) decided to take residence in Resafa. For about 15 years, the city was the political centre of the Arabian empire. At least two palaces were built and decorated richly with stucco (Fig. 1) and wall paintings. Gardens and water basins also served as part of the caliphal representation. This is astonishing, given that Resafa is situated in a dry area. One main goal of the project is therefore the reconstruction of environmental conditions and the understanding of the water management system, based on a hydrological modelling. Initial results show that this system was often changed during Resafa's history, and that it attained its most effective form during the Umayyad period.

A-I-4: The Late Roman Imperial Palace of Felix Romuliana. Reconstructing natural and archaeological landscape

The research area lies in the valley of the Crni Timok river in Eastern Serbia and is focused on a late antique fortified palatial complex associated with the Emperor Galerius (Fig. 2). The project employs several strategies, including archaeological and geomorphological surveys, in order to trace the development of the palace hinterland, thereby identifying its role within a central place model on a local level, its nature and function and its influence on the surrounding region. The hinterland's central nature is particularly evident in economic terms, confirming earlier theories that metallurgy played a key role in the development of this region. Felix Romuliana could therefore have played a key role on a regional or wider scale, as it lies directly on the East-West axis connecting the Timok and Morava valley regions. This position suggests that it may have served as a central place in a network of smaller fortified sites located along this route. Furthermore, a reconstruction of settlement patterns via geomorphologicial and archaeological surveys aims to establish to what extent geographical conditions influenced the formation, development and abandonment of these settlements from the Neolithic to the Medieval period.

A-I-8: Ancient Landscapes in the Environs of Atarneus and Pergamon – Geoarchaeology in the Lower Kaikos Valley

The Lower Kaikos Valley, situated in Western Turkey, is an interesting landscape in which to investigate the development and transformation of central places. In prehistoric times, the region had a decentralized settlement structure. By Hellenistic times, an advanced net of central places had developed around the central places of Atarneus and Pergamon. One of the main topics of research is the connection between the system of the Kaikos river as an important communication line and the rise and fall of Atarneus and Pergamon as important Hellenistic central places. The most prominent question is whether the Greek geographer Strabon was wrong when he stated that Kaikos entered into the Aegean Sea near Atarneus. Because the recent river mouth is located about 20 km southeast of this location. Did the mouth of the Kaikos river system change its location within the Late Quaternary? And how did landscape evolution and human settlement activity interact? To answer these questions, the project includes sedimentary and geomorphological investigations and integrates archaeological research. As a result, ongoing sediment analyses focus on the identification of different deposit forms and on human impact.

Fig. 1: Stucco from the islamic residence in Resafa

Fig. 2: The late antique imperial palace Felix Romuliana, viewing direction northwest

Prof. Dr. Ulrike Wulf-Rheidt
Architekturreferat, DAI
ulrike.wulf-rheidt@topoi.org
+49.(0)30.187711-138

Sacral Places as Central Places

Temples, Mausoleum, Kurgans, Pyramids and Rock-cut Tombs

INTRODUCTION

By sacral places, we understand places where ritual acts, for example contacts with supreme powers such as divinities, ghosts or ancestors took place. Many ancient cultures believed in an afterlife. Monumental tombs and a variety of grave goods support this hypothesis. Nevertheless, the everyday life of ancient people was always accompanied by manifold uncertainties and questions regarding religious aspects:

- what relation exists between the living and the dead (fear, worship etc.)?
- what is beyond the human horizon?
- what happens after death?
- is there eternal life or rebirth?

Monumental sacral places could be seen as a kind of reflection of these essential questions. When investigating the royal pyramids of Dahshur, the so-called kurgans in the Asian steppe, the mausoleum of Felix Romuliana in Serbia, or the tombs in Petra, it is evident that the construction of the monuments differs, but the basic concepts applied by the builders are comparable:
- to facilitate a physical or spiritual afterlife for the deceased
- to build a place of memory and, therefore,
- to establish a collective identity.

The monumental constructions also had a meaning for the living: as a place for gathering, for ritual ceremonies, as a place of pilgrimage, as memorial places or as a prominent landmark. Many sacral places have a meaning for entire cultures (e.g. the pyramids in Egypt, the kurgans in the Asian steppe belt).

Visibility seems to be an important factor for the location of sacral places. The burial mounds in the hinterland of Taganrog, as well as the pyramids of Dahshur and the mausoleum in Felix Romuliana, were located on exposed relief positions, e.g. hilltops or escarpments.

Due to their monumentality, they still document the existence of ancient cultures that disappeared hundreds or thousands of years ago.

Parco Reginonale Monte Narvegna e Cervia, Republican grave monument (Photo: K. Moede)

THE PROJECTS

A-I-1: Archaeological and geoarchaeological investigations in the Land of Seven Rivers – Kazakhstan.

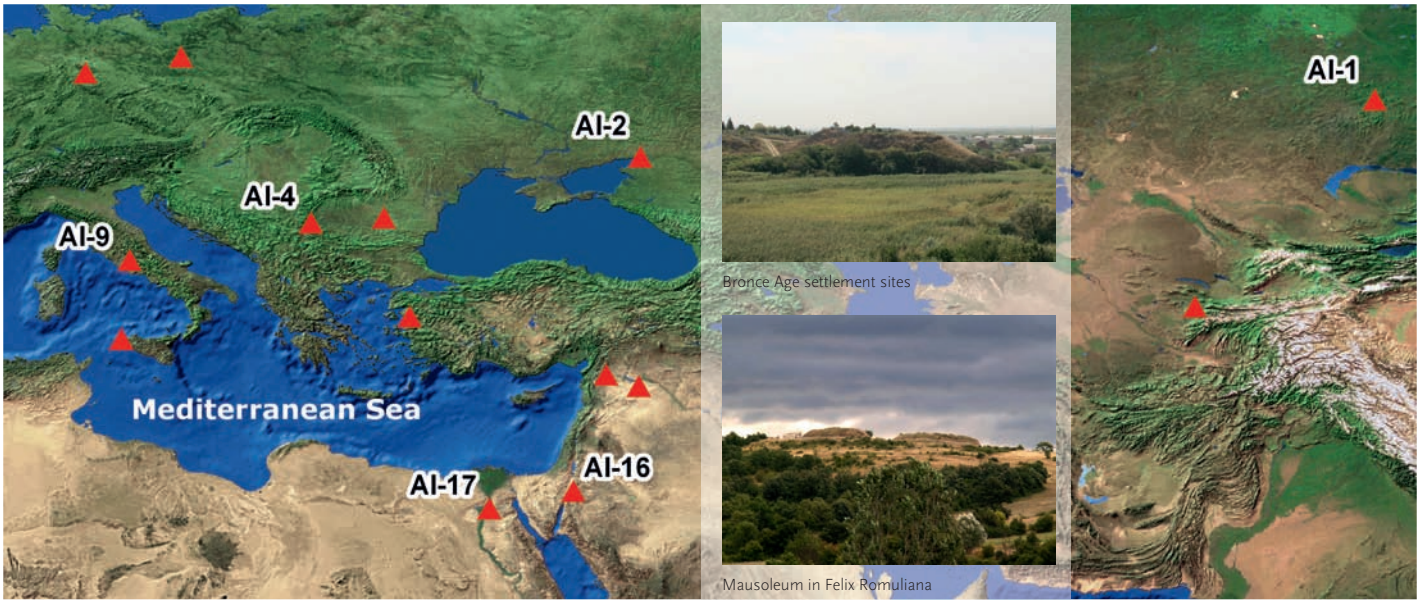
A-I-2: Central sites of an early Greek polis in the northeastern Black Sea region (Taganrog).

A-I-4: Felix Romuliana. A late antique imperial palace and its surroundings.

A-I-9: Monti Navegna e Cervia. Geo-Archaeology and landscape development in an Italian national park (Nespolo).

A-I-16: Monumental architecture in the Nabataean capital Petra: tombs and palaces.

A-I-17: Paleo-environmental reconstruction of the ancient landscape at Dahshur, with its graves, sanctuaries and settlements.



Locations of sacral places investigated in Research Group A-I

Prof. Dr. Stephan G. Schmid
Klassische Archäologie, Winckelmann-Institut, HU Berlin
stephan.schmid@topoi.org

Sacral Places as Central Places

Examples from Zhetisu, Petra and Dahshur

INTRODUCTION

The investigation of sacral places plays a major role in Research Group A-I. Despite different states of research, all monuments are of a high importance for the understanding of the functioning of sacral places. We are focusing on the following research questions:
- Are the monuments located in a specific landscape position?
- Is the distribution of the monuments random, or do patterns exist?
- Where does the building material for the monuments come from?
- Are the various tombs in question only burial grounds, or do they also have a cultic function?
- What kind of natural or socio-economic factors influenced the siting?

A-I-1: ZHETISU (KAZAKHSTAN)

The study site of the geoarchaeological investigation is located in the Zhetisu region in southeast Kazakhstan, which is characterized by grave monuments. Theses kurgans are remains of the Sakes culture, whose members inhabited the area in the early Iron Age (1st mill. BC). The Sakes belong to the Scythian culture group of the eastern Eurasian steppe belt and are described as warrior nomads. The research project includes investigation of the spatial distribution of kurgans.

After the late Bronze Age, the mobility of the inhabitants increased. This led to a new perception of space and utilization of the region. This process could be observed by investigating the distribution of kurgan burial fields and their internal structure. The distribution of kurgans and their geometric form in the Zhetisu region is comparable with the kurgan fields of north-Pontic regions.

Royal kurgan of the necropolis Asy Saga (Photo: A. Gass)

Antique authors, e.g. Herodotus described Scythian sacrifices that look similar to the investigated kurgans (Herodotus, The Histories, Book 4, Melpomene, 62). Furthermore he pointed out that the necropolis of the Sake's elite built a collective memory, which plays a major role for the Scythian culture (Herodotus, The Histories, Book 4, Melpomene, 71 & 127). In such a way these necropoleis are not only burial places, but also sacred places for the central identification of the Sakes.

Petra, Wadi Farasa East. Complex of the Soldier tomb from N (Photo: S. Schmid)

A-I-16: PETRA (JORDAN)

The richly decorated rock-cut façades of tombs are among the most eye-catching elements of the ancient Nabataean capital of Petra (southern Jordan). Recent archaeological investigations of the complex of the Soldier tomb in the Wadi Farasa East revealed that the rock-cut façades are not monuments *per se*, but an integral part of sophisticated multifunctional complexes.

The central element of the complex is a huge peristyle courtyard with freely built colonnades on three sides. The two main rooms, both rock-cut, are located on the main axis of the courtyard, i.e. the tomb proper, and a huge *triclinium* or banquet hall. The material cut away was used to construct the freestanding structures. The main entrance to the complex led through a huge, two-story building, literally squeezed between the two sides of the valley. Within the rooms of the building, remains of lavishly decorated wall paintings, opus sectile floors and hypocaust heating installations were found. In other words, the complex, built in the third quarter of the 1st c. AD, shows clear signs of regular use by living people and, thus, of a kind of coexistence between aspects of funeral rituals and daily life. The plan and the architecture of the complex are clearly borrowed from Hellenistic and Roman luxury architecture, i.e. the palaces and villae of the Hellenistic kings and the Roman aristocracy.

A-I-16: DAHSCHUR (EGYPT)

The necropolis of Dahshur is situated 30 km south of Cairo. The whole cemetery should be understood as a sacred area. The cemetery is dominated by five pyramids. Two of them were erected in the reign of King Snefru (about 2.600 BC), and three pyramid tombs were built in the Middle Kingdom (about 1.900-1.800 BC).
As the central element, pyramids were complemented by a pyramid temple, a causeway, and a valley temple, and have at least four functions.

- Architectural function: Protection of the king's body and funerary equipment.
- Cultic function: Execution of mortuary cult in the pyramid temples by priests over decades or even centuries.
- Cosmic function: the height and form of a pyramid are related to the sky and the sun. This setting should enable the spirit of the deceased king to fly to the northern sky and to exist there as a star eternally.
- Political function: The erection of a pyramid was a project to unite the country. Through their monuments, the socially distant god-kings were always visually present. Thus the political structure was translated into architectural forms and mapped onto the landscape.

The organization of the funeral monuments as symbolic reflections of the social organization of the early pharaonic state as well as the embedding of the monuments within the landscape can be analyzed at Dahshur in an exemplary fashion.

Bent Pyramid of King Snefru (Photo: D. Blaschda)

Dr. Wiebke Bebermeier (Postdoctoral Fellow)
Geographische Wissenschaften, Physische Geographie, FU Berlin
wiebke.bebermeier@fu-berlin.de

Central Places in Arid Environments

With a Focus on Water Supply Systems

INTRODUCTION

Ancient cultures developed a variety of water technologies to sustain permanent settlements in arid and semi-arid environments. Among them were wells and conveyance systems that transported water to the settlements via conduits, channels and aqueducts from perennial water sources such as rivers, dammed reservoirs or groundwater (Wikander, 2000). Additionally, water harvesting, the collection and storing of water, was a common method for water augmentation (Fig. 1). The harvested water served either for animal husbandry, for irrigation purposes or as drinking water.

This was the case in Resafa and Petra in the Near East as well as in Naga in Northeastern Africa (Fig. 2).
In Resafa and Naga, dams and levees, cisterns and surface reservoirs were used to collect, control and store periodic, concentrated surface runoff. While this was also the case in Petra, the extensive irrigation and terrace systems of the city's environs are the focus of the study.

The water supply systems were adapted to the specific environmental conditions in drylands, where the rainfall character is dominated by erratic, high-intensity, short-duration rainfall events over limited areas. This combination generates episodic floods, whose hydrographs directly correspond to the rainfall character (Tooth, 2000).

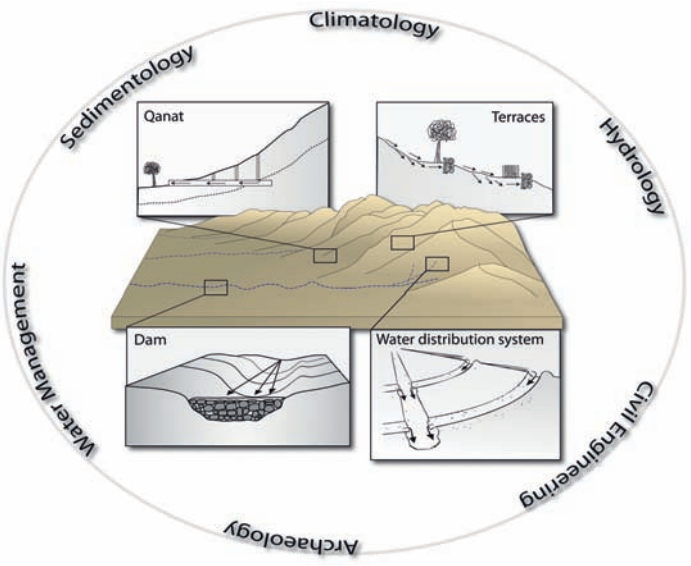


Fig. 1: Landscape sketch (center) with examples of traditional water harvesting (surrounding pictures) methods, along with relevant disciplines (outer terms)

GOALS

The basic conditions required for the systems to work, the extent to which these systems were vulnerable to environmental changes, and the ways in which they changed the environment are the primary goals pursued within this major topic. At the study sites, comprehensive ancient water technologies typical for the antique central places examined occure (Fig. 3).

APPROACH

Our approach focuses on geoarchaeological questions in dryland areas where water availability is the key factor and attempts to answer them using climatic, hydrological and geomorphological methods. For Resafa and Naga, a hydrological model is set up to assess water availability and feasibility of the systems under different climatic and hydrologic settings (Berking et al., submitted).

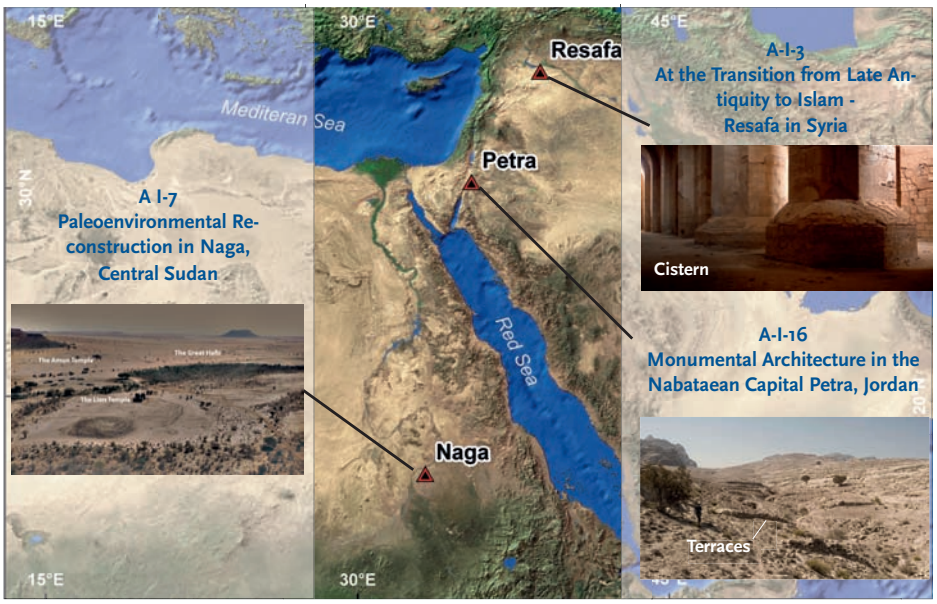


Fig. 2: Locations of the central places being presented, in the Near East and Northeast Africa

Fig. 3: 3D-Sketch of the Great Hafir of Naga (with flow direction indicated by grey arrows)

References

Berking, J., Beckers, B., Schütt, B.: "A comparative approach to estimate the (palaeo-) runoff of two semi-arid watersheds in a geoarchaeological context – a Case study of Naga (Sudan) and Resafa (Syria)". Geoarcheology, submitted.

Tooth, S. (2000). Process, form and change in dryland rivers: a review of recent research: Earth-Science Reviews, 51, 67-107.

Wikander, O. (ed.) 1999: Handbook of Ancient Water Technology. Brill Academic Publishers, Leiden.

Brian Beckers, Christoph B. Konrad (Doctoral Fellows)
Jonas Berking
Geographische Wissenschaften, Physische Geographie, FU Berlin
brian.beckers@topoi.org, christoph.konrad@topoi.org

Central Places and Periphery

The study of central places does not necessarily involve research of urban centres. That central sites also can develop in the periphery of densely settled areas (Aleppo) or far from urban agglomerations in a sparsely settled area (Monte San Giovanni, Don delta) is demonstrated by the projects, which cover different cultural areas and landscape zones (fig. 1). It is not important whether the central place is a settlement site, a single sanctuary or a construction like the oasis walls of Sogdia.

AREAS OF RESEARCH

It is obvious that a central place is necessarily linked to its surroundings. Therefore, the interdisciplinary investigations do not focus exclusively on the central site itself. The character and development of the cultural and natural landscape is of primary interest regarding "push and pull" factors for central sites, the functional integration of the site into the existing urban settlement structure, and in terms of the effects on the restructuring of the landscape. But the development of an outlying central place is not the sole focus of the research topic; the disturbance of a centralized system as is evident in the southern Harz foreland is also considered. The differentiated settlement system of this region was disturbed in the 2nd century BC by immigrants (fig. 2). By archaeological and geoarchaeological means, the project tries to work out the reasons for the particular choice of sites by the immigrants, and the influence of the immigrants on the centralized settlement system which collapsed around 50 BC.

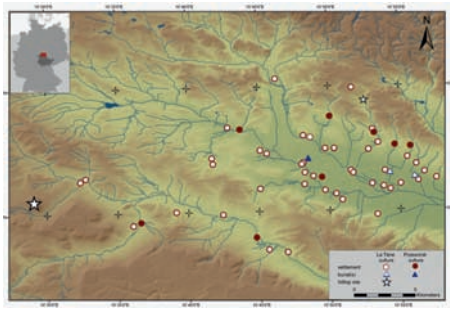


Fig. 2: Distribution of the central places (stars) and the settlements of the indigenous population (white; La Tène Culture) and the immigrants (black; Przeworsk-Culture) in the Southern Harz area

LOCATION OF CENTRAL SITES

Most of the outlying central sites have a characteristic topographical position in relation to their surroundings. They may be located on a mountain, such as the sanctuary of San Giovanni or the antique city of Erice, or they may have an elevated position on a high bank, such as the Lossow enclosure or the central settlements along the Don delta. Also, positioning along strategically or economically important transport or communication routes, such as rivers (Southern Harz, Lossow, Don delta) or intraregional connecting paths (Monte San Giovanni, Aleppo, Dur Katlimmu) is a characteristic of the given sites. The central function is either religious (Monte San Giovanni, Lossow, Aleppo) or of a strategic and economic nature (Sogdia, Aleppo, Erice).

Fig. 1: Location of the projects within the research topic "Central Places and Periphery"

Positioning along important routes is a significant factor for the development of a central place, even if it is located in the periphery. Aleppo, for example, is at the crossroads of main routes between the Mediterranean Sea and the Euphrates, and from Anatolia to Palestine and Egypt. The town itself is situated in a narrow river valley at the intersection of the periphery of three areas (fig. 3) with fertile soil and easily accessible groundwater, which are separated by stony plateaus and which needed to be controlled for the support of a potentially larger urban population. A look at the environs indicates lines of dense human presence and total lack of settlement in pre-Hellenistic antiquity.

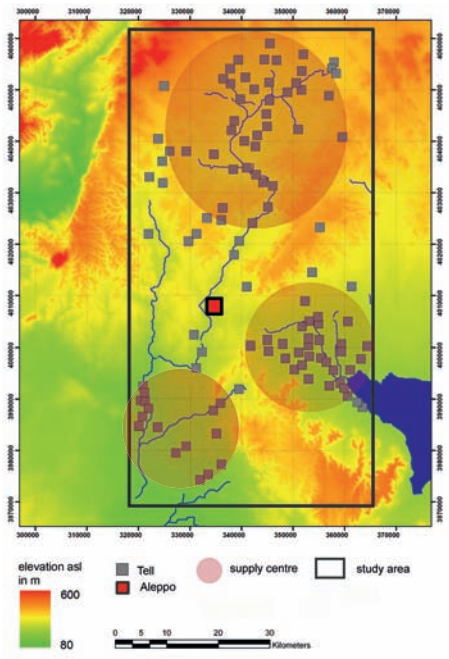


Fig. 3: Aleppo in the periphery of its three supply centres

In northern Mesopotamia a road system connected Dur-Katlimmu with the north but also across the steppe with the capital Ashur implemented by road stations like Tell Umm Aqrebe, east to Dur-Katlimmu. 33 villages listed on a stele from Tell Rimah, under the heading of Dur-Katlimmu, correspond to 31 villages discovered in a survey of the Wadi Ajij region, forming a five-tier settlement system with Dur-Katlimmu as Central Place and Tell Umm Aqrubba as sub centre. This "domestication" of the steppe, the construction of a canal system as well as of a "Royal Road" system mark the beginning of the degradation process of the vegetation.

Marlen Schlöffel (Doctoral Fellow)
Geographische Wissenschaften, Physische Geographie, FU Berlin
marlen.schloeffel@topoi.org

Central Places and Periphery

Case Studies From a Mountain and a Steppe Area

VIA DECENTRALITY TO CENTRAL PLACES – The sanctuary on Monte San Giovanni, Italy (A-I-9)

The case of the Monte San Giovanni sanctuary raises the question to what extent central places are developed in a sparsely settled area parallel to the antique and medieval centre of Rome. The Monte San Giovanni sanctuary (fig. 1, 2) cannot be regarded as a central place in terms of Roman administrative structure: i) it is too small; ii) a supra-regional importance has not been proven; and iii) it is situated between the two Roman provincial towns Rieti and Carsoli. Definition as a central place in the context of the spatial organization of settlements is not applicable here. Nevertheless, when focussing on the surrounding region the sanctuary takes on a new relevance in terms of centrality. Due to natural conditions, it is only through this region, which is traversed by two of the most important Roman roads, that different territories and central places (Rieti and Carsoli) are linked. The economic resources of these cities only become usable when they are connected. Additionally, goods that are produced in the study area are mainly consumed in these cities. Regarding the supply of goods, the large-scale rural region surrounding the sanctuary could be evenly ranked with urban settlements where tools for agriculture are produced and where markets exist. Therefore, both cities and rural areas are directly and reciprocally dependent on each other.

REFUGIUM OR CENTRAL SITE? Investigations in the northeastern Black Sea Steppe, Southern Russia (A-I-2)

Prior to the transmission of the Greek polis system to the Black Sea region, a wide variety of settlement patterns existed in the research area within the timeframe 2000-600 BC (fig. 3). Whereas during the Middle Bronze Age (3rd mill BC) and the transition from the Bronze to the Iron Age (ca. 1200-600 BC) the few known settlements are restricted to the areas immediately bordering the Azov Sea coast and the Don delta, in the Late Bronze Age (ca. 2100-1200 BC) hundreds of settlements are spread all over the steppe. After the collapse of the Late Bronze Age settlement system, settlements and burials are restricted to the Don delta region where, during all of the periods studied, the central sites are concentrated (fig. 3, 4). Through the study of natural and cultural "push and pull" factors, analysis will be conducted of why it was exactly the Don delta that served as the focus not only of central sites, but also of all settlements in certain periods. Did possibilities for central sites to develop in other landscape zones exist, especially in the periods where the entire steppe region was settled? And what is the cause of the unusual situation in the Final Bronze Age in which only central settlement sites are known?

The colonization of the steppe, including its more arid parts, and the end of this phase of intensive settlement are being researched through the study of the diversity of the natural and cultural landscape and their mutual interactions. Geoarchaeological investigations concentrate on geomorphology and erosional deposits in the hinterland of the Don delta to see whether it was manmade landscape changes or rather changes in climatic conditions that caused the system to collapse. The distribution of graves over various landscape zones and the study of settlement form and economic indicators should provide information on whether landscape changes coincide only with a change in settlement intensity or with changes in all aspects of society.

Fig. 2: Monte San Giovanni and its surroundings

Fig. 4: Central settlement (Final Bronze Age) at the Don delta

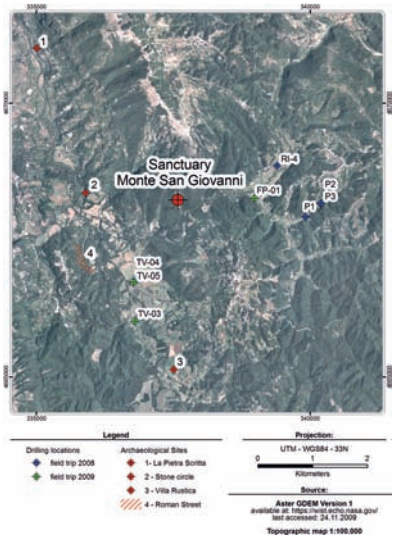


Fig. 1: Overview of the study area Monte San Giovanni with sites for archaeological and geoarchaeological research

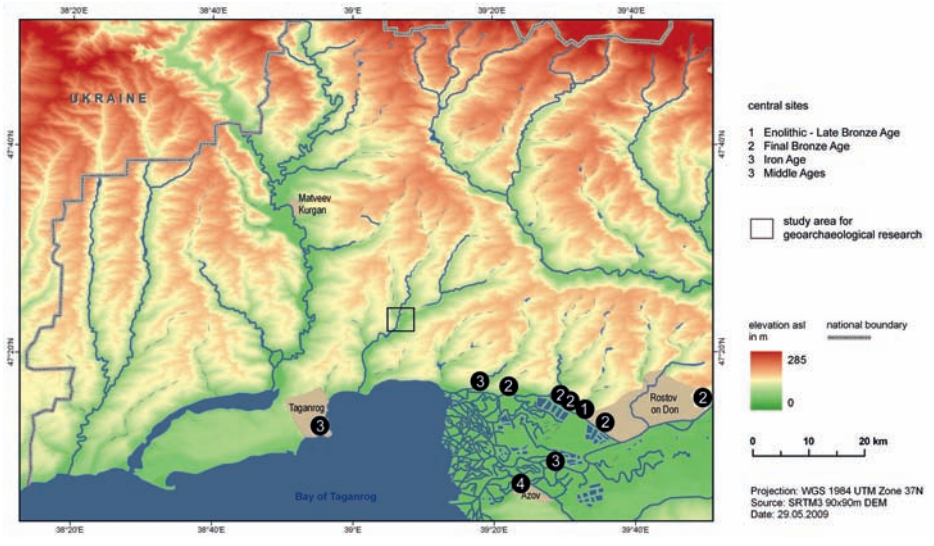


Fig. 3: Location of central sites within the research area over different periods of time

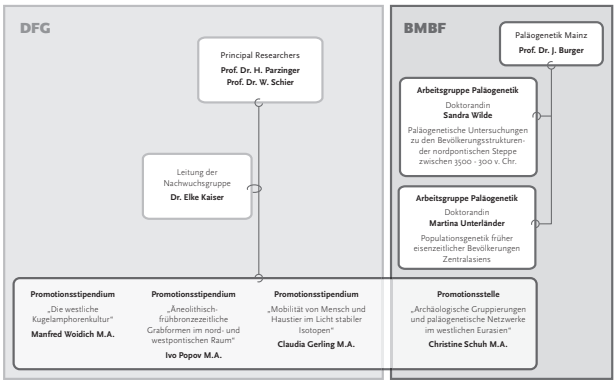
Marlen Schlöffel (Doctoral Fellow)
Geographische Wissenschaften, Physische Geographie, FU Berlin
marlen.schloeffel@topoi.org

Spatial Effects of Technological Innovations and Changing Ways of Life

Research Group A-II investigates the genesis and spread of spatially oriented and spatially effective innovations (wagons and draft animals, early herding, mounted nomadism) and their concomitant demographic, social historical, and cultural historical phenomena and consequences. Geographically, the focus is on the steppe belt north of the Black Sea, the adjoining areas, and selected regions of Central Asia, because a high level of mobility can be assumed for these semi-arid spaces in relatively early times. Mounted nomadism is definitely proven for the Scythian and Sakian and the somewhat more recent Hunno-Sarmatian period in the 1st century B.C. For the older periods that will be investigated here, such as the late 4th and entire 3rd centuries B.C., a subsistence economy based on specialized animal husbandry and mobile herding is postulated, but has not yet been archaeologically proven. Certain cultural phenomena and innovations are discernible over a vast area during these periods; thus far, this has been controversially explained with models of diffusion or migration on the basis of purely archaeological evidence.

STRUCTURE

The Research Group's collaborative project investigates demographic and socio-economic processes of transformation in the steppe zones west and east of the Urals in connection with historically important cultural innovations in four different time periods (3500-3000 B.C.; 3000-2500 B.C.; 2500-2000 B.C.; 800-200 B.C.). Along with purely archaeological research approaches, a concept for isotope-chemical and paleogenetic analyses was drawn up with the goal of detecting various levels of population movement. The paleogenetic investigations will be carried out in the framework of a complementary BMBF project, while the isotope-chemical component of Research Group A-II is part of Topoi. The doctoral projects in Topoi are all part of A-II's research work. C. Gerling prepares and measures samples for isotope analyses at the University of Bristol. The results of the measurements serve as the basis for their evaluation in the light of the archaeological facts. I. Popov and M. Woidich are working on desiderata in cultural groups that were in contact with the northern Pontic region in the 3rd century B.C. and thereby ensure that the results expected in A-II are contextualized within the larger area. They are supervised by E. Kaiser, who is also responsible for the overall evaluation at the conclusion of the project.

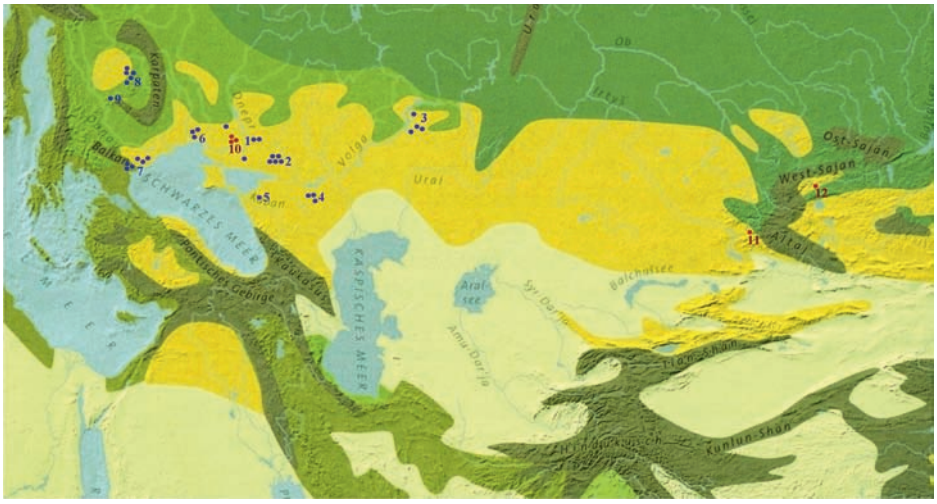


Structure of the paleogenetic investigations of the complementary projects of Topoi-Research Group A-II and of the project financed by the BMBF

RESULTS

Where possible, the samples required for the isotope-chemical and paleogenetic analyses are taken from the same individuals. In 2009, samples were taken from more than 200 individuals in the Eurasian steppe region and beyond. The archaeological background suggested concentrating on the northern Pontic region and adjoining areas for the three periods between 3500 and 2000 B.C. Here it was possible to take recourse to already excavated skeletal material as well as to make use of freshly excavated graves. Because individuals from old excavations in Semirechye are often poorly preserved, we relied on the newly excavated graves from H. Parzinger's subproject. To enable comparison, natural scientists also analyzed numerous contemporaneous burials in the southern Siberian region and select burials from southern Ukraine.

Because of the markedly laborious procedure required for the preparation of old DNA and the use of a new, promising sequencing procedure, no presentable paleogenetic results are ready yet. However, C. Gerling is already presenting the first results of her measurements.



Map with the burial mound sites from which samples were taken (blue: time periods 1-3 red: time period 4-1 central Ukraine; 1 eastern Ukraine; 3 middle Volga area; 4 Kalmykia; 5 Olennyi; 6 southwest Ukraine; 7 Bulgaria; 8 Hungary; 9 Uivar; 10 Scythian kurgans in southern Ukraine; 11 Sakian graves in Semirechye; 12 Scythian graves of Arzhan and others)

Conferences

Dec. 2-3, 2009
Workshop "Mobility and Knowledge Transfer from a Diachronic and Interdisciplinary Perspective".

March 24-26, 2010 (in preparation)
International Conference "Migrations in Prehistory and Early History. Stable Isotopes and Population Genetics – New Answers to Old Questions?"
Lecture Series "Isotope-chemical Investigations in Archaeology": E. Stephan (Constance), D.T. Price (Madison, Wisconsin), G. Gruppe (Munich), A.W.G. Pike (Bristol).

Dr. Elke Kaiser, Prof. Dr. Dr. h.c. Wolfram Schier
Prähistorische Archäologie, FU Berlin
elke.kaiser@topoi.org

Mobility in Semiretchye in the 1st Century B.C.

Semiretchye in southeastern Kazakhstan is one of the most important site regions in the European steppe belt, with countless archaeological legacies left by mounted nomadic groups (the Saks) of the Scythian period. Only very few (Beššatyr, Issyk) of the thousands of burial mounds (kurgans) have thus far been studied; and all of these excavations are old and do not meet modern methodological standards. The increased population of Semiretchye beginning in the 1st century B.C. is associated with fundamental changes in all areas of life: groups that were still settled in the 2nd century B.C. become mobile, livelihoods and ways of life change, and entirely new living spaces are sought out and appropriated or structured in new ways. Simultaneously, for the first time in the history of Semiretchye, close contacts develop with Iran and northwestern China, connections that will later develop into a northern branch of the Silk Road. These transformations, their causes, and their consequences will be investigated.

APPROACH

- Systematic registration of Sakian burial mounds and necropolises
- Targeted excavation of selected kurgans
- Gathering of new, well-documented anthropological sample material for isotope-chemical and paleogenetic analyses
- Systematic surveys and investigations of changes in landscape and climate (in connection with Research Group A-I)

ISSUES

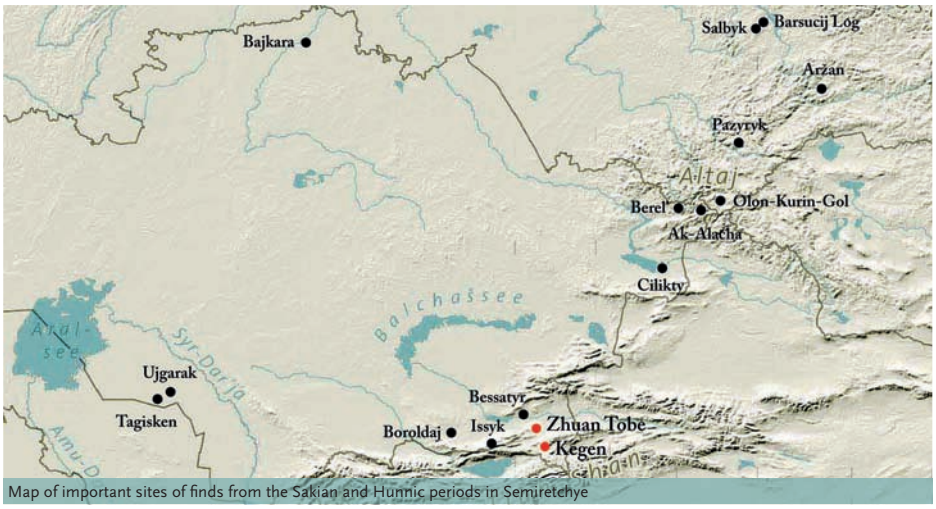
- The structure, dating, and function of these grave constructions and the structure of the necropolises apparently adhered to fixed, landscape-oriented rules
- New knowledge about the Sakian culture's beginning, development, end, and relationship to the subsequent Wusun and Hunnic period
- Registration of the patterns of mobility of the mounted nomadic population of this region
- Effects of changes in landscape and climate on the use of land in Semiretchye

RESULTS

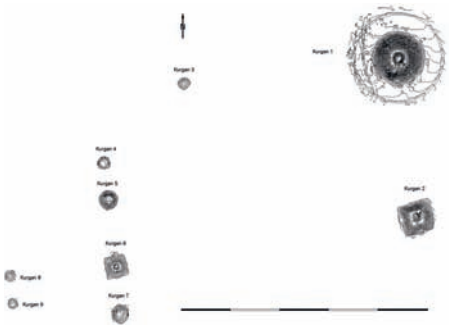
In 2008 and 2009, field campaigns (together with the FHTW Berlin) in the necropolises of Žuan-Tobe and in the burial grounds near Kegen surveyed a number of kurgans of various forms and sizes. This was the basis for the creation of 3-D models that are fitted into the topographic charts of the necropolises. Excavations were also carried out on both sites.

Necropolis Žuan-Tobe

The burial mounds of the necropolis are arranged along several north-south lines, as was apparently typical for the Sakian period. All are round, except for one square kurgan in each row. Geomagnetic investigations (together with the Bavarian State Office for Monument Preservation) and archaeological investigations of kurgans 8 and 9 display the actual structure of the kurgans: rammed earth with layers of stones. Four phases of construction can be distinguished. The kurgans were girded by placement of stones that enable the reconstruction of the contours of the grave constructions, otherwise blurred by erosion and plowing over. Kurgan 8 was square in the manner of a low pyramid, while kurgan 9 was round. Both had burial chambers that have been plundered.



Map of important sites of finds from the Sakian and Hunnic periods in Semiretchye


Topographical plan of the necropolis of Žuan-Tobe, Kazakhstan

Necropolises near Kegen

In the 2009 field campaign, additional kurgans farther to the southeast near the town of Kegen were investigated. A gigantic grand kurgan of earth towered in the center of the high plateau near Kegen, which is an entirely different kind of landscape from that investigated in 2008 in the much lower-situated Žuan-Tobe. Studied in 2009, the Kegen kurgan consisted of rammed earth, and its exterior was clad with mud bricks. A rising path was laid out on the side of the mound's outer contour; it led to a platform that was rearranged in modern times. Whoever may have been buried within, this monumental mound was clearly also a cult or ritual site. Two smaller kurgans in the environs, dating from the last centuries B.C. in the Hunno-Sarmation period (Xiongnu), were excavated.

Despite later plundering, they provided accompanying, datable finds and well-preserved bone material (including deformed skulls), which will be of crucial importance for a comparison with skeletal remains from the Sakian period and for the question of migration from the east or southeast at the end of the Sakian period.

Isotope-chemical and paleogenetic analyses of this material have not yet begun, but C. Gerling has already achieved interesting results for the burial grounds of Berel'.


Kurgan 1 with the mud brick structure, recognizable in detail. Kegen, Kazakhstan

Prof. Dr. Dr. h.c. mult. Herrmann Parzinger
Stiftung Preußischer Kulturbesitz
parzinger@hv.spk-berlin.de

Burial Complexes of the Copper and Early Bronze Age in the Northern and Western Pontic Region

LOCATION AND PERIOD

Based on the similarities and differences in phenomena and situations, two powerful culture-historical areas can be distinguished in the Northern and Western Pontic region: a Balkan-Danubian and a East European steppe region. Strong mutual relations between these areas can be seen in the Copper Age and they remain important during the Bronze Age and also in subsequent historical periods.

Research area

The so-called Transitional Period (3500-3100 BC) and especially its second half (the Proto-Bronze Stage) is represented in Bulgaria by the Pevets culture, a southern descendant of the Černavoda I culture of Southern Muntenia and Dobrudzha. The appearance of the earliest bronze objects is an important indicator of the proto-Bronze stage.

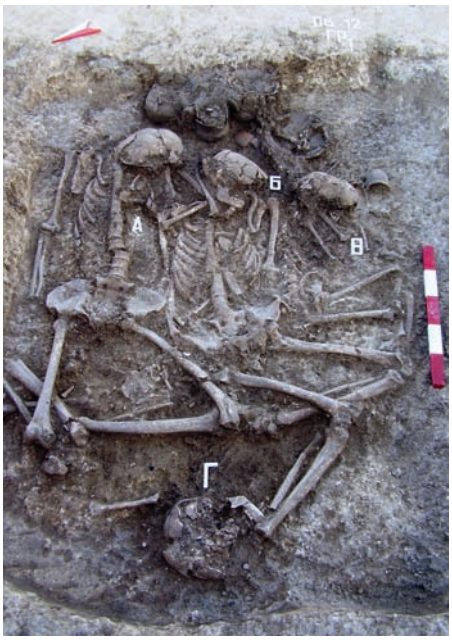
The Early Bronze Age in the Lower Danube is represented by several cultural groups: EBA 1a-c (3100-2750 BC) by Černavoda III – Celei – Zimnicea, Orlea-Sadovec and Ezerovo and EBA 2-3 (2750-2100 BC) by the Coţofeni – Glina – Černavoda II – Ezerovo – Yamnaya.

The prolonged development of the Chalcolithic cultures Cucuteni - Tripolye along the rivers Prut and Dniester and connected cultures such as Usatovo in the Northwestern Black Sea area accounted for the chronological and spatial continuity of contacts with steppe cultures. Bearing this in mind, major changes are observed, especially during the late stages of these cultures, which preceded and were partially synchronous with the Early Bronze Age cultures in the Balkans.

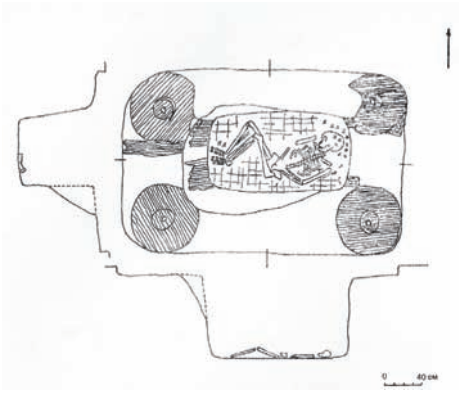
BURIAL COMPLEXES - CULTURAL ATTRIBUTION

The analyses and characterization of the burial complexes of the Copper and Early Bronze Age in the Northwestern and Western Pontic Region serve as the basis for the systematization of the main problems. According to present-day archaeological sources, many of the problems are related to contacts and influences between these regions and to historical and cultural processes in Southeastern Europe. The actual number of excavated graves, more than 300 in the Western Pontic Region, will be used in further research and analyses.

Most of the characteristic features relating to burial practices are common to the Yamnaya cultural and historical community along the Danube, along the Dniester river and to a great extent along the Dnieper river as well. Specifics involve the relevant quantitative parameters indicating the number of graves per burial mound, planning and orientation. These specifics are studied as regionally differentiating tendencies, in addition to study of the use of locally produced ceramics in the rites and their inclusion among the grave furniture.



Flat grave with four individuals from Zagortsi, Nova Zagora District, recently excavated by St. Alexandrov



Plachidol necropolis, Dobrich District, excavated by I. Panayotov and V. Dergachov. Barrow 1, grave 1, an adult female (c. 25 years) was buried. Traces of four disc-wheels were found in the four corners of the burial pit

OBJECTIVES OF RESEARCH

The formation and development of the cultural-historical communities of the nomadic stock-breeding tribes is a long and complex process. The existence of flat and tumular necropolises is a prerequisite for tracing prehistoric links between the Northern and Western Pontic region and for searching for answers to certain questions. What kinds of interactions can be observed between these two regions from the Neolithic to the Bronze age? What was the role of Yamnaya culture in this context?

For this analysis, I chose the following approach: Groups, and combinations: identification of clusters and a search for connections between them. Statistical analysis of the accumulated material and the forming of groups based on common indicators. The next step is the analysis of the groups, types of burial, for example, inhumation, cremation or cenotaph.

Additional divisions could be made according to the orientation of the skeleton, position of the skeleton, grave form, grave furniture and radiocarbon dates (at least 15 new radiocarbon dates would be obtained and used in the analysis). Analysis of connections: regional and chronological, between groups, inter-group relations, indicators that define sustainable groups and identification of the exact parameters under which there is the least likelihood of erroneous data, and finally: correlation of the data and comparison of the results with those complexes, around 300 in number, from northwestern part of the present-day Ukraine.

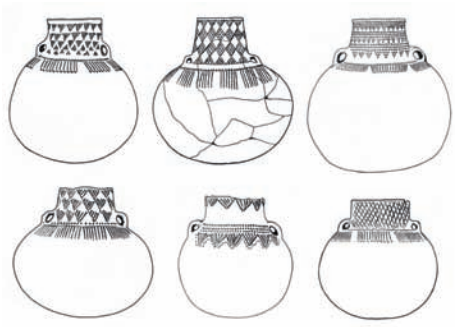
Ivo Popov (Doctoral Fellow)
Prähistorische Archäologie, FU Berlin
ivo.popov@topoi.org

The Western Globular Amphora Culture

Investigations into Differentiation in Space and Time and Cultural and Anthropological Identity

THE GLOBULAR AMPHORA CULTURE

The sites of the Globular Amphora culture (GAC) can be found across broad swaths of Central and Eastern Europe. Between 3100 and 2700 BC, its distribution area extended from the Elbe-Weser-region in the west to the Dniepr in the east. Natural expansion barriers include the Baltic Sea in the north and, roughly speaking, the German and Czech lower mountain ranges in the south, as well as the arc of the Carpathian Mountains. An internal differentiation into three subgroups has been established through previous research into this extensive archaeological complex. For the Western GAC, which covers the areas west of the Elbe River, the last comprehensive study was carried out in 1938. Since then, only regional studies have been pursued. The number of known sites has increased dramatically since then. Currently there are 900 sites in the project database, which can be used as a foundation for any further modern analyses.



Globular Amphoras from Saxony-Anhalt with different ornamentation elements and technics (after Beier 1988)

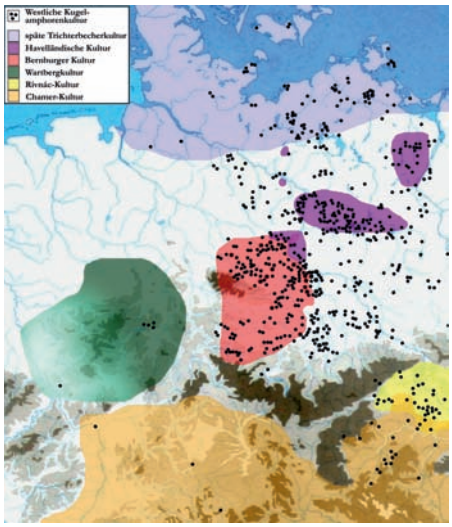
DIFFERENTIATION IN SPACE AND TIME

Why does the differentiation in space and time of the GAC constitute one of the main research objectives?
Research into this question can provide new evidence for the expansion of the GAC over such a vast territory. After classifying all the different kind of finds, mapping via ArcGIS will reveal regional elements and types. For the chronological differentiation, the correspondence analyses will prove the proper method to investigate the changes in shape and decoration of ceramics.

CULTURAL AND ANTHROPOLOGICAL IDENTITY

Which observations can offer indications for investigations concerning the cultural and anthropological identity of this late Neolithic population?

During the expansion of the GAC within the area being researched, a discernible transition from collective burials towards individual graves took place. This change in tradition offers one opportunity to obtain an insight into the awareness of identity demonstrated by the people concealed behind this archaeological complex. The expenses of grave constructions and the individual configuration of grave furniture seem to indicate a hierarchically structured society.
A further highly interesting aspect is the connection between some human burials and cattle burials or deposits. In particular, regularly observed deposits consisting of two animals in antithetic crouched position, which are widely interpreted as a harnessed bovine team, seem to be characteristic of the time period for the GAC. These findings underline the extraordinary status enjoyed by domestic animals, which is often used to argue that the agricultural practices of the GAC were mainly based on cattle breeding.
Individual interactions with contemporary neighbouring cultural groups reveal the problems caused by the use of the term 'cultural group' in connection with the GAC. Perhaps the GAC could be described as a Neolithic parallel society, which gradually integrated into the indigenous cultural environment through sharing of settlements and burial sites with local cultural groups. At the same time, the GAC clearly isolated itself and developed its own separate settlement clusters.



Sites of the Western Globular Culture (after Preuss 1998) and the distribution areas of the contemporary neighbouring cultural groups at 3000 BC

THE WORKING HYPOTHESIS

What were the reasons for the GAC's integration with other local groups and its widespread expansion?
One possibility could be the desire to access local raw materials, such as salt, amber, copper or flint. Or perhaps it was the complementary system of agriculture? The agricultural system in question permitted the opening up of previously unpopulated areas with less fertile soils. With the climatic decline, it offered the local cultural groups the acceptable alternative of subsistence agriculture, which then caused the further expansion of the GAC in those regions.

The burial complex of the Globular Amphora culture at Zauschwitz in Saxony with a human double grave, a triple cattle deposit and a characteristic set of grave furniture (after Coblenz/Fritzsche 1962)

Manfred Woidich (Doctoral Fellow)
Prähistorische Archäologie, FU Berlin
manfred.woidich@topoi.org

Research Group A-III Archaeometry – Archaeoinformatics

Both archaeoinformatic and archaeometric research yield a lot of information on past, spatially orientated human activities.

AIMS

The goal of Research Group A-III is to integrate archaeometric and archaeo-informatic research within Topoi, to bring researchers together and to make the research visible. The group, which has existed since 2009, does not focus on a particular research question, but rather focuses on generating synergetic processes between the different research strategies.
One major effect is the identification of space-related research questions to which archaeometric and archaoinformatic research can give important answers.
The research group is closely connected to the other research groups in research area A and cooperates with the other research areas as well.

STRUCTURE

The projects are divided into three groups:

Archaeoanalytics:
A-III-3 Archaeometric analysis of wheel-made pottery
A-III-7 Palynological Laboratory; Physical Geography Laboratory

Archaeoinformatics:
A-III-1 Climate Modelling
A-III-4 GIS-based comparative Analysis of Land Use in Mountainous Environments
A-III-6 Fundamental research on stratigraphical modelling

Prospection:
A-III-2 Geophysical Prospection
A-III-5 Remote Sensing

A lot of cooperation takes place between these groups: prospection data are analysed by means of archaeoinformatics, soil samples from project A-III-6 are analysed in the geography laboratory, new techniques of analysis for ceramics are tested in the geography laboratory, etc.

Various laboratories and instruments belong to the group or are available to its members, such as, e.g. geophysical equipment (geomagnetic; georadar), octocopter, GIS laboratory, palynological laboratory, physical geography laboratory, 3D Laser Scanner, IBM Power 5.

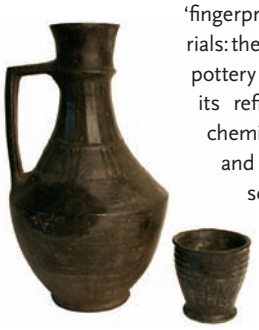
COMMUNICATION/ COMMON ACTIVITIES

Communication within the research group is facilitated during regular meetings attended by the researchers. External communication takes place in the 'archaeometrical colloquium' which features public lectures on recent developments within archaeometry. In the last year, three workshops were held. In February, a conference on „Potentials, Perspectives and Future Tasks of archaeometric Research in Germany" will take place. Regular workshops are held on GIS-based analysis within Topoi.
Results obtained by the research groups have been presented at national and international conferences.

Archaeoanalytics

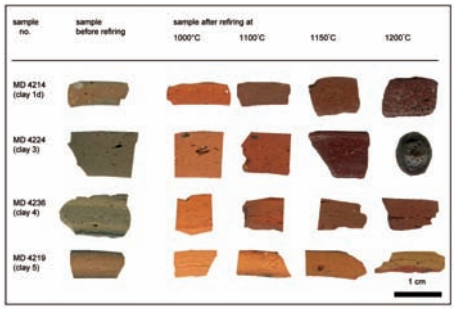
A-III-3 ECONOMIC SPACE. ARCHAEOMETRIC ANALYSIS OF WHEEL-MADE POTTERY

The distribution of ceramics can yield important information about the centres of production and areas in which the products were distributed or traded. Archaeometric analysis has a high potential for assisting in the determination of such 'economic spaces', as it can identify the specific 'fingerprint' of the raw materials: the clay used for ancient pottery is characterized by its refiring behaviour, its chemical composition and by the inclusions seen in thin-sections.



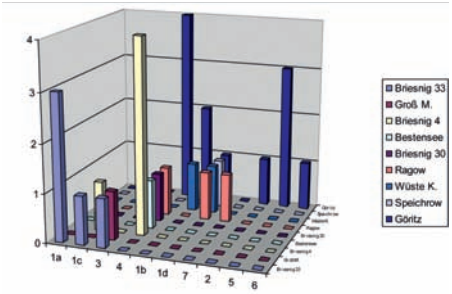
Wheel-made germanic pottery from the 4th century AD from Eastern Germany

The project involves analysis of wheel-made pottery of the late Iron Age (c. 250-50 BC) and of the Roman period in the barbaricum (c. 200-400 AD). Ten different clays have been detected indicating different workshops for wheel-made pottery in Brandenburgia. This is illustrated in the above example by small fragments of four samples refired at 1200°C.



Refired samples from wheel-made pottery

The samples represent a larger series of samples with the same colour and thermal behaviour refired at temperatures between 1000° and 1200°C. In thin-sections the differences between the four different clays cannot be seen, because typical inclusions are lacking.
Part of the project in the last year involved the evaluation of a newly available portable spectrometer for X-ray fluorescence analysis (Niton XL3t 900 GOLDD). The great advantage of the spectrometer is that analyses can be carried out anywhere – no laboratory is needed.
Measurements clearly showed the chemical differences between the ten different clays. The precision and accuracy of the data was compared with data from WD-XRF and proved reasonable, at least for some ten elements. PXRF data measured at fresh cracks in the sherds, without taking samples, agreed sufficiently with WD-XRF data from powdered samples and can be used with care for a larger series of sherds as a non-destructive method of chemical classification.



The distribution of the ten identified clays (Numbers) within the archaeological sites tested show that some clays occur also in far distant sites

The distribution of the different clays clearly proved that ceramics were traded at distances of more than 100 km – a completely new result for the region.

Prof. Dr. Michael Meyer
Prähistorische Archäologie, FU Berlin
michael.meyer@topoi.org

PD Dr. Gerwulf Schneider, Dr. Malgorzata Daszkiewicz
Excellence Cluster Topoi
gerwulf.schneider@topoi.org, m.dasz@wp.pl

Archaeoinformatics

Model Building and Simulations

A-III-1 CLIMATE MODELLING

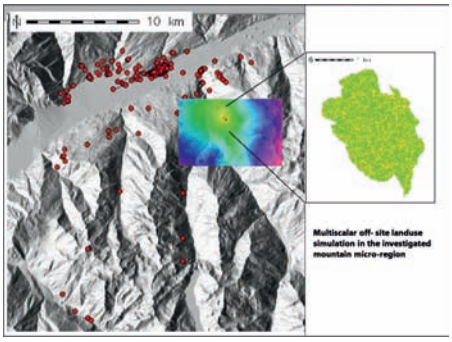
The project „Climate Modeling" aims at advancing scientific understanding of climatic conditions and their impacts on the civilizations of the Mediterranean region in the last 6000 years. To support as many projects of A-I and A-II as possible, a model chain has been developed that has been optimized to meet the needs of Topoi.

Janina Körper employs different techniques, utilizing global general circulation models to analyze climate change over the last 6000 years. Analysis of these simulations focuses on potential vegetation change. Moreover, for example, in cooperation with A-I-7, extreme value statistics analysis is performed and extended by statistical downscaling conducted by Sebastian Wagner, a senior fellow.

In conjunction with hypotheses related to the decline of the Meroitic culture, results based on the statistically downscaled monthly mean precipitation changes indicate that climate was apparently not the main driver. However, extreme value statistics reveal that during the time of the Meroitic culture in Naga about 2000 years ago, extreme rainfall events may have occurred more regularly than today.

A-III-4 GIS-BASED COMPARATIVE ANALYSIS OF LAND USE IN MOUNTAIN ENVIRONMENTS

Project A-III-4 deals with a comparative analysis of the long term use of mountain landscapes, and includes two case studies (Val d' Hérémence, Alps - CH and Westharz – D).



Example of simulated land use around a site: a cumulative topography-based cost surface from the site has been calculated and used in a further stage as a basis for models of agro-pastoral landuse within a defined catchment

The first systematic fieldwork campaign was carried out in August 2009 in the alpine micro-region. The research focuses on the long term agro-pastoral population dynamics from the Neolithic to pre-industrial times, by addressing questions of continuity and off-site activities.

The micro-region was analysed by means of an *ad hoc* survey strategy which integrated extensive and intensive field survey with non-destructive Remote Sensing methods (see project A-III-5) as well as by applying GIS-based techniques. This leads to GIS-based models of long-term settlement patterns: questions related to spatial organization, site catchment and movement can be addressed in an interdisciplinary manner. The potential of a computational model is related to its reproducibility and implementability, both of which make hypotheses comparable.

A-III-6 GIS-BASED METHODOLOGICAL FUNDAMENTAL RESEARCH

The aim of project A-III-6 is the development of the potential of 3D GIS (Geographical Information Systems) applications in archaeology. In particular, the project is focused on the application and development of spatial statistics in a 3D space.

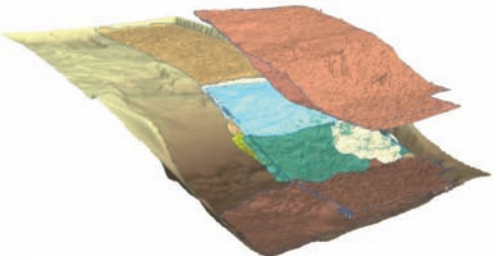


Fig. 1: 3D Point Clouds of stratigra-phical layers (Source: VIAS Vienna)

For this reason, data (both visible and invisible, such as physical and chemical soil content) are acquired using quantitative methods. Measurements of archaeological stratigraphy are hence performed via 3D laser scanner (Fig. 1) in order to calculate 3D GIS models (Fig. 2).

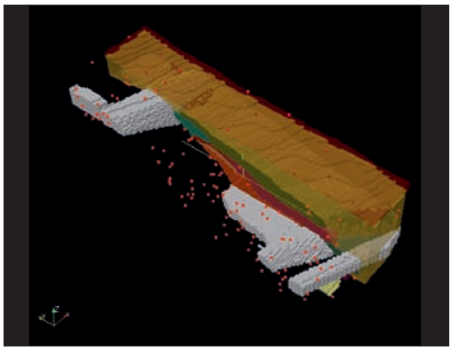
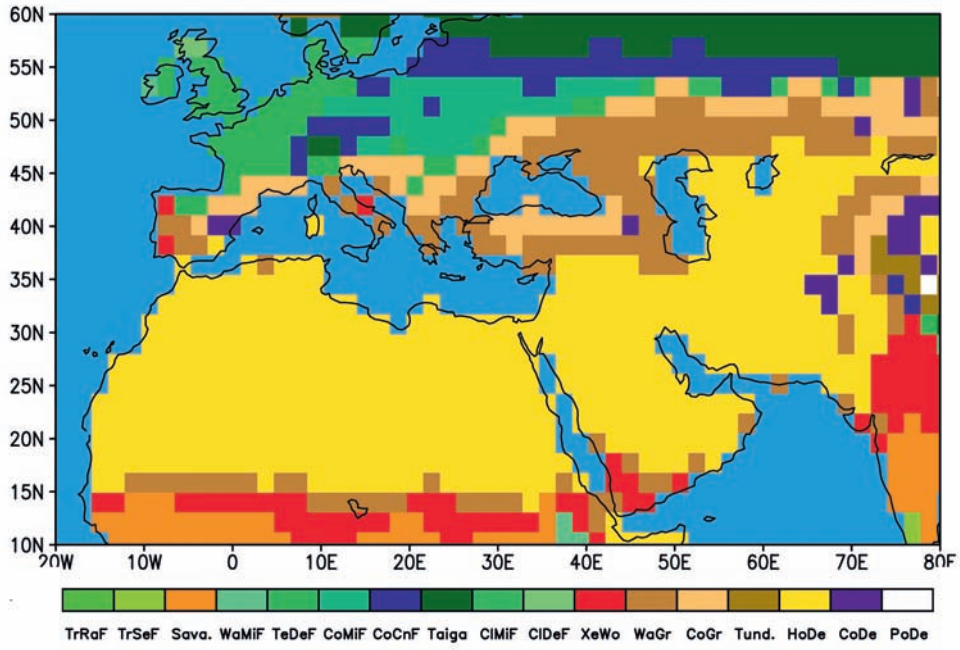


Fig. 2: Anticipated virtual model incorporating measured data depicted as red points



Simulated potential vegetation map for the Mediterranean Region 6000 years ago. Biome classification from Prentice et al. (1992)

A-III-1:
Prof. Dr. Jürgen Fischer, Dipl. Met. Janina Körper
Meteorologie, Weltraumwissenschaften, FU Berlin
janina.koerper@topoi.org

A-III-4:
Jun.-Prof. Silvia Polla
Klassische Archäologie, FU Berlin
silvia.polla@topoi.org

A-III-6:
Undine Lieberwirth M.A.
Topoi – GIS and Databases, FU Berlin
undine.lieberwirth@topoi.org

Prospection

A-III–2 GEOPHYSICAL FORUM

The geophysical forum provides skills and expertise in archaeological prospecting methods used to unravel the structure of archaeological sites and to provide guidance for later excavations. The geophysical methods are employed as an integral part of a research strategy in various projects within Research Area A. As every project has its own characteristics, close cooperation is needed between archaeologists, geographers, and geophysicists to conduct a feasibility study and to develop a survey design for a specific locality.

Ground Penetrating Radar and Geomagnetics in the field. Both instruments are supplied by TOPOI and used in many projects

Geophysical methods used for archaeological prospecting are mainly shallow geophysical techniques, including magnetic gradiometry surveys, magnetic susceptibility measurements, electrical resistance surveys, electrical imaging, tomography and ground penetrating radar. Often, special technical equipment and knowledge is essential to the unravelling of archaeological secrets. Our research in geophysical prospecting in archaeology is applied in the following major fields:

- Large-scale geophysical surveys
- Detailed tomography surveys
- Geoarchaeology

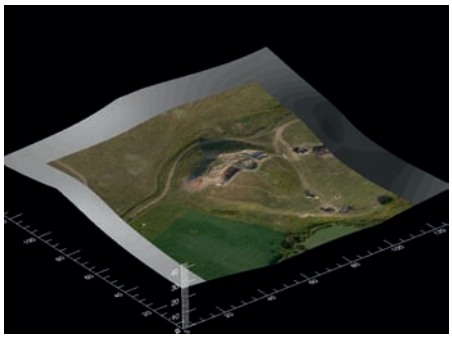
In most surveys, geomagnetic mapping is the standard method used. For larger surveys, we employ a fast, multi-channel, GPS-controlled device. The evaluation of new prospection technologies includes comparison of electrical and low-frequency electromagnetic measurements taken at the same sites. For the non-destructive prospection of separate archaeological structures, we mostly employed electrical resistivity tomography and ground-penetrating radar.
In geoarchaeology, mostly 2D sections using electrical imaging and seismic profiling yield good images of the natural environment of archaeological sites. If high resolution imaging of near-surface sediment structures is essential, GPR measurements are also used.

A-III-5 HIGH-RESOLUTION SURFACE ANALYSIS

Aerial photos with very high spatial resolution are important tools in archaeology. Documentation of archaeological excavations can be performed in an efficient way. Also, the assessment of the wider surroundings of archaeological sites can provide interesting information on the interaction between human activity and a physical region. For this purpose, Topoi's remote-controlled Octocopter enables researchers to take photos at the desired spatial and temporal resolution, thus allowing digital elevation models to be generated. This is a big advantage in comparison to classical aerial photos taken from airplanes. The Octocopter has an overall weight of around 1.3 kg and a payload of 0.3 kg for a small camera. Its rechargeable lithium ion batteries allow for a flight time of 17 minutes. This limits the flight height to around 400 m.

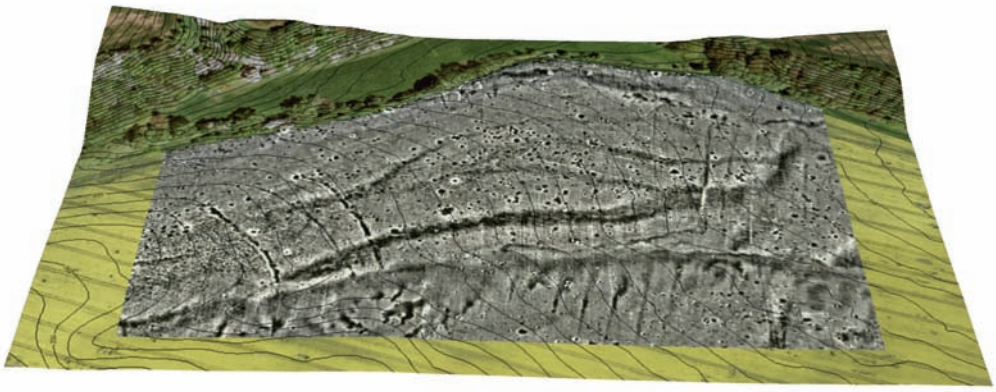
Octocopter in the air

The major advantage is the sophisticated internal stabilisation system, which enables the operator to fly the Octocopter at speeds of up to 6 m/s without requiring too much training. The use of 8 motors, rather than the Quattrocopter's 4 motors, increases security in the event of malfunction. The whole system, with all accessories, including charger and ground station, can be transported easily in a box. In 2009, an efficient work plan for the use of the Octocopter in the field was set up, and comprehensive owner manuals have been written to ensure proper use of the Octocopter.



Neolithic Tell Pietrele, fotographed by the octocopter

Another focus of the work was calibration of the camera, and photogrammetrical analysis of the photos. The Octocopter was utilised at two test sites in Pietrele (Romania) and the Harz Mountains, where precise digital terrain models with a high spatial resolution were created of the area. The Octocopter has proven to be a very interesting tool for archaeological applications and will be used intensively in 2010.



Geomagnetic survey in Urbach region of the South Harz Mountains (A-I-10) The geomagnetic map is superimposed onto the satellite picture(area in figure 1: 500 m x 300 m). In the magnetic map, several archaeological features are present, from localised iron-age pits to neolitic earthworks as well as linear structures caused by natural processes and human activities.

A-III-2: Prof. Dr. Georg Kaufmann, Burkart Ullrich
Geophysik, Geologische Wissenschaften, FU Berlin
georg.kaufmann@topoi.org, burkart.ullrich@topoi.org

A-III-5: Dr. Hans-Peter Thamm
Fernerkundung und Geoinformatik,
Geographische Wissenschaften, FU Berlin
thamm@geog.fu-berlin.de

How to Disentangle Terrestrial Archives

Two Specialized Geoarchaeological Laboratories for Topoi

HF-POLLEN LAB

Our new pollen laboratory was established in July 2009. It was specially designed to use Hydrofluoric (HF) acid to achieve the best results when extracting pollen grains and spores from various types of terrestrial archives to obtain information on former land-use and climatic conditions. HF is also used to prepare total digestions of specific samples (f.e. to analyze the composition of ancient ceramics). In addition, our laboratory has the facilities required to gather botanical remains like fruits and seeds from sediments. Acting as a service supplier, we offer our capabilities to every Topoi project that possesses appropriate archives and artefacts. Projects like A-I-1, A-I-2, A-I-9 and A-I-10 are already being provided with sample preparation for pollen analyses. Other projects like A-I-17 and research area A-III are interested in future cooperation. Several projects (e.g. A-I-10 and research area A-III) are in need of total digestion capabilities.

Workflow pollen preparation:

More than a dozen steps and two days of conditioning are necessary to prepare a sediment sample of 1 ml to produce a suitable microscopic preparation:

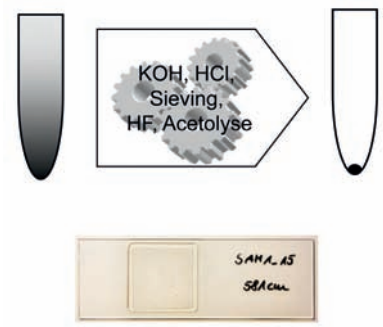


Fig. 1: After preparation the samples are analyzed at 500 – 1000 x Magnification. This may take ca. 1-4 d/sample

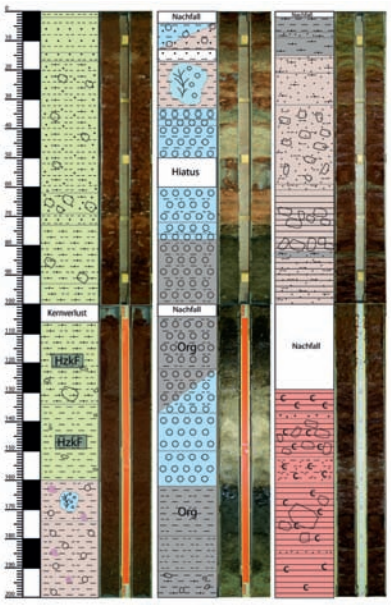


Fig. 2 and 3: Drilling core SB03 (above) from the Harz-Foreland (Project AI-10) with Holocene and Late Pleistocene sediments and an Analytical flowchart (below)

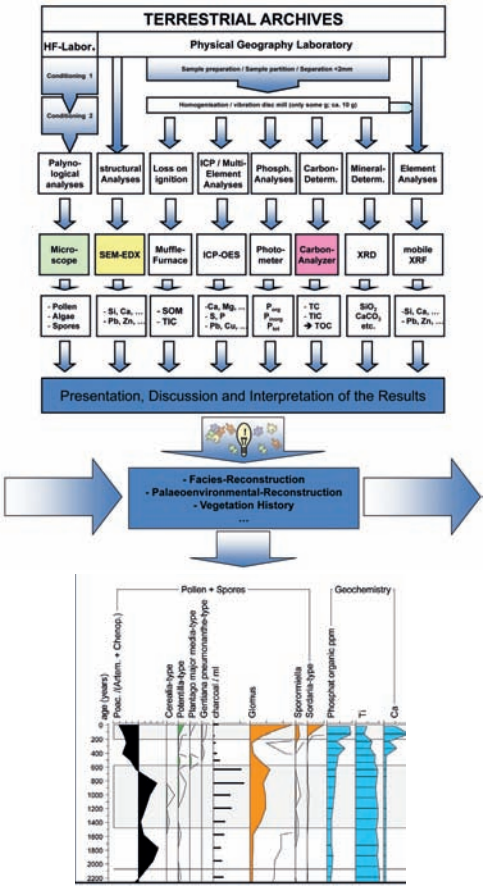


Fig. 4: Data from both preparation lines will be combined into multi-proxy diagrams (example data: L. Shumilowskikh, Th. Felauer)

PHYSICAL GEOGRAPHY LAB

The laboratory for Physical Geography is a well established laboratory which specializes in the analysis of sediment samples from terrestrial archives such as sections, drillings (Fig. 2), test pits, etc. All necessary sample preparation techniques (e.g. drying, separation, sieving, homogenization, digestion etc.) are available in the lab (Fig. 3).
The lab is equipped with the following analytical equipment:

- ICP-OES for element (Ca, Mg, P, etc.) quantification
- SEM-EDX for structural and material analyses (Fig. 5)
- XRD to determine the mineralogical composition
- Mobile XRF for element quantification
- Carbon Analyzer to determine carbon (Fig. 7)
- UV-VIS Photometer for element quantification.

Fig. 5: The Scanning-Electron-Microscope with Energy-Dispersive-X-ray detection

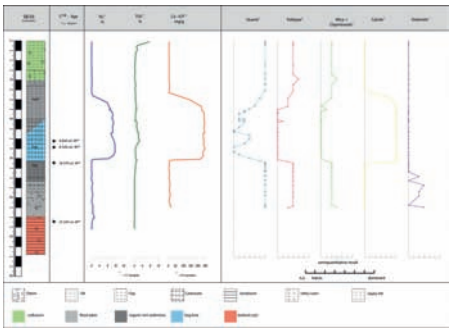


Fig. 6: Example of the geochemichal and mineralogic results from drilling core SB03 from the Harz-Foreland (Project A-I-10)

Fig. 7: The Carbon Analyzer used in the determination of organic and inorganic carbon contents

Dr. Philipp Hoelzmann, Dr. Frank Schlütz
Physische Geographie, Geographische Wissenschaften, FU Berlin
philipp.hoelzmann@topoi.org, frank.schluetz@fu-berlin.de

Host Universities

Freie Universität Berlin

Topoi Building Dahlem
Hittorfstraße 18
D-14195 Berlin
phone: +49.30.838-57271
fax: +49.30.838-53770

Humboldt-Universität zu Berlin

Topoi Building Mitte
Hannoversche Straße 6
D-10099 Berlin
phone: +49.30.2093-99073
fax: +49.30.2093-99080

Participating Universities

Technische Universität Berlin

Hochschule für Wirtschaft und Technik Berlin

Central European University, Budapest

Partner Institutions

Berlin-Brandenburgische Akademie der Wissenschaften

Deutsches Archäologisches Institut

Max-Planck-Institut für Wissenschaftsgeschichte

Stiftung Preußischer Kulturbesitz

info@topoi.org

www.topoi.org

Freie Universität Berlin

HUMBOLDT-UNIVERSITÄT ZU BERLIN

berlin-brandenburgische AKADEMIE DER WISSENSCHAFTEN

INSTITUTUM ARCHAEOLOGICUM GERMANICUM

MAX-PLANCK-INSTITUT FÜR WISSENSCHAFTSGESCHICHTE

STIFTUNG PREUSSISCHER KULTURBESITZ