Ancient Colonization of Marginal Habitats. A Comparative Analysis of Case Studies from the Old World

Edited by Gerd Graßhoff and Michael Meyer, Excellence Cluster Topoi, Berlin

eTopoi ISSN 2192-2608
http://journal.topoi.org

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Ancient Colonization of Marginal Habitats. A Comparative Analysis of Case Studies from the Old World

The present contribution deals with the concepts of marginal habitats in selected regions of the ancient world, ranging from modern Spain to the Jordanian desert and from Turkey to the Ethiopian highlands. Central to this research is the hypothesis that the occupation of areas beyond the ‘normal’ settlement patterns corresponds to colonization processes which reflect specific social strategies and may have stimulated the development of new technological skills. A review of ‘marginality’ research in various disciplines indicates that there is no comprehensive definition of the concept, which can be approached from a multitude of perspectives and with manifold objectives. A survey of the eight case studies and two more in-depth discussions of the sites of Musawwarat (Sudan) and Ayamonte (Spain) highlight the potentials as well as the limits of the archaeological investigation into past marginalities. Patterns of spatial marginalization are the easiest to detect. The studies also show that we must not limit our analysis to the adverse factors connected to different kinds of marginalities. Instead, our analyses suggest that spatially marginal areas were deliberately chosen for settlement – an integration with core-periphery approaches may help us to understand these scenarios, which have received little attention in ‘marginality’ research in archaeology or elsewhere so far.

1 Introduction

1.1 Objectives

The relation between the natural environment of settlement spaces, their occupation by human settlers and the development of technical knowledge in order to control the natural environment are of central interest in the evaluation of ancient settlement phases. Central to our research is the hypothesis that in early societies the occupation of settlement spaces that were located beyond the ‘regular’ settlement areas corresponded to colonization processes and required specific settlement strategies. Settlement spaces beyond the ‘regular’ settlement areas included, for example, remote areas or ecologically marginal habitats; the settlement of such areas was motivated by religious or to strategic considerations. We assume that the settlement of ecologically marginal habitats would have consequences, e.g. stimulation of the development of new technological skills.

The influence of the character of the colonized areas on settlement strategies that diverged from the ‘normal’ settlement strategies of a society and the technical knowledge developed to cope with ecological challenges inhabitants encountered will be evaluated in a comparative approach focusing on multiple different ancient societies that established colonies in the Mediterranean and in the Old World drylands. The research is being
conducted by the interdisciplinary research group *Ancient colonization of marginal habitats* (research group A-1 within the Excellence Cluster *Topoi – The Formation and Transformation of Space and knowledge in Ancient Civilizations*), in which scholars of prehistory, archaeology and physical geography are investigating the various forms of marginality associated with the different settlement areas and the different settling societies. The research projects build in part on previous studies conducted within the research group *Central places and their environment* of the Excellence Cluster *Topoi*. The eight research projects within the group take the form of case studies ranging geographically from modern Spain to the Jordanian desert and from Turkey to the Ethiopian highlands in order to cover different varieties of colonized areas and colonizing intentions. For each of the settlement sites, we attempt to assess the specific aspects of marginality associated with the area and ascertain how their ancient inhabitants coped with them. The research also investigates the implicit reason for colonizing the specific area chosen. It becomes clear that only an interdisciplinary approach, investing the history and trajectory of the settlement activities, past environmental conditions, social structures and technical skills simultaneously, can yield conclusive results.

### 1.2 Marginality in different disciplinary contexts

‘Marginality’ is a dimension of analysis and a topic of research in a number of disciplines. The aim of this section is to summarize the current scientific approaches to the concept of marginality in ecology, geography and archaeology.

#### 1.2.1 Marginality in the ecological context

In ecology, marginality is related to Hutchinson’s concept of ecological niches.\(^1\) This concept characterizes habitats by an area’s physiographic factors (abiotic and biotic), which can influence the survival and reproduction of individuals. Favorable habitat conditions are reflected in positive reproduction rates that make a population independent from immigration. Such habitats are defined as belonging to the ‘ecological niche’ of a species.\(^2\) Correspondingly, unsuitable habitats, in which the reproduction rate is negative, are not part of the niche, and a population is dependent on immigration of individuals from the core habitats to maintain stability. The transition zone between suitable and unsuitable habitats is in general characterized by a fuzzy border. Occupation of these fuzzy border areas tends to be only temporary and their demographical significance for the species is low. Kawecki has defined such areas as marginal habitats.\(^3\) Ecologists divide marginal habitats into a) habitats functioning predominantly as ecological niches in which temporary fluctuations in the system boundaries might have negative effects on the population; b) habitats which achieve only the lower system boundary to fulfill the requirements to function as an ecological niche and c) habitats in which the local population has implemented adaptation strategies enabling it to remain in this transition area between suitable and unsuitable habitats.\(^4\)

Summarizing, from an ecological perspective, the concept of ‘marginality’

[...] has been applied to describe phenomena that occur at biophysical limits of any kind. These may be geophysical boundaries, environmental thresholds, or

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\(^1\) Hutchinson 1961; Pulliam 2000; Kawecki 2008.  
\(^2\) Kawecki 2008.  
\(^3\) Kawecki 2008.  
\(^4\) Kawecki 2008.
habitats that are not well suited for particular species or populations [...]. Since the diversity of nature provides a great variety of conditions, margins and marginal conditions are innumerable.\(^5\)

### 1.2.2 Marginality in the perspective of human geography

In general, societies are composed of multiple social groups which can be distinguished on the basis of social status and ethnic, religious and cultural identifications. Not all groups participate equally in the socio-cultural, political and economic life of a society as a whole. While some groups enjoy privileged access to education, prosperity, participation in decision-making and natural resources, such access is restricted or denied for other groups.\(^6\) Human geographers investigate communities of the latter type, groups situated at the margin of a society, in order to describe and analyze the socio-cultural, political, economic and environmental factors triggering the societal, economic and spatial segregation which leads to the marginalization of specific groups.

Communities or individuals identified as marginal frequently exhibit enhanced vulnerability, as both phenomena – marginality and vulnerability – are triggered, or characterized by the same boundary conditions, such as disadvantaged setting, lack of access to natural resources and limitations on participation in the ‘normal’ social life of a community (like limited access to education, reduced food security, lack of access to decision making processes, being subject to environmental pollution etc.).\(^7\)

Although no definition of marginality has yet gained widespread acceptance,\(^8\) the two statements that follow can serve as a point of departure for developing an understanding of the concept:

Marginality is a complex condition of disadvantage which individuals and communities experience as a result of vulnerabilities that may arise from unfavorable environmental, cultural, social, political and economic factors.\(^9\)

Socio-economic marginality is a condition of socio-spatial structure and process in which components of society and space in a territorial unit are observed to lag behind an expected level of performance in economic, political and social wellbeing compared with average condition in the territory as a whole.\(^10\)

Taking these definitions into account, we can sum up by stating that the concept of ‘marginality’ in the discipline of human geography i) encompasses a societal, a spatial as well as a temporal dimension\(^11\) and ii) is a relative and a dynamic concept\(^12\), and by determining that iii) scale must be taken into account when investigating it.\(^13\)

Research on the societal dimension of marginality seeks to understand the causes leading to the marginalization of communities or individuals. The societal factors considered are demography, religion, culture, social structure, economies and politics.\(^14\) Social marginality research investigates how economic and political conditions influence the access of individuals or groups to resources. The societal dimension of marginalization is

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5 Callo-Concha and Ewert 2014, 38.
8 Cullen and Pretes 2002.
9 Mehretu, Pigozzi, and Sommers 2000, 90.
10 Mehretu, Pigozzi, and Sommers 1999, 7.
12 Cullen and Pretes 2005.
perceived as a social construct, in which power is identified as a crucial factor triggering marginality.\textsuperscript{15}

Since the spatial dimension of marginality is determined by the physical environment, our research focuses in particular on spatial patterns relating to centers (non-marginal) and peripheries (marginal).\textsuperscript{16} Spatially marginal areas are located at a distance from the major economic centers and have poor infrastructural connections. In consequence, they are not closely linked to mainstream developments.\textsuperscript{17} Another characteristic of spatially marginal places is their location at the edges of social or governmental systems.\textsuperscript{18}

In human geography, marginality is considered to be the product of socio-economic and geo-political boundary conditions which change over time. Dimension, scale and degree of marginality are influenced by dynamic processes and their assessment is influenced by the personal biases of the researcher.\textsuperscript{19} Thus, marginality needs to be investigated as a dynamic phenomenon with a temporal dimension. Moreover, the frame of reference from which a region, an individual or a community are classified as marginal or as central is essential to an understanding of the system as a whole. Groups or individuals can experience marginality in one sector of their socio-cultural or physical environment, while being well integrated within mainstream developments with regard to other aspects of their existence.\textsuperscript{20} Furthermore, the individual perspective of the person defining the frame of reference also affects the distinction between marginal and non-marginal.\textsuperscript{21} Thus the definition of marginality depends on the temporal and spatial scale under investigation and on the standpoint from which marginality and non-marginality are defined.\textsuperscript{22}

Social and spatial marginality tend to be associated with one another, and the transition between them occurs along fuzzy borders. Enclaves or ghettos are good examples of the fact that social marginalization, in this case religious or ethnic affinities, can result in spatial marginalization as well.\textsuperscript{23} Social marginality can be broken down into several subcategories.\textsuperscript{24} In practice, though, these categories tend to overlap, and although the distinctions can be helpful, they can also be limiting, preventing a comprehensive understanding of the complex interweaving and the processual nature of marginalization. Marginality can be classified into the following subtypes which differ in terms of the scope and the anchoring of the causes of marginalization:\textsuperscript{25}

\begin{enumerate}
\item a) Disadvantages which develop spontaneously as a result of natural or cultural limitations of an area and which affect the economy of a community or individuals are aggregated under the term \textit{contingent marginality}.\textsuperscript{26} Environmental factors like low-fertility or unfertile soils, steep topography and a negative water balance might contribute to the development or intensification of contingent marginality.\textsuperscript{27}

\item b) \textit{Systematic marginality} occurs predominantly in hegemonic social systems in which all of the power is concentrated within a single ruling social class, for instance in colonial or neo-colonial societies in countries of the Global South.\textsuperscript{28}
\end{enumerate}

\textsuperscript{15} Cullen and Pretes \textsuperscript{2000}  
\textsuperscript{16} Leimgruber \textsuperscript{1994}; Müller-Böker et al. \textsuperscript{2004} Mehretu, Pigozzi, and Sommers \textsuperscript{1999}  
\textsuperscript{17} Brodwin \textsuperscript{2000}; Müller-Böker et al. \textsuperscript{2004}  
\textsuperscript{18} Leimgruber \textsuperscript{1994}  
\textsuperscript{19} Gurung and Kollmair \textsuperscript{2005}  
\textsuperscript{20} Perlman \textsuperscript{1975}  
\textsuperscript{21} Cullen and Pretes \textsuperscript{2000}  
\textsuperscript{22} Cullen and Pretes \textsuperscript{2000} Gurung and Kollmair \textsuperscript{2005}  
\textsuperscript{23} Cullen and Pretes \textsuperscript{2000}  
\textsuperscript{24} E.g. Blaikie and Brookfield \textsuperscript{1987} who speak of 'ecological marginality' when referring to the latter category.  
\textsuperscript{25} Mehretu, Pigozzi, and Sommers \textsuperscript{2000}  
\textsuperscript{26} Mehretu, Pigozzi, and Sommers \textsuperscript{2000}  
\textsuperscript{27} Mehretu, Pigozzi, and Sommers \textsuperscript{2000}  
\textsuperscript{28} Mehretu, Pigozzi, and Sommers \textsuperscript{2000}
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1.2.3 Marginality in the archaeological context

In the discipline of archaeology, the contribution of Young and Simmonds\(^{31}\) and the perspectives on the topic which they explore represent a milestone in the research on marginality. In their critical examination of earlier (case) studies, Young and Simmonds drew on concepts from human geography, most notably the work of Blaikie and Brookfield\(^{32}\) on land management processes and land degradation in current Africa. Following them, Young and Simmonds distinguish three dimensions of marginality: the sociopolitical, the economic and the ecological. They see these three dimensions as neither mutually exclusive, nor mutually dependent, e.g. arguing that:

The archaeological implications of ecological marginality for settlement and subsistence are, at one level, dependent on the relationship between human communities and the biota affected by marginal conditions. However, to grasp these implications fully, archaeologists and historians must try to examine the total economic basis of a society and its relationship with its resources. In this context, the overlap between economic, ecological and sociopolitical marginality should be obvious.\(^\text{33}\)

In archaeological research ‘marginality’ is often defined exclusively on the basis of environmental criteria. Arguing against this narrow perspective is the recognition that definitions of marginality are relational and that it is important to consider scale and perspective, as well as the processual nature of marginality.\(^\text{34}\) The conditions of the respective ‘core’ group or region need to be fully explored before statements about marginality can be made, and it would not be appropriate to consider marginal groups, in conjunction with peripheral regions, and non-marginal groups, in conjunction with core regions as separate entities. Thus an integrated approach is required to address the different phenomena, one that examines sociopolitical, economic and ecological marginality separately.\(^\text{35}\) Such an approach can to some extent overcome the limits restricting exploration of the different dimensions of marginality using archaeological sources, allowing a better understanding of the complexity of the interweaving forms of marginality to be obtained.

Although a good deal of methodological thought has been presented in recent years, no approach to marginality has yet been established in archaeology as a clear standard. On the one hand, this is due to the complexity of the subject. One could say that “economic, ecological, social, political, cultural and spatial marginalities may all have different

\(^{29}\) Mehretu, Pigozzi, and Sommers 2000.

\(^{30}\) Mehretu, Pigozzi, and Sommers 2000.

\(^{31}\) Young and Simmonds 1999.

\(^{32}\) Blaikie and Brookfield 1987.

\(^{33}\) Young and Simmonds 1999, 200.

\(^{34}\) Young and Simmonds 1999.

\(^{35}\) Young and Simmonds 1999.
values in different times and places, and might occur together in many different combinations.\textsuperscript{36} On the other hand, the fact that archaeological sciences are themselves rather heterogeneous phenomena contributes to the coexistence of multitude of approaches to and uses of marginality in archaeology – or rather archaeologies. To cite just a very few examples, it is interesting to observe how in the classics field, i.e. classical archaeology, ancient history, Greek and Latin philology, the term ‘marginality’, even in recent publications, is used almost exclusively as a synonym for ‘periphery\textsuperscript{37}, while in fields closer to prehistoric archaeology or ethnology, ‘marginality’ tends to be considered more as a relative concept requiring a careful examination of the respective contexts to be defined and understood.\textsuperscript{38}

1.3 The concept of marginality as addressed in our research

The literature review shows that the concept of ‘marginality’ is applied with a wide range of implications in several disciplinary contexts, which to a certain extent overlap and borrow from one another. Still, each discipline approaches the topic with its own epistemological interest and its own methodologies, which are informed in turn by the data sets with which these disciplines operate. The field of ‘marginalities’ as outlined by geographic research gives the widest possible framework for our investigations. It also highlights the fact that the individual ‘forms’ of marginality overlap and intertwine. The nature of archaeological research is determined by some specific features of its data set, primarily its limitation to material remains, on the basis of which researchers deduce information about aspects of life in the past, including immaterial aspects, and the conditions associated with it. The spatial and chronological distributions of these material remains are primary categories of archaeological analysis. This may account for the fact that marginality that is expressed in spatial patterns is the primary type of ‘marginality’ studied in archaeological contexts.

Within our research group, ‘marginality’ is in most cases defined with regard to spatial distribution, be it in relation to ‘core’ settlement areas i.e. ‘centers’, or in relation to more favorable habitats which have been defined geographically. The two categories can converge but do not necessarily do so. For want of a better term, we call the first phenomenon ‘spatial marginality’, although this form of marginality often has socio-political causes and implications, since settlement centers are often also the centers of political power and social concentration. The second phenomenon comes closest to the standard ecological use of the term, and we therefore call it ‘ecological marginality’. Economic and social marginality do not necessarily possess a spatial dimension and are thus much less readily detectible in archaeological data sets. Still, several indications, such as the presence of deposits of raw materials and the differing degrees and forms of their exploitation can form the basis for assessing changing patterns of economic integration and marginalization. The same goes for social marginality, despite the fact that this may be the least discernable type from an archaeological perspective: detection of social marginality is usually limited to a recognition of its plausibility based on indirect evidence and complex argumentations.

Our working definition of ‘marginality’ implies that there is a condition of disadvantage associated with at least some, but not necessarily all factors determining the setup of communal and individual life in the relevant ‘marginal’ settings. This broad definition hinders the establishment of criteria for detecting ‘marginality’, which cannot be iden-
tified and characterized in the data sets available in the given (landscape-)archaeological contexts. On the other hand, it allows us to discuss constellations which may not be manifest in modern marginality scenarios or are not in the focus of, e.g. current geographical research, such as the colonization of new settlement areas despite their environmental marginality – a scenario investigated by several case studies in our research group.

One result of our open approach to discussing ‘marginality’ in past societies is the insight that marginality can be detected on the basis of very diverse material sources and lines of argument. Paraphrasing Callo-Concha et al., we suggest that the diversity of natural and social conditions provides an innumerably great variety of ‘marginalities’, whose archaeological investigation – methodological as well as empirical – is only just beginning.

2 Case studies on ancient spatial marginality

The research group ‘Ancient colonization of marginal habitats’ selected a total of eight different study sites throughout the Mediterranean, northeastern Africa and northwestern Arabia in order to investigate the different aspects of marginality in areas colonized during antiquity (Fig. 1). In the following, the study sites are briefly introduced and discussed with regard to the different types of marginality.

Spatially marginal areas are located at a distance from major economic centers and feature poor infrastructure connections. In consequence, they are not closely linked to mainstream developments. Another characteristic of spatially marginal locations is their proximity to the outer borders of a (political) system. Thus the investigation of spatial marginality focuses on the analysis of spatial patterns of central (in terms of administration, craft/industry and trade) and peripheral (marginal) areas.

Fig. 1 | The four relevant forms of marginality and their representation, based on the research group Topoi A-1 Ancient colonization of marginal habitats.

39 Callo-Concha and Ewert 2014, 58.
41 Leimgruber 1994.
42 Knitter, Blum, et al. 2015.
Colonization and habitation require conditions which are determined to a great degree by environmental factors. Colonization of unfavorable areas has frequently been accompanied by the development of techniques to overcome natural limitations, such as techniques for storing food and/or water, or, in dry areas in particular, water harvesting and water direction. Natural environments changed in conjunction with colonization: natural landscapes were transformed into cultural landscapes, the sediment balance and water budget as well as the nutrient fluxes were altered. Non-sustainable settlement and land use strategies resulted in land degradation, frequently leading to deterioration of other site-related factors.

The study sites vary greatly with respect to their physical regions, and taken together they encompass a broad time span, ranging from the 5th millennium BC to the 1st millennium AD. At all of the study sites, the research has adhered to a settlement-archaeological approach, encompassing the use of similar methodological approaches. The analysis of the study sites consistently pursues the ultimate aim of a diachronic and geographical comparison.

Due to the location of the study sites in the Mediterranean, northeast Africa and northwestern Arabia, the natural environments at all of the sites had, at least temporarily, dryland character. In consequence, the availability of water plays a major role for all kinds of settlement activities. Moreover, especially in marginal habitats, the exploitation and utilization of building material and the transfer, adaption and advancement of each kind of engineering process are of heightened interest. It is necessary to ascertain which sets of spatial knowledge, such as knowledge on topography, precipitation and runoff patterns or the quality of locally occurring mining resources, the relevant communities had. In addition, the ways in which spatial and technical knowledge were implemented to create a living-friendly environment must be evaluated.

Beckers, Berking, and Schütt 2012; Beckers and Schütt 2013.
2.1 Musawwarat es-Sufra, Sudan (Topoi A-1-1)

In the Napatan period (pre 300 BC), Musawwarat is marginal primarily in ecological terms, in relation to the ‘core habitat’ of the Kushite society i.e. the river oasis of the Nile valley. This ecological marginality translates into a spatial marginality: Musawwarat is the first (and for a long time the only) site colonized by the Kushites outside the Nile valley that featured monumental architecture and a state-supported religious topography. The socio-political position of Musawwarat is far from marginal: although we do not have any historical sources, the trajectory of the site and the input of resources apparent from the archaeological data show that it must have been of central importance to the Kushite rulers. In terms of social marginality we need to consider several groups with a potential presence at the site and their differential views of themselves and each other. We can assume that the Kushite elite, who developed and frequented the site, was not a marginal group. We are not in the position to make any statements about the social, and economic, status of the nomadic population who is thought to have frequented the region prior, during and after the development of Musawwarat as a religious center or about how they were perceived by the Kushite elite and the social majority of the river valley dwellers; similarly the self-perception of this nomadic component is not accessible to us on the basis of the available archaeological data. The economic situation is similarly complex. The technologies used in the development of Musawwarat were very advanced, and the site saw a huge input of resources. At the same time, as an intentional ‘outlier’, it was dependent on the Kushite ‘core area’ in the Nile valley. We have no data on the

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Fig. 3 | Estimation of the marginality levels of the social, spatial, economic and social marginality for the given time slices in the research region of the project Musawwarat (Topoi A-1-1). The estimation of marginality is linked to the correspondent regional context. The grey boxes indicate the estimated level of marginality; ‘no information’ indicates the absence of data sources on which to base an estimation.
economical potential of the nomadic population in the area, although it has been assumed that the development of Musawwarat was aimed at controlling them and siphoning off their production.

As far as the resolution of the archaeological and environment data allows an assessment, the parameters discussed remain unchanged in the subsequent Meroitic period (300 BC to 350 AD). The post-Meroitic period (post 350 AD) is not in the focus of the current research; archaeological data from the site are very limited for this era (for a detailed presentation of Musawwarat es-Sufra see section 3.1).

2.2 Petra, Jordan (Topoi A-1-2)

Petra, in the southern part of modern-day Jordan, is located in a mountainous region within the eastern part of the Jordanian rift, itself part of the highly sensitive tectonic shift between the Arabian and the African continental plates. Due to its situation in a semiarid region whose seasonal rainfall provokes heavy flashfloods, the site of the latter city of Petra can be considered ecologically marginal. Petra was apparently once a non-permanent settling place for a group of Bedouins that was slowly transformed into the site of more permanent settlement from c. 400 BC onwards. Since the Bedouin life-style

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45 For a recent general overview as well as for more specific approaches to the points briefly mentioned here cf. the various contributions in Mouton and Schmid 2013; van der Meijden, Schmid, and Voegelin 2012.
was adapted to the area’s ecological marginality, the marginality percentage for this early phase is not as elevated as is the case in the following periods. On the other hand, the political importance of the site was low. Since the nomadic way of life was adapted to the environmental situation, economic and social marginality can be considered low.

Historical and archaeological sources indicate that the first efforts undertaken towards transforming Petra into a permanently inhabited place were made in the 4th to 2nd centuries BC. The archaeological record clearly indicates how difficult the struggle with the seasonal flashfloods was. Thus the location’s ecological marginality increased considerably when the occupants of the site decided to settle there permanently. During the 1st century BC, at the latest, remarkable solutions were found for these problems, solutions which were as expensive and demanding as they were effective. Specifically, they entailed a well-functioning defense against the flashfloods and a well-functioning long-distance fresh water supply, which transformed Petra into an important central location and, as such, into the capital of the Nabataean kingdom. Interestingly, there seems to be no logical reason why the Nabataeans maintained what had once been a non-permanent settling place as a permanently occupied central place, since it would have been possible to find sites much better suited for the establishment of an urban center only a few kilometers away. It would appear, therefore, that some kind of ‘illogical’ emotional tie to the site was operating.

After the Roman annexation in AD 106, Petra remained a permanently occupied central place but lost its status as a capital of a political entity. Due to the environmental situation, the permanently inhabited settlement still can be considered ecologically marginal, and, due to the loss of its unique status, the new administration had less of an interest in maintaining the immense efforts that had to be undertaken to guarantee a permanently high living standard. This resulted in a slow decline in living quality. Due to the loss of its function as a capital, Petra’s political marginality increased, as did its economic marginality since greater emphasis was placed on diversification in long-distance trade in this period than in the previous period. Social marginality probably did not change in general terms. Although one could expected that social changes/shifts did occur within the population living at Petra, these cannot be pinpointed using the evidence presently available.

2.3 Conana, Turkey (Topoi A-1-3)

Statements about the aspects of marginality of the fortified settlement (Kale Tepe), discovered in 2008, located high on a mountain near the site of ancient Conana (Gönen) in northwest Pisidia are still highly speculative. Previous study of the site has been limited to surface surveys conducted under the direction of Bilge Hürmüzlu, University of Isparta. Very little in the way of reliable archaeological facts has been established for the surrounding landscape in the late Early Bronze to the Early Iron Ages either.

The hill-top settlement directly borders nomadically used plateaus. Agricultural products were provided by the neighboring lowlands. It has been clearly established that settlement had started by the Early Iron Age; earlier settlement activities are assumed. Presumably, settlement expansion took place on a large scale in the Hellenistic period.

The ‘Dark Ages’ phenomenon that occurs in parts of south-western Anatolia in the 2nd millennium BC should be reconsidered against the background of the hill-top settlement and its hinterland. Central Anatolian Hittite sources do refer to towns and countries in south-western Anatolia, a report which is contradicted by the absence of

46 Hürmüzlu et al. 2011, 2 with fig. 4.
47 Vanhaverbeke 2003, 197–207.
Fig. 5 | Estimation of the marginality levels of the social, spatial, economic and social marginality for the given time slices in the research region of the project Conana (Topoi A-1-3). The estimation of marginality is linked to the correspondent regional context. The grey boxes indicate the estimated level of marginality; ‘no information’ indicates the absence of data sources on which to base an estimation.

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1.) Kale Tepe  2.) Regional

Evidence, or very limited evidence, of Late Bronze Age material culture and settlements in the area in the archaeological record. Based on the published results of a survey further south, one could hypothesize that Late Bronze Age settlers preferred hill-top locations for their settlements due to the politically unstable situation between the Hittite Empire and the periphery; i.e., that the marginality is the result of the geopolitical situation. A review of these settlements changes the picture, however: these settlements have been dated to various periods ranging from the Hacilar culture (6th millennium BC) to the early 1st millennium BC, and they are often associated with terrace cultivation. To a limited extent, we expect to find indications of similar terraces on the Kale Tepe.

2.4 Chimtou, Tunisia (Topoi A-1-4)

Recent research has revealed some new evidence about the early inhabitation of Simitthus in the first millennium BC in the Medjerda valley of western Tunisia, where a roman colony was later founded under Augustus (Fig. 6). The earliest traces of settlement at the site found so far date to the fifth century BC., although some archaeobotanical evidence has been carbon dated to the eight century BC. The few palaeoenvironmental studies

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49 von Rummel, Broisch, and Schöne 2013, Khanoussi and Rummel 2012; see further for the topographic and chronological development of the city and her environment Rakob and Beschaouch 1993, 1–16.
which have been conducted⁵⁰ indicate highly variable flooding activity during the colo-

Fig. 6 | Estimation of the marginality levels of the social, spatial, economic and social marginality for the given time slices in the research region of the project Chimtou (Topoi A-1-4). The estimation of marginality is linked to the correspondent regional context. The grey boxes indicate the estimated level of marginality; ‘no information’ indicates the absence of data sources on which to base an estimation.

nization of the site, which has now been verified by the deep excavation area at the later roman forum.

It is assumed that marble quarrying, probably the most important natural resource of Chimtou, started in a later but pre-roman settlement period; quarrying activity definitely occurred from the 2nd century BC onward. The first building entirely constructed of marmor numidicum was a large Hellenistic monument on the top of Chimtou’s “temple hill”, which was probably built by the Numidian king Micipsa\(^{51}\). Moreover there are large grave structures that document an increasing wealth of the population by least the end of the Iron Age. In 46 BC, after the defeat of Pompeius and Juba I., Chimtou and its surrounding area probably became part of the Roman province of Africa, acquiring the status of a Colonia under Augustus in 27 BC\(^{52}\). The main hypothesis by F. Rakob and J. Röder was that the quarries were at that point became imperial property and under imperial administration, with a large camp for workmen, prisoners and guards on one side of the “marble hills”; whereas the Roman Colonia Iulia Augusta Numidica Simitthensium on the other side of the hill remained an independent juridical unit\(^{53}\). Dealing with and investigating these hypotheses and furthermore their influences on the landscape and city development are the major tasks of a current dissertation project within TOPOI research area A1.

Marble from Chimtou was in high demand as a luxury good in the Roman Empire from the 1st century BC onward\(^{54}\), causing an increase in marble quarrying activities. Parallel to the intensification of quarrying and trading activities, Simitthus expanded and gained political importance on a regional level. Simitthus prospered during the peak of the Roman Imperial period, especially under the reign of the Antonine and Severan emperors (second half of the 2nd – 3rd century AD), as did most other towns in North Africa\(^{55}\). Giallo antico was well-known throughout the Roman Empire, a fact which is due to the well-established trade routes\(^{56}\). The city benefited from its trading activities and also the agriculture in its territory. The city’s prosperity is so far evidenced by many monumental entertainment building types, such as a theatre, an amphitheatre, several baths and the building of huge administrational and political structures around the forum,\(^{57}\) as well as many temples in the urban area and a major cult centre on the so-called “Tempelberg” in the 2nd – 4th century AD.

Marble quarrying activities were probably disrupted in Late Antiquity, for reasons which are still not well understood. In the 4th century AD pagan places of worship began to be transformed successively into Christian buildings\(^{58}\). This and the big basilica from the 6th century AD, which was constructed in the area of the former so called “Kaiserkulttempel”\(^{59}\), indicates that Chimtou maintained some relevance at least on the regional scale. The role of the bishop’s seat and the evaluation of the city in the Byzantine period are especially not well documented and investigated. In the 7th century AD, at the latest, urban life at Chimtou diminished and its public buildings were gradually abandoned and suffered spoliation. Traces of the latest settlement at the site date to the 11th century AD.

\(^{51}\) Crawley Quinn 2013, 179–215; Rakob 1994, 1–38; Rakob and Beschauvoch 1993, 5–8; Rakob 1979, 119–171.

\(^{52}\) von Rummel, Broisch, and Schöne 2013, 209; Rakob and Beschauvoch 1993, 1 with complete bibliography.


\(^{54}\) See Zerres 2009, 272–280 and Schneider 1986, 142–160 with a complete list of the ancient literary sources and their discussion.

\(^{55}\) Jouffroy 1986, 233–237.

\(^{56}\) Most recently Russell 2013; Ward-Perkins 1951; Toutain 1896.


2.5 Northern Badia, Jordan (Topoi A-1-5)

The Northern Badia in northeastern Jordan forms part of the greater steppe desert Badiyat ash-Sham, which is located between the Middle Euphrates (Mesopotamia) and the Southern Levant. Due to the modern climatic conditions, characterized by low and seasonal rainfall, the region can be considered as ecologically marginal.

During the Late Neolithic period (LN) (Phase A, approximately 7000 to 5000 BC) the population of Northern Badia consisted of indigenous hunter-gatherers and incoming pastoralists, or mobile hunter-herders, whose material culture is associated with a vast number of archaeological sites, including traps for hunting animals (known as ‘kites’) and seasonal camp sites. The LN economy was pursued on a seasonal basis, concentrating mainly on intensive gazelle hunting and pastoralism and perhaps on opportunistic agriculture. These economic activities were primarily subsistence oriented and almost met the demands of the local population. From the local perspective, the economic marginality level can therefore be estimated as low. By contrast, from the external perspective the economic marginality level of a self-supplying population of this kind can be estimated as high (LN centers in the west). However, the existence of exchange contacts between the populations of both regions cannot be ruled out, a factor which would lower automatically this economic marginality. Detailed climate information for this period are unavailable for this entire region. In fact, general palaeoclimate trends in the Old World’s desert belt indicate aridization during this time, but these regions were characterized by still pristine landscapes, with intact vegetation covers. Therefore, one would have to assess the Late Neolithic economic valorization of the area by hunting and mobile pastoralism as adapted and sustainable to the habitat, which was characterized by dry climatic conditions on the one hand and an intact physiographic landscape on the other hand. The ecological marginality should therefore be evaluated as lying at mid-level. With respect to the level of spatial marginality of this region in the LN, the marginality can be also be rated as mid-level, since, as stated above, (exchange) contacts to the LN centers in the rain-fed regions to the west cannot be ruled out. Information on the social marginality is not available.

Climate proxies assume temporarily slightly wetter than present-day climate conditions in the (Late) Chalcolithic and the Early Bronze Age (C/EBA) (Phase B, 5000 to 3000 BC). Consequently, environmental changes must have resulted in a decrease in the ecological marginality of the region due to more favorable habitats. However, specific forms of economic activity have been identified for various parts of the Northern Badia that are characterized by different topographic and ecological conditions. As a result, the assessment of the ecological marginality of the entire region must be differentiated according to region: we find an almost high marginality for the mining region in the east, a middle to low marginality for the basalt desert and a low marginality for Jawa, a large fortified C/EBA settlement in the western part of the basalt steppe desert in the Northern Badia. Lacking any information on the sociopolitical structures in Jawa in the C/EBA to date, we must speculate that Jawa’s spatial and economic marginality was low since is probably served as a gateway community in the region, involved particularly in trading and exchange activities in local, regional and supra-regional ranges. Recent archaeological and geographical surveys indicate that the C/EBA economic activities in the entire region are characterized by the production and trade of flint tools, pastoralism and agriculture. The basaltic region of the Northern Badia was frequently used as pasture

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60 Betts and Colledge 1998; Rollefson, Rowan, and Wasse 2014.
61 Rollefson, Rowan, and Wasse 2014.
63 Müller-Neuhof 2014.
64 Müller-Neuhof 2014.
Fig. 7 | Estimation of the marginality levels of the social, spatial, economic and social marginality for the given time slices in the research region of the project Northern Badia (Topoi A-1-5). The estimation of marginality is linked to the correspondent regional context. The grey boxes indicate the estimated level of marginality; ‘no information’ indicates the absence of data sources on which to base an estimation.

by mobile pastoralists, as indicated by the remains of numerous camp sites with animal pens. Intensive agricultural activities are indicated by the existence of several presumably agriculturally used terraced gardens in the close vicinity of the C/EBA settlements of Jawa and Tulul al-Ghusayn.\textsuperscript{65} A large flint mining region in the eastern part of the Northern Badia shows intensive mining and export-oriented tool blank production activities.\textsuperscript{66} Due to its location at a great distance from Jawa, the hypothetical C/EBA central settlement of this region, its spatial marginality seems to have been high. However, the identification of two probably permanently inhabited C/EBA settlements east of Jawa close to the eastern edge of the basalt desert (Tulul al-Ghusayn and especially Khirbet Abu al-Husayn) qualifies the high spatial marginality of the mines, as they were not so remote from these settlements. The economic value of the mines however, was not marginal at all, since the production of characteristic C/EBA flint tools in these mines was clearly supra-regional export-oriented. Thus Northern Badia as a whole, was therefore economically not marginal, but the level of local economic marginality was related to the economic activity. The level of the spatial marginality of the various parts of the region also varied, but it can be considered to fall at mid-range for the entire region on the average. No information on the social marginality is available.

2.6 Yeha, Ethiopia (Topoi A-1-6)

There is evidence of intensive cultural and technological transfer between the South Arabian territorial state of Saba and the Horn of Africa starting in the early 1st millennium BC. This transfer is related to the migration of Sabaean populations to the Abyssinian highlands. Economic contacts between the two regions played an important role from the Bronze Age onwards.

\textsuperscript{65} Müller-Neuhof\textsuperscript{2014}
\textsuperscript{66} Müller-Neuhof\textsuperscript{2013a} Müller-Neuhof\textsuperscript{2013b}
The pre-Aksumite site Yeha is located in a fertile basin 35 km east of Aksum in the Abyssinian highlands, in the province of Tigray. The area is surrounded by mountains which are used today with terraced field systems. The steep mountain ranges are intercalated by plateaus, some of which were probably populated at least from the first millennium BC, in association with the agricultural use of the flat areas featuring fertile soils. Compared to the Sabaean cultural homeland in the arid desert fringes of Yemen, almost ideal environmental conditions prevailed in this region: periodic rainfall allowed rainfed agriculture and perennial springs secured the water supply for humans and livestock during the dry season. Based on current findings from Di’amat there was no adaptation of the irrigation practices known from the South Arabian oasis cultures of the desert fringes. These irrigation practices were probably not necessary in Tigray since only small agricultural units were required to the supply of the local population. Based on this, the ecological marginality can be estimated as low.

It is apparent that Yeha played the role of regional center for the community of Di’amat, which could be characterized as a union of various sites, significant for trade, or of strategic, political or ritual importance. Testifying to this role are two inscriptions from other sites which refer to Yeha and the monumentality of its sacral and secular buildings, which have no parallel elsewhere in the region. Therefore Yeha’s political and spatial marginality is assessed as low.

It is not yet possible to definitively establish the reasons for the Sabaean migration to the northern Horn of Africa, which started in the 9th century BC at the latest. We do not yet have clear epigraphic and archaeological evidence allowing us to do so. But the use of local natural resources (gold, ivory, incense), the securing of trade routes and the control of incense producing areas could have played a crucial role for the settlement of Sabaeans in this region. In consequence, the economic marginality is estimated as low. However, due to the sparse availability of archaeological findings this assessment must be understood as a hypothesis.

In contrast, social marginality in Yeha is estimated as high: As a result of the Sabaean migration process in the regions of present-day southeastern Eritrea (‘Akkälä Guzay) and northern Ethiopia (Tigray) for the first time a differentiated society with a hierarchical social structure is attested. This Sabaean migration makes itself apparent in the spread of South Arabian cultural forms, which led to a sustainable cultural change in these areas. This affects the spheres of political, social and religious life.

A social gap between the Sabaean settlers, with their differentiated social system and great technical expertise, and the indigenous population must be assumed. This assumption is derived by a generalizing process of elimination: anything that is not characterized as South Arabian could be indigenous or has already undergone an acculturation process. There is as yet no actual evidence of the indigenous culture of the early 1st millennium BC for the area of the Sabaean migration.
Construction of the monumental buildings of Yeha must have entailed a large amount of labor, probably with a workforce recruited from the indigenous population. The so-called Di’amat formula in Ethio-Sabaean inscriptions, a formula with which the Sabaean rulers lay their claim to power, reveals a social (“Sabaeans and the native settled population”) and ethnic (“population of red and black skin”) definition of the population.

2.7 Ayamonte, Spain (Topoi A-1-7)

The present-day Spanish town Ayamonte is located at the mouth of the Guadiana river. It is built at the site of a Phoenician settlement which was later used by the Romans. The Phoenician settlement was founded as a colony at the western margin of the Phoenician empire. The richness of the natural settings, the topographic suitability for strategic settlement and the availability of ores in the hinterland made the site eligible for coloniza-

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Fig. 9 | Estimation of the marginality levels of the social, spatial, economic and social marginality for the given time slices in the research region of the project Ayamonte (Topoi A-1-7). The estimation of marginality is linked to the correspondent regional context. The grey boxes indicate the estimated level of marginality; ‘no information’ indicates the absence of data sources on which to base an estimation.
tion. Due to the perennial availability of water, access to the ocean, periodical rainfall and nutrient-rich soils, the environmental setting provided ideal settlement conditions; therefore, ecological marginality is assessed as irrelevant during all settlement periods.

During the Neolithic and Chalcolithic periods, the area around Ayamonte was already settled, however the archaeological record for those periods is limited, making it impossible to draw conclusions about any kind of spatial, economic or social marginality.

During mid and late Holocene, the environmental setting changed only slightly, with increasing aridity and increasing temperatures. During the Bronze Age increasing settlement activities caused a deforestation of the area, resulting in land degradation. These changes of the environmental settings caused a slight deterioration of what was, in general, an ecological habitat suitable to human settlement (cf. Fig. 9, Phase B). The archaeological data indicating Bronze Age settlement do not provide information which would permit the characterization of the spatial-, economic- and social marginality.

In the beginning of the Iron Age and at the start of Phoenician colonization, the palaeoclimate exhibits an increasing humidity, causing changes in the environmental setting, and thus producing altogether ideal ecological conditions. The Phoenician colony itself, situated as it was at the western edge of the Phoenician empire, was associated with high spatial marginality due to its remoteness within the Phoenician trading system. Due to the mining and processing of ores and their spread through the Phoenician empire through trade, the colony had an increasing economic impact, resulting in low economic marginality. As above, the archaeological record does not permit any assessment of the social marginality.

Ideal environmental conditions continued during the Roman settlement phase. The overall levels of social and economic marginality also remained unaltered. Ayamonte was located within the border zone of the provinces Lusitania and Baetica. To the south, the Roman province of Mauretania Tingitana linked northern Africa to the Roman Empire. Thus we estimate the spatial marginality of Ayamonte is as low. The spatial marginality fell dramatically with the transition to the medieval times and then again during the Reconquista and the start of the Age of Exploration.

2.8 Resafa, Syria (Topoi A-1-8)

Resafa can be considered an ecological marginal place in the 1st century AD, since it lies in the middle of the Syrian desert steppe and has no direct water supply (natural spring or river). Only in the period of spring rains, does runoff water temporarily appear in the wadi, which formed along the edge of a tectonic fracture, running from north to south. In the late Roman period, Resafa can be considered to have become a geopolitically marginal location within the Roman Empire upon construction of a Roman Limes fort. Sergios, an officer of the Roman army, suffered a martyr’s death in front of the fort in AD 312. As a result, the place, now called Sergiopolis, gained importance as a pilgrimage center and underwent substantially expansion starting in the late the 5th and going on into the 6th century (city walls, cisterns, five church buildings). Tremendous efforts (building of huge water reservoirs fed by the wadis) were undertaken in order to provide water for the settlement, which had an estimated population of 5000–10 000 persons (figure extrapolated from an estimated storage volume of the cisterns of approximately

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67 Pons and Reille 1988
68 Faust and Diaz del Olmo 1997
69 Diaz del Olmo and Recio (unpublished)
70 Faust and Diaz del Olmo 1997
71 Tovar 1976; Nony 2001; Bechert 1999
72 Beckers and Schütt 2013
The hinterland, however, remained an ecologically marginal area due to the lack of water. Rain-fed agriculture was restricted to the springtime and supported by the construction of dams which were designed to collect and store water in enclosed fields.

Starting in the second quarter of the 8th century AD, the fortified city Resafa-Sergiupolis was expanded southwards, with a 3 km$^2$ area used as a residence of the Umayyad Caliph Hisham b. Abd al-Malik (ruled from AD 723 to 744). This area, located outside the city walls, shows previous traces of settlement activities and underwent expansion during the Umayyad period, involving the construction of palatial buildings. During this period, the settlement, then called Rusafat Hisham, became a residence and place of pilgrimage (the Caliph Hisham is the guardian of this holy place, who is revered by Christian and Muslim believers), which constitutes its role as a central place on the periphery within a marginal environment.

### 3 Selected case studies

In the following, two study sites of the group *Ancient colonization of marginal habitats* are introduced in more detail. These case studies have been selected for their different characters in marginality and the reasons for their colonization.
3.1 Musawwarat, Sudan (Topoi A-1-1)

The Kushite Empire (c. 750 BC to 350 AD) was the only one in a long succession of historic societies in the Nile valley which colonized the drylands outside the fluvial oasis of the Nile valley as a monumental arena of religious life. The site of Musawwarat – which was inscribed in the UNESCO World Heritage List in 2011 – is the most important testimony to this unique move, and as such it lends itself to investigate this trajectory in its conditions as well as its consequences.

Musawwarat es-Sufra is located in today Sudan, about 180 km northeast of the modern capital Khartoum, 25 km away from the Nile valley in what is now the semi-arid landscape of the Keraba. Its main archaeological remains are distributed over a core zone of c. 1 x 3.5 km within a wide wadi bordered by escarpments of Cretaceous sandstone plateaus (Fig. 11). Archaeological monuments comprise a major sacral complex, several additional temples and shrines, monumental water harvesting installations – the so-called hafayir – and some smaller features. In antiquity, as now, the yearly summer rains were the only available source of water in Musawwarat. Today precipitation amounts to c. 100 mm/a.74 In the first millennium BC it would have been only somewhat higher, but interannual fluctuations were probably lower.75 Thus, in the Kushite period the environment of Musawwarat corresponded to a dry savannah.76 The evidence for settlements and burial grounds at the site is very limited and difficult to date. However, its minor extent rules out any sort of permanent occupation in Kushite times or any other period. Despite the lack of direct evidence, we assume that the region was inhabited by a nomadic population – as it still is today. Indeed, a substantial pastoral production has been assumed by some researchers, but is debated by others.77 In relation to the Nile valley, which formed the core settlement area of the Kushites, the region of Musawwarat can be defined as marginal. The ecological conditions, which did not support settled life or the mixed agricultural production that has been suggested to have formed the subsistence basis of the Kushite society, constituted the main factor responsible for Musawwarat’s marginality.78

One of the earliest archaeologically testified events in Musawwarat is the establishment of a sacral complex in the Napatan era. Its early stages are poorly known, as the buildings of the first phases were completely torn down to make way for later rebuilding and enlargements. Eventually, the complex developed into an architecturally unique assemblage, the so-called Great Enclosure (Figs. 11–12: I A), which covers an area of c. 43 000 m² and comprises three temples, partly erected on artificial terraces, connected by ramps, corridors and passages, and surrounded by huge walled courtyards. The exact function of the Great Enclosure is still debated, not least because of the almost complete absence of formal decoration i.e., reliefs and related inscriptions, which could aid interpretation. Its first excavator suggested that the structure was a religious site and pilgrimage centre, whose central temple was dedicated to Amun-Re, while the courtyards may have served as gathering and sheltering places for the large crowds coming from the Nile valley during religious festivals.79 Later researchers interpreted the Great Enclosure as the Meroitic ‘National Shrine’, as the main place of worship of the Meroitic lion

76 Scheibner 2004, Scheibner 2005. Detailed geoarchaeological investigations have been conducted at the Meroitic site of Naga, 17 km southeast of Musawwarat; see e.g. Berking and Schütt 2014, Berking, Kaufman, et al. 2011.
77 See Edwards 2004, 166 with further references; cf. also Weschenfelder 2014.
78 Again, direct archaeological or historical data are missing, at least for the first part of the Kushite period i.e. the Napatan era (Edwards 2004, 136). For the subsequent Meroitic era see Edwards 1996, 20–27; Edwards 2004, 164–167.
god Apedemak, as a palace and a place of investiture of the Meroitic kings or even as an elephant training camp.\textsuperscript{80} Today, it is widely accepted that the three main building complexes of the Great Enclosure represent temples; many of the ancillary rooms have been interpreted in relation to cult activities and the presence of the king during religious ceremonies.\textsuperscript{81} Recent 14-C dates confirm older investigations which suggest that most of the extant parts of the monument – which total c. 5 km of running walls – belong to what is conventionally considered the sixth major building phase, dating to the early Meroitic period, i.e. the 3rd to 2nd centuries BC.\textsuperscript{82}

While many details regarding the early development of the Great Enclosure are still debated, important progress has been made towards understanding the technological and logistic requirements which had to be met in order to establish Musawwarat as a religious center. These requirements included not only building materials in vast quantities – most of it came from quarries within the valley of Musawwarat –, but also appropriate transport technologies, the organization and the sustenance of the workforce to construct and maintain the monuments at the site, and first and foremost a continuous availability of substantial amounts of water throughout, or at least during major parts of, the year. The allocation of water was secured by the construction of \textit{hafayir}, monumental water-harvesting installations, four of which have been found at Musawwarat and its immediate surroundings (Fig. 11).\textsuperscript{83} \textit{Hafayir} were built to collect and store the surface runoff during

\textsuperscript{80} For a synopsis of the history of these interpretations see Wolf, 2001.
\textsuperscript{81} Eigner, 1999; Eigner, 2010.
\textsuperscript{82} Scheibner, 2011; Näser, 2013; contra Näser, 2011.
\textsuperscript{83} Scheibner, 2004.
Fig. 12 | The Great Enclosure of Musawwarat es-Sufra.

the rainy season. They consist of two main components: a reservoir basin surrounded by an embankment, built of the excavated material from the digging of the basin, and varying installations in the inlet area, designed to channel, direct and clear the incoming water. The basin of the Great Hafir at Musawwarat has a diameter of c. 210–230 m; its storage capacity is calculated to 262,000 m$^3$. In terms of its position and alignment the hafayir is orientated towards the drainage system in the valley of Musawwarat, but as it is built outside the main runoff zone of the wadi, it is also effectively protected from damage by fluvial erosion and overfilling. While earlier research has connected the construction of the hafayir in Musawwarat and other sites to the Meroitic era, current 14-C dates from the Great Hafir indicate that it was already built in Napatan times, probably prior to the other monumental structures at the site. It impressively illustrates how advanced
infrastructural measures were used to compensate for the unsuitable natural water supply of the area – underlining the nexus between the colonization of the region by the Kushite society and the development and application of technological knowledge.

As Marijke van der Veen has remarked, a propos the settlement of the Egyptian oases, “the concept of ‘marginality’ is, in fact, often used in contexts where a certain inferiority is implied.”\(^{87}\) She argues that this may be a limiting perspective, and the case of Musawwarat indeed opens up a whole range of questions regarding the status of its marginality. Undoubtedly the site represented a marginal habitat from the perspective of and in relation to the Kushite core ‘habitat’ i.e. the Middle Nile valley. Nonetheless Musawwarat was singled out for the establishment of a sacral complex which eventually grew into one of the main religious centers of the Meroitic era – despite its ecologically and environmentally suboptimal conditions. Paradoxically, it is precisely the marginality of Musawwarat which aids in its understanding; it shows that the development of the site was not a ‘self-propelling’ process, but must have been initialized and controlled by specific socio-political motivations and interests.

Several researchers suggest that the foundation of Musawwarat should be connected to a shift in the Kushite economic system, its territorial organization and its socio-political structure.\(^{88}\) They read the sacral colonization of the Keraba as an attempt by the Kushite rulers to establish a more direct influence in the regions outside the Nile valley in order to control and integrate the nomadic population and siphon off their pastoral production. Recently, another interpretation has been put forward: it suggests that the ancestors of the Kushite rulers came from the regions southeast of the Keraba and that with the return into the savannah outside the river valley they ‘revived’ traits of their cultural repertoire.\(^{89}\)

At the present state of our knowledge, these assumptions remain speculative. Still, the efforts undertaken by the Kushites to establish Musawwarat as a religious center prove that the colonization of the site must have been founded in a firm political interest, which resulted in the mobilization of substantial resources. These resources included not only material input and the workforce, but also ideational investments, i.e. the creation and widening of topographic knowledge, knowledge of the range and the appropriateness of specific transport techniques, and above all advanced skills in the site’s water management. Moreover, they also comprised the establishment of new forms of sacral architecture and of a new sacral topography, centering around the lion god Apedemak, whose earliest known temple was erected by the early Meroitic ruler Arnakhamani next to the Great Hafir at Musawwarat (Fig. 11).\(^{90}\) The archaeologically explored trajectory of Musawwarat thus widens our perspective in investigating marginality, suggesting that the marginality of the site in this case was the qualifying, rather than a adverse factor. This shows that we must not limit our analytical frame of reference to scenarios in which marginality is connected to inferiority or disadvantage. This realization resonates with a phrase by Irving Chan Johnson, who explores images and social practices which “centre marginality as an important component of cultural and ethnic identity.”\(^{91}\)

3.2 Ayamonte, southwest Spain (Topoi A-1-7)

Ayamonte is situated at the mouth of the Guadiana river located in the southwestern Iberian Peninsula. The project aims to develop an understanding of the Late-Holocene estuarine landscape changes within the Guadiana river mouth and is associated to the

\(^{87}\) Van der Veen 1998, 221.
\(^{88}\) See Edwards 2004; Weschenfelder 2014 with a survey of older contributions.
\(^{89}\) Scheibner 2014; Wolf 2014.
\(^{90}\) See Näser 2014 with further references.
\(^{91}\) Johnson 2011, 116.
excavation of a Phoenician settlement in the modern city of Ayamonte. Part of the geoarchaeological research undertaken within this project is intended to verify the existence of a lagoon harbor in the lee of a weather-exposed ridge close to the settlement. Moreover, the research is assessing the human impact during Phoenician colonization, emphasizing deforestation and soil erosion processes. The primary goal is to gain information about the relations between the colonizing Phoenician society and its environment.

Ayamonte is located in the lower Guadiana basin, in the western margin of the Spanish province of Huelva near the western border with Portugal (Fig. 13B). The local bedrock is very heterogeneous and consists of Carboniferous shales, fossil-rich Paleozoic greywackes, volcanic dolerites, Triassic limestones and red sandstones as well as Quaternary sand- and silt deposits. The relief is characterized by steep slopes and deep incised rivers. The climate is of Mediterranean-type, with hot, dry summers with at least two months of drought, and mild winters during which the majority of rain falls.

Prior to the discovery of the Phoenician settlement and necropolis in the modern town of Ayamonte, the Guadiana estuary was a Terra Incognita in terms of Phoenician settlement activity.

The Phoenician period on the Iberian Peninsula started around the 1st millennium BC and was characterized by an apparently systematical colonization of the coastal strips of modern Spain. The Phoenician colony in modern Ayamonte was located in the

![Fig. 13 | Supraregional distribution of Phoenician settlements in the Mediterranean. (A) Phoenician settlements and trading routes of the Mediterranean; (B) Phoenician and Indigenous settlements of Southwest Iberia; (C) Locations of Archaeological Survey Findings and Mineral Resources in the wider area of the two prehistoric settlements Ayamonte and Onuba.](image)

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92 Instituto Geolóxico y Minero de España 1983.
93 Rivas-Martínez et al. 1990.
94 García Teyssandier 2013.
most western part of the Phoenician diaspora (Fig. 13A). The Phoenician colonies were exclusively located along the coastal strip of the Mediterranean Sea and Gulf of Cadiz, preferably located on a ridge or peninsula close to river mouths which guaranteed protection and access to the hinterland.\footnote{Arteaga 1988a; Schubart 1982; Aubet 2001; Koch 2001; Arruda 2009}

The motivation of the Phoenicians to colonize this area, and their modes of contact with the indigenous community remain uncertain and are subject of a controversial debate.\footnote{Arruda 2009; Koch 2001.} However, although not located in close proximity to the coastline, numerous ore deposits in the hinterland of the Phoenician settlements along the coastal strip of the southwestern Iberian Peninsula are considered to be one of the main reasons for the colonization (Fig. 13C).\footnote{Mulhy 1998.} Although evidence of an export-oriented quarrying is missing, it is assumed that in particular the iron-, copper- and silver deposits were of economic importance.\footnote{Schubart and Maaß-Lindemann 2004.} Next to the accessible ore deposits, available agricultural and marine resources as well as the availability of timber and slaves (indigenous Iberians) could have acted as important pull-factors.\footnote{Arruda 2009; Treumann 2009; Wagner and Alvar 1989.} Thus, due to its wealth in natural resources and physiographical prerequisites the economic and ecological marginality for Ayamonte must be estimated as low.

The settlement history of the Guadiana estuary starts around 7 kyr BP at which time the mean-sea-level reached, after sea-level decline from the last glacial maximums, approximately the position it holds today.\footnote{Hoffmann 1987; Arteaga 1988a; Arteaga 1988b; Jurado, Sanz, and Tomico 1997.} Within the greater research area, Neolithic finds are known for the dunes close to modern city of Cadiz.\footnote{Kunst 2001a.} Some lithic tools ascribed to Neolithic times document the settlement activities. The megalithic tomb in Villablanca, 10 km northeast of Ayamonte, indicates an advanced stage of Neolithic culture.\footnote{Kunst 1988.}

Remains of Chalcolithic fortifications are located in the hinterland of the Guadiana estuary and in the vicinity of the city of Huelva.\footnote{Kunst 1988.} Other than at the rivers Odiel and Tinto, there is almost no direct evidence for Chalcolithic mining activities at the Iberian Peninsula.\footnote{Kunst 2001b.} However, there is a noticeable concentration of Chalcolithic settlements by the rivers upstream close to numerous copper deposits of the region.\footnote{Kunst 1988.}

The Bronze Age settlements of the lower Guadiana river are characterized by a wide range of stone box graves. In contrast to this richness, archaeologists face an almost complete lack of settlement sites.\footnote{Schubart 1988.} The only Bronze Age-settlement in the vicinity of Ayamonte was discovered close to the modern town of Odeleite, located 10 km northwest of the Guadiana estuary. Compared with the fairly scattered pre-Bronze Age sites, the locations of Bronze Age settlements seem to be concentrated along the Guadiana river.\footnote{Kunst 1988.}

Findings in Castro Marim (ancient Baesuris), a settlement on top of a hill right of the Guadiana river about 3 km away from Ayamonte, date back to the transition of the Late Bronze Age to the Iron Age and give some hints indicating an indigenous population that was clearly in contact with Phoenician traders.\footnote{Schubart 1975.} The Phoenician findings in Ayamonte are manifold and include ceramics, remains of metallurgical furnaces, building structures
and remains of a metal workshop. Based on these archaeological finds, one can deduce a relatively large extent and significance of this Phoenician settlement during the 8th and 7th century BC. Both, the necropolis and the settlement are the most westerly evidences of Phoenician colonization and are therefore unique in their character. Although the archaeological objects found within the settlement and necropolis are very revealing, social marginality for the Phoenician community in modern-day Ayamonte cannot be evaluated.

Archaeological findings of Roman times are abundant within the research area. The majority of the sites are located directly along the Guadiana river, or in the vicinity of the modern sand and barrier beaches and dunes. This indicates that the dune system and beach barriers of Isla Canela left of the Guadiana river mouth already existed during Late Roman times. The densely settled areas along the banks of the Guadiana river, as well as along the banks of its major tributaries indicate that stable fluvial dynamics existed at least by Roman times.

4 Conclusions

During their history, the settlement areas investigated within this research group undergo changes with respect to types of social, political and spatial marginalities. In contrast, ecological factors related to the settlement areas changed only slightly during the periods under consideration. However, deforestation and unsuitable land use frequently caused land degradation and deterioration of site conditions – especially in ecologically favored regions – and thereby caused an increase of ecological marginality in the sense of an ‘ecological marginalization’ (from lat. margo – en. brink, border, lat. facere – en. produce, compose). By contrast, the utilization of settlement areas characterized by unsuitable natural settlement conditions was frequently made possible through the implementation of technical measures such as water harvesting measures in drylands or terrace constructions in mountainous areas. This often resulted in an improvement of the natural settlement conditions and, thus, in a decrease in ecological marginality.

During early phase of colonization settlement spaces outside of regular settlement areas were characterized by a high degree of spatial marginality. The degree of spatial marginality tended to decrease with continuing exploitation of the hinterland and the ongoing colonization process. Whether the colonies are characterized by a high or a low degree of economical marginality is determined by the intention behind the colonization: Was colonization undertaken for political or strategic reasons? Or was the colonization a result of the exploitation of natural resources? Where natural resources, especially ores or rare building materials, were available and were mined, the importance of a colony as a marketplace increased, at least temporarily, resulting in low economical marginality during these periods. This is clearly demonstrated by the examples of the settlement sites of Chimtou, Tunesia (chapter 2.4) and Ayamonte, Spain (chapter 2.7). Colonies that were established due to cultic reasons could also take on great importance as a marketplace, which could develop even if it was not rich in natural resources if the presence of political or spiritual power contributed to that importance. However, even considering spiritual motivations, it remains a challenge to understand why societies were willing to make enormous efforts to establish permanent settlements with sophisticated infrastructure in

110 Garcia Teyssandier 2015
111 Garcia Teyssandier 2015
112 Kunst 1988
113 Kunst 1988
114 Kunst 1988
inaccessible valleys with high flood risks (Petra, Jordan, chapter 2.2) or in semiarid regions without sufficient water resources (Musawwarat es-Sufra, Sudan, chapters 2.1, 3.1; Resafa, Syria, chapter 2.8) and again Petra, Jordan, chapter 2.2. In prehistoric contexts, very few conclusions can be drawn on social marginality. This is frequently due to problematic data sets and problems associated with data acquisition. The settlement site of Yeha, Ethiopia (chapter 2.6) is an exception; it did constitute the center of the community of Di’amat with its strong Sabaean influence.

The analysis of the case study of Musawwarat, Sudan (above, chapters 2.1, 3.1) quotes Irving Chan Johnson’s call to “centre marginality as an important component of cultural and ethnic identity”. Though it sounds paradoxical, Johnson illustrates the potential of integrating ideas of centrality and marginality. Recent research on centrality has introduced a simplified and at the same time more abstract concept of centrality, defining it as relative concentration of interactions. Accordingly, a central place corresponds to a culmination point of interaction. This notion of centrality offers the potential to assess semi-quantitatively the importance of a place based on the central functions it provided. Hence, based on centrality we are able to reconstruct the interaction patterns of certain places. The concept of marginality as outlined in this paper supplies a framework for characterizing the space a settlement is located in. Spatial marginality is the basis upon which to understand Johnson’s request to “centre marginality”. Ecological marginality is the crucial factor in Musawwarat’s, Resafa’s and Petra’s location and at the same time in establishing the extraordinary character of these central places during their heydays. Centrality measures the causes for this importance, marginality defines its basis. In the same light, it is possible to ‘read’ their decline as a function of centrality’s decreased pull factors, leading to a decreased ability – or interest – to counteract the causes of marginality.

Centrality helps us explain why a place is important and how it functions, while marginality informs us about the preconditions and society’s assessment of the place’s space; marginality shows us the relativity of suitability and unsuitability, centrality measures the consequences. Viewed in this way, both concepts are complementary, illustrating the value and necessity of integrated research and holistically oriented hypotheses. The insights gained by Topoi’s previous research on centrality and the current research on marginality helps to draw a more comprehensive picture about the spatial and social organization of ancient societies.

116 Johnson 2011, 216.
118 Nakoinz 2012
119 Gringmuth-Dallmer 1996
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Illustration credits
Wiebke Bebermeier
Dr. rer. nat. (Göttingen 2008), joined the Institute of Geographical Sciences in 2008 as
a postdoctoral fellow; she has been a junior professor for physical geography with a
concentration on landscape archaeology since 2011. Research interests: (pre)historic
human environmental interactions, present and ancient watershed management and
landscape archaeology.

Prof. Dr. Wiebke Bebermeier
Freie Universität Berlin
Department of Earth Sciences, Physical Geography
Malteserstraße 74–100
12249 Berlin, Germany
E-Mail: wiebke.bebermeier@fu-berlin.de

Dennis Mario Beck
M.A., current PhD student and member of the BergSAS and Berliner Antike Kolleg. Studied
classical archaeology, provincial Roman archaeology and religious studis
at Ludwig-Maximilians-Universität München and at the Università di Roma – La
Sapienza. Member of the archaeological excavation projects in Simitthus/Chimtou
and Meninx/Djerba. Research interests: Marble and trade in Antiquity, roman reli-
gion, roman urbanism esp. in north africa.

Dennis Mario Beck
Deutsches Archäologisches Institut- Zentrale
Podbielskiallee 69–71
14195 Berlin, Germany
E-Mail: Dennis.Beck@dainst.de

Iris Gerlach
Dr. phil. (Munich 1997), M.A. in Near Eastern Archaeology, Classical Archaeology
and Assyriology has been the head of the Sanaa Branch of the Oriental Department
at the German Archaeological Institute since 2000. She is the director of various field
projects in Yemen, Ethiopia and Qatar. Research interests: South Arabian and Pre-
Aksumite archaeology, cultural contacts, especially trade and migration, temples and
religion, ancient water management, burial rites and art history.

Dr. Iris Gerlach
Deutsches Archäologisches Institut
Orientabteilung, Außenstelle Sanaa
Podbielskiallee 69–71
14195 Berlin, Germany
E-Mail: iris.gerlach@dainst.de

Torsten Klein
has been a PhD student in Berlin since 2013, working on the Environmental reconstruc-
tion of the ancient settlement Ayamonte, lower Andalucia. He earned his degree as Diplom-
Geographer in 2012, in physical geography at the Universität Leipzig. His thesis was
on archaeogeophysical properties and environmental magnetism at a Neolithic site
near Leipzig, Saxony. Research interests: physical geography, geoarchaeology, human-
environmental interactions, geophysics, geology and coastal geomorphology.
Torsten Klein  
Freie Universität Berlin  
Department of Earth Sciences  
Physical Geography/Topoi  
Malteserstraße 74–100  
12249 Berlin, Germany  
E-Mail: torsten.klein@fu-berlin.de

Daniel Knitter  
Dr. rer.nat. (Berlin 2013), received his doctorate in Berlin with a thesis on *Central Places and the Environment – Investigations of an Interdependent Relationship*; M.Sc. and B.Sc. in Geography. Since 2013 he has served as a research assistant and coordinated the Topoi Lab of Research Area A. From 2009 to 2010 he was a research assistant in Topoi, working on the project *Monti Navegna e Cervia* (A-I-9). Research interests: human-environmental interactions, especially in connection with geomorphological and geomorphometrical processes, (pre)historic landscape development under human influence and theoretical geography.

Dr. Daniel Knitter  
Freie Universität Berlin  
Department of Earth Sciences  
Physical Geography/Topoi  
Malteserstraße 74–100  
12249 Berlin, Germany  
E-Mail: daniel.knitter@topoi.org

Kay Kohlmeyer  
Dr.phil. (Berlin 1981), was a research assistant 1985–1992 and 1993–1994 at Deutsche Orient-Gesellschaft/Museum of Pre- and Protohistory Berlin and the German Archaeological Institute Damascus; since 1994 he has been a professor of field archaeology at the HTW University of Applied Sciences Berlin. Research interests: Syrian and Anatolian archaeology, methods of field and virtual archaeology. Current projects: excavations on the Citadel of Aleppo (Syria), in Anuradhapura (Sri Lanka); participating in the Conana survey project (Turkey).

Prof. Dr. Kay Kohlmeyer  
HTW Berlin  
Field Archaeology/Landscape Archaeology  
Wilhelminenhofstrasse 75 A  
12459 Berlin, Germany  
E-Mail: kay.kohlmeyer@htw-berlin.de

Jan Krause  
Dr. rer.nat. (FU Berlin 2013), first joined the Institute of Geographical Sciences, Freie Universität Berlin, as a research assistant in 2003 and has served as project coordinator of Research Area A in the Excellence Cluster 264 Topoi since 2008. Research interests: GIS, palaeohydrology, past and present morphodynamics, drylands and landscape archaeology.
Dr. Jan Krause  
Freie Universität Berlin  
Department of Earth Sciences  
Physical Geography/Topoi  
Malteserstraße 74–100  
12249 Berlin, Germany  
E-Mail: jan.krause@topoi.org

Dirce Marzoli  
Prof. Dr., is the Director of the German Archaeological Institute in Madrid, Spain.

Prof. Dr. Dirce Marzoli  
Deutsches Archäologisches Institut  
Abteilung Madrid  
C/ Serrano, 159  
28002 Madrid, Spain

Julia Meister  
M.Sc., has been a graduate student at the Berlin Graduate School of Ancient Studies since 2012 (Doctoral Program: Landscape Archaeology and Architecture); she holds an M.Sc. and B.Sc. in Geography; in 2014 she became a research assistant at the Freie Universität Berlin (Institute of Geographical Sciences, Physical Geography), having worked as a research assistant at the German Archaeological Institute (Oriental Department, Badia Project) 2012–2013. Research interests: human-environmental interactions, ancient water management and palaeoenvironmental reconstruction.

Julia Meister  
Freie Universität Berlin  
Department of Earth Sciences Physical Geography/Topoi  
Malteserstr. 74–100  
12249 Berlin, Germany  
E-Mail: j.meister@fu-berlin.de

Bernd Müller-Neuhof  
Dr. phil. (FU Berlin 2005), M.A. in Near Eastern Archaeology, Prehistory and Assyriology, joined the Oriental Department at the German Archaeological Institute in 2010 with the project Aride Lebensräume im 5. bis frühen 3. Jahrtausend v. Chr.: Mobile Subsistenz, Kommunikation und Ressourcennutzung in der Nördlichen Badia (Nordostjordanien), which was funded by the Deutsche Forschungsgemeinschaft. Current research interests: ancient water management, nomadism, lithic technologies, prehistoric trade and exchange, evolution of urbanization and conflicts and warfare in prehistoric societies.

Dr. Bernd Müller-Neuhof  
Deutsches Archäologisches Institut  
Orientabteilung  
Podbielskiallee 69–71  
14195 Berlin, Germany  
E-Mail: bernd.mueller-neuhof@dainst.de
Claudia Näser  
M. phil. (Cambridge 1995) in World Archaeology, option African Archaeology, Dr. phil. (HU Berlin 2001) in Egyptology, was junior professor and guest professor at Humboldt-Universität zu Berlin and head of the Archaeological Mission to Mushawwarat es-Sufra from 2004 to 2015. She is now working as a freelance archaeologist, directing i.a. the Mograt Island Archaeological Mission and the Archaeological Mission to the Fourth Cataract/Sudan. Research interests: the archaeology of Egypt and the Middle Nile valley from prehistory to Islam, the archaeology of nomadism, archaeological theory, the politics of archeology and archaeological practice, critical heritage studies.

Prof. Dr. Claudia Näser  
Herbert-Baum-Straße 24  
13088 Berlin, Germany  
E-Mail: claudia.naeser@online.de

Philipp von Rummel  
Dr. phil. (Freiburg i. Br. 2005), was appointed General Secretary of the German Archaeological Institute in 2014 and is a co-director of the German-Tunisian research project at Chimtou (Tunisia). Research interests: late antique archaeology, particularly questions of archaeology and identity, archaeology of the migration period and the city of Rome in late antiquity, North African archaeology from the Iron Age to the Middle Ages and Roman urbanism.

Dr. Philipp von Rummel  
Deutsches Archäologisches Institut  
Podbielskiallee 69–71  
14195 Berlin, Germany  
E-Mail: philipp.vonrummel@dainst.de

Dorothée Sack  
Dr.-Ing. (Karlsruhe 1982), Habilitation (Frankfurt a. M. 1994), educated as an architect and building archaeologist, has worked in the Near East, mainly in Syria and Lebanon, since 1973 and has taught at several universities, including those in Karlsruhe, Mainz, Bonn, Bamberg and Frankfurt a. M. Since 1998 she has been a professor for building archaeology at the Institute of Architecture of the Technische Universität Berlin, where she established a postgraduate program for conservation of monuments. Current research interests: Late Antique and Islamic architecture and city development; urban history and the development of the settlement of Resafa/Syria in the period from Roman/Late Antiquity to the 13th century. Head of the project Resafa, pilgrimage city and caliphal residence.

Prof. Dr.-Ing. Dorothée Sack  
Technische Universität Berlin  
Fachgebiet Historische Bauforschung,  
Masterstudium Denkmalpflege  
Strasse des 17. Juni 152  
10623 Berlin, Germany  
E-Mail: dorothee.sack@tu-berlin.de
Stephan G. Schmid
Dr. phil. (Basel 1996), Habilitation (Paris 2002), has been a professor of classical archaeology at the Institute of Archaeology, Humboldt-Universität zu Berlin since 2008. His previous positions include a full professorship at University of Montpellier III (2002–2008) and scientific secretary (deputy director) at the Swiss School of Archaeology in Greece (1996–2002). Current research interests: Nabataean archaeology, especially in and around Petra in southern Jordan, the archaeology of iron in the Tyrrhenian area, Greece in the Hellenistic and Roman periods, hilltop settlements of Iron Age and Roman periods in southern France.

Prof. Dr. Stephan G. Schmid
Humboldt-Universität zu Berlin
Winckelmann-Institut
Unter den Linden 6
10099 Berlin, Germany
E-Mail: stephan.g.schmid@culture.hu-berlin.de

Brigitta Schütt
Dr. phil. (Aachen 1993), Habilitation (Trier 1998), has been a professor at the Institute of Geographical Sciences, Freie Universität Berlin since 2002, and served as Vice President for Research at Freie Universität Berlin since 2010. Research interests: past and present soil erosion, Late-Quaternary palaeoenvironments, palaeohydrology, past and present morphodynamics, drylands and watershed management.

Prof. Dr. Brigitta Schütt
Freie Universität Berlin
Department of Earth Sciences, Physical Geography
Malteserstraße 74–100
12249 Berlin, Germany
E-Mail: brigitta.schuett@fu-berlin.de

Ulrike Wulf-Rheidt
Dr.-Ing. (Karlsruhe 1997), Prof. (Freie Universität Berlin 2009), is the director of the Department of Architecture of the German Archaeological Institute and the head of the research project The development of the Roman imperial palaces on the Palatine Hill in Rome and A new topographical map of Simitthus/Chintou in Tunisia, focusing on Hellenistic and Roman architecture with an emphasis on residential and palace architecture and urban development.

Prof. Dr.-Ing. Ulrike Wulf-Rheidt
Deutsches Archäologisches Institut
Architekturreferat
Podbielskiallee 69–71
14195 Berlin, Germany
E-Mail: ulrike.wulf-rheidt@dainst.de