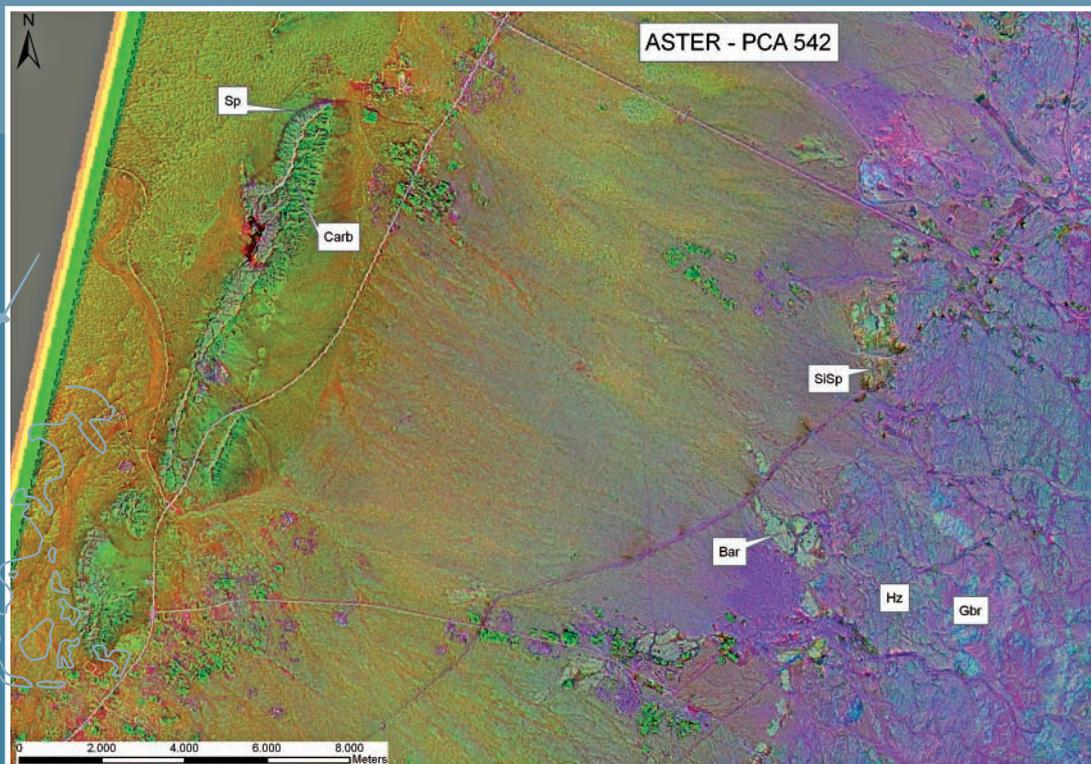


The Role of Culture in Early Expansions of Humans



Jebel Faya, UAE: Principal component analysis of Aster multispectral image revealing geolithological domains.





THE ROLE OF CULTURE IN EARLY EXPANSIONS OF HUMANS

Editorial

The seventh issue of the ROCEEH newsletter reports on geoarchaeological studies on the Arabian Peninsula and in Northern Italy. It summarizes two ROCEEH workshops on environmental themes and introduces the ROCEEH Graduate Network.

Geomorphodynamics and Landscape Reconstruction in the Emirate of Sharjah, UAE

The Arabian Peninsula has recently become a major focus of geoarchaeological and paleoclimatological investigations. Archaeological localities in northern Saudi Arabia, Yemen, and the UAE have been dated with OSL and suggest that early humans left Africa not only via the Nile–Levant corridor, but also by crossing the Bab al-Mandab to reach the Arabian Peninsula. This modern interpretation of the “Out of Africa” hypothesis is sustained by various paleoclimatic and geomorphological investigations which reveal the existence of favorable climatic phases.

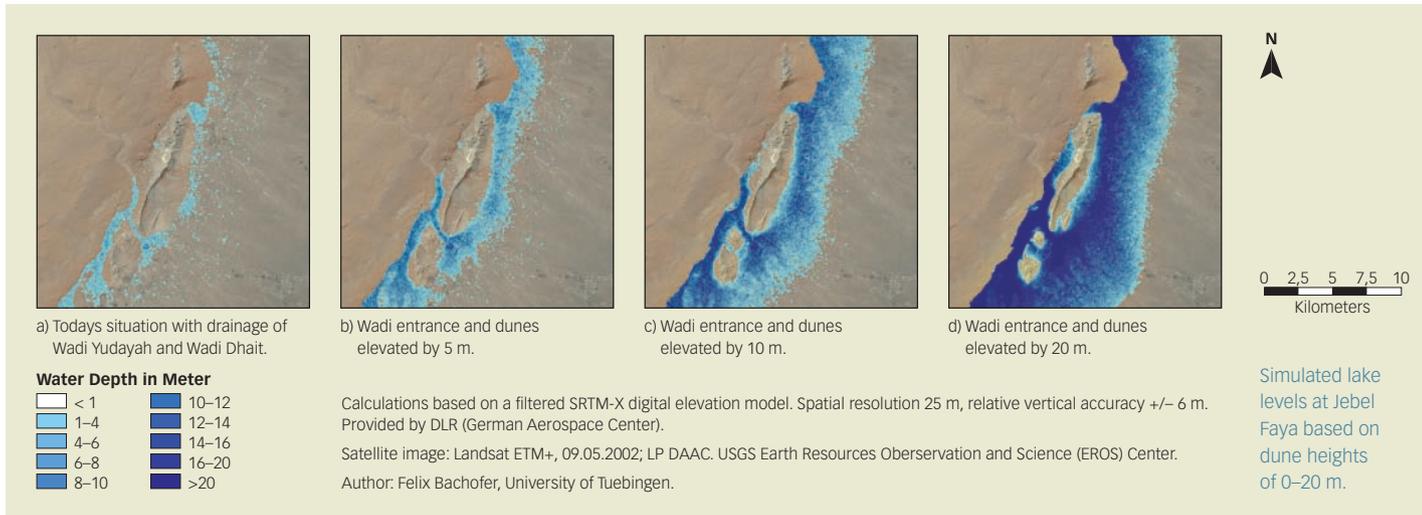
A joint project between the Directorate of Antiquities of the Government of Sharjah Emirate (S.A. Jasim), the Institute of Archaeological Sciences of Tübingen University (H.–P. Uerpmann, M. Uerpmann, K. Bretzke) and the Institute of Geography of Tübingen University (V. Hochschild, M.

Märker, J. Eberle) has revealed a well-dated stratigraphic sequence of archaeological sites at Jebel Faya covering the period from 125,000–6,000 years ago (*see ROCEEH Newsletter 6-2012*).

In the area around Faya, a high artifact density from different archaeological epochs leads to the hypothesis that conditions for human life must have been quite favorable at times. The regular availability of water was a prerequisite for survival in this flat inland basin, bounded on the west by the anticlinal structure of Jebel Faya (350 m a.s.l.) and the northeastern edge of the Rub el-Khali desert. On the east, glacial and shallow wadis originate in the Hajar Mountains and reach the present day oasis settlements of Maleha at about 185 m above sea level. The study area is situated at the transition zone between the aeolian processes of the Rub el-Khali on one side, and the fluvially triggered denudative geomorphic dynamics of the Hajar Mountains on the other. The north-



View from Jebel Faya towards find location Faya NE1 (foreground).



ern Wadi Dhaid cuts through the Rub el-Khali, whereas other major drainage systems were often dammed by dunes. In this geographic situation, a rather complete and highly differentiated sedimentary archive can be expected.

The project aims to conduct regionally differentiated paleo-hydrological investigations that will explain the geomorphologic interactions between pediments and dunes, as well as the existence of temporary water-filled depressions. Using a detailed hydro-geomorphologic model, we intend to simulate the interaction of aeolian and fluvial process dynamics and reconstruct landscape evolution in the northeastern Rub al-Khali. Innovative modern synergistic techniques to describe the interaction of aeolian and hydro-geomorphologic process dynamics will be applied. The combination of remote sensing, digital elevation models and stratigraphic information, as well as geophysical prospection and process modeling has already led to interesting preliminary results.

Michael Märker

Geoarchaeological Survey of the Mugello Basin, Northern Tuscany, Italy

The distribution of human occupation during the Paleolithic is reflected in the landscape evolution of the northern Apennine Mountains. To better characterize this relationship, we



Terrace landscape of the Mugello Valley with the Apennine Mountains in the background (Photo: G. Quèhèrè).

chose the Mugello Basin as a case study combining the fields of geography, geology and archaeology. The Mugello Basin is an intramontane valley situated along the Apennine chain which is now drained by the Sieve River. Stone artifacts found on the terraces of the Sieve date to the Middle and Upper Paleolithic, a time roughly 100,000–20,000 years ago.

Geological history

The intramontane basins of the Apennines formed during a late phase of mountain building between the late Pliocene and early Pleistocene. A variable regime of compressional and extensional forces led to tectonic fragmentation with resultant “horst and graben” structures. As downward movement in the southern part of the Mugello Basin exceeded that in the northern part of the basin, the valley profile became asymmetrical. This half-graben structure resulted in a closed drainage pattern and the formation of a paleolake that filled with sediments transported by the rivers that drained this portion of the Apennines. During this fluvio-lacustrine phase, sediments up to a thickness of about 600 m were deposited. These sediments originate from both lacustrine and alluvial delta deposits, so-called delta fans.

At the beginning of the final alluvial phase about one million years ago, the paleolake was tapped and then drained by the Sieve River, a tributary to the Arno. Due to the abrupt lowering of the erosional base, the Sieve and its tributaries began to incise the former fluvio-lacustrine deposits. Subsequent erosional and depositional cycles led to the formation of terrace systems that are related both to climatic changes during glacial-interglacial intervals and tectonic activity. Of five terraces that developed during the alluvial phases, three Pleistocene terraces are visible today:

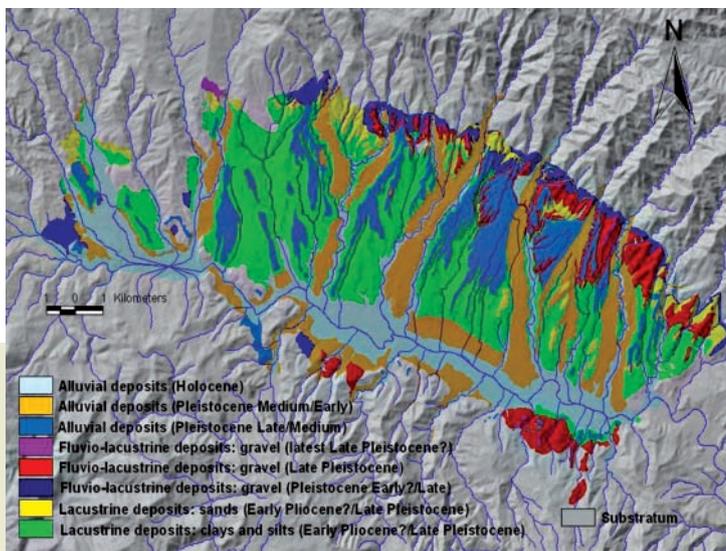
1. The highest terrace, the main paleosurface, results from conjoined alluvial deltas that stretch along the Sieve River. During a subsequent phase of stability, soils developed. This oldest terrace is exposed at Soli/Trebbiolo and contains mainly Middle Paleolithic stone artifacts.

2. The formation of the middle terrace and soil development on it are attributed to the penultimate glacial phase. This terrace with relatively flat surfaces is composed of fluvial deposits. This second oldest terrace can be seen at Lucigliano and yields stone artifacts from both the Middle and Upper Paleolithic.
3. The youngest Pleistocene terrace is visible at Toro and contains reworked artifacts from the Middle and Upper Paleolithic contexts.

Below these, the lowest terrace is a Holocene formation and represents the modern Sieve floodplain.

Landscape reconstruction

To reconstruct the landscape we conducted two week-long field campaigns in May and October 2012. The field work conducted in October coincided with an interdisciplinary field school for Geography students from Tübingen. The field work focused on the characterization of physical and chemical settings of the paleosurfaces and the underlying soils and substrates. While the chronology of the surfaces plays a key role in understanding the development of the terrace systems in the Mugello Valley, their ages remain unknown. To resolve this issue, we collected soil and substrate samples to determine the ages of these terraces. We also conducted geoelectric tomography to determine the distribution of paleosurfaces and fluvial deposits. We completed a detailed soil survey and measurements of the soil and substrate characteristics in terms of physical, chemical and hydrological behavior. This data is essential to assess hydrogeomorphologic process dynamics and to generate models of landscape evolution.



The present day spatial distribution of fluvio-lacustrine deposits shown on a simplified geologic map of the Mugello Valley (Märker 2006, after Benvenuti 1994).

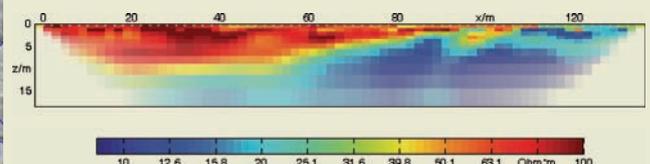
The archaeological materials

At the Archaeological Museum of St. Agata, we examined a selection of stone artifacts from surface collections from the three Pleistocene terraces at the sites of Soli/Trebbiolo, Lucigliano and Toro. While the analysis is still in progress, first observations make it clear that the artifacts found on the higher terraces are mainly Middle Paleolithic, while those from the lower terraces are mixed assemblages of Middle and Upper Paleolithic. The artifacts from the higher terraces have fresh edges, meaning that they have been minimally transported, while the artifacts from lower terraces are more rounded, suggesting erosion and possible transport by water.

The large Middle Paleolithic assemblages include cores that are distinctly Levallois in nature. This mode of stone artifact production was typically used by Neanderthals. Most cores are made on local varieties of chert and jasper and show multiple modes of reduction, including unidirectional, bidirectional, convergent, preferential and centripetal. Almost all cores have cortex on their base, indicating that they originally came from river cobbles, and show a variable degree of preparation. The assemblages contain relatively few retouched tools and blanks.

In contrast, the Upper Paleolithic assemblages consist of fewer artifacts. While these assemblages are also dominated by cores, the cores of the Upper Paleolithic assemblage are distinct from the Middle Paleolithic. The Upper Paleolithic assemblages consist mainly of platform cores that were used to make elongated flakes. Most of the platform cores are smaller in size than the Middle Paleolithic Levallois cores. The platform method was a mode of stone tool production typically used by anatomically modern humans. The Upper Paleolithic assemblages also contain few retouched tools or blanks.

In closing, this study of landscape evolution in the Mugello Valley has shown us how data from the fields of geography and geology can complement archaeological information. Since anatomically modern humans replaced Neanderthals in Italy about 45,000–40,000 years ago, we hope that the archaeological finds will help narrow the dating of the terraces.



Geoelectric tomography of a terrace cross-section at Lucigliano showing distribution of fluvial gravel deposits (high resistivity, red) and lacustrine clay sediments (low resistivity, blue).



Middle Paleolithic artifacts from the locality Lucigiano.



Upper Paleolithic artifacts from the locality Lucigiano.

As the analysis of data collected in the field continues, we expect to extract more information about the complicated relationship between human settlement and landscape.

Michael Märker & Andrew Kandel

Project Workshops

“The environmental background of early hominin dispersal in western Eurasia”

Weimar, Germany, 19–20 April 2012

Twenty scientists from seven European countries met at the Senckenberg Research Station of Quaternary Paleontology to explore new approaches in the reconstruction of the early human environments of western Eurasia. *Homo erectus* first reached the Mediterranean during the Early Pleistocene, and the hominin record of western Eurasia provides evidence for at least one later immigration event. The environments that were available to hominins play an important role in intra- and interregional dispersal events. The participants in the workshop assessed the fossil record and discussed advantages and limitations of diverse proxies for reconstructing hominin habitats.

The macromammal fossil record helps identify potential routes of dispersal. Furthermore, it illustrates multiple intra- and interregional dispersals. Habitat structure and ecology are considered as being relevant for hominin distribution and dispersal. Vegetation, fauna and climate represent a set of components which determine the structure of the environments and their potential for occupation by hominins. Following an initial overview of spatio-temporal patterns observed in the fossil record of Pleistocene Europe, we assessed proxies for environmental reconstruction.

Which indicators are available to reconstruct environments settled by humans? High resolution records of fossil pollen provide information on vegetation and permit the recon-

struction of climate. Integration of signals from proxies with different spatio-temporal resolution, for instance pollen and macroplant remains, allows for an expanded validity. Such records match with the fossil record of other climate sensitive organisms, such as reptiles and amphibians. Micro- and macromammals contribute to the reconstruction of vegetation density and heterogeneity. In view of the multitude of sources for information about the environment, the integration of such diverse signals is among the future challenges. It is a prerequisite for addressing the different scales of the signals and validating the various data sources.

A recurring motif in discussions on hominin dispersal was the successive opening of landscapes that would have enabled or supported hominin dispersal. A reconstruction requires information about vegetation structure. Equipped with a set of useful proxies, we can determine the degree of openness linked with hominin presence. However, several contributions showed that the link between climate, landscapes and hominin settlement is not as direct as previously thought. An open landscape, as such, was not particularly inviting for early hominins. Instead, hominins in western Eurasia seem to prefer low seasonality linked with high habitat diversity.

Macromammals contribute further information about hominin environments on the level of ecomorphology and community ecology. Ecological studies addressing individual taxa examine functional and ecological morphology and infer features of habitats from morphological characters of single specimens. Approaches in community ecology on the other hand focus on guild structure and composition. Specific communities correspond to their environments. Studies in which both perspectives are joined provide a maximum of information. All approaches can be assessed on a quantitative level. This is a methodological prerequisite for structured comparisons of the performance of different proxies.



Participants at the workshop on “Environmental background of early hominin dispersal” at the Senckenberg Research Station of Quaternary Paleontology in Weimar.



Participants of the post-workshop excursion at the Darbas locality in southern Armenia.

It may also reveal shortcomings and limitations in their interpretation. Low temporal and spatial resolution of fossil assemblages and poor dating impose severe limitations on the integration of different datasets. It is necessary to devote more attention to the different scales inherent in various samples resulting from excavation and fossil collection.

We consider this meeting as a starting point to promote the discussion of more rigorous definitions, methods and approaches in the reconstruction and interpretation of early hominin environments and corresponding dispersal patterns. The group made plans to meet at regular intervals and integrate other initiatives with convergent aims and ideas.

Christine Hertler

“Early Pleistocene Environmental Changes in Southern Caucasus—Reconstruction of Climate and Vegetation Development in Armenia and Georgia at the Time of Early Human Expansion into Eurasia”

Yerevan, Armenia, 25–31 July 2012

The project “Early Pleistocene Environmental Changes in Southern Caucasus—Reconstruction of Climate and Vegetation Development in Armenia and Georgia at the Time of Early Human Expansion into Eurasia” is a trilateral cooperation between Germany (A. Bruch), Georgia (E. Kvavadze) and Armenia (I. Gabrielyan) funded by the Volkswagen Foundation since Feb. 2012. The first project workshop with 18 participants gave an overview on our current knowledge of the Early Pleistocene environment and discussed the future perspectives of the project. Program and abstracts are available on www.roceeh.net.

The first day’s lectures were dedicated to environmental development in southern Armenia. The sediments of the Sisian Formation of the Vorotan River basin are pre-

dominantly diatomites dated to 1.4–0.9 Ma. Presentations focused on results from paleontological studies of fossil macroflora (I. Gabrielyan), microflora (S. Scharrer, A. Bruch), insects (M. Marjanyan), mollusks (L. Harutyunova) and fishes (S. Pipoyan) recovered from these sediments. A lecture by B. Gasparyan about the Paleolithic record of Armenia and ongoing projects gave an archaeological context to the presentations on the environmental setting of the Early Pleistocene.

The presentations of the second day highlighted the history of Georgia. I. Shatilova reported on the Early Pleistocene vegetation history of the western Georgian lowland. Several talks focused on the third key-region of the project, the southern Georgian highland, with presentations on the geological setting (R. Chagelishvili), palynological analyses (E. Kvavadze, I. Martkoplshvili) and ecological implications of the large mammal fauna of Akhalkalaki (M. Buchsianitdze, C. Hertler). The day ended with two presentations on palynology (A. Hayrapetyan) and wood anatomy (G. Oganessova) of modern Armenian plant taxa and a short geological field trip to obsidian sites in the vicinity of Yerevan.

In summary, the workshop provided an overview of the impressive dataset already available for a sound synthesis of Early Pleistocene environmental history of the Southern Caucasus. It demonstrated not only the high potential of the various complementary methods and international expertise available, but also the necessity of applying multi-proxy approaches to fully understand paleoenvironments. Moreover, it gave new perspectives for joint methodological applications and future collaborations. The second project meeting will be held in Tbilisi, Georgia, in the autumn of 2013.

Angela Bruch

ROCEEH Graduate Network (RGN)

On 12 June 2012, the first colloquium of PhD students involved in the ROCEEH project was held at the Senckenberg Research Institute in Frankfurt. The main aim of this meeting was to present PhD research projects and facilitate scientific exchange among graduate students. Presentations reflected PhD activities within ROCEEH from a variety of fields, including paleobiology (R. Volmer, D. Höne-mann), archaeology (L. Giemsch, K. Bretzke), geography (G. Quénehervé) and paleocognition (D. Garofoli). Participants discussed potential ways to establish an organizational structure within ROCEEH to assist graduate students. The RGN was founded with the main goals of 1) organizing annual meetings, 2) maintaining a database with contact information about graduate students in ROCEEH related projects, and 3) establishing a close contact with ROCEEH and ROCEEH's scientific environment. RGN plans to set up a home page on www.roceeh.net to inform graduate students about prior and upcoming events initiated by RGN and create a platform for presenting their projects and publications. RGN welcomes active participation of all PhD and Master students in projects related to ROCEEH. We look forward to fruitful collaboration with ROCEEH and its associated institutions.

Knut Bretzke, on behalf of RGN

Forthcoming

- Sessions S13 "Advanced exploration of spatial patterns in archaeological site assemblages using GIS applications and data mining technologies", S15 "Databases on cultural heritage and their geographic visualization", S16 "Early humans in space and time: how to get from DB assemblages to spatial distributions" by Michael Märker, Philip Verhagen, Espen Uleberg, Y. Kondo. Computer Applications and Quantitative Methods in Archaeology (CAA) "Across Space and Time" (**25–28 Mar. 2013**) in Perth, Australia. (<http://www.caa2013.org/CAA2013sessions.pdf>).
- Session SSP4.1 "Should I stay or should I go – the role of climate in early expansions of humans" by Finn Viehberg, Angela Bruch, Minoru Yoneda. European Geosciences Union (EGU) General Assembly (**7–12 Apr. 2013**) in Vienna, Austria. (<http://meetingorganizer.copernicus.org/EGU2013/session/12477>).
- 4th East African Association for Palaeoanthropology and Palaeontology (EAAPP) Conference (**28 Jul.–1 Aug. 2013**) in Mombasa, Kenya. Co-sponsored by ROCEEH. (<http://www.eaapp.or.ke/events.htm>)

Who's who?

This issue: Miriam Noël Haidle



Miriam Haidle

Miriam Haidle is the scientific coordinator of the ROCEEH research center and is based at Senckenberg Research Institute in Frankfurt/Main. Her main research interests lie in the evolution of human cognition, the expansion of cultural capacities and processes of Paleolithic innovation. Haidle studied Paleolithic Archaeology, Pre- and Protohistory, Ethnography, Geology and Physical Anthropology at the universities of Tübingen and Basel. Following a broad scope of interest, she studied evidence of hunger and malnutrition in her doctoral thesis, taught and conducted fieldwork at circular earthwork sites of the early Metal Ages in Cambodia, and analyzed the human skeletal remains of the Neolithic site of Herxheim. She developed cognigrams and effective chains as an approach to systematically compare cognitive aspects in tool behavior of animals and during human evolution ("How to think tools?" http://tobias-lib.uni-tuebingen.de/frontdoor.php?source_opus=6014). This work forms the basis of several new evaluations of important steps in the evolution of tool behavior, ROCEEH's "Expansion of Cultural Capacities" model (see Newsletter 6-2012), and a DFG project on "Qualitative and quantitative differences of innovative behavior in MSA technocomplexes of Southern Africa". Haidle's work was honoured with a Margarete von Wrangell scholarship of the state of Baden-Württemberg and a Feodor Lynen fellowship of the Alexander von Humboldt Foundation, which she spent at the University of Aarhus.

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