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ÖAW AUSTRIAN ACADEMY OF SCIENCES

10 DECEMBER 2020

VIRTUAL WORKSHOP

MAKING THE MOST OF SOILS IN ARCHAEOLOGY

WORKSHOP WITHIN THE FRAMEWORK OF THE PLATFORM 'NATURAL SCIENCES AND ARCHAEOLOGY'

PROGRAMME & ABSTRACTS

OREA

OREA – INSTITUTE FOR ORIENTAL AND EUROPEAN ARCHAEOLOGY

PROGRAMME

9:00–9:15	*Welcome* (Barbara Horejs, Julia Budka)
9:15–9:30	*Introduction* (Kerstin Kowarik, Katharina Rebay-Salisbury, Roderick B. Salisbury)
9:30–10:00	Erich Draganits Sedimentation, erosion and water management: Geoarchaeology in the context of the ancient salt mine of Chehrābād (Iran)
10:00–10:30	Susanna Cereda Keep it clean: a microstratigraphic approach to the study of built space, maintenance practices and concepts of cleanliness
10:30–11:00	*Coffee break*
11:00–11:30	Roderick B. Salisbury Archaeological soil chemistry for spatial organization and activity area analyses
11:30–12:00	Steffen Schneider Soils in archaeological landscape reconstruction: Challenge – Geoarchive – Archaeological site
12:00–13:00	*Lunch break*
13:00–13:30	Ian Bull Digging the dirt on soil biomarkers
13:30–14:00	Elena I. Zavala et al. Preservation of Ancient DNA in Pleistocene sediments
15:00–15:30	*Coffee break*
14:30–15:00	Katharina Dulias Digging Deep – How Ancient DNA and Palaeoproteomics Can Change the Game
15:00–15:30	*Discussion & Conclusion*

ABSTRACTS

Erich Draganits (University of Vienna)

Sedimentation, erosion and water management: Geoarchaeology in the context of the ancient salt mine of Chehrābād (Iran)

In archaeological formation processes, the difference between sedimentation and erosion is a crucial boundary that decides between – on the one hand – creation and burial of archaeological records or – on the other hand – their non-existence and destruction. We have investigated the fluvial hinterland of the ancient salt mine at Chehrābād (Iran), located in the northwestern Iranian Plateau at an altitude of ca. 1450 m. Based on high-resolution digital elevation models, geotechnical rotary drilling, sedimentological analyses and radiocarbon dating, the long-term effect of centuries of irrigation on the fluvial landscape evolution can be shown.

Susanna Cereda (University of Innsbruck)

Keep it clean: a microstratigraphic approach to the study of built space, maintenance practices and concepts of cleanliness

This paper explores the everyday life of constructed spaces in the tell-sites of Arslantepe (Turkey) and Monjukli Depe (Turkmenistan), through a microstratigraphic approach. Specifically, it focuses on how people took care of the built space in terms of waste management, structural maintenance and general treatment of earthen surfaces. Following this approach, variations in the nature, frequency and spatial arrangement of the sediment components allowed us to distinguish different types of deposits originating from a broad spectrum of activities and events, which reflected the multifaceted relationship between people and their built environment. Ultimately, microscopic data not only enabled us to identify specific formation processes, but they also stimulated consideration of the social practices materialised in those surfaces, and on the cultural conventions related to concepts of cleanliness and propriety.

Roderick B. Salisbury (University of Vienna)

Archaeological soil chemistry for spatial organization and activity area analyses

Anthropogenic processes, combined with the chemical and physical properties of soils, allow for the accumulation of chemical residues as indicators of past human activities. Many different soil characteristics and chemical analyses can be used to examine anthropogenic markers in the sediment archive, including phosphates, trace elements, plant nutrients, stable carbon isotopes, and biomarkers. These provide information on site boundaries, activity areas, spatial organization and land use. An overview of the most recent advances in archaeological soil chemistry of phosphates, trace elements, and heavy metals from bulk samples will be illustrated with case studies from Austria, Hungary and Italy.

Steffen Schneider (German Archaeological Institute, Rome Department)

Soils in archaeological landscape reconstruction: Challenge – Geoarchive – Archaeological site

Soils and soil formation processes play diverse roles in the reconstruction of the landscapes around archaeological sites. They may have a hindering or even preventing effect on the identification of the original features of sediments and cultural layers, in the form of post depositional alterations such as (de)calcification or bioturbation and argillipedoturbation. At the same time, soils can be valuable geoarchives that enable detection and dating of paleo-surfaces and phases of landscape stability or activity, for example, in the form of buried topsoils or redeposited soil sediments. Last but not least, some soils themselves can be regarded as a type of archaeological site, as can be seen in the example of plaggen soils.

The paper addresses some of the manifold challenging and promising aspects of soils in landscape reconstruction and presents case studies from Northern Germany to Sicily on soils in the context of burial mounds, terps, harbours, and agricultural areas. The paper presents and puts up for discussion multi-proxy analytical approaches and sampling strategies, with a focus on the evaluation of drilling and vibracores.

Ian Bull (Organic Geochemistry Unit (OGU), School of Chemistry, University of Bristol)

Digging the dirt on soil biomarkers

Methodologies using lipid compounds, more specifically geochemical biomarkers, to derive information about the history of a soil are particularly useful since information may be obtained in the total absence of any morphological evidence. Of all the soil lipid proxies used to obtain historical insights into human activity, faecal biomarkers (5β-stanols and bile acids) remain the most popular and widely deployed. They continue to see an increasing use in archaeological contexts, expanding knowledge about use of resources and agricultural/built environments in Antiquity. Their use has been expanded and refined over the last forty years and a number of faecal biomarker based proxies have now been developed to differentiate between sources that would constitute the majority of expected archaeological inputs. An overview of developments and where the field is heading shall be presented.

Elena I. Zavala (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Zenobia Jacobs** (Centre for Archaeological Science, School of Earth, Atmospheric and Life Sciences; Australian Research Council (ARC) Centre of Excellence for Australian Biodiversity and Heritage, University of Wollongong, New South Wales)**, Benjamin Vernot** (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Elena Essel** (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Cesare de Fillipo** (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Sarah Nagel** (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Julia Richter** (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Frédéric Romagné** (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Anna Schmidt** (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Kieran O'Gorman** (Centre for Archaeological Science, School of Earth, Atmospheric and Life Sciences, University of Wollongong, New South Wales)**, Bo Li, Vladimir Vaneev** (Institute of Archaeology and Ethnography, Russian Academy of Sciences, Siberian Branch, Novosibirsk, Russia)**, Maxim B. Kozlikin** (Institute of Archaeology and Ethnography, Russian Academy of Sciences, Siberian Branch, Novosibirsk; Altai State University, Bernaul, Russia)**, Michael V. Shunkov** (Institute of Archaeology and Ethnography, Russian Academy of Sciences, Siberian Branch, Novosibirsk; Novosibirsk State University, Russia)**, Anatoly P. Derevianko** Institute of Archaeology and Ethnography, Russian Academy of Sciences, Siberian Branch, Novosibirsk; Altai State University, Bernaul, Russia)**, Viviane Slon** (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Janet Kelso** (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Svante Pääbo** (Max Planck Institute for Evolutionary Anthropology Leipzig)**, Richard G. Roberts** (Centre for Archaeological Science, School of Earth, Atmospheric and Life Sciences; Australian Research Council (ARC) Centre of Excellence for Australian Biodiversity and Heritage, University of Wollongong, New South Wales) **and Matthias Meyer** (Max Planck Institute for Evolutionary Anthropology Leipzig)

Preservation of Ancient DNA in Pleistocene sediments

The analysis of ancient DNA sequences has become an important tool for reconstructing the evolutionary history of humans and other species. It has recently been shown that DNA from Pleistocene hominins can be retrieved not only from their skeletal remains, but also from cave sediments. This may make it possible to determine the sequence and timing of occupations at archaeological sites. We explore this possibility at Denisova Cave, a site in the Altai Mountains in Southern Siberia, where remains of Denisovans, Neandertals and a first-generation offspring of parents from these two groups have been found. Using a fully automated workflow for DNA extraction, library preparation and hybridization capture, we analyzed 728 samples from Pleistocene layers of the cave for the presence of mammalian and hominin mitochondrial DNA. This presentation will summarize new insights on the preservation of DNA in Pleistocene sediments and ability to reconstruct occupational patterns at the site.

Katharina Dulias (University of York**)**

Digging Deep – How Ancient DNA and Palaeoproteomics Can Change the Game

Palaeogenetics and Palaeoproteomics have been of increasing interest in recent years and led to several outstanding insights into past environments, biodiversity, human populations, domestication processes and more. The use of soil as study material is already established in ecology and palaeoclimate reconstructions. However, its use for archaeological analyses is in its infancy. This paper gives an introduction to the incredible potential of archaeological soils and explains sampling techniques and further analysis. The different application of palaeogenetics and palaeoproteomics is highlighted and a future outlook of the field is presented.