Geoarchaeology in Vienna Conference 2025

Pushing Borders – Expanding Horizons

12th to 14th February 2025
University of Vienna Biology Building (UBB), 1030, Vienna

universität wien
Doctoral School of Historical and Cultural Studies

universität wien
Vienna Doctoral School of Ecology and Evolution

HEAS
human evolution & archaeological sciences

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Words from the Organisers

Dear colleagues, presenters, participants, and members of the geoarchaeology nexus,

We, the organisers, are delighted to welcome you to the second round of the Geoarchaeology in Vienna Conference, a student led initiative! We are excited to continue the initial vision of creating a network of geoarchaeologists in Vienna, and to build upon the strong foundation we all created last year, with this 2025 edition! It is especially encouraging to see all the new collaborations that have already or are currently forming from this network. In the final session of 2024, we set two major milestones to be reached with a second edition: 1) making the meeting an annual staple for exchange and networking and 2) extending it to include a broader field of experts and students. With this year's motto and subtitle “Pushing Borders – Expanding Horizons” we are acknowledging and fulfilling this. We are excited to extend the network to include colleagues throughout Austria, and beyond.

Bringing together a network is an essential step towards a higher unity in the strongly interdisciplinary field of geoarchaeology. Sitting at the crossroads of multiple methods and approaches, researchers working within this - still - undefined research area need to build a strong network to improve collaboration and create a solid baseline among archaeological disciplines. It is towards this goal that “Geoarchaeology in Vienna” wants to offer a space to share and connect. We have also set out to not only become a once-a-year event but to create more opportunities for exchange and visits to relevant institutions and places. Here we are also proud to say: more opportunities are on the horizon!

We would be amiss to not take the opportunity to express our immense gratitude to our funding providers; a joint event grant from the Doctoral School of Historical and Cultural Studies and the Vienna Doctoral School of Ecology and Evolution, along with a workshop grant from the Human Evolution & Archaeological Sciences (HEAS) research network, who also graciously allowed the Keynote Lecture to be a HEAS talk and reach a wider audience. We would also like to take the opportunity to thank Martina Steer, the Coordinator of the Doctoral School of Historical and Cultural Studies and Antonia Vogel, the Executive Manager of the Vienna Doctoral School of Ecology and Evolution. A special mention and thanks are owed to the ever-helpful Maeve Nic Samhradáin, the Administrator of HEAS, without whom this event would be much worse organised. We would also like to thank Fabian Siegle, the secretary for the Department of Evolutionary Anthropology at the University of Vienna, for all his help with room booking and general assistance with the UBB.

Thanks also to everyone who submitted an abstract or registered to participate, without you the conference and this nexus would not be possible or as memorable!

To many more insightful discussions and geoarchaeological focused events! We hope you enjoy the conference.

Thomas, Doris, Valentina and Doralice

Schedule

Hörsaal 1 - UBB Wednesday 12th February	
6 p.m.	**HEAS Talk - Lisa-Marie Shillito** *Every Archaeological Problem Starts as a Problem in Geoarchaeology*
afterwards	**Evening Krapfen Reception**

Seminar Room 5.1 – 5th Floor - UBB Thursday 13th February	
09:00 - 10:00 a.m.	**Opening - Organizers**
	Junior Keynote - William Chase Murphree *Examining Upper Palaeolithic Fire Use using a Geoarchaeological Approach*
10:00 - 11:15 a.m.	**Session 1**
	Gabriella Kovács *Soil Micromorphological Analysis at Százhalombatta - Földvár Bronze Age Tell Settlement in Hungary*
	Kerstin Kowarik *Geoarchaeology and Paleofeces*
	Florian Exler *A Geochemical Approach to Optimize Ancient DNA Recovery from Sediments*
	Flashtalk
	Meike van Lit *FAIR Archaeology*
11:15 - 11:45 a.m.	**Coffee Break**
11:45 - 1:00 p.m.	**Session 2**
	Jan Horák *Geochemistry on Czech Archaeology – Overview of its History, Presence and Future*
	Valentina Laaha *Potential and Challenges of Geochemical Analysis in (high) Alpine Contexts*
	Isabella Prackwieser *From the Alps to the Desert: Developing Geoarchaeological Research at the University of Innsbruck, Using the Case Study of Qurayyah (Tabuk, Saudi Arabia)*
	Flashtalk
	Michaela Schauer *Handheld Portable X-ray Fluorescence in Geoarchaeology: Challenges and Potential in Soil Chemistry*
1:00 - 2:30 p.m.	**Lunch**
2:30 - 3:30 p.m.	**Icebreaker session**
3:30 - 4:30 p.m.	**Session 3**
	Robert Krickl *Material Analyses for Polychromy Research*
	Doris Jetzinger *Promoting the Use of pOSL Profiling for Archaeological Applications in Austria: Current Opportunities and Challenges*
	Immo Trinks *Geoarchaeological Prospection at VIAS*

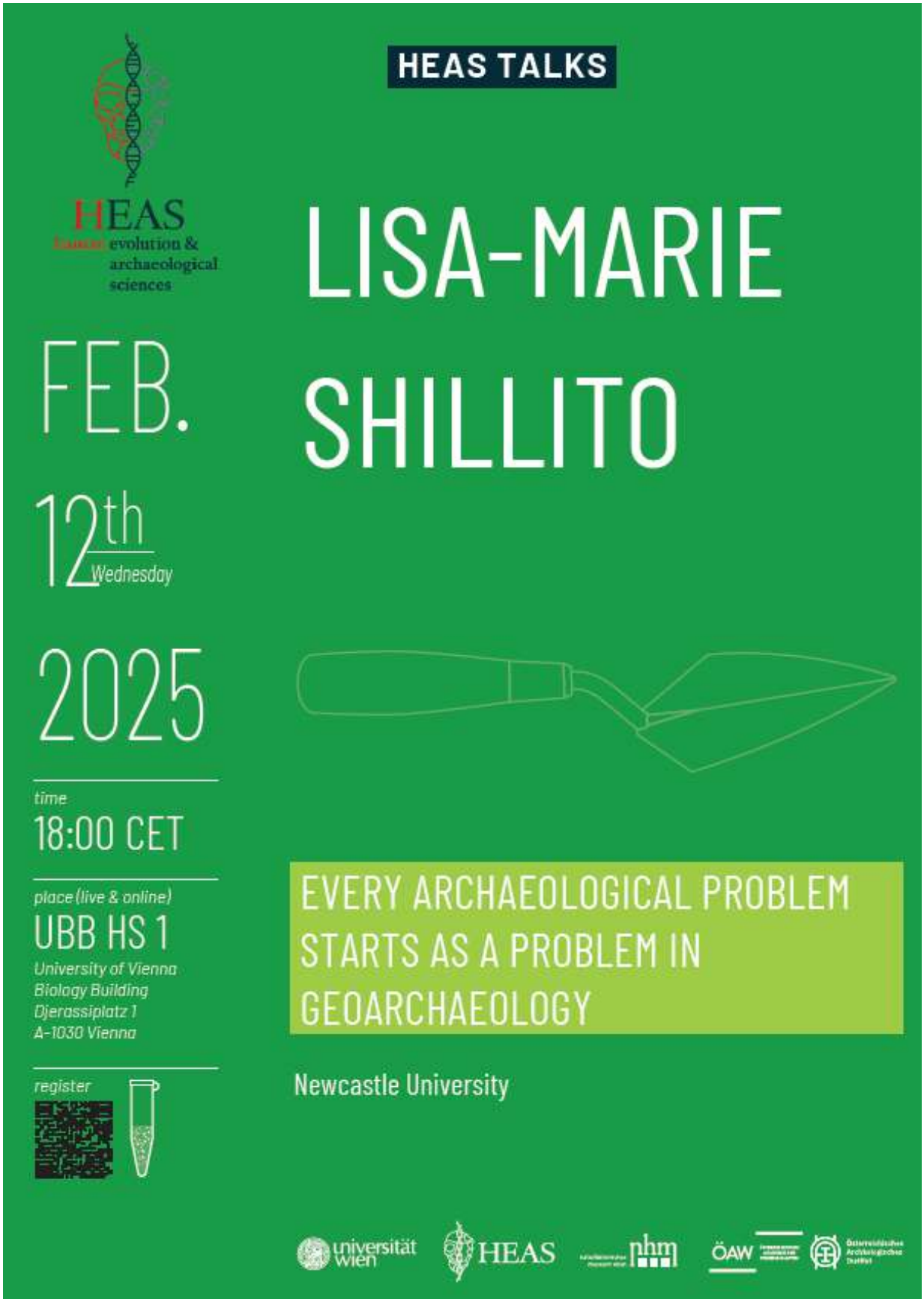
Thursday 13th February - Continued	
3:30 - 4:30 p.m.	**Flashtalks**
	Manuela Thurner *Opal Iron of the Csaterberg - Burgenland*
	Vasiliki Anevlavi *From Quarries to Artefacts: Analytical Advances in Marble Provenance Research at the Austrian Archaeological Institute, Austrian Academy of Sciences*
4:30 - 5:00 p.m.	**Wrap - Up and Final Discussion**
after 5:00 pm	**Optional Coffee and Snack Break**
7:00 p.m.	**Conference Dinner - Elvira's***

Seminar Room 5.1 – 5th Floor - UBB ♥ Friday 14th February ♥	
9:00 - 9:30 a.m.	**Opening - Organizers**
	Breaking into Round Table Groups
9:30 - 12:30 a.m.	**Round Table Sessions** *and Coffee Breaks*
12:30 - 1:30 a.m.	**Lunch**
1:30 - 3:30 p.m.	**Lab Visits** *and Coffee Breaks*
3:30 - 4:15 p.m.	**Round Table Presentations**
2:15 - 5:00 p.m.	**Final Discussion**
	Next Steps - Future of the Geoarcheaology Network
5:00 - 6:00 p.m.	**Closing Reception - Final Get Together**

*Elvira's Restaurant, Seidlgasse 39, 1030 Wien

Keynote Lecture

We are excited to welcome Lisa-Marie Shillito of the School of History, Classics and Archaeology, Newcastle University, United Kingdom, to Vienna to give us the opening keynote lecture titled; "Every Archaeological Problem Starts as a Problem in Geoarchaeology". The lecture is also a HEAS talk and hence will be hybrid. We encourage participants to attend either in person or online (please register here). If you are able to attend in person there will be a small reception afterwards too. Thank you, Lisa, for coming to Vienna to give this talk!



Junior Keynote Lecture

This year we are excited to include a 'junior' keynote lecture given to us by William Chase Murphree of the Interdisciplinary Centre for Archaeology and Evolution of Human Behaviour (ICArEHB), University of Algarve, Portugal. This lecture is given by a late stage or recently finished PhD candidate to facilitate our vision of introducing students to the geoarchaeology discipline and promote the work of up and coming young geoarchaeologists. As the organisation committee is student led, we also want to take the opportunity to support and encourage fellow students.

We are glad to welcome Chase to Vienna to give this talk and please find the abstract for this talk below.

William Chase Murphree

Title: Examining Upper Palaeolithic Fire Use Using a Geoarchaeological Approach

Affiliation: ICArEHB, University of Algarve, Portugal

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Abstract

The use of fire is a fundamental and vital part of our modern world, and one strongly rooted in our evolutionary history. While much of the current research on evolution of pyrotechnology (fire use as tool) has focused on the development of fire use in extinct hominin populations, far less has been focused primarily on modern humans. One reason for this is that it is widely assumed that by the time modern humans enter Europe, habitual fire use is ubiquitous and deeply integrated in our behaviour. Here, I present my research on Upper Palaeolithic fire use from a geoarchaeological perspective.

I first present the results of our recent review of the evidence for Upper Palaeolithic pyrotechnology. We described potential patterns of regionalized fire use behaviour in the early part of the Upper Palaeolithic. Our results also highlight a clear change in standardized forms of combustion features coinciding with the middle period of the Upper Palaeolithic. However, we also identify a publication gap in well described fire use throughout Europe during Last Glacial Maximum (LGM). For this lack of data, we provided three possible explanations: publication bias, absence or limited fire use due to resource stress, or preservation bias due to cryoturbation.

While the first two explanations are plausible, they are hard to test experimentally. So, to test the latter, we have conducted one of the first multiscale high-resolution analysis of the effects of freeze-thaw on experimental archaeological combustion remains (ashes and charcoals). I then compared this data with archaeological examples including the analysis of combustion features found within the LGM occupations of the Ukrainian site of Korman'9. My results suggest that a lack of preservation due to freeze-thaw alone might not be the most parsimonious answer for the scarcity of fire features during the LGM.

Overall, the evidence for Upper Palaeolithic fire use suggests a complex mosaic of pyrotechnological behaviours. It also highlights the use of geoarchaeology for giving new and broadening perspectives on past human behaviour.

Presentation Abstracts

We are excited to have 9 presentations covering a wide range of geoarchaeological topics, the abstracts are arranged into the sessions and the order that they will be presented in. Please find the abstracts of our speakers below.

Session 1

Title: Soil Micromorphological Analysis at Százhalombatta-Földvár Bronze Age Tell Settlement in Hungary

Presenter: Gabriella Kovács

Affiliation: Hungarian National Museum Public Collection Centre, National Institute of Archaeology, Budapest

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Abstract

Soil micromorphology is the technique applied while studying anthropogenic sediments, built over 800 years at Százhalombatta-Földvár Bronze Age tell settlement. Systematic sampling started in 1999/2000 under the umbrella of the SAX (Százhalombatta Archaeological Expedition) project, which is still ongoing, as the excavation of the site has not yet been completed. Everyday life is under the microscope (via thin sections) in this case to add details visible at high magnification. This data set is used among the numerous others (i.e. phytolith analysis, ceramic petrography, archaeobotany, archaeozoology etc.) to better understand and more precisely reconstruct prehistoric life at the site.

Since everyday life is connected to a range of activities (from construction to space use, from cultivation to crop processing or from environmental opportunities to choices and decisions and so on), there is an uncountable amount of sign that needs to be detected and identified in order to investigate and understand life at the site. Unfortunately, this process is slow and not having much comparative data from similar sites at the moment, it is also challenging. We have a lot of small details in hand, but general patterns are hard to put forward at this stage. All the microscopic observations on the other hand are opening new opportunities and raises further questions when investigating the past. The gained data in some of the cases is refining or even changing previous concepts (i.e. mode of construction, materials used) that highlights the value of the method.

In my presentation some of the results will be presented.

Title: Geoarchaeology and Paleofeces

Presenter: Kerstin Kowarik

Affiliation: ÖAW

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Abstract

Paleofeces are naturally desiccated ancient feces, which are preserved in dry caves, desert areas, waterlogged contexts, and salt mines, but also in ancient latrines, bogs or in soils when the environmental conditions prevent their deterioration. Plant and animal macro- and microfossils (e.g. pollen grains), parasite eggs, and biomolecules (DNA, proteins, metabolites) are present in ancient fecal samples.

The interdisciplinary study of human and non-human paleofeces represents one of the most promising research fields for in-depth insights into ancient diet and also into human-animal relations.

There are a number of important points of contact between paleofeces research and geoarchaeological research. On the one hand, methodological procedures of geoarchaeology, such as micromorphological analyses, represent important fields of extension for paleofeces research. On the other hand, paleofeces are often only preserved in poor condition. Here it is particularly the observations of geoarchaeologists that can contribute to the recognition or the targeted search for feces.

Therefore, the present contribution lobbies for a systematic exchange between geoarchaeology and paleofeces research.

Title: A Geochemical Approach to Optimize Ancient DNA Recovery from Sediments

Presenter: Florian Exler

Co-authors: Susanna Sawyer, Pere Gelabert, Richard Kimber, Victoria Oberreiter, Olivia Cheronet, Ron Pinhasi, Stephan P. Kraemer

Affiliation: Department of Environmental Geosciences, Centre for Microbiology and Environmental Systems Science & Department of Evolutionary Anthropology, University of Vienna, Austria

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Abstract

Ancient DNA (aDNA) extracted from sediment material can provide valuable information about past ecosystems, biodiversity, and human or animal activities at archaeological sites. However, sediments are a heterogeneous mixture of organic and inorganic materials, and the preservation mechanisms and sources of aDNA within sediments remain only partially understood. Although sediment material is often available in large quantities, processing extensive amounts is challenging due to the co-extraction of modern DNA contaminants and organic molecules that inhibit downstream applications. These factors can reduce the genetic information obtained from ancient species, complicating or even preventing analysis. To address these limitations, my PhD project employs a geochemical approach to separate sediment components by density using a heavy liquid, followed by the analysis of the resulting fractions. By isolating fractions containing aDNA from those that do not, this method aims to reduce both inhibitory substances and modern DNA contamination, as well as retrieve information about the host phases. This approach provides a potential solution for heavily contaminated samples, which are often difficult or even impossible to process using standard methods. Additionally, it has the potential to process larger sediment volumes in a single batch, optimizing resource efficiency and enhancing the recovery of ancient sedimentary DNA data.

Session 2

Title: Geochemistry on Czech Archaeology – Overview of its History, Presence and Future

Presenter: Jan Horák
Affiliation: University of Hradec Králové, Czechia
Contact: jan.horak.3@uhk.cz

Abstract

The lecture presents the state of geochemistry applied in archaeological science in Czechia. It has surprisingly longterm history, although limited to individual cases rather than established scientific branch. The lecture presents some of the interesting applications. The presence of the discipline is much better in a sense of general attitude of archaeology towards application of scientific methods. The positive attitude of archaeologists towards them has also its negative aspects, like the demand to apply them only for narrow archaeological tasks (typically phosphate analysis to resolve a potential cenotaph situation). This is also an illustration of a more general problem: the discipline has no institutional background – no Czech archaeological institution is focused on geoarchaeology as its main task – including studying programs. It is still existing only through the personal interest of individual scientists. Other scientific disciplines applied in archaeology, like geophysics or paleobotanics, are in much better state (better institutionalization and longterm research). Nevertheless, the situation now has a positive potential for development – the technology is getting better adopted (mainly in form of pXRF) and generally known, there is no shortage of the data coming from the excavations and research projects. We need better methodology be adopted as automatic (standardization of analyses; general methodology of research), better and stronger international contacts and better presence of lab-oriented departments in archaeological institutions. All these aspects are now on a good trajectory.

Title: Potential and Challenges of Geochemical Analysis in (high) Alpine Contexts

Presenter: Valentina Laaha
Co-authors: Kerstin Kowarik, Kerstin P. Hofmann, Daniel Brandner, Roman Scholz
Affiliation: University of Vienna
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Abstract

Geochemical analysis provides the opportunity to access information about human activity, stored in local soil archives. This archive is built upon the ability of soils to gather and hold on to information about their respective environments over time and space ('soil memory'). This includes elemental traces left by human activity and land-use practices. In highly dynamic and sensitive systems, such as (high) mountainous regions, the analysis of the elemental distribution in the soil enables the approach of otherwise archaeologically invisible areas. While this concept has shown high potential in lowland areas with profound soils, the geochemical analysis of shallow, but highly complex alpine soils remains underdeveloped. To address this gap, a pilot study was carried out at the alpine pasturing area of the Grafenbergalm, Dachstein plateau, Austria. There a site and near-site area of a former alpine hut has been sampled with a hand corer. The extracted soil samples were analysed for elemental composition with a benchtop ED-XRF (SPECTRO XEPOS). The results show a clear difference in chemical composition of soil samples from different levels within the soil. Elemental distribution mapping on digital elevation models thereby highlighted the necessity for heightened awareness regarding the correlation of chemical distribution and the pronounced local relief. Other aspects, such as the comparison of geochemical patterns to the results of geomagnetic measurements, also show the continued need for ground truthing and a deeper understanding for the sources of chemical traces in these specific soils. These findings provide a first basis for the further advancement of the method in alpine regions. With this understanding geochemical analysis of alpine soils, integrated in a wider geoarchaeological toolbox, provides the potential to tackle the specific challenges of the reconstruction of human-environmental interaction and use of the landscape in the yet understudied (high) mountainous regions.

Title: From the Alps to the Desert: Developing Geoarchaeological Research at the University of Innsbruck, Using the Case Study of Qurayyah (Tabuk, Saudi Arabia)

Presenter: Isabella Prackwieser

Co-authors: Susanna Cereda

Affiliation: University of Innsbruck

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Abstract

The University of Innsbruck's Microarchaeological Laboratory, founded in 2020, has focused on establishing itself as a national micromorphological centre while fostering collaborations with national and international partners. Since November, the laboratory has been equipped to produce thin sections in-house, enabling full control of the micromorphological workflow — from sampling to analysis — and expanding its analytical capabilities.

To illustrate the lab's work, we will discuss the case study of Qurayyah, a site in the province of Tabuk, Saudi Arabia, jointly investigated by the Heritage Commission of the Saudi Ministry of Culture (Ahmed Abualhassan) and the University of Vienna (Marta Luciani). This oasis, continuously inhabited from the 4th millennium BC to the 1st millennium AD, is renowned for its Bronze Age pottery production. It is also the focal point of the FWF (Austrian Science Fund) funded ANAPAN project (Project No. 16562) — a collaborative effort involving the University of Vienna, ÖAW, TU Wien, LFU Innsbruck and the DAI working on Tayma.

This interdisciplinary project investigates technological and cultural interactions in northwestern Arabia and the Levant through the study of pottery and clay sources. Specifically, our task in this project is to examine two distinct types of earthen features, that are hypothesized to be associated with ceramic production: (1) elevated circular structures with central depressions (the "donuts") and (2) an elongated formation composed of two parallel rows of earthen mounds delimiting an inner lane (the "ditch").

During a two-week field campaign, we conducted a geoarchaeological survey of these features. This involved excavating trenches, describing the exposed deposits using sedimentological standards, and documenting the site with a range of methods, including Structure-from-Motion (SfM) photogrammetry, drone imagery, hand drawings, and field reports. Targeted sampling was also carried out for further analysis.

In this presentation, we share the results and interpretations of these preliminary findings. Additionally, we will outline the research strategies and analytical techniques — such as OSL dating, μXRF, SEM, and TOC — that we plan to employ in collaboration with our research partners. This case study highlights the potential of the Microarchaeological Laboratory and its contributions to advancing geoarchaeological research.

Session 3

Title: Material Analyses for Polychromy Research

Presenter: Robert Krickl
Affiliation: ÖAI/ÖAW; Krickl Research e.U.
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Abstract

Chemical and physical analyses of materials play a key role in advancing the understanding and reconstruction of archaeological objects. Chemical and physical analyses of materials play a key role for advancing our understanding of archaeological objects and their historical contexts. They not only provide insights into the composition and properties of these materials but also help to reconstruct their production, original appearance and subsequent alterations over time. This presentation will emphasize the practical application of both non-invasive and micro-invasive methods – including inter alia spectral imaging techniques, spectroscopic investigations with portable instruments and cross-section analyses. These techniques allow for the identification and differentiation of various material phases, as well as the mapping of their spatial distribution within the objects. The presentation will focus on recent case studies on the investigation of polychromy of Roman stone artefacts, which often reveal complex pigments application and surface treatments.

Title: Promoting the Use of pOSL Profiling for Archaeological Applications in Austria. Current Opportunities and Challenges

Presenter: Doris Jetzinger
Co-authors: Tim Kinnaird, Martin Fera
Affiliation: University of Vienna
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Abstract

Establishing the chronology for past events, activities, and processes is an essential component of archaeological research. Dating of organic materials via the ^{14}C method and dendrochronology provide absolute chronological data, and artefact typologies can be developed to generate relative chronological sequences. However, the applicability of these approaches is limited in the absence of preserved organic remains, or where the provenance of organics, especially charcoal, has low reliability. In these circumstances, mineral-rich sediments or rocks can be approached using optically stimulated luminescence (OSL) dating, which has proven highly advantageous as it allows for the direct dating of sediments, rocks, and rock surfaces.

Since 2005, portable OSL readers have been used to facilitate on-site luminescence measurements of bulk sediment through sedimentary sequences, to inform sampling decisions, obtain proxies for age, and assess potential for OSL dating. OSL profiling (pOSL) can generate luminescence profiles of stratigraphic sequences by recording luminescence intensities down profiles or cores, providing relative chronostratigraphic data. It also generates proxy data to interpret geomorphic contexts, formation processes, and variations in mineralogy through stratigraphies.

While pOSL profiling is already established in several countries as part of the (geo-)archaeological toolbox, the method has only been used sparingly in Austrian archaeological research to date. To utilise and promote the possibilities of pOSL profiling, the method has recently been employed in a number of pilot studies in Lower Austria and Carinthia to generate chronostratigraphic contexts for archaeological structures such as ramparts and ditch enclosures as well as for natural features such as erosion gullies. Preliminary results from these efforts haven proven significant in understanding construction histories and (post-)depositional and formation processes of the studied features as well as chronostratigraphic contexts of features within their surrounding landscape. Our pilot studies help underline the potential of pOSL profiling and the benefits of further establishing this approach for archaeological applications in Austria.

Title: Geoarchaeological Prospection at VIAS

Presenter: Immo Trinks

Co-authors: Stefan Krojer

Affiliation: Vienna Institute for Archaeological Science (VIAS)

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Abstract

The research is centred around geoarchaeology, with a focus on near-surface geophysical prospection methods such as ground-penetrating radar (GPR), magnetometry and sonar surveys. The interdisciplinary work involves the fields of archaeology and geophysics, aiming to enhance our understanding of archaeological sites without the need for invasive techniques. Vienna University with the Vienna Institute for Archaeological Science (VIAS) and the research network on Human Evolution and Archaeological Science (HEAS) offers a robust platform for interdisciplinary research.

Ongoing and Planned Research Projects

Current Projects:

* 3D Documentation of Manor Houses: This project employs 3D digital documentation methods, to digitally preserve and study manor houses across Northern Europe. The outcome assists art historians by providing precise 3D data for annotation and further historical analysis.

* High-Resolution Underwater Geophysical Prospection and Documentation: aimed at developing high-resolution underwater documentation methods for shallow underwater environments.

* High-resolution GPR Surveys and 3D Surface/Subsurface Mapping, combining GPR with 3D mapping techniques to provide detailed surface and subsurface visualizations of archaeological sites.

* Semiautonomous Geophysical Archaeological Prospection: Exploring the use of semiautonomous robotic systems equipped with geophysical sensors to conduct extensive high-resolution archaeological surveys.

Planned Projects:

* Geophysical Archaeological Prospection in Challenging Environments: Specifically targeting forested and otherwise inaccessible areas, this project will adapt existing geophysical techniques or develop new methods to survey sites where traditional methods are hindered by environmental conditions.

Discussion Topics for the Workshop

1. Prospective Collaborations: Seeking partnerships with experts in remote sensing, artificial intelligence, sedimentology and environmental science to further enrich our geophysical surveys and data analysis methods.

2. Methodological Approaches: Discussion on the latest advancements in sensor technology, and data acquisition techniques into archaeological prospection.

3. Future Developments in Geoarchaeology: Envisioning the use of AI for data analysis.

Poster Abstracts

We are happy to include posters to the conference this year. There are 6 posters, with 4 of these having an accompanying flash talk. Please find the abstracts of the posters and flash talks below.

Flash talk – Session 1

Title: FAIR Archaeology

Presenter: Meike van Lit

Affiliation: University of Glasgow

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Abstract

Is data generated within the discipline of Archaeology truly FAIR?

Many subdisciplines of archaeology have adopted concepts, methods and data from other disciplines: geoarchaeology, for example, has adopted methods from the geosciences. But a lot of knowledge generated by archaeological research is not adopted by other sciences. Why?

This poster will highlight one possible reason why archaeological research is not commonly included by other, relevant sciences: the FAIRness of archaeological data. FAIR stands for Findable, Accessible, Interoperable, and Reusable, and is one of the key points of scientific research. This poster does not aim to present a complete solution, but will focus specifically on what archaeologists can do to maximise the usability of our research output. In other words: to make sure that not only our conclusions can be used by other disciplines, but that our data and methodologies are up to standard and scientifically valid in the eyes of other disciplines. It will, therefore, focus on the Interoperable and Reusable aspects of FAIRness in archaeological data.

Flash talk – Session 2

Title: Handheld Portable X-ray Fluorescence in Geoarchaeology: Challenges and Potential in Soil Chemistry

Presenter: Michaela Schauer

Co-authors: Mario Wallner (GeoSphere Austria), Raimund Karl (Universität Wien/Prifysgol Bangor University), Tanja Trausmuth (GeoSphere Austria), Helga Rösel-Mautendorfer (Freiberufliche Keltologin)

Affiliation: Vienna Institute for Archaeological Science

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Abstract

Handheld Portable X-ray Fluorescence (p-XRF) has been utilized for analysing the geochemistry of soils for several years, offering a rapid and non-destructive method of investigation. While the technology itself is not new, its on-site application in archaeological contexts - such as identifying and characterizing features like metallurgical activities, animal enclosures, waste disposal zones, or the organisation of houses where floors are preserved - has gained significant traction in recent years.

Despite its increasing use, the field still lacks standardised protocols and clear methodologies for data acquisition and interpretation. This gap creates challenges in fully demonstrating the method's potential for geochemical surveys and encouraging its widespread adoption in geoarchaeological research.

This poster addresses these challenges through a case study of a geochemical survey conducted at Mitterdorf im Mürztal. The study used p-XRF to investigate the archaeological site, highlighting critical considerations in survey design, data processing, and interpretation. These insights aim to contribute to the ongoing conversation about advancing p-XRF as a tool for geoarchaeological exploration.

Flash talk – Session 3

Title: Opal Iron of the Csaterberg - Burgenland

Presenter: Manuela Thurner

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Abstract

The iron smelting in Burgenland was extensively researched in the 1970s and discussed at an international iron conference in 1975. The excavations in Mittelburgenland (Weppersdorf, Unterpullendorf and Steinberg-Dörfl) were of particular significance, especially regarding the furnace types, slags, and ores. The Toneisenstein was systematically mined and smelted in bloomer furnaces. The pits in the Oberpullendorf area are still clearly visible in LiDAR scans, indicating large quantities of ore. A local historian who laid the foundation for the research on iron smelting in Mittelburgenland was Josef Polatschek. He mapped hundreds of slag sites and pits, thereby locating places for later iron smelting excavations (including Weppersdorf, Unterpullendorf and Steinberg-Dörfl).

However, he did not only focus on smelting sites in Oberpullendorf but also in the more southern districts, for example around the so-called Csaterberg. Josef Polatschek noticed that the slags from Kohfidisch, Schandorf or Burg contained opal fragments, which led him to an intriguing consideration, which he discussed in several excavation reports which he wrote to the Burgenländisches Landesmuseum. Is iron-rich "Süßwasseropal" suitable for smelting and can iron be extracted from it?

In 2024 the iron-furnace sites listed in his maps were visited and updated as archaeological sites through a report. The iron-rich "Süßwasseropal", the furnaces sketched in the 1960s and 1970s, along with a smelting experiment which will take place in summer 2025 and an excavation, will provide clarity on the smelting of "iron opal" at Csaterberg. During the conference, the site, the iron opal, and a comparison with the known iron smelting sites in Mittelburgenland will be discussed.

Title: From Quarries to Artefacts: Analytical Advances in Marble Provenance Research at the Austrian Archaeological Institute, Austrian Academy of Sciences

Presenter: Vasiliki Anevlavi

Co-authors: Walter Prochaska

Affiliation: Austrian Archaeological Institute, Austrian Academy of Sciences

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Abstract

Provenance studies of white marble integrate archaeology, economic history, and geology using petrography, stable isotope analysis, and geochemistry to explore the cultural, economic, and artistic significance of marble in the ancient world. By combining geological samples from quarries and outcrops with archaeometric analyses of artefacts, this research provides critical insights into trade networks, material preferences, and technological advancements. The study highlights the role of region-specific quarrying practices and their integration into broader trade systems, revealing how local materials often complement imported marbles, influenced by economic and cultural factors.

This research employs petrographic techniques, elemental chemical analyses (Mn, Mg, Fe, Sr, Y, V, Cd, La, Ce, Yb, U), and isotopic measurements (δ18O ‰, δ13C ‰) to trace the origins of marble artefacts. Statistical methods enable rigorous comparisons between artefacts and an extensive database of quarry samples from across the ancient Mediterranean and beyond. This comprehensive approach identifies both local and supra-regional sources of marble, illustrating the diverse factors influencing material selection and distribution. The methodology, applicable across various periods and contexts, facilitates the study of marble usage and trade from prehistory to modern times, offering valuable insights into the continuity and evolution of quarrying and distribution practices.

Recent research has been supported by sample collections from Dr. Donato Attanasio (Italy), Dr. Walter Prochaska (Austria), Dr. Luc Moens (Belgium), and the OeAI-OeAW (Austria), which include over 9,000 geological samples and 5,000 artefacts. Future advancements include the acquisition of an ion chromatograph for fluid inclusion analysis, a powerful tool to enhance the precision of quarry source differentiation.

Posters

Title: Horse-Hunting in the Last Glacial Maximum in Lower Austria: Reconstructing a Landscape to Determine Choice of Prey

Presenter: Florentine Noll
Affiliation: University of Vienna
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Abstract

There are several sites in Lower Austria that can be traced to hunting activities in the Last Glacial Maximum – most of them containing a very low percentage of horse bones in them. Notable exceptions include Alberndorf 1 and 2, which both contain over 40 percent of equine remains out of their assemblages. Another massive horse kill site in Middle Europe during the Last Glacial Maximum is Stranska Skala IV in Czechia, where it is hypothesised that the surrounding landscape played a vital role in the act of hunting and butchering horses.

This paper aims to reconstruct the landscape around Alberndorf 1 and 2 to assess how the landscape may have benefitted especially horse hunting. To combat this, extensive literary research was undertaken, and the sites were mapped into QGIS. In QGIS, the current landscape was used as a base for conducting varying geoarchaeological methods – for example determining erosion rates, using the current soils and slopes to reconstruct the LGM Landscape. The Alberndorf sites were exposed to multiple erosional factors including water flows and agricultural use. It could then be concluded that the hillside slopes were a lot less steep than today, and the side valley was not as deep as currently.

In comparison with Stranska Skala IV, some interesting differences and similarities could be noted. The position of the sites was chosen for an advantage in hunting on hillsides overviewing a plain. However, Alberndorf was not as specialised in horse hunting as Stranska Skala IV, so likely the wider landscape of Alberndorf influenced the migratory routes of multiple species of prey, while Stranska Skala apparently had a strong bias for equines.

The contrast and parallels of the sites show the diverse strategies and methods of the hunters in the Last Glacial Maximum and how varying landscapes would produce a different kind of hunting biases for certain species of prey.

Title: Modelling Prehistoric Landscapes in the Seeland Region (Switzerland)

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Abstract

The SNSF-funded, multidisciplinary research project ArchSeeLand of the Prehistoric Archaeology Division at the University of Zurich is dedicated to settlement and landscape archaeology in the Swiss Plateau between Lakes Biel, Neuchâtel and Murten from the Middle Bronze Age to the Early Latène Period (1500 - 400 BC). The associated PhD project 'Human-Modified Landscapes' investigates complex human-environment relationships and focuses on modelling anthropogenic interventions in the landscape using mainly geo- and dendroarchaeological proxy data. On this basis, possible settlement areas are evaluated, agricultural and woodland areas are modelled, and transport networks are reconstructed in order to gain a deeper understanding of prehistoric landscape use and organisation. Geophysical investigations (geomagnetics, geoelectrics (ERT), resistivity and susceptibility) are used to provide evidence for the anthropogenic design and modification of prominent features such as terraces, ramparts and ditches. Micromorphological and geochemical analyses of sediment cores provide additional information on sedimentation rates, soil structure and composition, and allow conclusions to be drawn on potential uses. The aim of this poster is to present and discuss the potential of geoarchaeological approaches in a multidisciplinary human-ecological research project.

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