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HEAS

Geoarchaeology in Vienna Workshop.

Assessing Status Quo –Establishing
Connections –Illuminating Future Paths.

11th–13th January 2024.

Franz–Klein–Gasse 1, 1190 Vienna.

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Words from the Organisers

Science is, at its heart, a team effort. Whether in the natural sciences, humanities, or social sciences, advances in research are to a large extent made possible by co-operations, connections, peer exchange and feedback, and by establishing scientific networks among colleagues. As young geoarchaeologists based and studying in Vienna, we have at times felt a lack of opportunities for peer exchange and of a geoarchaeological network among the city's different archaeological research institutions. Geoarchaeology seemed to be a very niche subject, even within archaeology - or so we thought.

Over time we have come to realise that there is in fact a lot of geoarchaeological research based in or tied to Vienna. There are geoarchaeologists with different specialisations and focus areas, but there are also archaeologists who are working with geoarchaeologists or specialists from the earth sciences, as well as pedologists, sedimentologists, mineralogists, geologists, and geographers working in archaeology. What does seem to be missing, though, is a network or broader connections among these geoarchaeologists and researchers working in and with geoarchaeology.

This lack of a geoarchaeological network in Vienna is what sparked the initiative to organise the "Geoarchaeology in Vienna" workshop. The essential idea was to bring people from various institutions and backgrounds to the table, discussing needs and wishes for Vienna as a future hub for geoarchaeology. The great number and diversity of registered speakers and participants is therefore especially exciting and represents many of the various branches of the discipline. From the 11th to the 13th of January 2024, we will introduce each other to our specific research areas, projects, and laboratories, building knowledge for future opportunities for not only co-operation, but a more connected research platform for geoarchaeology in Vienna and beyond. The overall goal is for all participants to profit from the connections established during this workshop in their future scientific ventures. We hope to continue organising networking events on a more regular basis and with a broader scope to include Geoarchaeologists from all over Austria and beyond.

This booklet provides an overview of all the speakers, participants, and contributions to the first workshop dedicated to "Geoarchaeology in Vienna" and thus presents an overview of a large number of Vienna-based geoarchaeologists and geoarchaeology-related specialists. As a take-home resume of the workshop output, we hope that it will serve you well as a reminder of this event, and as a starting point for further networking.

We would also like to take this opportunity to thank the Human Evolution & Archaeological Sciences (HEAS) research network for funding this event and for supporting our efforts. Special thanks go to Maeve Nic Samhradain for all her kind help and support during the organisation of the workshop.

We hope you enjoy the workshop.

Doris, Valentina, and Thomas.

Workshop Schedule

Thursday 11th January 2024 – HS7, Franz–Klein–Gasse 1, 1190 Vienna.

Day 1: Keynote & Reception	
Time	Talk/Event
18:30	Keynote: Objects, geoarchaeology, and context – Paul GOLDBERG*. <i>This is a HEAS talk and open to the public.</i>
19:30	Glühhudler Reception – <i>Food and drinks will be provided.</i>

*Please note that workshop participants are still required to register on the HEAS website (<https://www.heas.at/events/heas-workshop-4/>) to attend the keynote by Paul GOLDBERG. Please do so before attending on the 11th.

Friday 12th January 2024 – Collections Room, Franz–Klein–Gasse 1, 1190 Vienna.

Day 2: Presentations & Discussions

Time	Talk/Event
9:00	Congregate/Coffee at the Collections Room, Franz–Klein–Gasse.
9:25	Introduction – Valentina LAAHA, Doris JETZINGER & Thomas BEARD.

Session 1: Geophysics + Prospection

9:40	Geophysical geoarchaeological prospection – state-of-the-art and the road ahead – Immo TRINKS.
9:50	Archaeological prospection at the ÖAI – Part I: Geophysics – Franziska REINER.
10:00	The case of the missing features – a case study in the Po Valley, Italy – Jakob KAINZ.
10:10	Session 1 Discussion.

Session 2: Soils + Sediments

10:40	<i>“... every archaeological problem starts as a problem in geoarchaeology”</i> (Renfrew 1976) – Erich DRAGANITS.
10:50	Archaeological prospection at the ÖAI – Part II: Percussion coring – Elise BAUDOIN.
11:00	Bringing together Alpine archaeology and geoarchaeology – Kerstin KOWARIK.
11:10	Elements of human activity – Exploring soil geochemistry on the Grafenbergalm, Austria – Valentina LAAHA.
11:20	Session 2 Discussion.

11:50

Coffee Break.

Session 3: Microarchaeology	
12:20	Microarchaeological approaches to anthropological questions – Mareike STAHLSCHMIDT.
12:30	Settling the mountains – Investigating human habitation and resources exploitation in (and from within) the Austrian Central Alps – Susanna CEREDA.
12:40	Geoarchaeology: A holistic approach to contextualizing archaeology and sites – Thomas BEARD.
12:50	Session 3 Discussion.

13:20	Lunch Break – <i>Sandwiches will be provided.</i>
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Session 4: Provenance + Artefacts	
14:30	Non-invasive spectroscopic and imaging techniques for cultural heritage research – Robert KRICKL.
14:40	Provenance studies of white marble: a multidisciplinary approach in the Roman Eastern Mediterranean – Vasiliki ANEVLAVI.
14:50	Work with p-XRF, they said... it's fun, they said... – Michaela SCHAUER
15:00	Session 4 Discussion.

15:30	Coffee Break.
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Session 5: Landscapes	
16:00	Geoarchaeology and landscapes – The integration of geoarchaeological data with historic landscape characterisation – Doris JETZINGER.
16:10	Geoarchaeology and underwater archaeology – A promising team – Helena SEIDL DA FONSECA.
16:20	Geoarchaeology of risk: The sediment record of prehistoric coping mechanisms and resilience – Roderick SALISBURY.
16:30	Session 5 Discussion.

Post Sessions	
17:00	Concluding Discussion.
18:00	Dinner – Mozart & Meisl.

Saturday 13th January 2024 – Optional Lab Visits, UZA II & Franz–Klein–Gasse.

Day 3: Optional Lab Visits

10:00

Soils Lab tour with Robert PETICZKA – UZA II.

11:00

Final Discussion – Collections Room, Franz–Klein–Gasse

11th January 2024

Day 1: Keynote & Reception

HS7, Franz–Klein–Gasse 1, 1190

Vienna.

Name:	Paul GOLDBERG
Email:	paulberg@bu.edu
Institution:	<p>Institut Für Naturwissenschaftliche Archäologie (INA), University of Tübingen. CAS–SEALS, University of Wollongong. ICArEHB–The Interdisciplinary Center for Archaeology and the Evolution of Human Behaviour, Universidade Do Algarve.</p>
Title of Presentation:	Objects, geoarchaeology, and context



Abstract:

So much of archaeology is concerned with objects, whether they be ceramics, lithics, faunal and floral remains, or even architectural remains, which are essentially large objects. These things have been the mainstay of the archaeological record for centuries. In the last few decades, it has become evident that there is more to understanding what people did in the past than by focusing mainly on the objects. The deposits that enclose them have their own story to tell, and in fact, constitute an important (generally neglected) and essential part of the archaeological record. I will attempt to illustrate these ideas with examples from archaeological sites, at the same time emphasising the concept of context, particularly at the microstratigraphic scale.

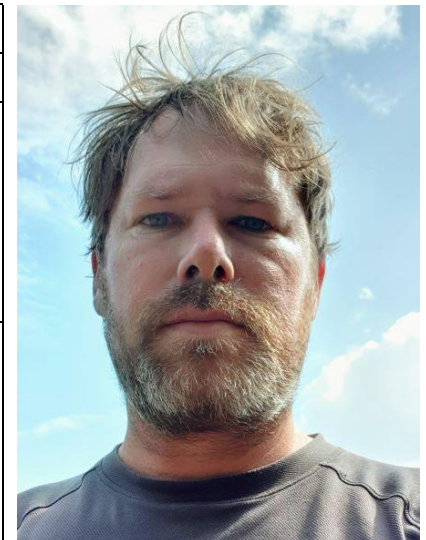
12th January 2024

Day 2: Presentations &
Discussions

Collections Room, Franz–Klein–
Gasse 1, 1190 Vienna.

Session 1: Geophysics + Prospection

Name:	Immo TRINKS
Email:	immo.trinks@univie.ac.at
Institution:	Vienna Institute for Archaeological Science, University of Vienna.
Title of Presentation:	Geophysical geoarchaeological prospection – state-of-the-art and the road ahead



Abstract:

Geoarchaeology encompasses a range of methods and techniques used to study the archaeological record through the application of the geosciences. Near-surface geophysical prospection methods are specifically employed to non-destructively identify and map features and relics buried at archaeological sites. These methods provide valuable insights into the subsurface, helping archaeologists identify areas of archaeological potential.

In recent years, geophysical archaeological prospection has witnessed remarkable advancements, especially in data coverage rates and density. These improvements have been largely attributed to the introduction of motorised prospection array systems. As the field continues to grow, it prompts the question of what lies ahead in terms of research, development, and potential challenges.

While there has been a surge in larger survey areas, a comprehensive understanding of the relationship between buried archaeological structures and their geophysical data representation remains elusive. This gap in understanding underscores the need for extensive geoarchaeological surveys using non-invasive methods in combination with targeted soil sampling to better grasp buried archaeological structures and their corresponding expressions in prospection data.

Emerging technological advancements present promising opportunities for enhanced data collection. Tools such as closer channel spacing, wider sensor arrays, robotic vehicles and affordable precise positioning systems are leading the way in increasing data quantity and quality without compromising time. The integration of 3D imaging, laser scanning, and photogrammetry is revolutionising the field, offering a comprehensive view of archaeological sites.

However, challenges persist. Sites located in obstructed environments, such as forests or urban areas, present significant obstacles. Innovative solutions, such as visual SLAM and LiDAR-based odometry and mapping, are emerging as potential answers to these challenges.

Similar to the advancements made with regard to terrestrial geophysical archaeological prospection methods, comparable improvements are possible in the field of underwater archaeological prospection. High-resolution multibeam, side-scan and sediment sonar measurements permit the detailed mapping of archaeological sites and structures in water covered areas or those embedded in the underlying sediment. Plenty of exciting research & development as well as application opportunities remain.

Keywords: Geophysical prospection, magnetometry, georadar, sonar, high-resolution.

Name:	Franziska REINER
Email:	franziska.reiner@oeaw.ac.at
Institution:	Österreichisches Archäologisches Institut, Österreichische Akademie der Wissenschaften.
Title of Presentation:	Archaeological prospection at the ÖAI - Part I: Geophysics



Abstract:

One sub-area of the new Technical Unit is "Archaeoprospecting", which subsumes the areas of expertise of geophysics and geoarchaeology, among others. The planning and implementation of geophysical prospection and geoarchaeological investigations are carried out in this sub-area. The main focus of this presentation is on geophysical prospection, which has been used in numerous national and international projects since 2020. Geomagnetism and/or georadar systems are used depending on the project size, location and issue. The preparation of the measurement data using the latest processing methods and the subsequent cartographic implementation of the data obtained using GIS software, including the archaeological interpretation of the measurement data, are the core tasks of this area of work. In this presentation, I would like to give an insight into the various projects and the knowledge gained in recent years. On the other hand, I would also like to give an insight into the challenges and complications associated with some of the projects.

Keywords: Archaeological prospection, geophysics, geomagnetism, GPR.

Name:	Jakob KAINZ
Email:	jakobkainz@hotmail.com
Affiliation:	Independent Researcher.
Title of Presentation:	The case of the missing features – a case study in the Po Valley, Italy



Abstract:

Integrated geophysical prospection and sampling for assessing the visibility of archaeological features in geophysical data.

It is well established that geophysical methods are one of the most effective tools for identifying buried archaeological remains and therefore are a vital tool in the monitoring, controlling and management of buried archaeological remains. Alluvial settings however can be an extremely challenging environment for geophysical methods and especially for magnetometry. The Soprintendenza Archeologia, Belle Arti e Paesaggio of Cremona, Lodi and Mantova therefore wanted to test the applicability of magnetometry and ground penetrating radar (GPR) across different sites in the central Po Plain, Northern Italy. The surveyed sites ranged from the Bronze Age to the Middle Ages, including Bronze and Iron Age burials and settlements, Roman kiln, warehouse and villa sites and a Roman to medieval multiperiod site.

Aerial photographs indicated an abundance of archaeological features which were corroborated by GPR whereas far less by magnetometry. To investigate the parameters relating to the (in)visibility of the archaeological features in the magnetometry data, two sites with similar features, namely circular ditches of ploughed out tumuli, were examined for their magnetic and chemical properties.

The magnetic characteristics of soils, sediments and deposits are environmentally sensitive and the type of iron oxide relates to the soil formation processes affected by past environments. Environmental magnetism and portable X-ray fluorescence (pXRF) measurements were carried out at the Institute of Geophysics of the Czech Academy of Science, Prague, through grants from the COST Action SAGA (CA17131) – The Soil Science & Archaeo-geophysics Alliance: going beyond prospection network, to identify the magnetic characteristics of soils, sediments and deposits across the two sites.

Mass and frequency dependent magnetic susceptibility, magnetic hysteresis, isothermal remanent magnetization (IRM) and back-field remagnetisation curves (DCD) allowed identifying the magnetic and chemical profiles of the site's natural backgrounds and their archaeological deposits. The creation of a Day Plot and the unmixing of the sample's magnetic components allowed characterising key magnetic parameters while the pXRF established chemical profiles for the natural backgrounds and archaeological deposits. This allowed identifying the sites key magnetic and chemical differences and address the (in)visibility of the archaeological features and identify areas which are more suitable for the application of magnetometry.

Keywords: Archaeological prospection, environmental magnetism, pXRF.

Session 2: Soils + Sediments

Name:	Erich DRAGANITS
Email:	erich.draganits@univie.ac.at
Institution:	Department of Geology, University of Vienna.
Title of Presentation:	<i>"... every archaeological problem starts as a problem in geoarchaeology"</i> (Renfrew 1976)



Abstract:

I am geologist and geoarchaeologist working at the Department of Geology at the University of Vienna. At the end of the last millennium, I studied prehistoric archaeology and geology at the University of Vienna and I realized early that it is very challenging to work at a satisfying level in a single research field, but almost impossible in more than one. Therefore, I have received a master (then called diploma), PhD and habilitation in geology, but did not continue my prehistoric archaeology formally after the *"Erster Studienabschnitt"* roughly equivalent to a bachelor degree, but continued to work on quite some excavations. These digging experiences include a variety of different site types and archaeological periods from Pleistocene to Medieval.

During my career, I have been carrying out research ranging from dominantly archaeological to pure geological. Geological and geoarchaeological research topics involved a broad variety including locations on four continents, different scales from micron to landscape and age ranges from Precambrian to present / Palaeolithic to early Medieval. Studies include a variety of different solid rocks as well as loose sediment, analysed with various applicable analytical methods. For details concerning projects, studies, materials, methods and results see published work: http://www.researchgate.net/profile/Erich_Draganits.

In 1976 Colin Renfrew was one of the first to define geoarchaeology and he outlines that it as a research field that applies *"the skill of the geological scientist ... upon the archaeological „site"*. Commonly applied geological skills include geomorphology, stratigraphy, sedimentological studies, thin-section analysis, provenance studies and coring, but in my experience may also embrace – at first sight – in geoarchaeological context extraordinary appearing expertise like tectonics, engineering geology and glacio-eustasy. The definition of Renfrew (1976) ends: *"And since archaeology, or at least prehistoric archaeology, recovers almost all its basic data by excavation, every archaeological problem starts as a problem in geoarchaeology."* As a geologist and geoarchaeologist, I have always found this sentence very motivating, especially, because it also applies for archaeological surveys and landscape archaeology.

Keywords: Geology, sedimentology, stratigraphy, thin-section analysis, geomorphology.

Name:	Elise BAUDOUIN
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Institution:	Österreichisches Archäologisches Institut, Österreichische Akademie der Wissenschaften.
Title of Presentation:	Archaeological prospection at the ÖAI - Part II: Percussion coring



Abstract:


The new Technical Unit of the ÖAI is responsible for carrying out international excavations, among other things, but has expanded its spectrum within the "Archaeoprospecting" sub-area since 2022 and is involved in international projects with geoarchaeological investigations. It is possible to obtain information about layer sequences and deeper structures, take soil samples or carry out palaeogeographic reconstructions by means of percussion coring. In many projects that have already been accompanied by a geophysical investigation, the geophysical data can be supplemented by percussion coring. This allows information to be obtained on the extent and thickness of the preserved settlement horizons, which is essential for projects where excavation is not possible due to various boundary conditions.

In this presentation, I would like to give an overview of the activities on behalf of the team and explain the different roles they played in the projects.

This will be followed by an overview of the information gained through this application, but also the limitations and technical challenges that this method has brought with it to date.

Suggestions on the topic are welcome.

Keywords: Percussion coring, soil, layer sequence.

Name:	Kerstin KOWARIK	
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Institution:	Österreichisches Archäologisches Institut, Österreichische Akademie der Wissenschaften.	
Title of Presentation:	Bringing together Alpine archaeology and geoarchaeology	
<u>Abstract:</u>		
<p>Humans and mountain regions share a long and complex past. The human-environment interaction in these landscapes is varied, spanning from hot spots of human resource extraction, settlement areas, to ritual spaces, communication routes and mobile herding zones.</p> <p>Alpine Archaeology or Mountain Archaeology with its long research history and well-established methodological framework has produced important insights into these past processes. But research in mountainous regions is beset with a number of challenges such as highly dynamic ecosystems as well as sedimentation processes, but also low rates of soil formation in the upper altitudes. Geoarchaeology in general and recent analytical advances (micromorphology, biomolecules) specifically open up new and promising avenues of research.</p> <p>In a new research initiative headed by the Austrian Archaeological Institute and the German Archaeological Institute we aim to closely integrate geoarchaeological approaches into our interdisciplinary research framework on the Karst plateau of the Dachstein mountain range</p>		
Keywords:	Alpine Archaeology, high altitude, lipids, multi-element, land-use.	

Name:	Valentina LAAHA
Email:	valentina.laaha@univie.ac.at
Institution:	Department of Prehistoric and Historical Archaeology, University of Vienna. Roman-Germanic Commission of the German Archaeological Institute.
Title of Presentation:	Elements of human activity – Exploring soil geochemistry on the Grafenbergalm, Austria



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Abstract:

Human-environment relationships over the last years have become a major interest of not only mainstream debate, but also archaeological research. At the same time, new and rapidly developing technologies give way to novel and more detailed approaches to proxy analysis of past human presence. Here, soils and sediments move into the focus as promising archaeological archives. Soil geochemical analysis allow the reconstruction of else invisible aspects of human occupancy and activities, that left their chemical fingerprint.

Alpine regions, due to their sensitivity, represent challenging but intriguing model regions for the understanding of change in human-environment interactions. Alpine pastures, thus provide an interesting field of study for geoarchaeology.

In an ongoing project of the Austrian Archaeological Institute and the German Archaeological Institute at the Grafenbergalm on the Austrian Dachsteinplateau, soil cores have been taken from a probable (pre)historic hut foundation. The soil samples are currently being analysed as part of my master thesis at the University of Vienna with specific interest in the soil formation and chemical composition. Here the question of distinctiveness of soil memory in alpine pasturing soils and the potential of soil geochemistry analysis in the recognition and reconstruction of alpine pasturing are emphasised. Therefore, powdered and homogenised samples are analysed using X-ray fluorescence (XRF). First results of qualitative and quantitative elemental mappings show visible horizontal and vertical differences in the alpine pasture soil.

This pilot study will set the ground for a better understanding of human impacted alpine soils at the Dachstein plateau, their development, and potential for archaeological endeavours.

Keywords: Soil geochemistry, XRF, soil formation, alpine pastures, human-soil relationship.

Session 3: Microarchaeology

Name:	Mareike STAHLSCHMIDT	
Email:	mareike.stahlschmidt@univie.ac.at	
Institution:	Department of Evolutionary Anthropology, University of Vienna.	
Title of Presentation:	Microarchaeological approaches to anthropological questions	
<u>Abstract:</u>		
<p>The Department of Evolutionary Anthropology at the University of Vienna is concerned with the study of the evolution of our species from a range of perspectives. One of these perspectives is the microarchaeological study of the sedimentary context of archaeological remains and of sedimentary artifacts. During the occupation of site, people not only discard artifacts, but they also create sediments, depositing microscopic bone and flint fragments, combustion residues, even their own DNA. Microarchaeological studies can reveal these materials and their formation history, which is crucial in evaluating their association with the macroscopic record. At the center of such studies lies archaeological soil micromorphology that can then be complemented with variable material analysis. Such analyses allow us to characterize material, fabric, and microstratigraphy. In my work, I employ microarchaeological analysis mainly to study the formation history of ancient sediment DNA and the evolution of fire use. I will present examples from own work highlighting how microarchaeology can provide us with insights into who was living at archaeological sites and what their life looked like.</p>		
Keywords:	Microarchaeology.	

Name:	Susanna CEREDA
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Institution:	University of Innsbruck.
Title of Presentation:	Settling the mountains – Investigating human habitation and resources exploitation in (and from within) the Austrian Central Alps



Abstract:

The Alps, known for their diverse ecosystems and climatic variations, provide a unique living laboratory for exploring the intricate relationship between humans and their environment. Since the beginning of the Holocene, people have skillfully adapted to the challenging and fluctuating alpine conditions, giving rise to the distinctive cultural landscape we recognize today.

The University of Innsbruck, located in the homonymous capital of Tyrol, is deeply connected to this geological, geographical, and ecological context. The connection is evident in the numerous doctoral programs and transdisciplinary research centers that address the “Alpine Area”. The Institute of Archaeologies shares this focus, displaying a keen interest in examining human habitation, resource exploitation, and the environmental impact that societies have had over millennia in these regions.

In this presentation, I will provide an overview of the geoarchaeological research conducted at the institute, highlighting a variety of case studies: from a Mesolithic subalpine camp to a Copper Age lakeshore settlement, Bronze Age copper mines, and a high-alpine 19th century garnet extraction site. Additionally, I will introduce the "Microarchaeological Laboratory", established in 2020, and present its activities, current and future infrastructure as well as its plan to cultivate expertise in micromorphology.

The aim of this presentation is to inspire and facilitate the establishment of stronger connections between geoarchaeological hubs within the country. Enhanced connections will promote the development of integrative and interdisciplinary research projects, ultimately contributing to a more comprehensive understanding of the complex dynamics of human settlement and adaptation in the Alps and its neighbouring regions.

Keywords: Alps, Human-Environment interaction, Microarchaeological Laboratory, Innsbruck.

Name:	Thomas BEARD
Email:	thomas.beard@univie.ac.at
Institution:	Department of Evolutionary Anthropology, University of Vienna.
Title of Presentation:	Geoarchaeology: A holistic approach to contextualizing archaeology and sites



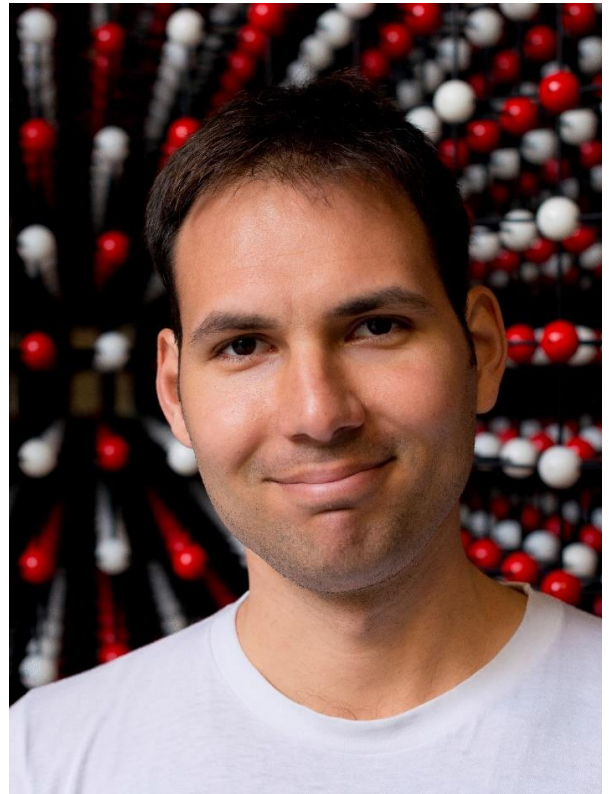
Abstract:

Geoarchaeology is useful in interpreting both anthropogenic and geogenic processes at archaeological sites. A wide variety of geoarchaeological analyses have proven effective in investigating both anthropogenic activities along with geogenic processes, that allow archaeologists to understand the context their assemblages are recovered from. I am interested in anthropogenic processes and understanding how humans have interacted with a site and the surrounding landscape, I recognize the importance of understanding the role of geogenic processes too, as these can determine the way in which humans can and do interact with a site. Without a sound understanding of both the anthropogenic and geogenic processes that have occurred and affected a site, a geoarchaeologist cannot provide the whole story to contextualize the artefacts properly. As such I try to use a holistic approach to understand site formation with an emphasis on the geogenic processes while still acknowledging the importance of the anthropogenic processes in the sites and in our archaeological understanding. As a geoarchaeologist I intend to apply a wide variety of analytical tools to investigate these various processes in their various forms and manifestations from a macro- to a microscale. To achieve this, I have used fabric analysis along with particle size analysis, XRF, and observational descriptions of the sediments and stratigraphy. Having focused mainly on the macroscale analyses, I am now expanding my geoarchaeological toolbox to include micromorphology under the supervision of Dr Mareike Stahlschmidt, along with other micro based analyses. As such my current research involves investigating the preservation and integrity dynamics of ancient sedimentary DNA using a broad spectrum of these geoarchaeological analytical approaches to provide a microcontextual understanding to these miniscule molecules. I also hope to try utilize my knowledge of fabric and see if it can elucidate upon structures and features at the microscale.

Keywords: Fabric analysis, micromorphology, aDNA, microarchaeology.

Session 4: Provenance + Artefacts

Name:	Robert KRICKL
Email:	mail@r-krickl.com
Institution:	Österreichisches Archäologisches Institut, Österreichische Akademie der Wissenschaften.
Title of Presentation:	Non-invasive spectroscopic and imaging techniques for cultural heritage research



Abstract:

Chemical and physical analysis of materials can contribute significantly to the understanding and reconstruction of archaeological objects. The presentation will focus on the practical employment of non-invasive methods for identification and differentiation of phases and their spatial distribution in the course of recent case studies in the investigation on the polychromy of Roman stone artefacts in interdisciplinary teams. Potentials and limits of inter alia X-ray fluorescence, multispectral and hyperspectral imaging are exemplified on measurements performed on immobile objects at their site of display in museums.

Name:	Vasiliki ANEVLAVI
Co-authors:	Walter PROCHASKA & Sabine LADSTÄTTER
Email:	vasiliki.anevlavi@oeaw.ac.at
Institution:	Österreichisches Archäologisches Institut, Österreichische Akademie der Wissenschaften.
Title of Presentation:	Provenance studies of white marble: a multidisciplinary approach in the Roman Eastern Mediterranean



Abstract:

Provenance studies of white marble aim to combine the disciplines of archaeology and economic history with geology and the applied analytical techniques of petrography and geochemistry. In recent years, our research has focused on the combination of geological samples from local quarries and outcrops and the evaluation of all archaeometric data of the marbles under consideration. This contributes to answering questions about the regional and long-distance trade of white marble, which was an important component of the economic history of the Roman Empire. For this study, the Eastern Mediterranean is the targeted region, with case studies from Corinth (Greece), Ephesos (Turkey), Ascalon (Israel) and the province of Thrace (Bulgaria). The analytical methods applied to the samples included petrographic investigations, chemical analysis with a large range of elements (variables: Mn, Mg, Fe, Sr, Y, V, Cd, La, Ce, Yb, U), and isotopic analysis ($\delta^{18}\text{O}$ ‰, $\delta^{13}\text{C}$ ‰). Statistical treatment for each sample was applied. All samples were compared with the large database of quarry samples across the ancient world. The provenance of these artefacts shows and unwraps, in several cases, the importance of the local material, as well as the supra-regional quarries and their marble trade network.

Keywords: White marble, provenance studies, Eastern Mediterranean, Roman trade.

Name:	Michaela SCHAUER
Email:	michaela.schauer@univie.ac.at
Institution:	Vienna Institute for Archaeological Science, University of Vienna.
Title of Presentation:	Work with p-XRF, they said... it's fun, they said...



Abstract:

I'm a trained Prehistorian and Near Eastern archaeologist specialized on portable X-ray fluorescence analysis (p-XRF). I've been introduced to the method at Goethe University Frankfurt in 2016, worked with it at Ludwig-Maximilians-University Munich, and just moved to Vienna in October 2023 to start my ESPRIT project '[Standardising portable X-ray Fluorescence for archaeometry](#)' at VIAS.

In terms of chemical, physical and geological background, I'm mainly self-taught, with support from the LMU Geology Department in regard to geochemistry in recent years. My special interest is in pottery and sediments, but I've worked on a variety of materials such as stones, obsidian, slags, metals, etc. in Europe and the Near/Middle East.

I'm most fascinated by the prospect of using p-XRF analysis to identify raw material use and sources, production techniques and sites, as well as distribution and social networks of which we were previously unaware. I carry out p-XRF analyses in the laboratory, but particularly enjoy working on field projects in close collaboration with other archaeologists and other disciplines such as geophysics, geology, mineralogy etc. This is also closely related to my belief that fieldwork benefits most from the major strengths of p-XRF: it's a fast, cost-effective screening method that can be used directly in the field on a large number of samples, providing results immediately after measurement. This allows for an exchange between all the specialists involved in the project, and therefore an adjustment of sampling strategies, research questions, and excavation or survey techniques, often leading to new, unexpected and fascinating ideas and insights into the archaeological (and geological) record.

In my talk I'll give a very brief introduction to the method, some of my previous work, and an insight into my current ESPRIT project.

Keywords: p-XRF, pottery, fieldwork.

Unfortunately, Alexandra is unable to attend on the 12th and will no longer be presenting.

Name:	Alexandra RODLER-RØRBO
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Institution:	Institute of Conservation, University of Applied Arts Vienna. Österreichisches Archäologisches Institut, Österreichische Akademie der Wissenschaften. Department of Lithospheric Research, University Vienna.
Title of Presentation:	Earth pigment provenance research.
<u>Abstract:</u>	
<p>The Hellenistic and Roman period were particularly colorful – people processed certain raw materials to use them as colorants and their material qualities and provenance mattered. Yet, little is known about where these materials came from and where they were processed. Some materials are rare in nature and were equally rare in ancient art, other mineral pigments were produced from easily available resources and/or were likely an output of far-reaching trade networks. Mineralogical-petrographic and geochemical analysis are useful for tracing production processes and raw material provenance to reveal the connectivity of ancient societies through pigment trade. A plethora of mineral pigments was used in the past; materials were processed ranging from powdered ochre and cinnabar to pyrotechnological multi-component materials such as Egyptian blue. They came together to color walls and sculpture alike and now enable the understanding of interaction across production technologies, trade networks and cultural relations.</p>	
Keywords:	Ancient polychromy, ochre/earth pigments, Pb isotopes, trace elements, trade.

Session 5: Landscapes

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Institution:	Department of Prehistoric and Historical Archaeology, University of Vienna.
Title of Presentation:	Geoarchaeology and landscapes – The integration of geoarchaeological data with historic landscape characterisation



Abstract:

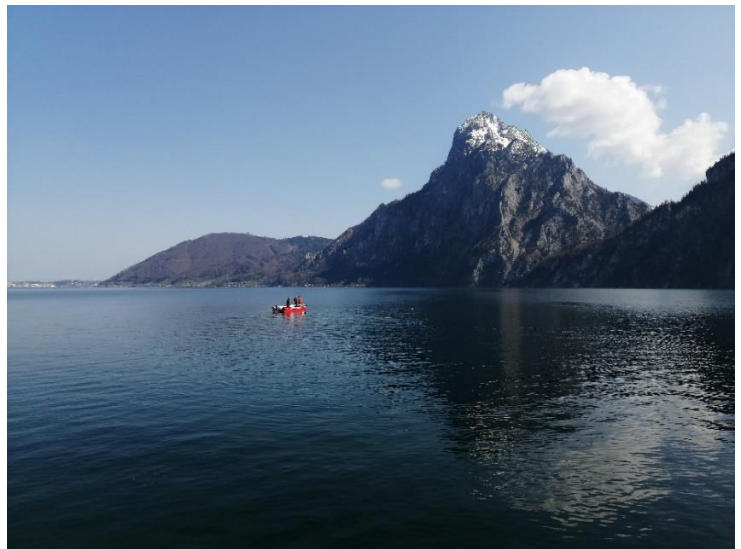
The combination of approaches, methods, and techniques from geoarchaeology and landscape archaeology for a holistic study of landscape histories is well-established within these fields of research. Especially the joint analysis of remote sensing data, geophysical prospection data, results from excavations and test trenching, and sedimentological, pedological, and geochemical data is being widely used in archaeological landscape studies. This interdisciplinary, multi-method approach is well-suited to addressing different types of questions concerning landscape evolution, land-use practices, and human-landscape interactions.

Despite this established workflow, little attention is often paid to collecting, storing, and analysing these interdisciplinary data within a theoretical and methodological framework. One such framework that is frequently used in landscape archaeological research is Historic Landscape Characterisation (HLC), a tool for collecting and visualising information on the origins and development of landscape histories. Typically, distinct areas of land-use character are identified and categorised in classes for each documented time period in a given research area, allowing for an analysis and visualisation of the changes in land-use practices and landscape character over time.

In my dissertation project, I work on creating an archaeological landscape biography of the Kreuttal microregion in Lower Austria. To this end, I aim at incorporating geoarchaeological data from geophysical prospection, targeted coring, and geochemistry into an HLC framework to facilitate a systematic, joint analysis of landscape- and geoarchaeological information. By defining separate categories for geoarchaeological data in the HLC, information on stratigraphy, sedimentology, depositional contexts, formation processes, and geochemistry can be linked with the land-use classes and landscape character categories. Using and expanding the capabilities and scope of the HLC framework in this fashion will allow for a more comprehensive study of the landscape history of the Kreuttal microregion and the processes by which it was informed. Results offer insights into stratigraphic sequences, formation processes, and past human activities as well as their short- and long-term impact on the landscape. Ultimately, both geoarchaeology and landscape archaeology will profit from the integration of geoarchaeological data with HLC and the added value of a systematic analysis framework for enhancing our understanding of past human behaviour on the macro scale.

Keywords:	Historic landscape characterisation, formation processes, land-use, human-landscape interactions.
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Name:	Helena SEIDL DA FONSECA
Co-authors:	Cyril DWORSKY & Peter TREBSCHKE
Email:	seidl@pfahlbauten.at
Institution:	Kuratorium Pfahlbauten – UNESCO World Heritage Management Austria “Prehistoric pile dwellings around the Alps”
Title of Presentation:	Geoarchaeology and underwater archaeology – a promising team



Abstract:

The *Kuratorium Pfahlbauten* manages the Austrian part of the UNESCO World Heritage “Prehistoric Pile Dwellings around the Alps” since 2012. All five pile dwelling sites in Austria, that belong to the UNESCO World Heritage are located under water, in shallow water zones on lake shores or on island locations in Lake Attersee, Lake Mondsee and Lake Keutschach. Other underwater sites in the federal states of Upper Austria and Carinthia are known, while discoveries of moor settlements are currently missing. For eleven years, the team of the *Kuratorium Pfahlbauten* has been establishing and expanding areas of monument preservation, research and education relating to prehistoric pile dwellings. It is important to install sustainable monitoring and protective measures on the underwater monuments, to create structures for underwater archaeological research and to build a network for regional community management.

Various underwater archaeological research is currently taking place in Austria. Questions about prehistoric lake levels and landscape reconstructions in general arise again and again. The example of the investigations at the Iron Age site of *Traunkirchen am Traunsee* (Upper Austria) shows how interdisciplinary collaborations lead to new insights that show the changes the landscape has been subject to over thousands of years and how they shape our understanding of how humans use the landscape.

In Austrian pile dwelling research, but also in the area of monument preservation of wetland monuments in the region spanning the Alps, more and more geoarchaeological questions are emerging. How can we research the development of our lakes in more depth? This question arises not only for the past, but also for the future in view of advancing climate change.

Keywords: Underwater archaeology, lake shore settlements, prehistoric landscape, landscape changes.

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Title of Presentation:	Geoarchaeology of risk: The sediment record of prehistoric coping mechanisms and resilience



Abstract:

Managing risk and preventing potential natural disasters is a practical concern in a world of climate change, viral pandemics, and socio-political turbulence. Archaeology has also been interested in these topics, and archaeological data often contributes to narratives about past crises. Meanwhile, geoarchaeologists have begun to apply their trade to an ever-wider range of archaeological and historical questions. While identification of formation processes and raw materials continue to be important contributions, geoarchaeology is now being used to place human social behavior in cultural, physical and ecological contexts. Examining the connections between environmental processes and human responses documents socio-political collapse and natural catastrophes and contributes to questions of anthropogenic impacts on ecosystems. To extend our research further, geoarchaeological methods should be suited to examining strategies to mitigate risk. Combining archaeological data with sediment archives (sedimentology, geomorphology, and biogeochemical data) can provide data on past cultural activities. This can be used to infer the risk identification and management strategies, in addition to documenting consequences. Results of these studies would be multi-scalar and diachronic, requiring careful consideration of chronology and preservation biases. The results can provide concrete examples of localized, small-scale risk management and its relative success.

Keywords: Socio-natural systems, landscapes, land-use, biomolecules.

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