

Book of Abstracts



3. Heritage Science Austria Meeting 23 September 2022



<https://heritagescience.at>

A...kademie der
bildenden Künste
Wien

Venue: Aula, Schillerplatz 3, 1010 Vienna

Program:

8:15-08:45 Registration

09:00 Opening of the Conference

Welcome words from **Johan F. Hartle**, Rector Academy of Fine Arts Vienna and **Katja Sterflinger**, Head of the Institute for Science and Technology in Art, Academy of Fine Arts Vienna and Chair of the Monument Advisory Board

09:05-09:40 Keynote lecture

Stefan Simon, Director of the Rathgen Forschungslabor Berlin
Look up – why museums need to become green

09:40-10:20 Session 1

Chair: Katja Sterflinger

9:40-10:00 **Johannes Tichy**

Pink salt loving biofilms on stone cultural heritage monuments

10:00-10:20 **Katharina Derksen**

Assessing the effects of climate change on the biodiversity of fungi and risk of mould growth in different storage environments for cultural heritage collections in Austria

10:20-10:40 Coffee break & posters

10:40-12:00 Session 2

Chair: Gudrun Styhler-Aydın

10:40-11:00 **Michael Grabner**

Research on historic roof structures in Vienna

11:20-11:40 **Cyril Dworsky**

Pfahlbauten

11:00-11:20 **Raimund Rhomberg**

Bauforschung in Vorarlberg

11:40-12:00 **Barbara Keiler**

Denkmalpflege in Vorarlberg: Organisation und Praxis



12:00-13:20 Lunch break & posters

13:20-15:00 Session 3

Chair: Johannes Tintner-Olifiers

13:20-13:40 **Valentina Ljubić Tobisch**

Experimentelle Galvanographie in Heritage Science

13:40-14:00 **Valentina Pintus & Dubravka Jembrih-Simbürger**

Assessing the deterioration of synthetic organic materials in modern-contemporary art: science in progress

14:00-14:20 **Paul-Bernhard Eipper**

Degradation of chrome yellow and cadmium sulphide on works of art

14:20-15:00 **Eleonora Weixelbaumer**

„Warum ist etwas und nicht nichts?“ (Franz West). Methoden der Restaurierung und Konservierung in den Landessammlungen Niederösterreich

15:00-15:45 Coffee break & poster session

15:45-16:00 Closing Ceremony – (final discussion)

Moderators:

Katja Sterflinger, A...

Klaudia Hradil, TU Wien

Martina Griesser, KHM

Acknowledgements

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Oral Presentations

Pink salt loving biofilms on stone cultural heritage monuments

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Climate change is one of the most serious threats our world is facing and predicted to amplify damage processes affecting global built cultural heritage. The aim of this study is to investigate to which extent the biodeterioration of stone and building materials is affected by salt crystallization cycles and how this factor affects microbial community successions, biological resilience and activity on stone materials.

The community structure and function of the microbiota is achieved via classical microbiological cultivation and “omics” analyses. Only through depicting the living organisms on the level of DNA analysis and mapping the related functional genes on RNA level, the way for dedicated yet unexplored treatment strategies is opened.

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- Piñar G., Ettenauer J., Sterflinger K. 2014a. "La vie en rose": A review of the rosy discoloration of subsurface monuments. In: Saiz - Jimenez C. (ed). *The Conservation of Subterranean Cultural Heritage, 113–124; CRC Press/Balkema, Leiden; ISBN 978 - 1 - 138 - 02694 - 0*

English

Assessing the effects of climate change on the biodiversity of fungi and risk of mould growth in different storage environments for cultural heritage collections in Austria

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Mould is one of the most important and problematic factors in the destruction of objects in museums, libraries and depots. Current models and simulations to assess possible effects of Climate Change on the risk of mould growth in cultural heritage collections are still underdeveloped and require a more substantial data basis. This study is part of a larger project (Querner et al. 2022) seeking to fill in some of these knowledge gaps. For two years, indoor climate and fungal data are collected at 20 different sites in and around Vienna. Cultivation samples from air and surfaces are complemented by DNA analyses to gain a comprehensive insight into the status quo of fungal biodiversity and activity within our historic collections.

References

Querner P., Sterflinger K., Derksen K., Leissner J., Landsberger B., Hammer A., Brimblecombe P. 2022. Climate Change and Its Effects on Indoor Pests (Insect and Fungi) in Museum. *Climate* 10(7), 103; doi:10.3390/cli10070103

Englisch

Research on historic roof structures in Vienna

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The Austrian Monuments Authority initiated a project to analyse and describe the roof constructions of buildings from the first district in Vienna. Next to set up a typology of the existing structures, the dendrochronological dating of the wooden elements was done.

The main wood species is Norway spruce and Silver fir and dates were found between 1142 AD and the 20th century.

To get an idea where the timber was coming from, dendroprovenancing was started. The main supplier was the river Danube. Floating marks were studied and the tree ring sequences were used to date with regional chronologies.

Englisch

Bauforschung in Vorarlberg

Raimund Rhomberg

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Seit dem Jahre 2003 bin ich in der Bauforschung professionell selbstständig tätig. Diese Arbeit resultiert aus einem eingehenden Interesse an Burgen aus dem die Beschäftigung mit Baudenkmalern hervorgewuchs. Basis für den beruflichen Werdegang bildete das Architekturstudium an der Technischen Universität Wien. Der Wissensaufbau für die Bauforschung erfolgte über Kurse, Vorträge und viele Besuche von Denkmälern und berufliche Erfahrung am Denkmalamt der Landesstelle Vorarlberg. Dazu lief eine eigenständige Entwicklung einer Methodik zur geodätischen Vermessung von Bauwerken unter Hilfenahme eines Tachymeters und der digitalen Photogrammetrie und die inhaltliche Erstellung der Berichte für die Denkmalpflege.

Exakte digitale Pläne und Fotos bilden die Basis aller wissenschaftlichen Ausarbeitungen zu einem Bauwerk und werden von mir selbst erstellt. Dazu erfolgt eine historische Aufarbeitung der Baugeschichte und Baugenese eines Objektes. Die Folge sind Bualterpläne und ein Bericht mit der Befundinterpretation. Es erfolgt u.a. eine Zusammenarbeit mit dem Dendrochronologen Dr. Klaus Pfeifer aus Vorarlberg um die Datierung von Bauphasen zu präzisieren.

Im Fokus stehen meist Bauernhäuser, Stadthäuser, Stallungen, Burgen, Schlösser, Stadtbefestigungen und Kirchen. Die meisten erarbeiteten Objekte stehen unter Bundesdenkmalschutz und werden nach den neuen Richtlinien des Denkmalamtes dokumentiert. Nicht unter Schutz stehende Objekte werden ähnlich behandelt.

Hauptauftragsgebiet stellt das Bundesland Vorarlberg, Kärnten, der Kanton Graubünden in der Schweiz und das Bundesland Bayern in Deutschland dar.

Bei dem Vortrag handelt es sich um eine Auflistung der letzten neunzehn Jahre Berufserfahrung und Einblick in Bauforschung in Vorarlberg.

Deutsch

Denkmalpflege in Vorarlberg: Organisation und Praxis

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Das Bundesdenkmalamt hat die Aufgabe, das kulturelle Erbe Österreichs zu erhalten, dieses dafür zu erforschen, zu schützen und zu pflegen. Die Denkmäler maßgebend zur Identitätsfindung einer Region bei, sie sind einzigartig und unverwechselbar und prägen unsere Lebensräume. Neben klassischen Denkmälern wie Klöstern, Burgen und Schlössern gibt es aber eine Vielzahl von anderen Kategorien wie Bauernhöfe, Fabrikanlagen oder Altstadt-ensembles. Heutige und frühere Ansprüche an die Gebäude haben sich gewandelt. Mit dem Denkmalschutz sollen einerseits Nutzungsänderungen ermöglicht werden, gleichzeitig soll sichergestellt sein, dass die Eingriffe das Wesen des Denkmals nicht gravierend beeinträchtigen. Dazu werden einige Beispiele der letzten Jahre und die Organisation einer Regionalabteilung im Rahmen der Bundesbehörde präsentiert.

Deutsch

Experimentelle Galvanographie in Heritage Science

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Die Galvanographie ist ein 1840 von Franz von Kobell in München erfundenes Verfahren zur Reproduktion gemalter Bilder durch einen galvanischen Prozess (Kobell 1842, 1852; Reuter 1889; Ljubic Tobisch et al. 2022). Die auf diese Weise hergestellten galvanischen Druckplatten erlaubten eine praktisch unbegrenzte Vervielfältigung der Druckplatten und eine unlimitierte Auflage. In der vorgestellten Studie wurde die historische Technik der Galvanographie experimentell nachvollzogen. Sie hat gezeigt, dass die Morphologie, d.h. die Körnigkeit und Pastosität, die Dicke der aufgetragenen Farbe und insbesondere die verwendete Trennschicht einen Einfluss auf die Qualität der galvanisch abgeschiedenen Kupferschicht, und in Folge, auf den Druck haben.

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Reuter R. 1889. Die Anfänge der Galvanographie und Galvanoplastik in Österreich, Mitth. Des k.k. Technol. Gewerbe-Museums, Sect. Für Met. Und Elektrotechnik. 113–126.

Ljubic Tobisch V., Weitensfelder H., Kautek W. 2011. Die Anfänge der Galvanoplastik und Galvanografie in Österreich, Blätter Für Tech. 74, 135–161.

Deutsch

Assessing the deterioration of synthetic organic materials in modern-contemporary art: science in progress

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The deterioration of synthetic organic materials in modern-contemporary art, such as binders, pigments, plastics, foams etc. during age, can highly compromise their chemical stability, appearance, and mechanical properties. Such circumstances motivate scientific research into developing new analytical techniques as well as into preventive and interventive conservation techniques. Polymeric material characterization and ageing studies are the keys to these endeavours and often challenging. This work aims to highlight evolving scientific methods, whether *in situ* or on extracted micro-samples, applied to issues-related to modern-contemporary art.

- Deutsch
- Englisch

Degradation of chrome yellow and cadmium sulphide on works of art

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Industrial paint production developed at the end of the 19th century. Although there was no long-term experience with new colors for artists, the commercially available products, traded as tube colors, enjoyed high levels of use. Not only among the great painters, but also among the minor masters, we find chrome yellow and cadmium sulfide. It is not only the unsuitable storage and unfavorable environmental conditions of the works painted with them that are responsible for their degradation; the pigments themselves are not stable products either. Focus is given to damage phenomena and colour changes, the role of light and relative humidity in degradation process as well as practical preventive measures.

References

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Deutsch

„Warum ist etwas und nicht nichts?“ (Franz West)
Methoden der Restaurierung und Konservierung in den Landessammlungen
Niederösterreich

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Die Landessammlungen Niederösterreich (LSNÖ) umfassen rund 9 Millionen Objekte aus vier großen Sammlungsbereichen: Kunst, Kulturgeschichte, Natur und Archäologie. Während spezialisierte WissenschaftlerInnen aus den jeweiligen Fachdisziplinen die Bestände erforschen und erweitern, obliegt dem Bereich der Konservierung und Restaurierung die Betreuung aller Objektgruppen. Dabei lassen sich Methoden teils übergreifend anwenden, teils ist es notwendig, an die Fachdisziplin und die damit verbundenen Objekte spezifisch angepasste Lösungen zu implementieren. Als übergreifend einsetzbares Instrument erproben die LSNÖ seit 2021 ein Microfadeometer, das Prognosen über die Lichtbeständigkeit verschiedenster Materialien ermöglicht. Dies führt zu einer Optimierung des Leihgeschehens in der Ausstellungspraxis in den Bereichen Kunst und Kulturgeschichte. Beispiele für den Bedarf an höchst spezialisierten Restaurierungsanwendungen sind die Bereiche der archäologischen Bodenfunde und der zeitgenössischen Kunst im öffentlichen Raum. Dazu 3 Fallbeispiele: 1) Blockbergung von Dokumenten aus dem 2. Weltkrieg; 2) 3D-Scan als Dokumentations- und Vermittlungstool; 3) Franz West, „Warum ist etwas und nicht nichts?“ (1997/2022) – Wiederaufstellung in Stronsdorf (NÖ).

Deutsch



Posters

New advances in understanding the curing, ageing, and photo-ageing processes of blended Thitsiol/Urushiol Asian lacquers by THM-GC/MS and other techniques

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In this work, blend-models of Thitsiol with Urushiol Asian lacquers in different percentage concentrations were prepared and for the first time their curing process, as well as ageing, and photo-ageing processes, were studied. Analytical pyrolysis in thermally assisted hydrolysis and methylation mode, coupled with gas chromatography and mass spectrometry (THM-GC/MS) and other techniques were used for this purpose. The data obtained within this research highlights the main chemical and physical changes for the Thitsiol-Urushiol blends, including unknown oxidation markers, their mechanism of reactions, and micro-cracks formation on the surface. These results are of high interest for professionals dealing with Asian lacquers.

Archaeometry and Heritage Science: connecting and dividing elements

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Both Archaeometry and Heritage Sciences apply natural science methods to artifacts and structures belonging to the human cultural heritage. Yet, the dialogue between these two disciplines is still scarce. On the pretext of aiming at distinct objectives—i.e., past reconstruction vs. present/future preservation—archaeometrists and heritage scientists rely on different semantics, conferences, journals and institutions. Through this poster we intend to push scholars from the two disciplines towards a stronger integration for a more comprehensive valorization of cultural heritage along its whole life-cycle.

Plasticized PVC and minced mutton meat in an Artwork by Dieter Roth – challenges in understanding its aging behavior through scientific studies

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This work deals with the challenges in understanding the ageing behavior of the artwork "PO^EMETRIE" (1968) by Dieter Roth, for conservation-decision making. The object is a book, consisting of a plasticized polyvinyl chloride (p-PVC) plate as a cover and p-PVC bags mounted on it as book pages. Text is printed on the bags outside, while being stuffed with minced mutton. Due to plasticizer migration, as well as fat diffusion and leakage, the text now floats on and in a sticky brownish surface layer and is at massive risk of being lost.

Scientific investigations were carried out on the object for the identification-characterization of its main materials and degradation products but also on artificial accelerated thermally aged p-PVC-based models. The influence of factors such as soling, meat, and fat was considered in the p-PVC-based models, in order to understand the main mechanism of ageing. Further investigations were done on surface cleaning with a focus on the use of surfactants.

SONIME Sonic Memories – Audio Letters in Times of Migration and Mobility

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Since the invention of the phonograph at the end of the 19th century, it has been possible to send spoken letters over long distances. While the early audio letters were sent by travellers from the middle class, the later formats were also used by people in migration contexts. These unique items are by all means cultural heritage of great value, yet they can hardly be found in public archives and are severely threatened with loss. The SONIME project collects and preserves audio letters, that are hidden in archives or are privately owned. It combines methods of conservation research and cultural history.

**Arsenical bronze production of the Early Bronze Age Egyptians in Giza:
archaeometallurgical case study of material from the collection of the Prehistoric
Institute of Vienna University**

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Austrian team, led by Karl Kromer, worked in the south-eastern part of the Giza necropolis in 1970s and discovered settlement remains from Dynasty 4, from the reigns of Khufu and Khafra (c. 2500–2450 BC). It can be inferred from the archaeological context that the debris was coming from craft installations, where craftsmen attached to the pyramid building were working. Among the remains was also metallurgical waste, including crucible fragment and many fragments of slag, prills and even finished artefacts. Our paper focuses mainly on the metallurgical remains, an evidence of arsenical copper production, which are curated in the *Studiensammlung des Instituts für Urgeschichte und Historische Archäologie*, Universität Wien. Recently, with this study were compared also metallurgical remains currently in Egypt, from the excavations of American, Ancient Egypt Research Associates mission at Giza.

The results presented in this paper include a team of scientists and an Egyptologist, needed for the understanding of archaeological context. A range of archaeometallurgical methods was applied to the remains, in order to identify technological processes: ED-XRF, optical microscopy, HV, SEM/EDS/WDS, NAA, MC-ICP-MS, and μ XRD. Fragments of vitrified crucibles and samples of slags contain copper and arsenical copper prills, rich in arsenic, and also iron and antimony. These metallic prills were incorporated in the slag phases formed by fayalite, magnetite, wüstite and amorphous glassy phase, and exceptionally also by quartz and copper/iron sulphides. The study brought evidence of an active remelting and casting operations and, most likely, the alloying of copper with arsenic. Thus, Old Kingdom Egyptians most probably actively sought also for sources of arsenic for the production of their artefacts. Trace elements composition and lead isotope ratios of arsenical copper tools and arsenical copper prills are, with a few exceptions, very homogeneous and point out to the provenance in the Sinai Peninsula and/or Eastern Desert of Egypt.

Colours revealed – Polychromy of Roman monuments in the Danubian provinces (PolychroMon)

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The project PolychroMon – Polychromy of Roman monuments in the Danube provinces, carried out within the framework of the Heritage Science Austria Programme at the Austrian Academy of Sciences, aims at a systematic evaluation of the Roman stone monuments from a multidisciplinary perspective. Focus is on votive, funeral and architectural monuments from Carnuntum, the Vienna Basin and the Leitha area from several Austrian collections (Museum Carnuntinum, Kunsthistorisches Museum Vienna). For identifying the original colouring, the project primarily applies non-destructive methods, coupled with microinvasive traditional methods when necessary. The poster presents an overview of the first results of the investigation carried out mainly on the monuments from the Museum Carnuntinum, with a particular emphasis on the polychromy associated with the Mithraic monuments from the area.

Keep up the tradition. Dry masonry as a sustainable conservation strategy for Ephesus

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A sustainable and low-invasive conservation strategy is one of the most challenging tasks in the preservation of archaeological sites. Traditional handicraft techniques that have been tried and tested over centuries prove to be particularly suitable. A rather impressive example are dry-stone walls in Ephesus, which were built to protect the excavated city areas against slope erosion. These have proven to be extremely efficient and stable with the advantage of being reversible. The poster presentation will emphasize on the economic and ecological benefits of these measures, but also their durability and resilience. In addition, aspects of aesthetics and landscape appearance will be discussed.

Portable electrochemical pencil instrumentation in metal conservation science

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A custom-made three-electrode pencil controlled by a potentiostat system is presented for the electrochemical reduction of sulphide and chloride tarnish layers on silver-copper alloys (Ljubić Tobisch et al. 2022; in print). The decisive operation parameters are the diaphragm tip material and the working electrode, i.e. the treated specimen, potential. Polyester felt and polyvinylformal sponge resin were applied as diaphragm tip materials. The polyester felt caused significant scratch marks, in contrast to the PVFM resin sponge. The pencil has been applied on naturally aged silver artefacts of the 19th and 20th century to demonstrate the superb controllability of this technique in respect to the extent of the intervention.

References

- Ljubić Tobisch V., Selimovic A., Kautek W. 2022. Selective Electrochemical Treatment of Naturally Aged Silver Alloy Artefacts, *Stud. Conserv.* doi: <https://doi.org/10.1080/00393630.2022.2099185>.
Ljubić Tobisch V., Selimović A., Kautek W. In print (2022). Portable electrochemical pencil instrumentation in metal conservation science, *Heritage* 5.

Surface characterization of Austrian Daguerreotypes

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The surface properties of daguerreotypes are the most important source of information in connection with its production and its long-term preservation (Gröning and Faber 2006; Ljubić Tobisch 2019, 2020; Ponstingl 2011). The surface morphology and surface chemistry provide information about the production methods, and the corrosion and ageing processes. The PHELETYPIA project, "The impact of early photography and electrotyping media on the creation of images and contemporary art", funded by the Austrian Academy of Sciences, is researching original daguerreotypes with the aim to gain detailed information about the special Viennese methods from the early 1840s.

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Revisiting the imperial past – Comprehensive scientific investigation and conservation treatment of historic lacquer coatings of “Princes’ Dress Carriages” from the collection of the Wagenburg in Vienna

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The Imperial Carriage Museum Vienna (*Kaiserliche Wagenburg Wien*) holds an exceptional and precious collection of various carriages of the former transport pool of the Viennese court and vehicles from numerous aristocratic families. The aim of this research project was to establish a suitable conservation strategy for four prominent 18th century Prince’s state carriages supported by extensive chemical research. This included study of exact construction and composition of the lacquered surfaces combining optical microscopy (LM, SEM/EDS) and gas chromatography - mass spectrometry (GC-MS) technique. The microscopical results revealed a multiple stratigraphy with up to 20 coloured lacquer layers: Several packages of alternating pigmented layers (chalk, lead white, ochre, red lead or vermilion), metal interlayers (gold, silver or brass) and organic coatings give an impression of the eventful prehistory of the object. GC/MS analyses proved the use of complex oil-resinous mixtures containing drying oil, namely linseed oil with addition of essential oils and various diterpenous and triterpenous resins: spike oil, amber, sandarac, pine resin and mastic were often detected.

Currently one of the four Prince’s State Carriages is under conservation treatment. One of the main focuses was the removal of extensive overpaint on its panels – the brilliant rococo technique, a gilded panel decorated with painted peacock feathers and flower bouquets adorned with silver filings was covered up with bronzing and multiple layers of varnishes from the 19th century.

The new insights in the accurate composition of the historic coatings certainly endorsed the optimal methodology of their conservation/restoration treatments and gives us important information about the materials used for the original varnishes and the desired surface effect.

The APPEAR project at the KHM: Multitechnological research on three mummy-portraits of the KHM

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In the course of the APPEAR project (Svoboda and Cartwright 2020; online APPEAR database), all 10 mummy portraits of the KHM were subject of scientific investigations. The methods applied comprised the identification of the wooden panels as well as the study of painting techniques and the applied pigments. All 10 portraits were investigated using Multiband Imaging (MBI) and μ -X-Ray Fluorescence analyses (μ XRF). Additionally, three of the mummy portraits could be investigated also with Macro-XRF (MA-XRF) and are subject of this poster. Unexpected results could be gained and the interpretation of the MBI images supported.

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Taking a closer look at the life cycle of marble objects: raw material procurement, manufacturing processes, use and significance, weathering, data management, and dissemination

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This study focuses on the multidisciplinary-biographical approach of white marble heritage artifacts, with the current case study of Roman spolia in religious buildings in the Austrian Alpine regions. The research focuses on all phases of the life cycle of marble objects, including the origin of the raw material; use and significance; their functions over time and space; the weathering processes and conservation; the digital documentation and data management; and finally, the involvement of the local communities in the investigation and protection of sites meaningful to them and their history.

Acquiring centimetre-accurate camera positions in project INDIGO

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INDIGO is a two-year, ÖAW-funded research project that aims to document, disseminate and analyse the graffiti-scape along Vienna's *Donaukanal*. INDIGO's prime data are digital photos because they capture the geometrical, spectral, and certain temporal aspects of newly created graffiti. To speed up their archiving and photogrammetric processing, INDIGO developed a compact piece of hardware that sits on top of the camera to record centimetre-accurate camera coordinates for each photo. This poster details the hard- and software of our cost-effective geocoding solution.

Using long-read sequencing to explore the microbial community structures on salt-weathered historical buildings

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The continuous degradation of historical buildings and artwork by different weathering processes is predicted to increase through lasting effects of climate change. To better understand the role of microorganisms in that procedure, we used long-read sequencing of 16S rRNA gene samples to identify the composition of the highly diverse microbial communities on different samples challenged by salt-weathering. Our approach provides the basis for further characterizations and contributes to the evaluation and development of more effective conservation methods in heritage science.

How project INDIGO automatically turns graffiti photographs into orthomaps

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Graffiti are a short-lived and polarising form of cultural heritage. The graffiti-focused research project INDIGO, funded by ÖAW, documents and digitally preserves (almost) every graffito created along Vienna's *Donaukanal*, one of the world's largest graffiti hotspots. A central aim of INDIGO is the creation of a georeferenced orthophoto for each graffito, which digitally geo-localizes the graffito in 3D space and facilitates the interpretation in a spatial context. The poster explains the "orthophoto" concept and details how INDIGO uses modern photogrammetric techniques to derive them automatically.

Integrating metagenomics and physico-chemical methods to unveil bioweathering patterns on petroglyph sites in the Negev desert of Israel

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Petroglyphs are found worldwide and are one of the earliest forms of mankind expression (Nir et al 2019). Despite their value, research on conservation and preservation of rock art is still minimal, especially as related to biodeterioration, which can play a significant role in the degradation patterns of stone (Steiger et al. 2014). For this reason, we explored the (bio)degradation processes of petroglyph sites in the Negev desert, Israel. Through the use of metagenomics and physico-chemical methods we characterized the microbiome of the stone and highlighted patterns of weathering possibly connected to biodeteriorative microorganisms (Mergelov et al. 2018).

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**Landscape Narratives: documentation of and research on designed landscapes.
The Archive of Austrian Landscape Architecture LArchiv at BOKU Vienna**

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Plans, sketches and photos show how landscape architects shaped the Wachau landscape, today a World Heritage Site, and the artificial Danube island in Vienna. It is the ephemeral nature of plants, which gives archival documents a key role in ensuring the long-term existence – material or virtual – of landscape architectural creations (Hennaut 2021: 106). Analysis of these documents contribute to a thorough understanding of the historical development of the built environment and of key contemporary issues, such as the climate and biodiversity crises, rapid urbanization, and spatial justice.

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Spectroscopy-based study of structural changes of proteins and lipids in sheep parchment under the effect of artificial sunlight and relative humidity

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We present a comparative study of structural changes of collagen and lipids in traditionally prepared sheep parchments. Two sample batches were exposed to artificial sunlight aging (Xenon Arc Simulator Dr. Hönle, Germany, 295-3000 nm) for one month and 80% RH for one week. Molecular changes were studied by vibrational spectroscopy followed by band deconvolution and multivariate analysis. This workflow revealed differences in the characteristic amide bands (proteins, peptides) and CH-stretching bands (lipids) (Olsztyńska-Janus et al. 2017; Fourneau et al. 2020) in the ATR/FTIR and Raman spectra. Also, the fingerprint region below 1000 cm⁻¹ (Raman) exhibited interesting, aging-related variations.

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Etruskische Spiegel in Österreich – Multidisziplinäre Forschung zu einer der größten Objektgruppen der Etruskischen Kunst

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Die etruskischen Spiegel stellen mit derzeit rund 3.000 bekannten Exemplaren eine der umfangreichsten Objektgattungen innerhalb der etruskischen Kunst dar und sind als Quellen für verschiedene Aspekte der etruskischen Kunst und Kultur von großer Bedeutung. Die etruskischen Spiegel, die sich in österreichischen öffentlichen Sammlungen befinden, werden nunmehr in einem FWF Forschungsprojekt aufgearbeitet und anschließend in der internationalen Publikationsreihe CORPUS SPECULORUM ETRUSCORUM präsentiert. Neben der archäologischen und kulturwissenschaftlichen Bearbeitung liegt ein Augenmerk des Projektes auf der technisch-naturwissenschaftlichen Untersuchung der Objekte sowie auf der Erstellung von exakten Umzeichnungen auf Basis von 3D-Scans.

Trouble in Store - defusing the battery problem at the Technical Museum Vienna

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Introduction to the significance of batteries as cultural-technological objects and sources for scientific research. Outline of the problems, challenges and opportunities batteries represent to museum institutions (identification, manipulation, storage, exhibition and research).

Four sections will treat the following topics at the TMW: Developments in the storage of batteries to date; surrogates as safe alternatives for their display in public spaces; treatment options for their physical preservation; and research to improve and develop conservation methodology.

DiTAH - a project to expand digital skills, methods and infrastructure in humanities research and teaching

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The aim of the DiTAH-project (Digital Transformation for Austrian Humanities) funded by the Austrian Federal Ministry of Education, Science and Research is to establish and process the methods and approaches developed in the Digital Humanities in such a way that they can be transferred to everyday use in humanities research and the education of students and scholars. For this purpose, jointly developed solutions are created in three major subject areas: integration of the digital infrastructure, preparation and low-threshold access to digital methods and tools, and the promotion of digital skills in science and teaching. The implementing consortium consists of members of leading Austrian DH institutions (<https://www.ditah.at/>).

Within the project, the interdisciplinary investigation of historical manuscripts generates a variety of measurement and descriptive data: these range from multi- and hyperspectral images to spectroscopic material analyses, codicological and restoration descriptions, to transcriptions and philological editions. As part of the DiTAH-project, a repository for archiving and disseminating this diversity of data in the form of multimodal manuscript representations is being developed. With regard to Linked Open Data, particular value is placed on the use of established standards (IIIF, METS, TEI, SKOS). These objects are disseminated on the one hand via a web viewer and on the other hand via technical interfaces.

The data material that has been produced continuously for years as part of the research work of the Vienna Centre of Image and Material Analysis in Cultural Heritage (CIMA: <https://cima.or.at/>) is used as a concrete application. The resulting repository is intended both for further use of the data in technical, scientific and humanities research, as well as for university teaching (in particular for teaching technical methods and data sources in the humanities).

Optical coherence tomography in long wavelength range: a prospective method for art object diagnosis

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Optical coherence tomography (OCT) is a non-destructive contactless method for volumetric structural imaging of morphologically and chemically complex specimens (see Fig.1). Recent advances in the development of OCT beyond the standard biomedical field – in the long near-IR and mid-IR spectral ranges – have opened up many new applications (Zorin et al. 2020; Cheung et al. 2015). Among these scenarios is the preservation and restoration of works of art and heritage objects (Zorin et al. 2019; Zorin et al. 2020). In this contribution, we demonstrate the state of OCT technology in this area and show typical results and performances.

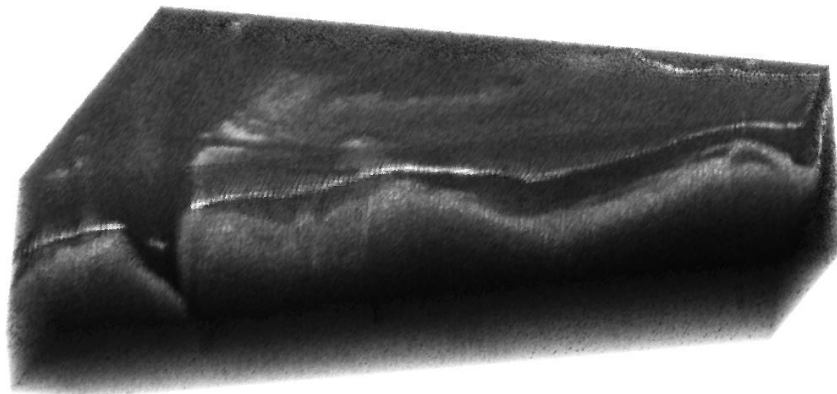


Figure 1: OCT volumetric scan of a varnish coated painting mockup.

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IAEA fosters the development and applications of accelerator-based analytical techniques for Heritage Science

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The IAEA Physics Section is pursuing efforts on utilizing accelerator-based nuclear analytical techniques to support fundamental and applied research, as well as provide education and training worldwide.

Characterization of cultural and natural heritage for their conservation is among the key priority areas of accelerator applications. Relevant accelerator-based analytical techniques include ion beam analysis, accelerator mass spectrometry and synchrotron-based techniques.

There are various tools and mechanisms to foster accelerator science and technology for characterization, dating, authentication, and provenance of cultural and natural heritage such as knowledge transfer and knowledge sharing with the scientific community, heritage science stakeholders and the public. Optimization of the analytical conditions and developing mitigation strategies towards safe analysis have utmost importance in our activities (Bertrand et al. 2015). Through the IAEA Technical Cooperation projects, we are also assisting developing Member States in creating new installations and upgrading/advancing accelerator-based and nuclear analytical techniques to strengthen their role for heritage science.

A specific workspace on the IAEA Accelerator Knowledge Portal designed to serve the scientific and industrial community highlights the use of accelerator-based techniques and the dedication to pursuing safe analysis of heritage objects and materials [Accelerators4Heritage (iaea.org)].

The poster will give an insight of the IAEA activities on the characterization, dating, authentication and provenance of cultural heritage with accelerator-based techniques and how to enhance the involvement and collaborations with the IAEA in this field.

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Characterization of mineral building materials from the Fortress of Basthovë, Albania

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The ruins of the Fortress of Basthovë, built between the 15th and 18th centuries, are a significant example of the Albanian cultural heritage. As part of a co-operation with UNOPS, mortar and stone samples from walls built in different periods were investigated in order to gain insights into their material characteristics and state of preservation. Analyses carried out by light and electron microscopy revealed a unique mortar binder characteristic including a general good state of preservation and hydraulic properties caused by a local, impure lime sediment used for lime burning. Based on the results an appropriate mortar system has been elaborated and applied on-site during a conservation campaign in 2022.

New underwater archaeological explorations of an endangered submerged prehistoric site in Lake Wörthersee (Carinthia, Austria)

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Waterlogged sites at the shores of alpine lakes and wetlands of the perialpine zone (vulgo pile-dwelling settlements) offer unparalleled preservation conditions for organic archaeological materials. In 2011, UNESCO World Heritage status was inscribed to 111 of such sites, and their prevalence is growing as an important subject of research. Today's general understanding of European wetland settlement prehistory is significantly shaped by interdisciplinary research. In Carinthia, neither the quality nor the quantity of wetland sites have been recorded systematically. Considering this, the region has a special position regarding the international discourse on archaeological heritage science. Consequently, it is holding large potential for future contributions to the field. A methodical modern approach to archaeological fieldwork is critical for addressing this research gap. In winter 2021 new underwater archaeological fieldwork revealed an unexplored new site in Lake Wörthersee. First preliminary results are presented. Necessary strategies for the protection of this heavily erosion-exposed underwater monument are discussed.

Long term mineral poultices with clay mineral content for the application in microbial and heavily salt contaminated monuments

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The “Pretty in Pink” research project investigates not only the microbial colonisation of historic and salt-contaminated plaster but also the effect of salt reduction treatments with mineral compresses. Specially prepared compresses are tested on the salt-contaminated test specimens in the laboratory and *in situ*. The damaged surfaces in the *Virgilkapelle* in Vienna were chosen as a historical object. In order to check the effectiveness of the compress mixtures in terms of salt extraction and applicability, they are subjected to test methods and analytical procedures like XRD, IC and SEM.

How does history taste like? A closer look on food archaeology

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This poster is meant to be a presentation of a rather new approach in archaeology. Food archaeology is a very broad topic. It will not be possible to elaborate all the related areas, but the focus will be on definitions and methods as an introduction to the subject. Food archaeology will be defined as well as its limits. What can be analysed and what can't, what can be interpreted and what remains undisclosed to our understanding.

Über Heritage Science Austria



Motivation

Heritage Science Austria soll durch die Vernetzung der österreichischen Forschungs-Community aus den Gebieten Naturwissenschaften, Technologie und Geisteswissenschaften die Dokumentation, das Verständnis und die Erhaltung des kulturellen Erbes und Naturerbes Österreichs verbessern.

Ziele sind:

- Bündelung von Ressourcen und Infrastruktur durch Austausch von Museen, Galerien, Archiven, Sammlungen, Universitäten, Forschungsinstituten, Klein- und Mittelunternehmen und selbständigen Fachleuten;
- Aufbau und nachhaltige Sicherung von Expertenwissen und effizienter Wissenstransfer;
- Teilnahme Österreichs an internationalen Forschungsprogrammen sowie E-RIHS (European Research Infrastructure for Heritage Science).

Team

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KUNST HISTORISCHES MUSEUM WIEN	Naturwissenschaftliches Labor
A...kademie der bildenden Künste Wien	Institut für Naturwissenschaften und Technologie in der Kunst
TU WIEN TECHNISCHE UNIVERSITÄT WIEN	Röntgenzentrum
di:'angewandte	Institut für Konservierung und Restaurierung
universität wien	Institut für Physikalische Chemie
150 YEARS FEATURING FUTURE 1872 - 2022 UNIVERSITY OF NATURAL RESOURCES AND LIFE SCIENCES, VIENNA	Institut für Physik und Materialwissenschaften Institut für Landschaftsarchitektur Institut für Hydrobiologie und Gewässermanagement