The Scientific infrastructure at LEIZA: past - present - future

16.12.2024

ROLAND SCHWAB

Kompetenzbereich »Restaurierung, Konservierung und Materialanalytik«

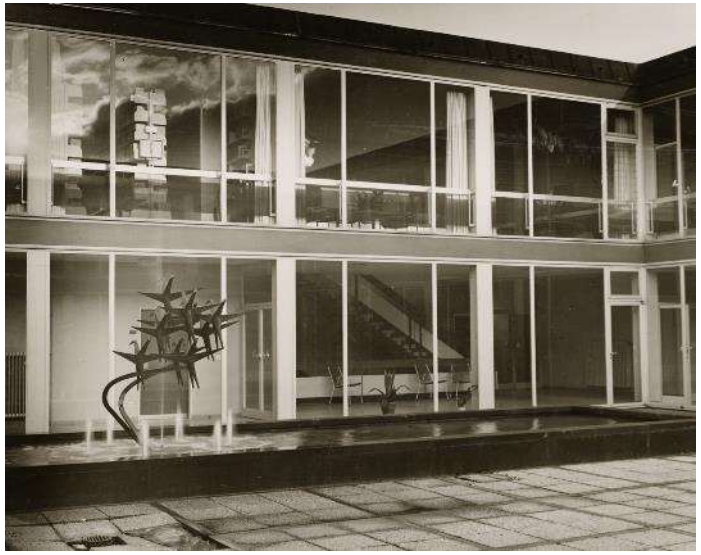
Labor für Archäometrie & Labor für pyrotechnologische Studien und Experimente (PyroSEr)

Römisch-Germanisches Zentralmuseum Mainz (RGZM)

1852 - 2022

Housed in the Electoral Palace

Restoration workshops during 19th cent (LEIZA)



New building from 1960

The chemical laboratory

The chemical laboratory in 1962 (LEIZA)

Prof. H.-J. Hundt & Dipl. Chem. Dietrich Ankner 1973 (© LEIZA)

Leibniz-Zentrum für Archäologie (LEIZA)

Ludwig-Lindenschmit-Forum 1

1. The new building and the Museum für Antike Schifffahrt (© LEIZA)

Exploratory Research and Method Development

Speakers: Roland Schwab & Ivan Calandra

Sections of the Scientific infrastructure

- Laboratories for Restoration and Conservation, R. Lehnert
- Laboratory for Archaeometry, R. Schwab
- Imaging Platform at LEIZA (IMPALA), I. Calandra
- Laboratory for pyro technological Studies and Experiments (PyroSEr), R. Schwab
- Laboratory for Traceology and Controlled Experiments (TraCEr), J. Marreiros
- Scientific IT, digital Platforms and Tools, A. Mees

Laboratory for Archaeometry

Laboratory for materialography

(© R. Schwab)

Sample preparation of polished blocks, thin sections & powders

Precision cut-off machine (QATM Qcut 150 A)
& Vacuum mounting system (Buehler SimpliVac)

Semiautomatic grinding and polishing machine (QATM Qpol 300 A1-ECO+)

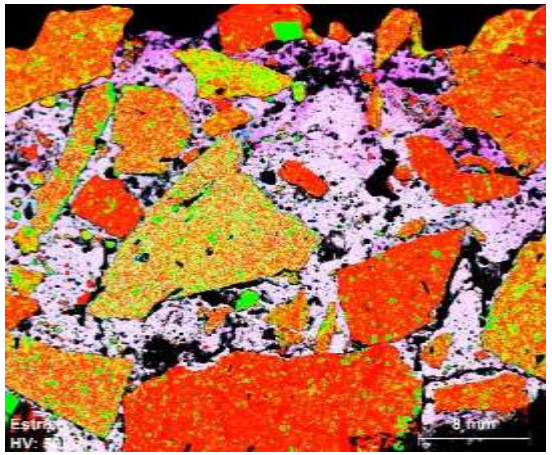
Planetary (Mono) Mill (Fritsch Pulverisette 6)

Laboratory for Archaeometry

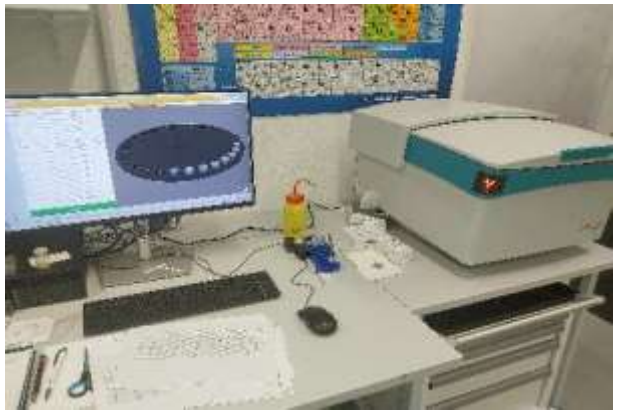
Laboratory for physical-chemical analysis

Several XRF devices for automated, spatially resolved and in-situ analysis (pXRF), Micro-LIBS

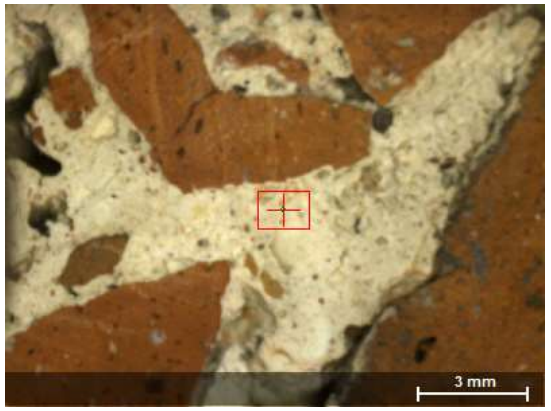
Micro XRF (Bruker M4 Tornado)



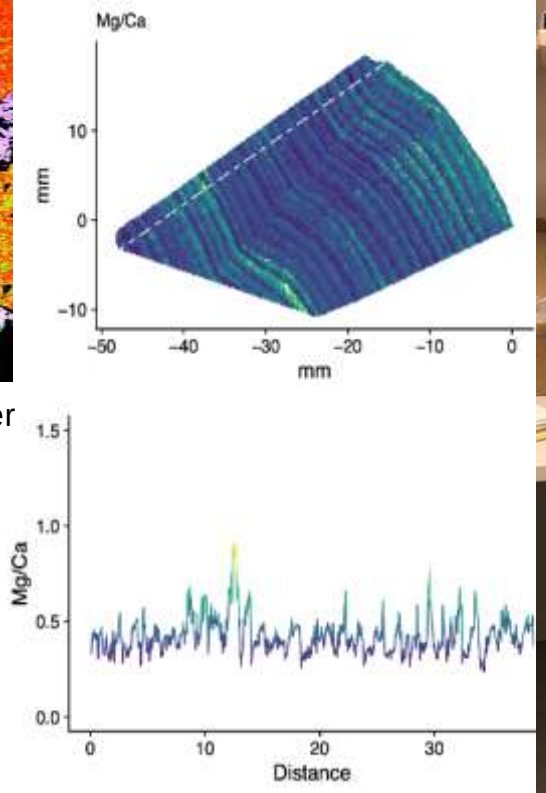
µ-XRF element map of Roman plaster



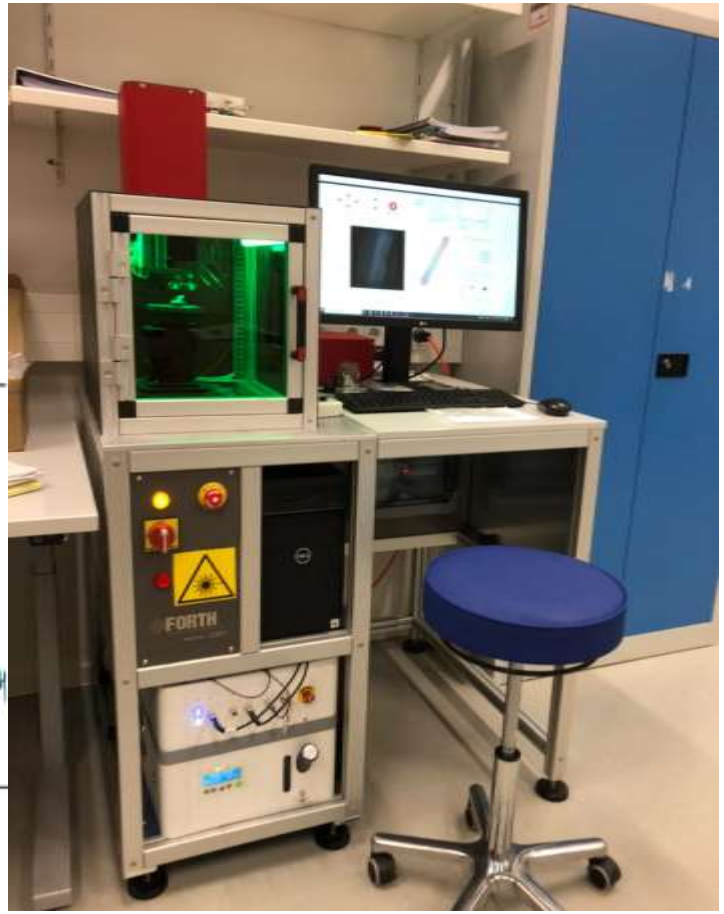
Automated benchtop XRF (Spectro XEPOS HE)



µ-XRF point analysis (R. Schwab)



LIBS element map of carbonate layer in a Roman aqueduct (© N. Hausmann)



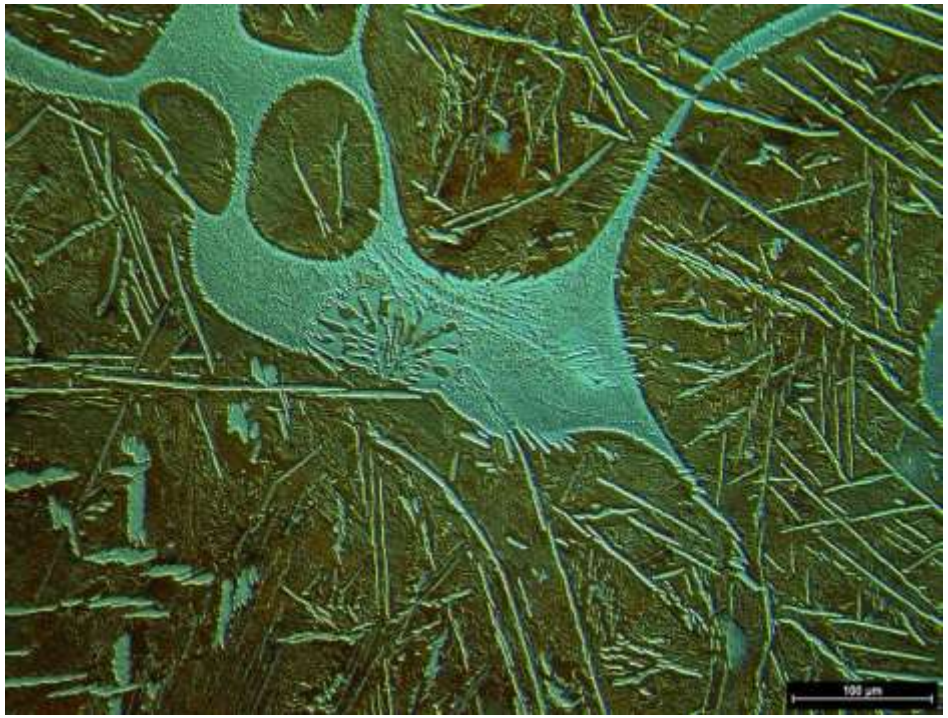
laser-induced breakdown spectroscopy (LIBS)

Imaging Platform at LEIZA (IMPALA)

Non-destructive 2D and 3D documentation and measurement of artefacts

© I. Calandra

Different light-, laser- and digital microscopes, scanning electron microscope & 3D scanners



Medieval pig iron lump from a early blast furnace
(etched with Klemm I and viewed by sided light, R. Schwab)

Scanning electron microscope (ZEISS EVO 25)

Laser Scanning Microskope (ZEISS LSM 800 MAT mounted on the Axio Imager.Z2 Vario)

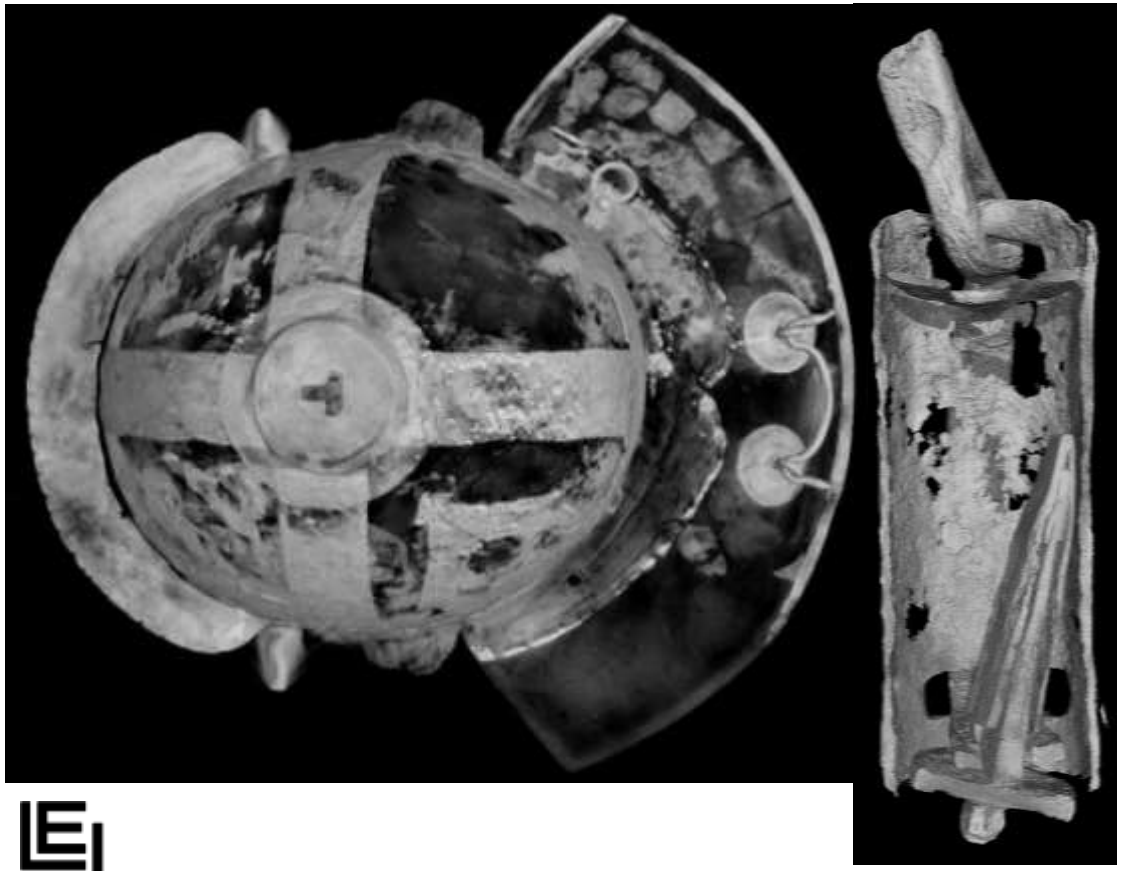
Automated digital microscope (ZEISS Smartzoom 5)

Imaging platform at LEIZA (IMPALA)

3D X-ray computed tomography scanner

© I. Calandra

- "Mainzer Militaria" (Roman period; PI: Christian Miks)
→ CT scans to document mechanisms, production, restoration...



2D and 3D computed tomography system (phoenix v|tome|x L 450)

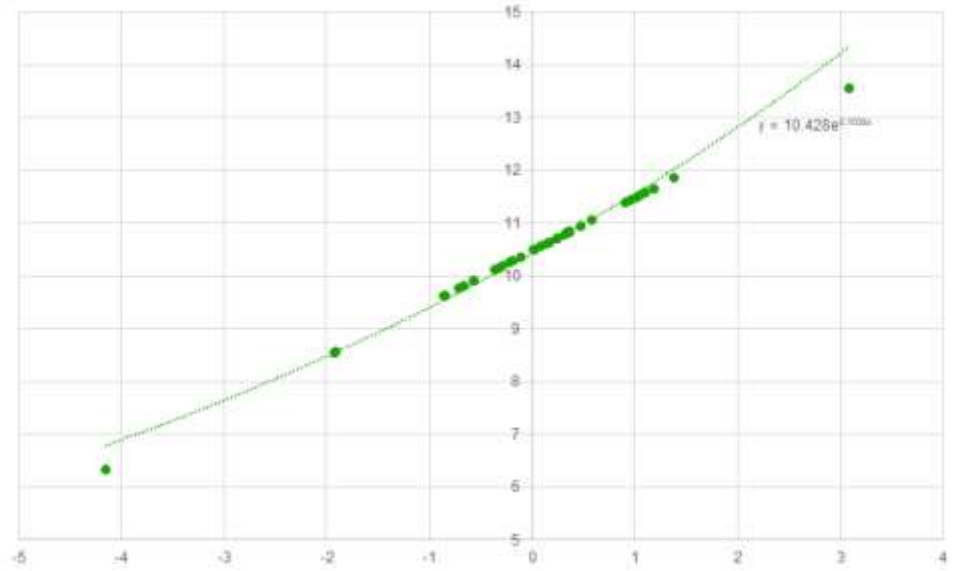
Scientific IT: Geodesy & Metrology

Documentation / Shrinkage

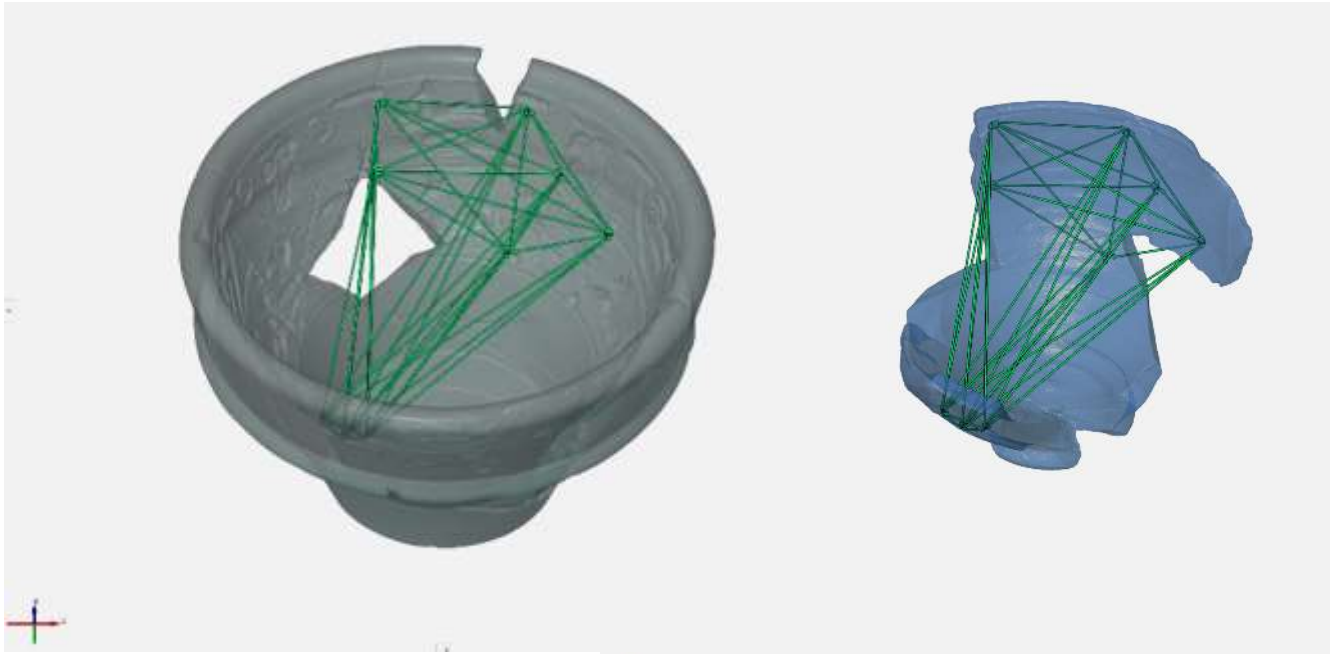
© A. Mees

How can geometric changes in ceramic shrinkage be documented and visualised?

Geometric changes between mould and the vessel made in this mould. Visualised In 3DHOP
https://leiza-scit.github.io/MouleGobelet-ToulonSurAllier/



Variance in shrinkage



Measurement of identical distances to determine the geometric changes

Images: Anja Cramer, Florian Thiery & Allard W. Mees / LEIZA, CC BY 4.0

Laboratory for pyrotechnological Studies and Experiments (PyroSEr) in Mayen

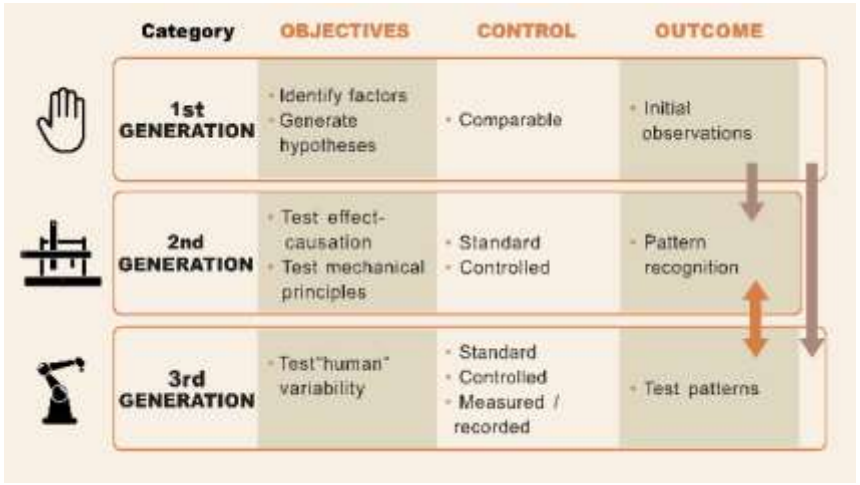
© E. Hanning

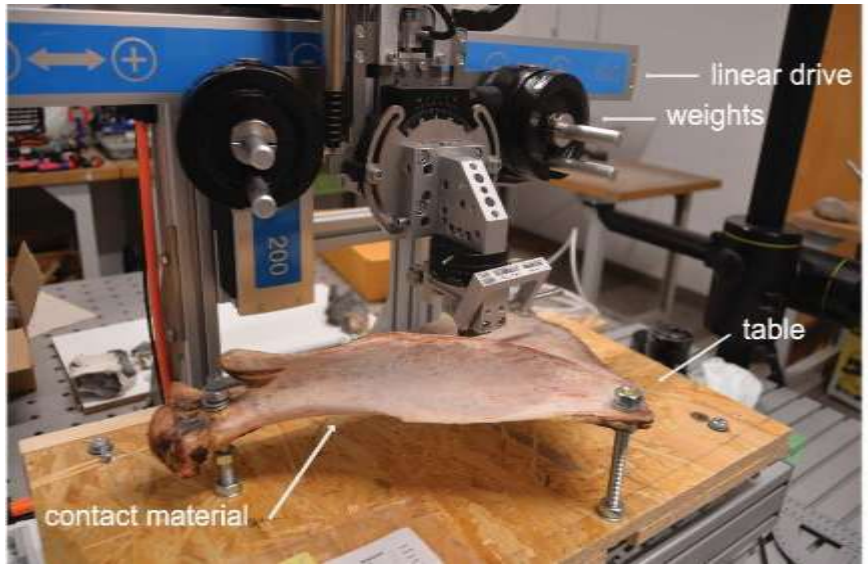
Laboratory for Traceology and Controlled Experiments (TraCEr)

Analyses of traces of use on artefacts from archaeological and experimental contexts

© J. Marreiros

protocols, guidelines and workflows for controlled experiments quantitative analyses of traces of use on artefacts.





Current LEIZA Projects

in the Near East

Numismatics

Jérémie Chameroy

Coinage and coin circulation in Pergamon and the Lower Kaiko Valley

To define Pergamon's networks and contacts with other cities from the Hellenistic to the Roman imperial period on the basis of the coins corpus of Pergamon's harbour Elaia and to illustrate their development.

Bronze coins from Elaia minted for Trajan (98-117)

Late antique coin moulds from Qasr-Qarun/Dionysias (Fayum)

Find complex of approx. 15,000 coin moulds from the early 4th cent. AD near the *ala V Praelectorum* camp offers a unique source for the investigation of unofficial local coin production in the Roman Empire. .

The tomb of Tutankhamun

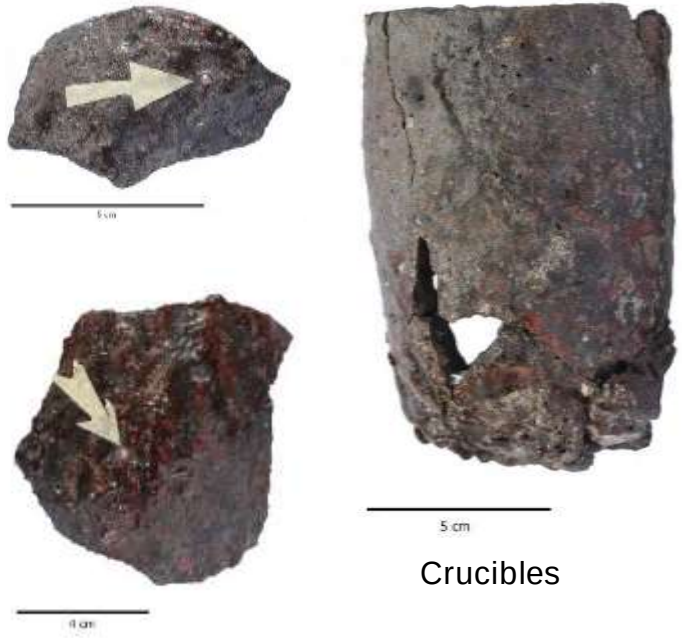
Katja Broschat & Christian Eckmann

Restoration and investigation of the gold from the tomb of Tutankhamun

An early Byzantine workshop for copper alloys on Elephantine Island (Aswan, Egypt)

Jörg Drauschke & Christian Eckmann

Elephantine Island



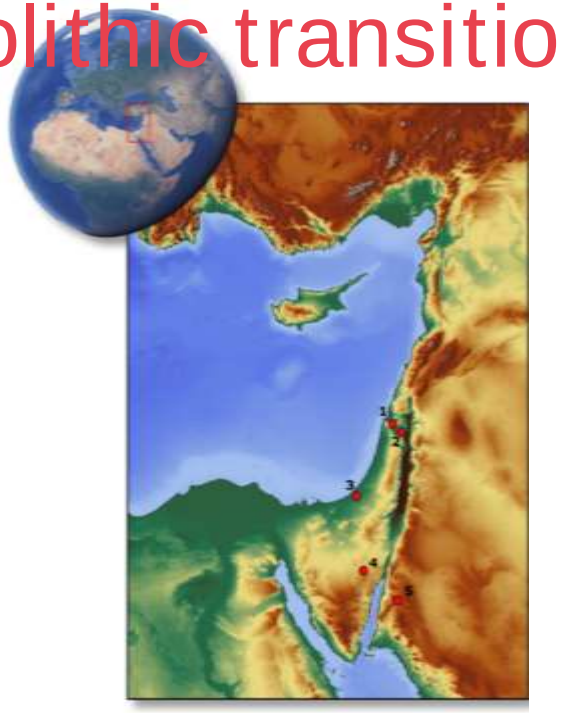
Crucibles

Crucible fragments with metal drops

In situ measurement with pXRF of metallurgical relicts in the fragments

On the origins of human technological innovations: new insights from stone tool use during the Late Middle-to-Upper Paleolithic transition in the Levant

João Marreiros



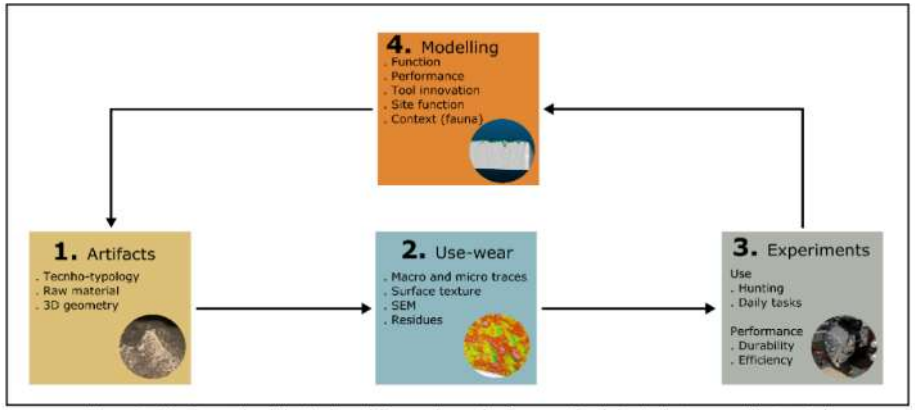


Figure 2 - Study methodological workflow, where the four methodological steps are illustrated.

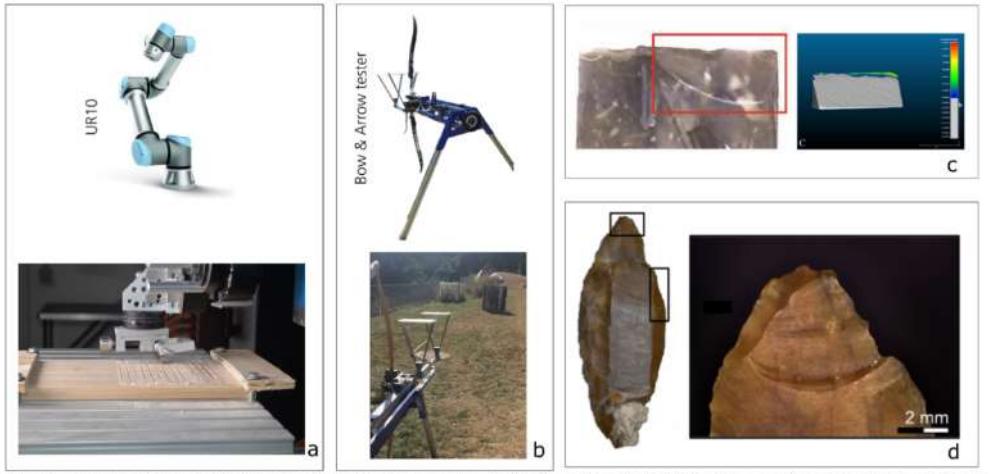


Figure 1 - Collaborative robotic Arm (a), and archery setup (b), that will be used to perform the experiments. Examples of edge damage data analysis (c) and diagnostic impact fractures (d).

Research agenda

- The aim of this project is to uncover and evaluate why stone tool technologies evolved during the LMP-UP transition
- The project combines two approaches a) identify signatures of tool use and b) experimentally test the tools' performance

Danke für Ihre Aufmerksamkeit.
Thank you for your attention.