13th scientific conference Methodology and Archaeometry

Zagreb, 27th and 28th of November 2025

https://metarh.ffzg.unizg.hr/

PROGRAMME:

Thursday, 27th of November

9:00 – 9:10
Conference opening

Key-note lecture:
Chair: Ina Miloglav

9:10 -9:55
Cristina Barrocas Dias
Meat in the Pots, Plants in the Bones: Integrating Organic Residues, Isotopes, and Proteins in Paleodietary Reconstruction

10:00-10:20 Coffee break

Session 1
Chair: Miroslav Vuković

10:20-10:35
Dimitrij Mlekuž Vrhovnik & Tomaž Fabec
Prehistoric Hunting Megastructures in the Adriatic Hinterland

10:40-10:55
Ivor Kranjec, Jelena Behaim & Miljenko Jurković
New LiDAR-Based Insights into Post-Roman Landscape Transformations of the Northern Adriatic: Three Case Studies from Istria and the Quarnero Islands

11:00-11:15
Tino Leleković
Boundaries Without Borders: What LiDAR and Magnetometry Revealed About the Croatian Limes

11:20-11:35
Srđan Beck & Katarina Šprem
Roman centuriation of ager Polensis in southern Istria (Croatia)

11:40-11:55
Marin Buble & Lujana Parman

Data sharing and the protection of archaeological heritage - possibilities of the intersectoral cooperation on mitigating the risk of wildfire damage to the archaeological heritage. The example of the Trogir area

12:00-12:20 Coffee break

Session 2
Chair: Jacqueline Balen

12:20-12:35
Kyriakos Sgouropoulos, Dushka Urem-Kotsou & Apostolos Sarris
Combining Field-Based and Remote Digital Approaches in Archaeological Surface Survey

12:40-12:55
Martina Naso, Arthur Leck, Rémy Chapoulie, Gabriele Gattiglia, Francesca Anichini, Bruno Dutailly, Claudia Sciuto, Théophane Nicolas, Ariane Menu, Amala Marx, Kai Salas Rossenbach, Nevio Dubbini, Ivan Radman Livaja, Jana Kopackova & Filomena Sirovica
Integrating 3D digitisation and archaeometric analyses in ceramics and lithics: automated workflows in the AUTOMATA project

13:00-13:15
Marko Porčić
A new approach to quantifying vessel shapes from profile drawings

13:20-13:35
Andreja Kudelić, Natali Neral, Dinko Tresić Pavičić, Filomena Sirovica, Ana Maričić, Mia Marijan & Dalibor Branković
Archaeology and Geology in Ceramic Studies: Towards an Integrated Framework for Interdisciplinary Pottery Technology Research in Croatia

13:40 – 14:40 Lunch break

Session 3
Chair: Jasna Vuković

14:40-14:55
Katja Kavkler, Elena Leghissa, Miran Pflaum, Peter Turk, Maja Gutman Levstik, Lidija Korat Bensa & Sabina Dolenec
Preliminary Results of Archaeometric Analyses of White Incrustations on Third Millennium BC Pottery – A Case from the Ljubljansko barje area

15:00-15:15
Atanas Tsurev & Nikolina Nikolova
Beyond Red and White: Archaeometric Perspectives on Early Neolithic Pottery at Chavdar

15:20-15:35
Bogdan Manea, Valentin Radu, Daniela Dimofte, Ioana Poroșnicu, Adrian Sima, Florin Vlad, Ion Tiseanu & Cătălin Lazăr

Born by Nature, Shaped by Man: Archaeometric Insights into Shell-Tempered Chalcolithic Pottery from Săveni-La Movile

15:40-15:55
Massimiliano Puntin
Protocol for investigating ancient colours: a multi-analytical non-destructive approach to the study of Roman painted plasters

16:00-16:15 Coffee break

***Session 4* - Poster presentation**

16:15-17:00

Jelena Bulatović, Ivana Dimitrijević, Ina Miloglav, Jacqueline Balen & Krešimir Filipec
Animal Exploitation in the Copper Age of Eastern Slavonia: Zooarchaeological Evidence

Izaskun Egilegor Uranga
Beyond Prehistory: Towards a Methodology for Contemporary Archaeology of Megaliths

Marija Kostić, Nejra Omerović, Jugoslav Pendić, Maja Kokanović, Tamara Blagojević & Jelena Jovanović
The use of micro computer tomography (mCT) in scientific purposes and preservation of cultural heritage

Ante Lozina & Andrej Bašić
Digitization of the Sacred: Initiating a Digital Database of Saints' Archaeological Remains and Relics in Dalmatia – Interdisciplinary Approach and Knowledge Transfer

Anna Nicolussi & Diana Dobreva
Late Antique Coarse Ware from Negrar di Valpolicella (Verona, Italy): Local Production and Regional Exchange

Petra Nikšić & Krešimir Filipec
Reassembling the past: four methods used for determining the minimum vessel number at the early medieval site Stari Perkovci – Debela šuma (Eastern Croatia)

Almir Olovčić & Katarina Šprem
Chert samples from the Istrian peninsula (Croatia) and their chemical signatures: can we make a distinction based on the results?

Franka Ovčarić & Janja Mavrović Mokos
Shaping the Edge: Late Bronze Age Fortifications of Northwestern Croatia

Ivana Pandžić & Milica Tapavički Ilić
Salt Through Time - A Multidisciplinary Approach to Understanding Salt, Life, and the Earth System

Maarten Peels
An epistemology for prehistoric filmmaking

Milica Tapavički-Ilić, Theodora Moullou & Barbara Care
COST action GameTable (CA 22145) computational techniques for tabletop games heritage

Milica Tapavički-Ilić, Ivan Radman Livaja & Gabriele Gattiglia
COST action MAIA (CA 23141) - managing artificial intelligence in archaeology

Friday, 28th of November

Session 5
Chair: Marko Banda

10:00-10:15
Boris Rozić
Spatial Analysis of Mousterian Sites in Bosnia and Herzegovina

10:20-10:35

Petar Minkov, Zheni Vasileva, Denitsa Sandeva, Yana Dimitrova, Hanna Aleksandrova & Nadezhda Karastoyanova
Unveiling the Past: Interdisciplinary Methods Applied to the Late Bronze Age Site of Kamenovo, Northeast Bulgaria

10:40-10:55
Katarina Šprem, Damir Pocrnić & Damir Palenik
Veli Brijun quarries, Istria, Croatia – historical and geological context

11:00-11:15
Marta Rakvin & Jacqueline Balen
Developing Interdisciplinary Strategies for Public Engagement with Iron Age Heritage

11:20-11:40 Coffee break

Session 6
Chair: Goran Tomac

11:40-11:55

Mario Novak, Valentina Martinoia, Mario Carić, Natalija Čondić, Domagoj Perkić, Dinko Tresić Pavičić, Morana Vuković, Joško Zaninović, Emily Zavodny & Sarah McClure
Comparative regional stable isotope analysis reveals fluctuations in millet consumption during the Bronze and Iron Ages in Croatia

12:00-12:15

J. Marla Toyne, Donovan Adams, Andrea Rimpf, Mario Carić & Mario Novak
Unpacking 'Fuzzy' Diets: Using Fuzzy Clustering Analytical Methods of Stable Isotopes to Examine Community Identity in Late Avar Period Šarengrad, Croatia

12:20-12:35

Valentina Lončarić, Mafalda Costa, Domagoj Perkić, Hrvoje Potrebica & Marko Dizdar
Threads of Glass: Production and Provenance of Iron Age Adornments from the Zakotorac and Nakovana tumuli

12:40-12:55

Marin Šoufek & Iva Kaić
The use of SEM-EDS in the analysis of 13 green-coloured Roman engraved gems from Sisak, Croatia

13:00-13:20 Coffee break

Session 7
Chair: Ina Miloglav

13:20-13:35

Selena Vitezović & Gordana Jeremić
Technology and function of bone objects from the Roman period: some preliminary results

13:40-13:55

Zheni Vasileva, Petar Minkov, Vanya Petrova, Denitsa Sandeva, Hanna Aleksandrova & Yana Dimitrova
Caught in Arachne's net: Old Artefacts and New Discoveries from the Chalcolithic Period through Interdisciplinary Methods

14:00-14:15

Tena Karavidović, Janja Mavrović Mokos & Tajana Sekelj Ivančan
Technological Insights into Iron Age Ironworking: Evidence from the Late Hallstatt Settlement of Sveti Križ (North-West Croatia)

Archaeology and Geology in Ceramic Studies: Towards an Integrated Framework for Interdisciplinary Pottery Technology Research in Croatia

Andreja Kudelić[1], Natali Neral[1], Dinko Tresić Pavičić[2], Filomena Sirovica[3], Ana Maričić[4], Mia Marijan[5], Dalibor Branković[6]

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[2]Kaducej d.o.o., Split, Croatia

[3]Archaeological Museum in Zagreb, Zagreb, Croatia

[4]University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Department of Mineralogy, Petrology and Mineral Resources, Zagreb, Croatia

[5]Heritage 993, Split, Croatia

[6]Arheo Tech d.o.o., Draganić, Croatia

13th scientific conference Methodology and Archaeometry
27th – 28th of September 2025, Zagreb

Introduction: From Fragmented Research to a Unified System

- Until recently: no systematic integration of archaeological and geological data on pottery production
- Archaeometric studies were rare and often fragmented, using different methods and data systems
- Croatian Science Foundation **project prePOT** introduced a systematic, multidisciplinary approach across Croatia

  - Established the **first national study collection** (archaeological + geological)
  - Created an **integrated digital database**
  - Led to the founding of LaKeS **Laboratory at the Institute of Archaeology**

Technological features and cultural practices in prehistoric pottery traditions in Croatia (prePOT) (UIP-2020-02-3637)

February 1st **2021** – July 31st **2026**

Research group:
Andreja Kudelić, Ana Maričić, Natali Neral, Dinko Tresić Pavičić, Mia Marijan, Dalibor Branković, Filomena Sirovica
http://prepot.iarh.hr/index.php/en/

INSTITUTE OF ARCHAEOLOGY

HRZZ Hrvatska zaklada za znanost

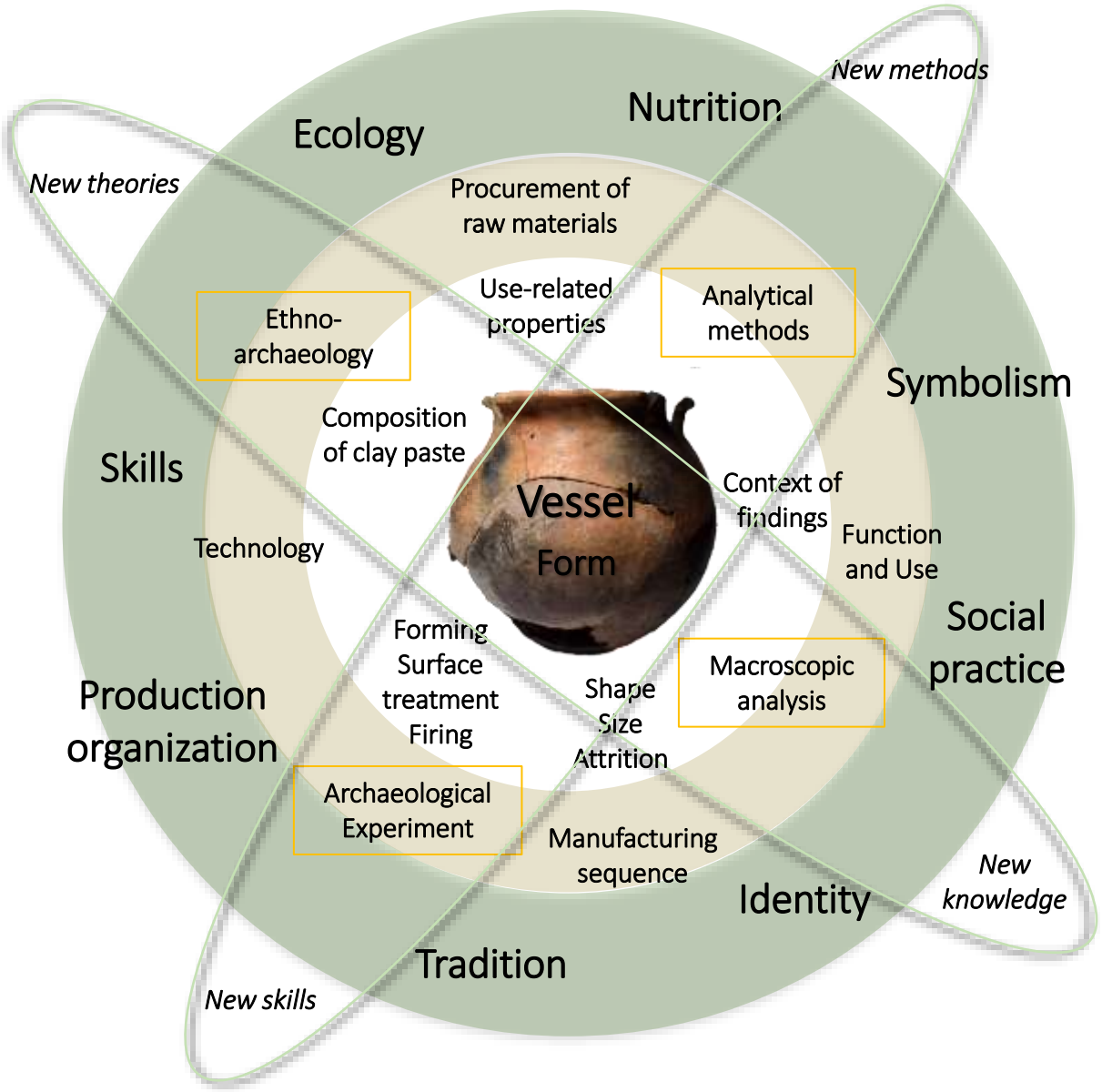
PREPOT

The Project: *Technological features and cultural practices in prehistoric pottery traditions in Croatia (prePOT)*

- Funded by the Croatian Science Foundation (2021–2026) (UIP-2020-02-3637)
- Systematic study of prehistoric pottery from settlements, graves & caves
- Focus on: raw material selection; clay paste composition; technological sequences of production

Goals:

- Identification of vessel types, production methods, and use through time and across regions
- Recognition of technological patterns within broader pottery assemblages and ceramic styles
- Understanding knowledge transmission, integration of new techniques, and external influences on local traditions
- Assessment of how environmental factors (raw materials, landscape) shaped technological choices in relation to cultural practices and preferences



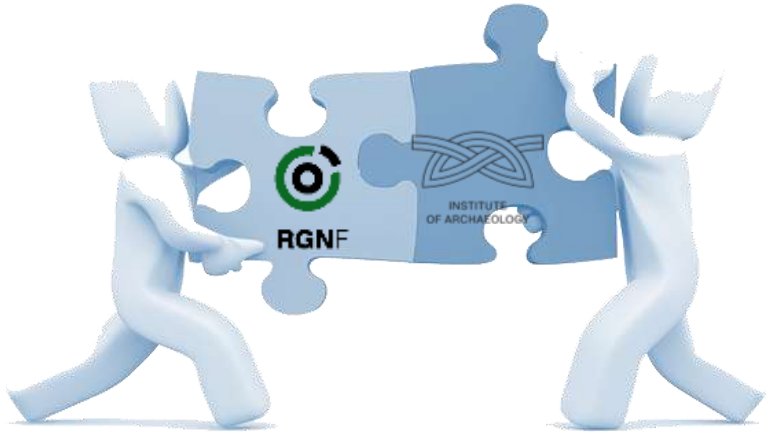
Multidisciplinary Research Approach

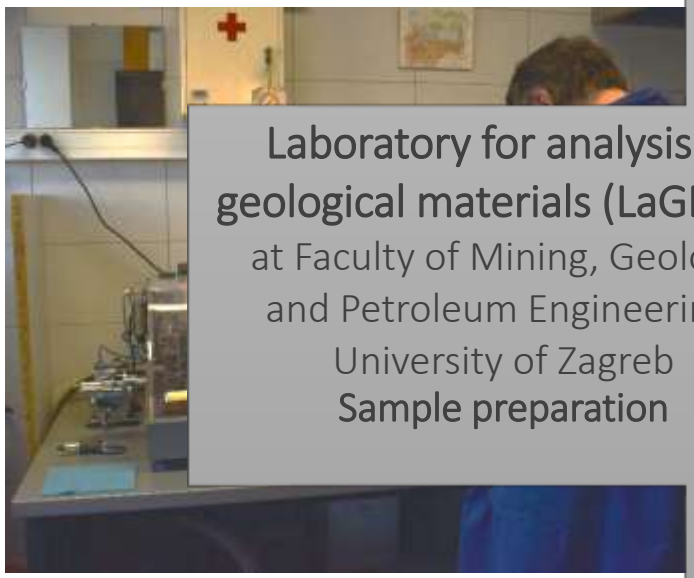
- Archaeological & geological methods
- Macroscopic, experimental & analytical methods
- Natural & technical sciences: raw material, properties, origin
- Pottery as a complex techno–cultural system
- Holistic integration of evidence → more credible interpretations
- All conducted within a unified methodological framework
- Advancing archaeological science in Croatia

Selected archaeological ceramics, along with **raw materials** collected near archaeological sites, are subjected to **mineralogical and petrographic analyses** (**optical microscopy, X-ray powder diffraction**), **FTIR spectroscopy**, **sedimentological**, and **geochemical analyses**.

Prerequisite for meeting Project objectives

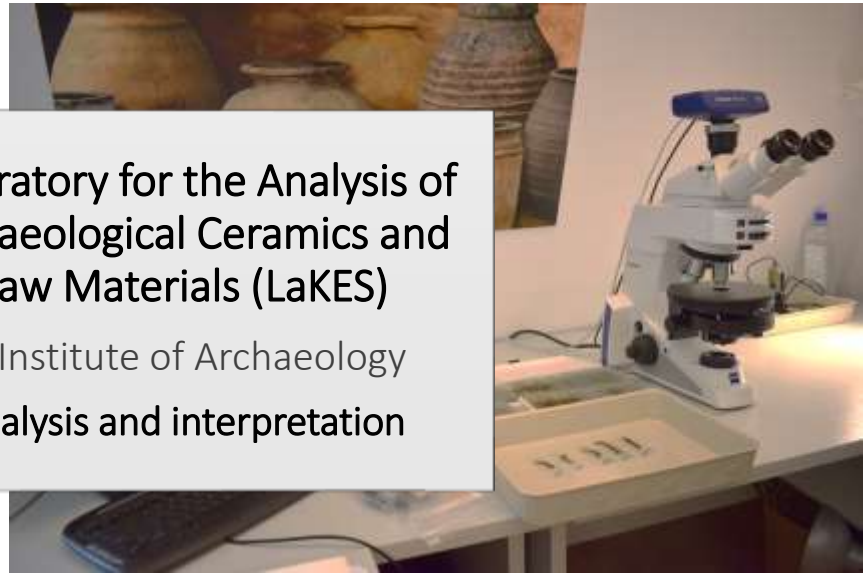
1. Establish a **standardized system** and methodology for material processing and analysis.
2. Assemble and train a **specialized research team**, including both archaeologists and geologists.
3. Provide the **necessary research infrastructure**, such as an optical microscope for thin-section petrography — a fundamental method for ceramic analysis.
4. Develop **collaboration and networking** with external Laboratories.





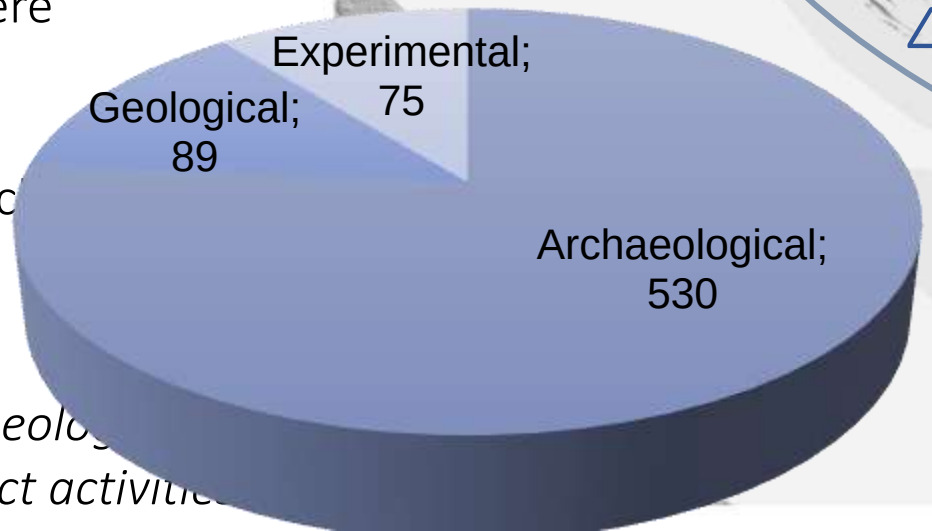
Laboratory for analysis of geological materials (LaGEMA)
at Faculty of Mining, Geology, and Petroleum Engineering, University of Zagreb
Sample preparation

Laboratory for the Analysis of Archaeological Ceramics and Raw Materials (LaKES)
at Institute of Archaeology
Analysis and interpretation

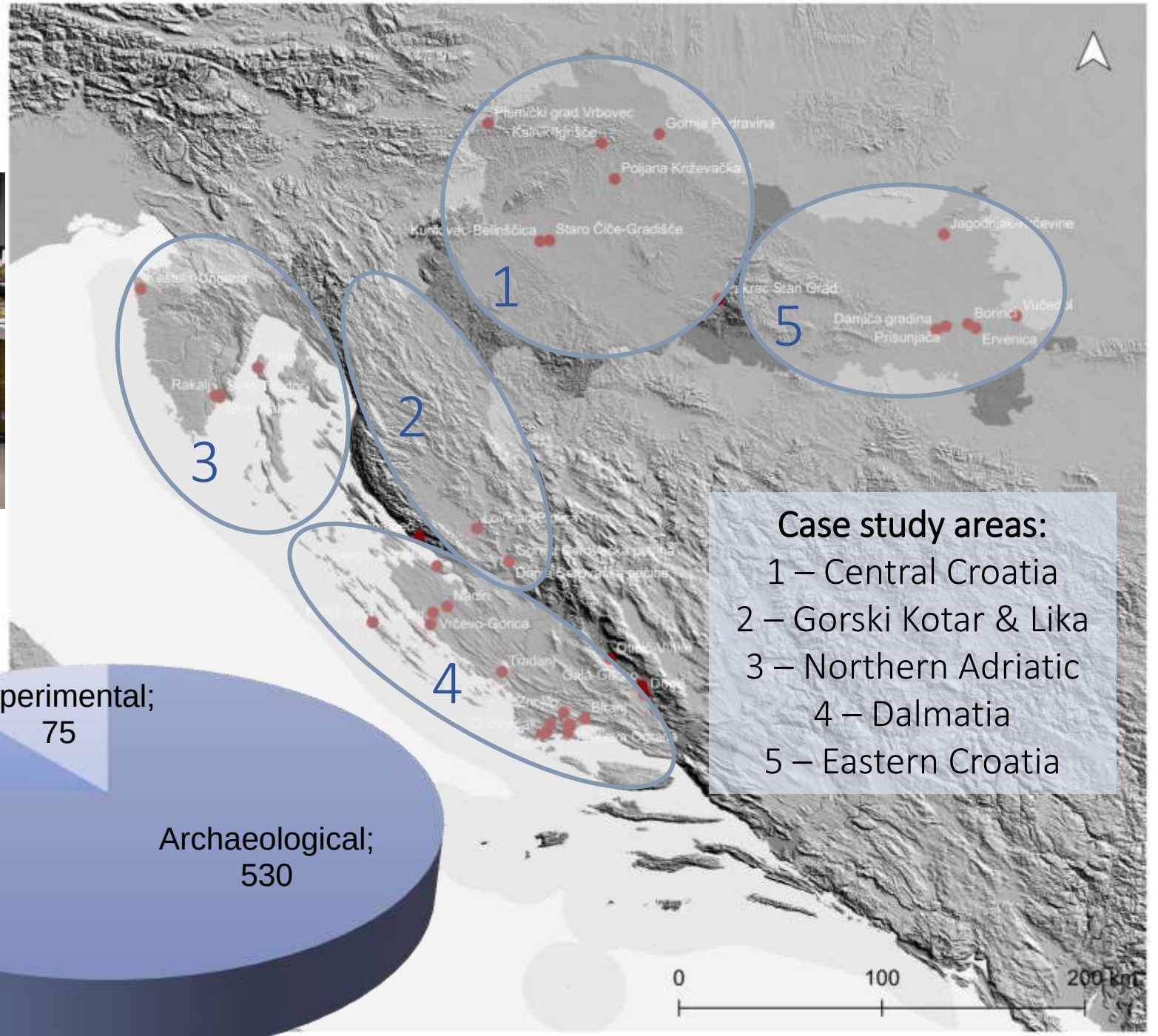


Sample Collection and Analytical Dataset

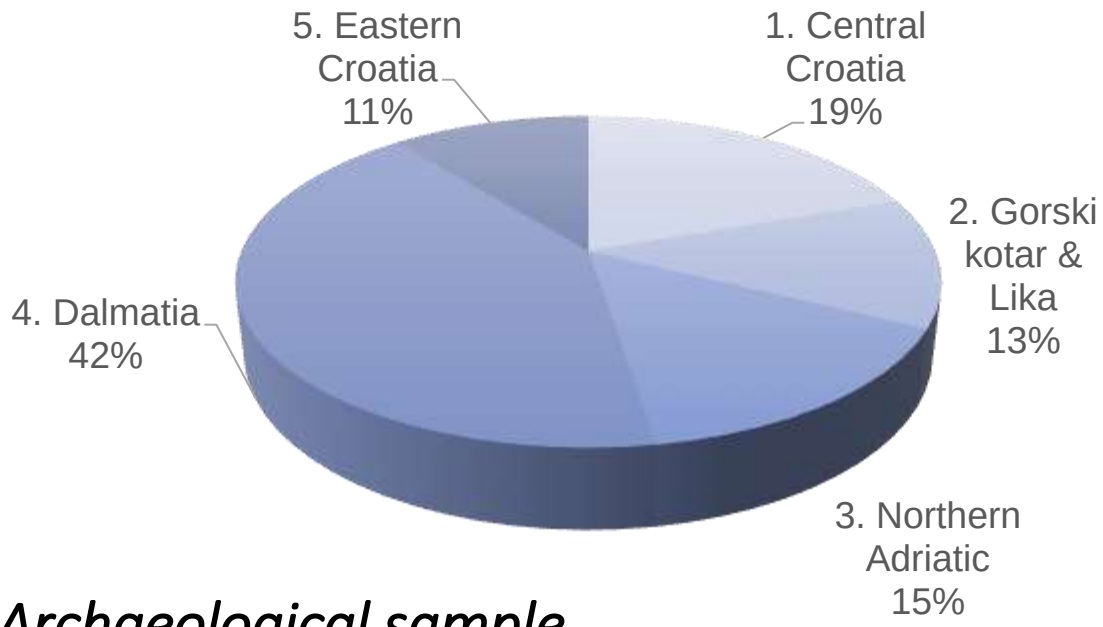
The archaeological component of the database includes only those pottery samples that were selected and subjected to analytical methods, forming a representative subset of a much larger body of excavated material.



Distribution of archaeolo
included in the project activiti

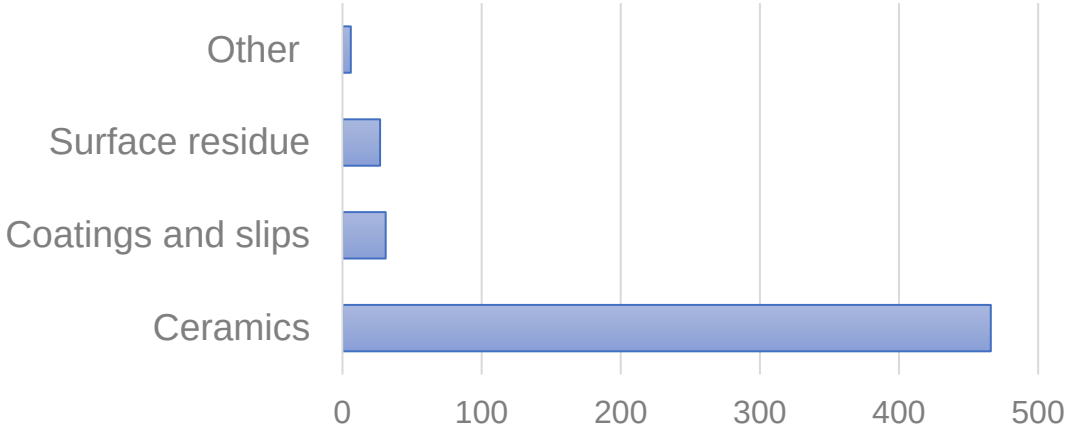


Sample Distribution by Region

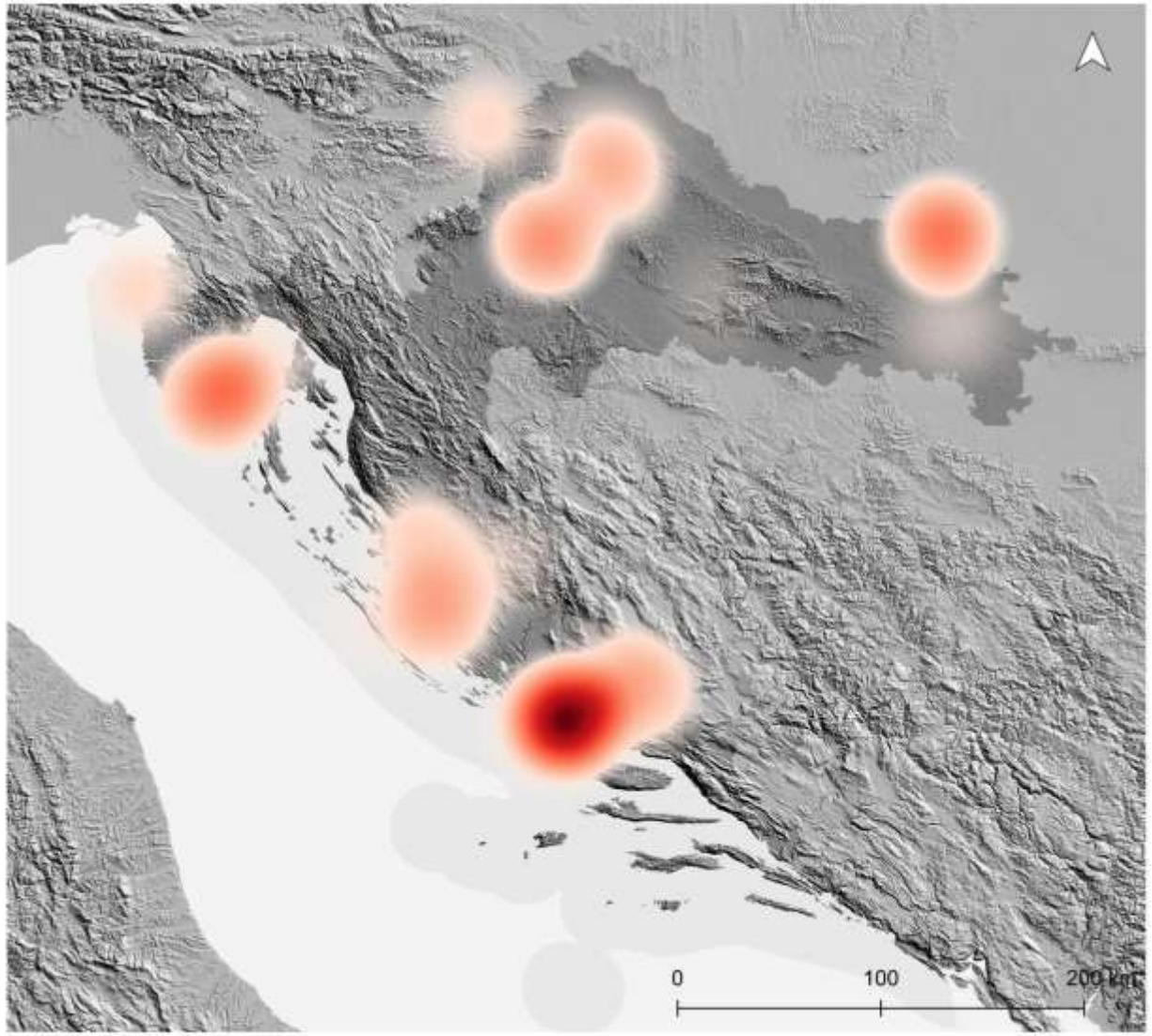


Archaeological sample

representation by case study region ⬆

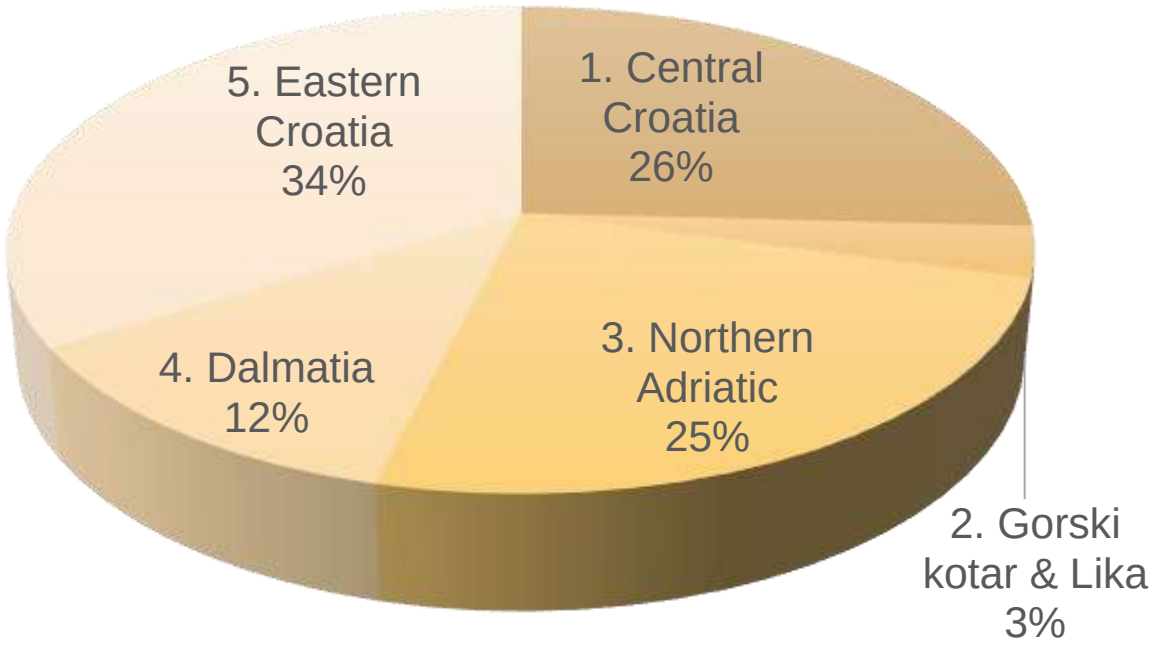


Proportion of Archaeological Sample Types in the Total Dataset



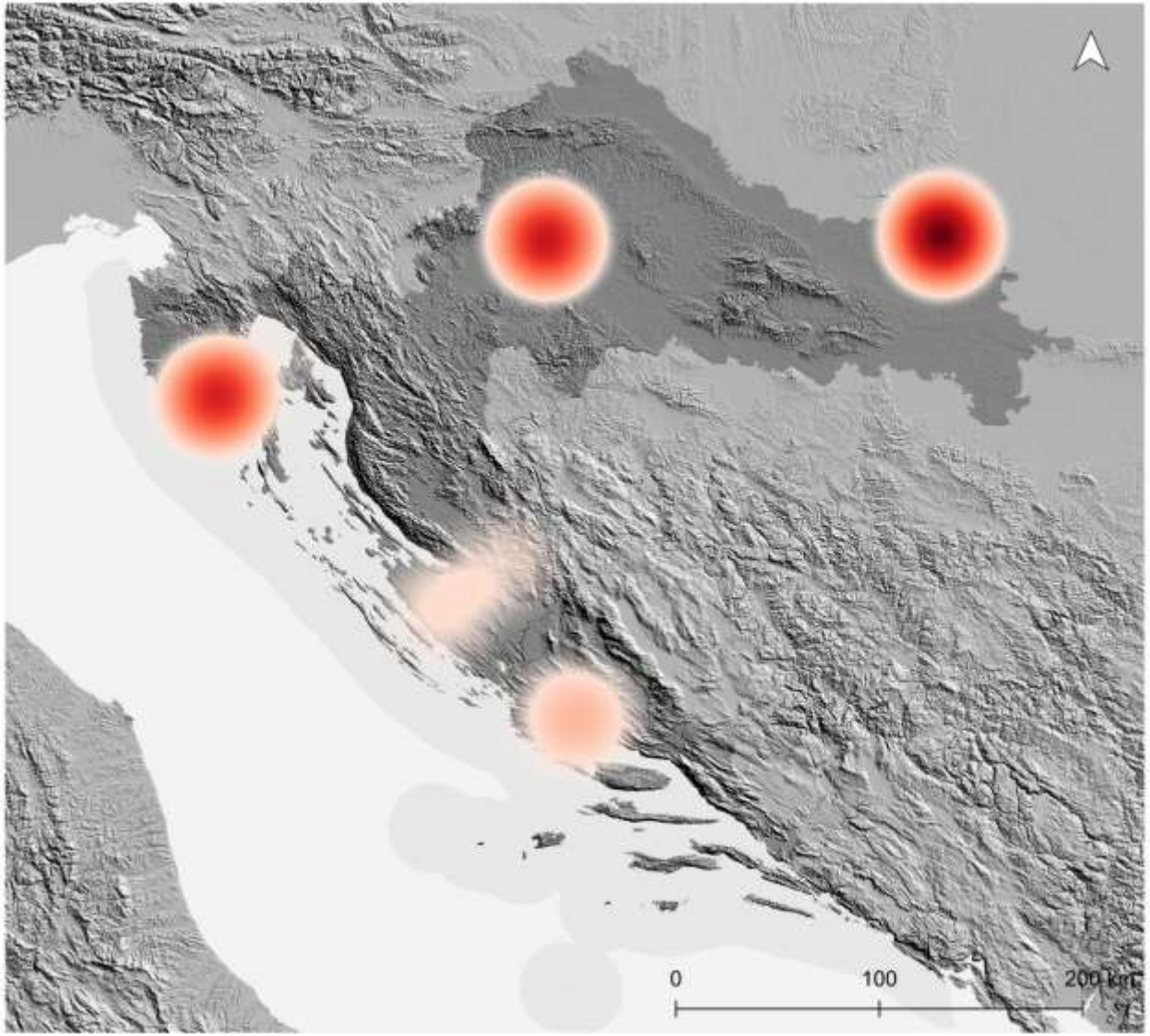
A GIS-generated heat map illustrates the spatial concentration of archaeological samples.

Sample Distribution by Region



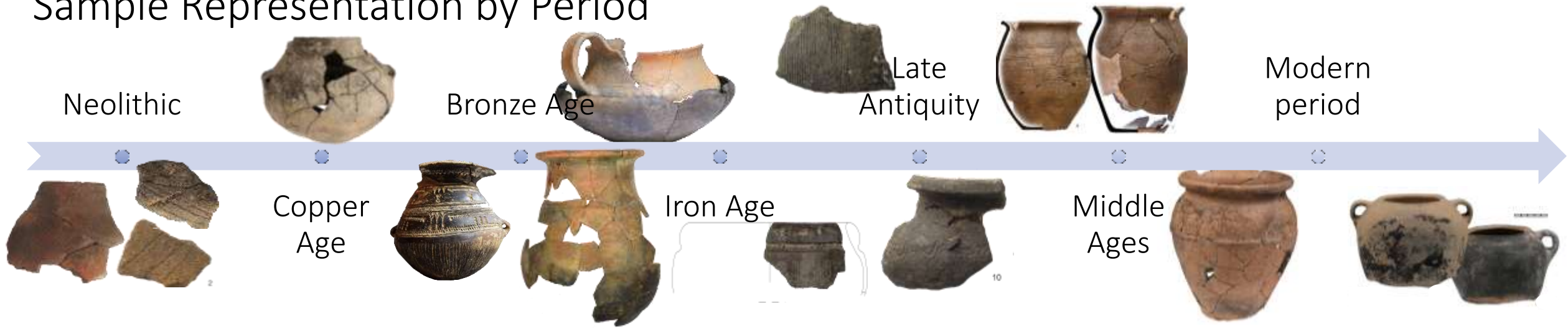
Geological sample

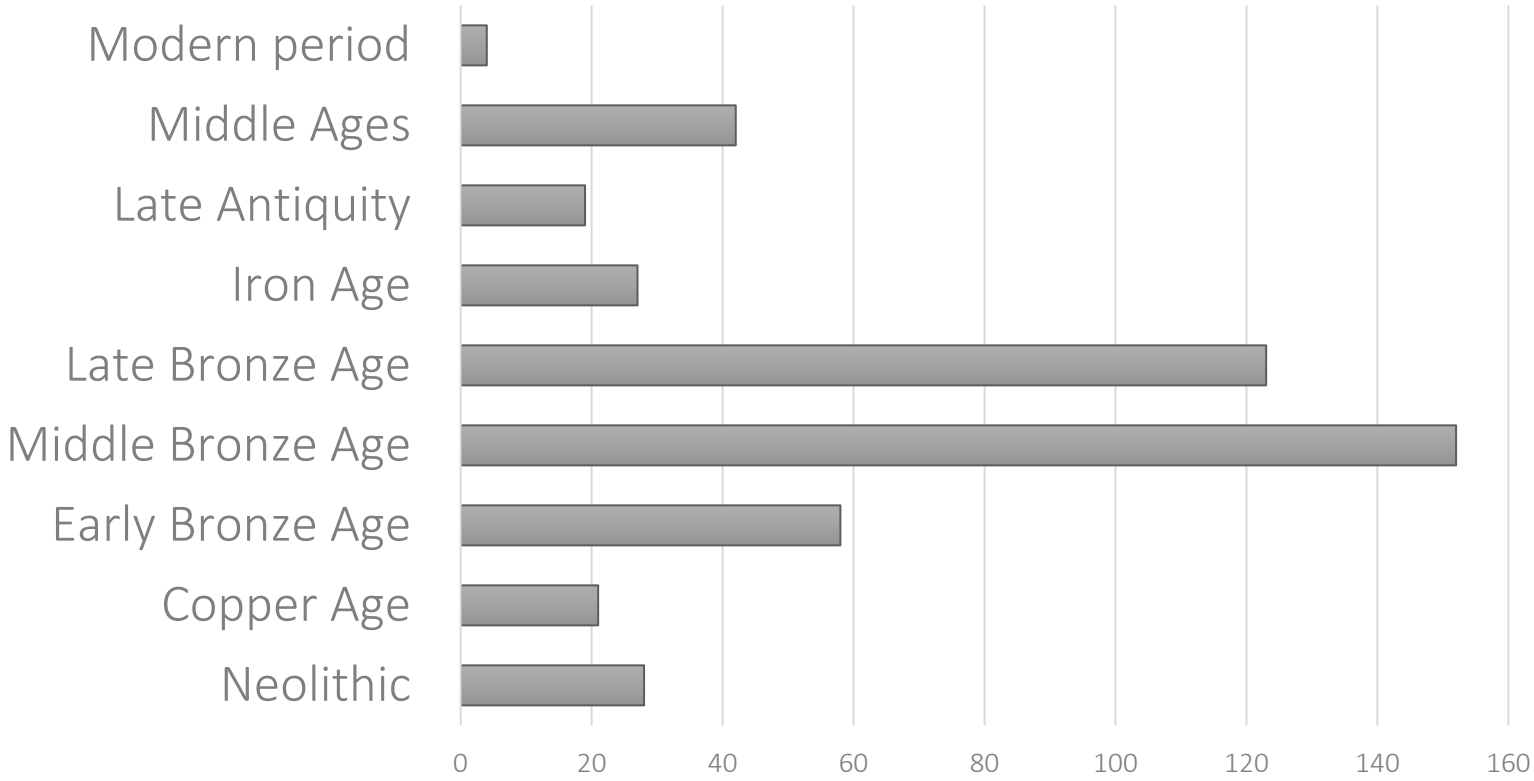
representation by case study region



A GIS-generated heat map illustrates the spatial concentration of geological samples.

Sample Representation by Period





Analytical Workflow and Method Application

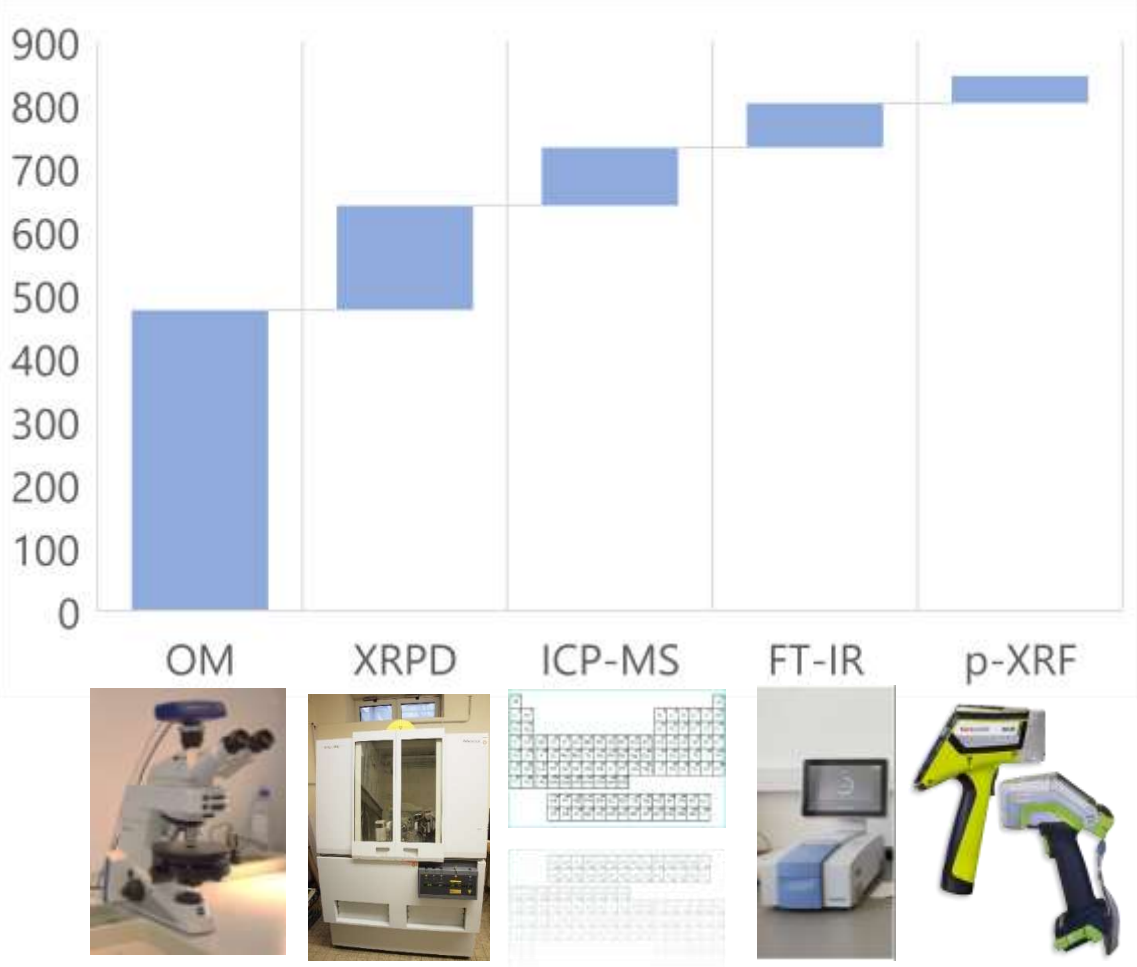


Chart showing total number of samples subjected to each analytical method.

Methods	A	G	E	Total
OM	418	45	12	475
XRPD	99	57	9	165
FT-IR	65	0	5	70
ICP-MS	82	10	0	92
p-XRF	39	4	0	43
LG	0	46	0	46
SEM-EDS	7	0	0	7
PLT	0	0	56	56
ORA	38	0	0	38
Total	748	162	82	992

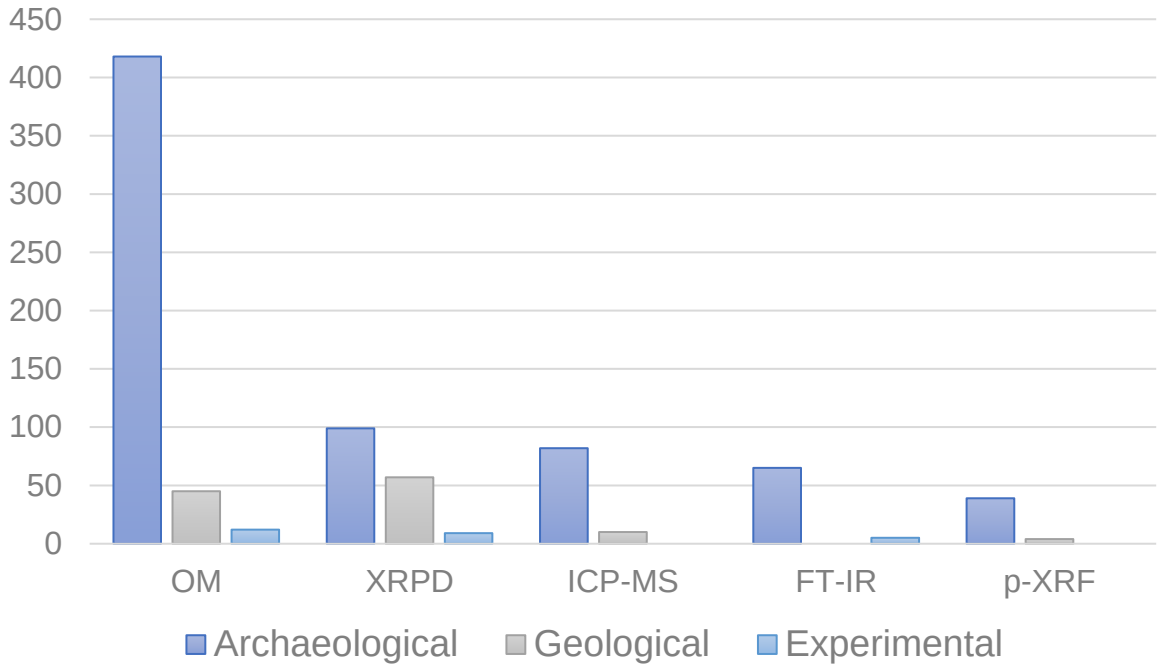
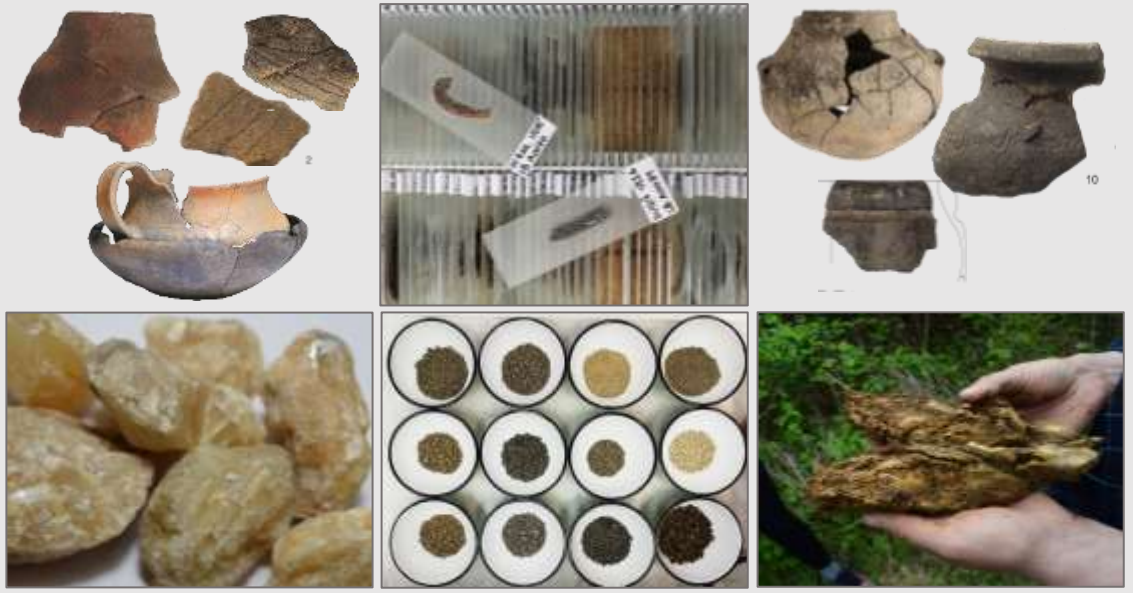


Chart showing the proportion of each analytical method applied to different sample types

Data Management and Sample Database

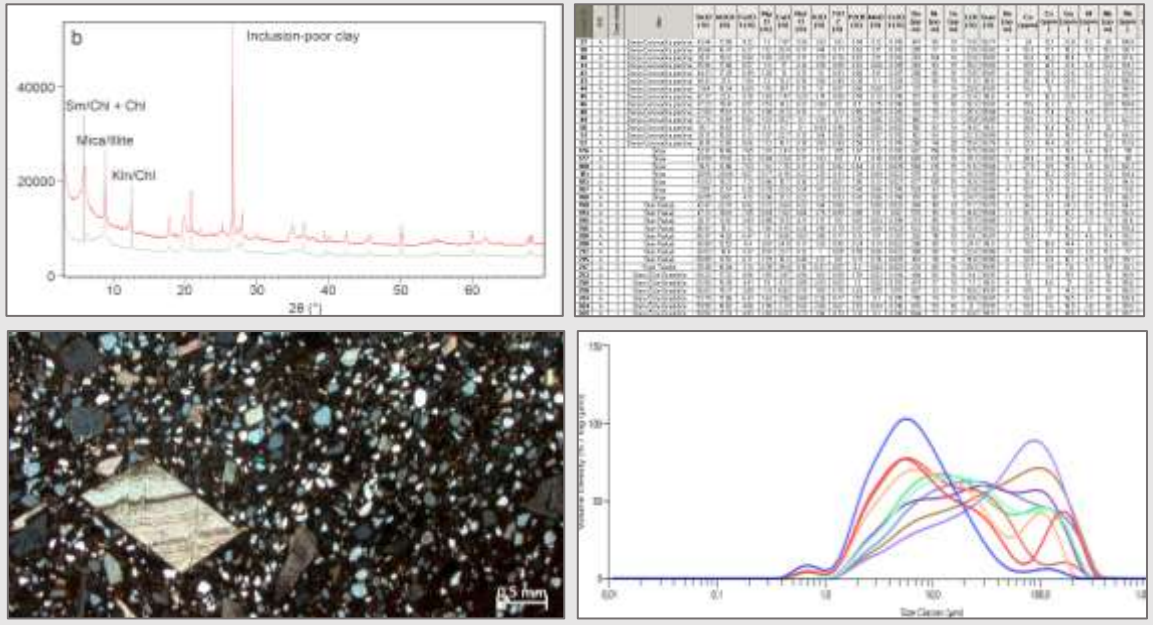
Physical collection

- **Archaeological samples** (ceramics)
- **Geological samples** (raw materials: clays and rocks)
- **Experimental reference material**

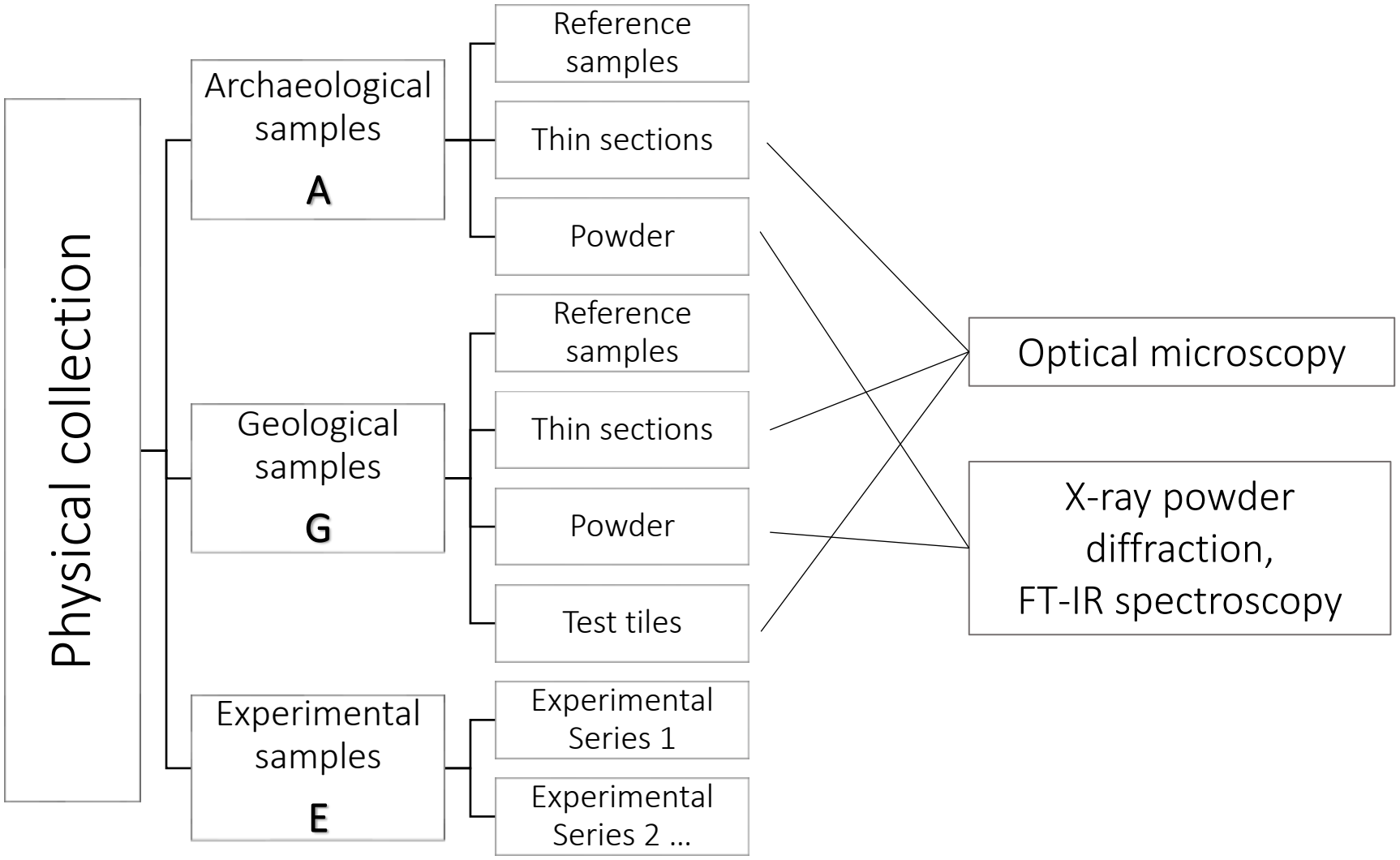


Digital database

- **Relational data base** – table data
- **Analytical archive data** (photographs, tables, graphs)



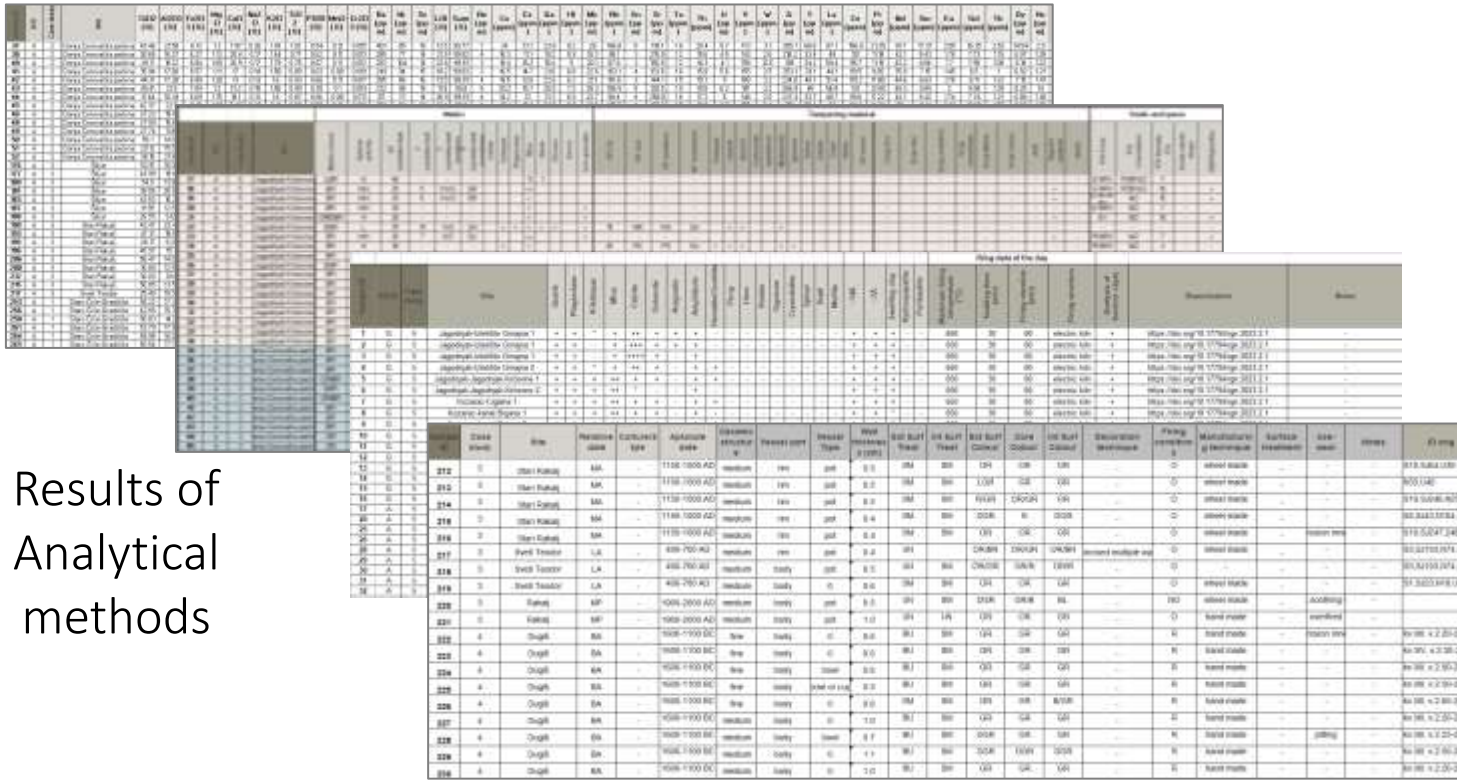
Physical Collection Overview

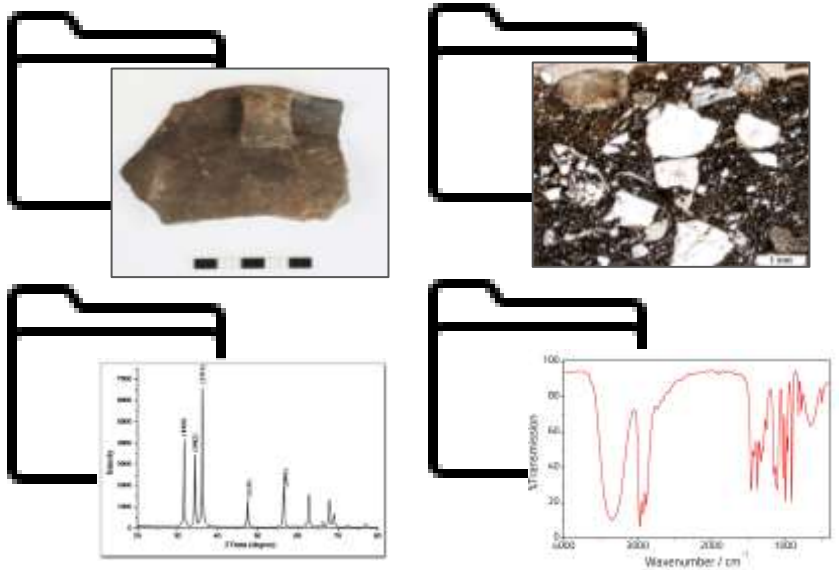


Digital Database Overview

- Digital database
  - Relational tables
    - Basic data
    - OM
    - XRPD
    - ICP-MS
    - FT-IR
    - p-XRF
    - LG
  - Analytical archive
    - Photographs of reference materials (tiff, jpg)
    - Photomicrographs (tiff, jpg.)
    - XRPD diffractograms (pdf)
    - FT-IR spectra (pdf)
    - LG (descriptive data)

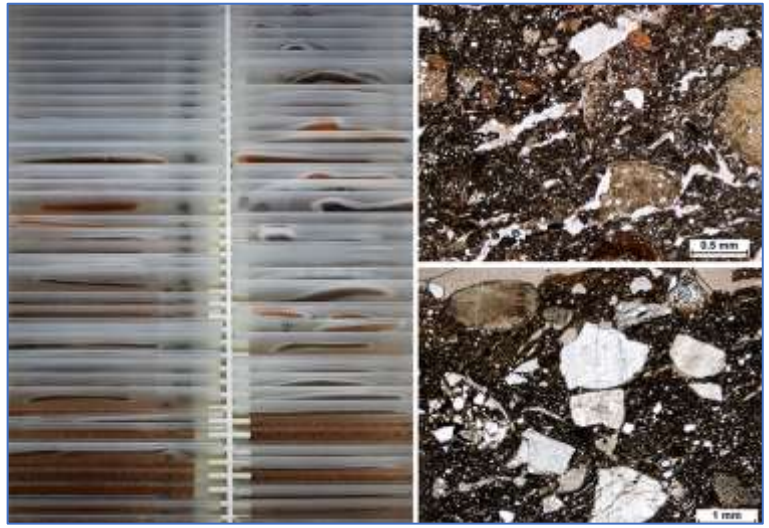
Results of Analytical methods





Study Collection of Archaeological and Geological Materials

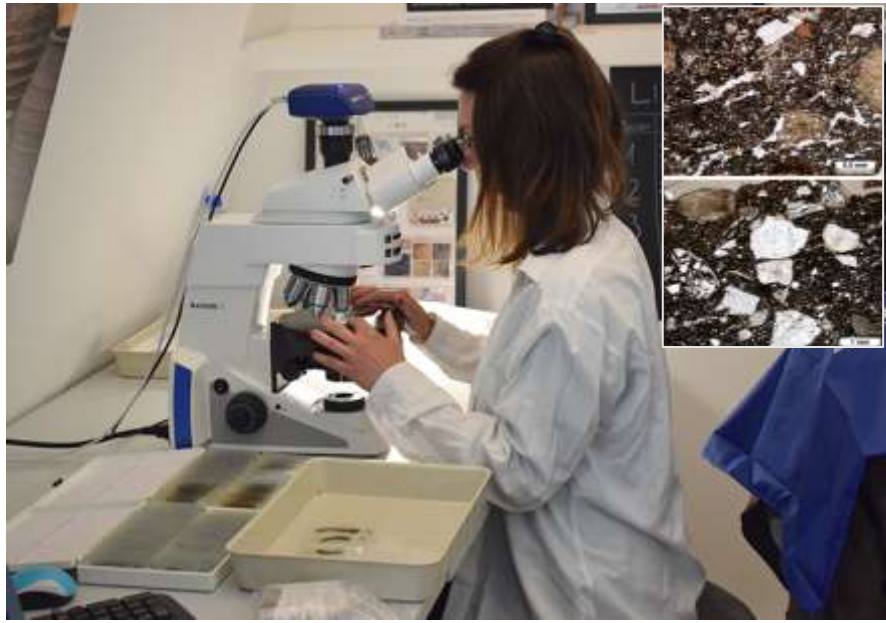
- Housed at the Institute of Archaeology, forming first national study collection of archaeological and geological samples
- Include **project samples + materials from earlier research**
- Over 800 archaeological and 100 geological samples
- Over 720 thin sections
- Forms a national study collection for ceramics and raw material research
- Provides a consistent, representative dataset for technological and provenance studies



LaKeS Laboratory: Enabling Integrated Research

Laboratory for the Analysis of Archaeological Ceramics and Raw Materials **(LaKeS) – Institute of Archaeology**

- The first laboratory in Croatia dedicated to the integrated analysis of archaeological ceramics and pottery raw materials
- Macroscopic analysis(study of manufacturing sequence & use-wear)
- Ceramic thin-section petrography
- Pottery raw material analysis
- Development & maintenance of reference sample archive
- Collaboration with specialised analytical laboratories
- Integrates analytical results with cultural and technological interpretation



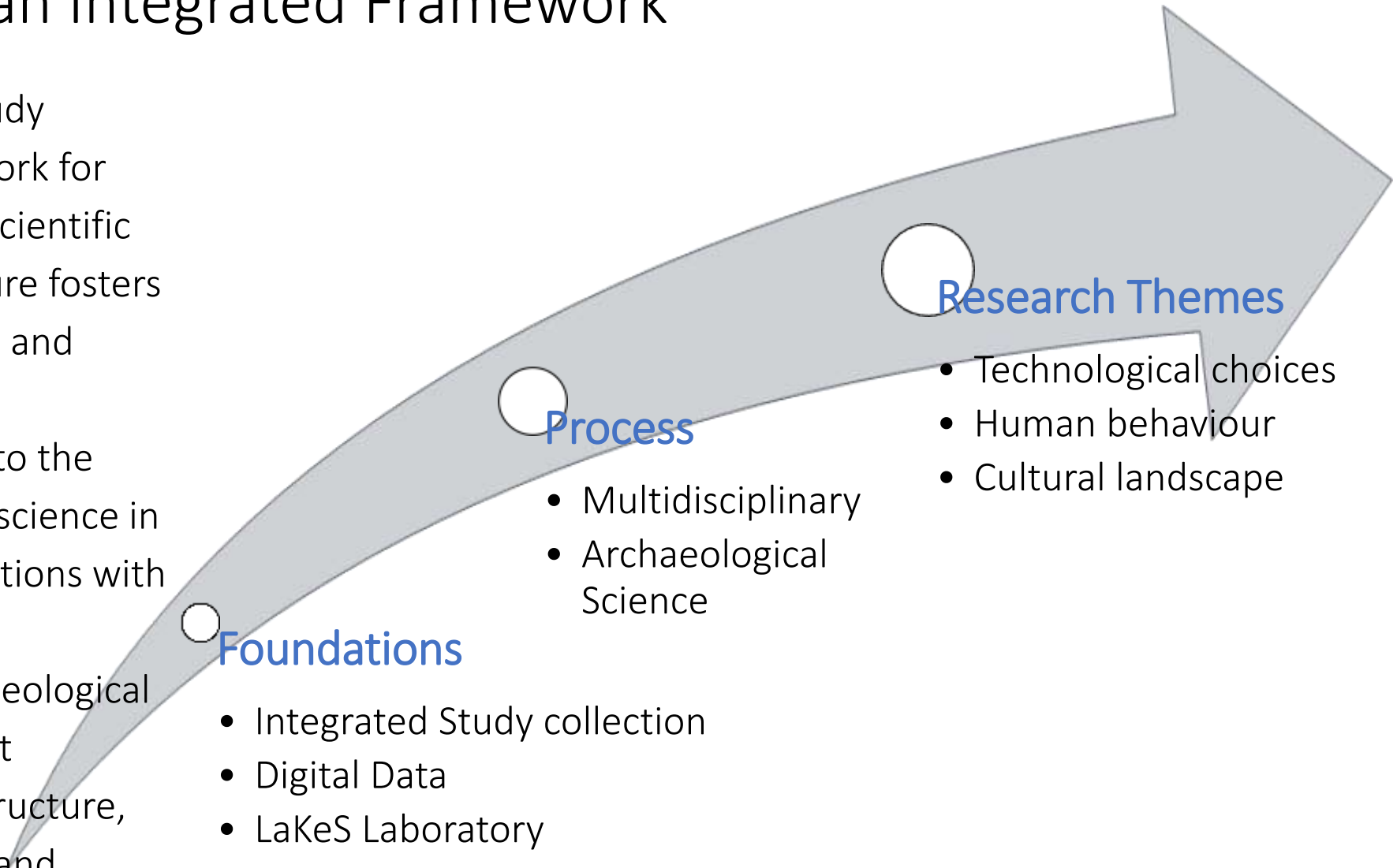
Scientific Contribution

- Integrated study collection & digital database → structured framework for analysis
- LaKeS Laboratory → supports reproducible, interdisciplinary research
- Goes beyond the traditional culture-historical approach
- Enables study of:
  - Technological choices & production sequences
  - Distribution patterns of pottery
  - Transmission of pottery traditions & adoption of innovations
  - Environmental vs. cultural influences

- Clearly defined research questions guide all procedures and sample selection
- Ensures well-organised results, full scientific potential of the material, and the production of publishable scholarly outputs
- To date, **over 60% of all collected and processed samples have been published**
- **Open access** to data is under development, aiming to make results widely available in the future

Conclusion: Towards an Integrated Framework

- In conclusion, LaKeS and the study collection create a new framework for integrating archaeological and scientific data in Croatia. This infrastructure fosters interdisciplinarity, transparency, and sustainability in research.
- In the long term, it contributes to the development of archaeological science in Croatia and strengthens connections with European research networks.
- Combining archaeological and geological expertise, supported by a robust database and laboratory infrastructure, can generate more meaningful and reliable insights into past pottery production and cultural practices.



Thanks to all colleagues who kindly provided archaeological and geological samples for analysis, thus contributing to the Project and the creation of the national study collection.

Thanks to Michaela Hruškova Hasan, Mario Valent, and the other **members of the LaGEMA Laboratory, at the Faculty of Mining, Geology, and Petroleum Engineering,** University of Zagreb, for their support and for providing access to the laboratory and analytical instruments.

- Museum of the City of Trogir (Lujana Paraman)
- Archaeological Museum Split (Damir Kliškić)
- Museum of the City of Kaštela (Ivan Šuta)
- Museum of Cetinska Krajina Region – Sinj (Daria Domazet, Danijela Petričević Banović)
- Department of Archaeology, University of Zadar (Martina Čelhar, Maja Grgurić, Dario Vujević)
- Museum of the City of Šibenik (Emil Podrug)
- Department for Terrestrial Archaeology in Juršići, Croatian Conservation Institute (Josip Višnjić)
- Museum of Lika – Gospić (Tatjana Kolak)
- Department of Archaeology, Faculty of Humanities and Social Sciences, University of Zagreb (Helena Tomas)
- Museum of Turopolje (Tanja Pintarić)
- Kaducej Ltd. (Josip Burmaz)
- Museo civico di Umago (Zoran Čučković)
- IARH (Snježana Vrdoljak, Daria Ložnjak Dizdar, Tatjana Tkalčec, Tajana Sekelj Ivančan, Ana Konestra)
- Independent scholar (Zlatko Perhoč)