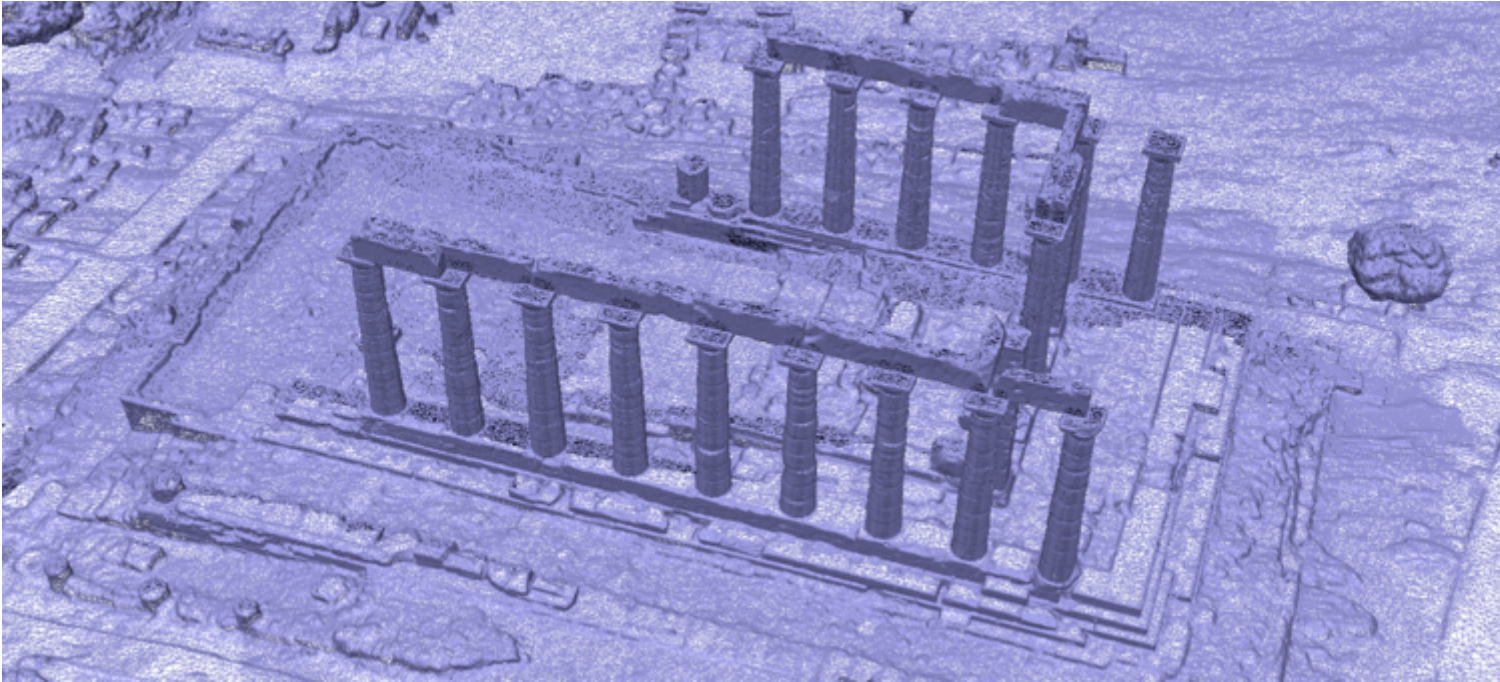


Computational Archaeology



We are an interdisciplinary team using computational innovation to advance archaeological research through AI, HPC, remote sensing, and geospatial analysis. Our mission is to uncover insights into past societies and environments, focusing on urban development, economic networks, mobility, and agriculture.

Summary

We are a dynamic, interdisciplinary team of international researchers focused on advancing archaeological research through computational innovation.

Our mission is to develop and apply cutting-edge computational methods to detect, analyse, monitor, and protect archaeological features at multiple scales.

By integrating HPC, AI, remote sensing, and geospatial analysis, we aim to harness the transformative potential of technology to uncover new insights into past societies and their environments, exploring aspects such as urban development, economic networks, human mobility, and ancient agricultural practices.

APPROACH

We are currently organising our projects around three key focus areas:

- **Material Culture:** Using machine/deep learning, computer vision, 3D scanning, morphometrics, hyperspectral imaging, and AI-driven language modelling to detect and/or analyse artefacts, ecofacts,

and ancient texts.

- **Movement Modelling:** Reconstructing past mobility networks through geospatial analysis, remote sensing, and computational simulations. We study ancient roads, water transport, and economic systems using environmental modelling, cost accumulation, and agent-based simulations.
- **Site Detection & Protection:** Developing AI and GIS-based methods to automatically detect and reconstruct archaeological sites. We use multi-source satellite imagery, LiDAR, and deep learning to identify hidden settlements and cultural landscapes from the Amazon to South Asia and the Mediterranean. We also develop techniques for the monitoring and detection of heritage at risk (looting, urban and agricultural expansion, or environmental impact).

VALUES

Our core values drive the foundation of our work and are reflected in the following principles:

- **Scientific Excellence:** We uphold the highest research standards in applying our research practices.
- **Open Science:** We are committed to ensuring transparency, reproducibility, and accessibility.
- **Innovation:** We pioneer new computational methods that push the boundaries of archaeological research.
- **Interdisciplinary Collaboration:** We actively engage with experts from diverse fields to enrich our approaches and expand the impact of our research.
- **Diversity & Inclusion:** We encourage participation from under-represented groups and foster an inclusive research environment.
- **Knowledge Transfer & Outreach:** We actively share our research and methodologies, fostering societal benefits while inspiring future discoveries.

IMPACT

Beyond advancing the discipline, our research plays a crucial role in shaping society through:

- **Influencing Policy:** Provides data and models that support informed decision-making in heritage protection, urban development, economic strategies, agricultural practices and environmental protection, helping to shape policies and practices.
- **Transforming Education:** Provides new insights into historical contexts, while enhancing how history is taught through interactive, immersive learning tools that deepen understanding of past societies.
- **Safeguarding Cultural Heritage:** Develops innovative techniques to monitor, and protect archaeological sites from threats like looting, human activity and environmental damage.
- **Promoting Public Engagement:** Makes cultural heritage accessible to a broader audience, fostering interest and involvement in preservation efforts.

Objectives

- **Advancing Archaeological Research:** Develop and apply computational methods to detect, analyse, monitor, and protect archaeological features.
- **Material Culture:** Use machine learning, computer vision, 3D scanning, and AI to detect and analyse artefacts, ecofacts, and ancient texts.
- **Movement Modelling:** Reconstruct past mobility networks using geospatial analysis, remote sensing, and computational simulations.
- **Site Detection & Protection:** Develop AI and GIS-based methods to detect and protect archaeological sites from threats such as looting and environmental impact.

- **Interdisciplinary Collaboration:** Engage with diverse experts to enhance research approaches and expand impact.
- **Scientific Excellence:** Uphold the highest standards in research practices.
- **Open Science:** Ensure transparency, reproducibility, and accessibility in research.
- **Innovation:** Pioneer new computational methods in archaeological research.
- **Knowledge Transfer & Outreach:** Share research and methodologies to benefit society and inspire future discoveries.

WORK WITH US

Whether you're interested in training, research, or a collaborative project, reach out to us!

We are always open to new collaborations and exciting research possibilities. We have strong experience in securing funding and offer guidance through the application process for grants, especially those for national and European funding. We particularly encourage female students and researchers to apply.

Barcelona Supercomputing Center - Centro Nacional de Supercomputación

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