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Earthen Heritage in the Eastern Mediterranean between Archaeology and Sustainability
UdR Palermo – Resp. Scient. Prof. Maria Luisa Germanà
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ABSTRACT BOOKLET

INSTITUTIONAL GREETINGS

ICOMOS-ISCEAH for the preservation of built earthen heritage
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OPENING LECTURE

Living Earthen Architectural Heritage. The Syria's earthen domes. Knowledge, Value, Sustainability
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This paper explores the earthen architectural heritage of northern Syria, with particular attention to the system of corbelled (false) domes and the rural settlements that produced them. The reading is systemic: climate, water, local raw materials, technical cultures and community organisation are considered together, in line with UNESCO's lexicon (Outstanding Universal Value, Authenticity, Integrity) and the One Health approach (the health of people, animals and ecosystems). After outlining the historical–environmental context of the arid lands south-east of Aleppo and presenting the *Coupoles et Habitats* project completed in 2009, the study examines construction logics, performance and fragilities of the region's earthen architecture, the role of data and digital tools for documentation and management, and the operational implications for archaeology, architecture and planning in arid territories. The interpretive key is a "culture of uncertainty": a tradition of adaptation that also informs contemporary transitions.

SESSION 1
From Earth to Architecture: Sourcing and Selecting Raw Materials

1.1.
Tracing the Provenance of the Earth Materials at Erimi-*Laonin tou Porakou*, Cyprus
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This paper illustrates the geoarchaeological results from the EARTHERITAGE Project, conducted collaboratively by the Universities of Siena, Genova and Palermo. The project focuses on the analysis, documentation and preservation strategies of earthen architectural heritage in the Eastern Mediterranean, with particular emphasis on the Middle Bronze Age site of Erimi-*Laonin tou Porakou* in Cyprus (ca. 2000–1600 BC).
The geoarchaeological investigation involves multiscalar analyses of the complex landscape of the Kouris River Valley, where the archaeological site is located.
The research objective is to expand the existing environmental and soil datasets and to establish a comprehensive theoretical framework for assessing human-environment interactions. Data are integrated to elucidate the temporal and spatial distribution of soils within the study area and to provide essential information for determining the provenance of the earthen materials used in the archaeological structures.
The methodology encompasses geomorphological and pedological observations, characterization of physical and chemical properties of the main soil types across different geological units and geomorphological context, soil micromorphological analysis of undisturbed samples, as well as X-ray diffraction (XRD) and Scanning Electron Microscope (SEM) analyses on selected raw materials. 20 soil profiles and pedo-sedimentary sequences were examined in total.

Results enable accurate soil classification and new insights into the potential geological fingerprint of the earthen materials. The findings suggest that Calcisols and Cambisols were the most probable sources of raw materials at Erimi-Laonin tou Porakou, owing to their high clay content, which confirms that suitable raw materials were widely available and easily accessible in proximity to the site.
The project was funded by the Italian Ministry of Education, University and Research, under the scheme for Research Projects of National Relevance.

1.2

The Use of Earth in the Protohistoric Northeast Iberian Peninsula: Challenges and Insights through Micromorphology

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Earthen architecture poses significant challenges in archaeological research due to the inherent characteristics of earth and its combination with volatile materials such as plant-based elements. These factors complicate the identification of original spaces and structures once buildings become archaeological sites. In the protohistoric period of the northeast Iberian Peninsula, most constructions used a mix of materials, predominantly stone. However, during the Second Iron Age (Iberian period), mud-brick walls became increasingly common. Earth was employed for coatings, floors, roofs, and internal structures such as benches and hearths.
One effective method for studying these remains and understanding the use of earth in construction is micromorphology. This technique provides insights into the formation processes of domestic spaces, their use, and their subsequent destruction. The methodology involves collecting undisturbed samples to produce thin sections, allowing the observation of micro-layers and micro-remains composing the sedimentation—elements often unnoticed during excavation. Micromorphology thereby complements and enhances the information obtained from the macroscopic study of archaeological remains.
As an example, we examine several protohistoric sites in the area, focusing particularly on the Early Iron Age building at Sant Jaume (Alcanar, Catalonia) (ca. 800–500 BC). This fortified settlement, notable for its unusual pseudo-circular ground plan, features stone walls and a robust foundation system. The internal space is organized into multiple rooms, which originally included a first floor or storey constructed using the wattle and daub technique. Preliminary results have also been presented regarding the architectural chaîne opératoire, addressing questions related to the provenance of raw materials, construction techniques, and their cultural significance.
Understanding the construction processes will enable a deeper exploration of the social organization of these past communities: their preferred building materials, treatment methods, the number of individuals involved in construction activities, and the relationship between building for necessity and displaying power and status through architecture.

1.3.

The Stories of Matter: Clayscapes and Craft Practices in Ancient Lagash

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The Stories of Matter: Characterizing Pottery Craft Production at Early Dynastic Lagash focuses on the study of ceramic production in the ancient Mesopotamian city of Lagash (modern al-Hiba, southern Iraq) during the Early Dynastic period (ca. 2900–2350 BC). Recent excavations in the southeastern area of the site (Area H) have uncovered a pottery production quarter with well-preserved kilns and associated structures, offering a rare opportunity to investigate the socioeconomic organization of ceramic manufacture. The pottery workshop appears to have been in continuous use from Early Dynastic I through Early Dynastic IIIB, undergoing several phases of reconstruction and modification over time, reflecting shifts in production strategies, organizational frameworks and relation with the urban layout. As part of this broader research, a clay atlas of the Lagash region is being developed through the systematic sampling of local alluvial sequences. These samples are being processed to build a reference collection for petrographic and geochemical comparisons with archaeological materials. In parallel, ethnographic interviews have been conducted with local communities to document traditional uses of clay for both domestic pottery production and earthen architecture. This dual approach fosters the reconstruction of long-term strategies of environmental adaptation and sustainable resource use. The study of ceramic production relies on thin section analysis of pottery from the excavation—likely of local manufacture—to better understand technological features and raw material selection. In addition, micromorphological analysis of the kiln structures is underway, aimed at shedding light on their construction techniques, operational sequences, and functional dynamics within the production process.

1.4.

The abandoned earthen heritage of Greece and future applicable perspectives

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This study delves into the layered history and living legacy of earthen architecture in Greece, highlighting its cultural depth, local wisdom, and sustainable potential. Through a diachronic exploration—from prehistoric techniques to 20th-century transitions—the research celebrates the ingenuity of traditional communities that shaped a resilient and place-based architectural language. Drawing upon fieldwork observations, historical case studies, and contemporary comparisons, this research offers a comprehensive understanding of the position of Greece's earthen architecture in relation to the global context, with particular emphasis on Europe in recent years. Furthermore, it underscores the significance of preserving and continuing the use of the knowledge systems associated with this traditional construction method, many of which are at risk of being lost.

By documenting overlooked practices and analyzing the sociopolitical factors behind their decline, the study contributes to efforts to preserve and revalorize earthen heritage. It proposes new educational pathways—both formal and community-based—to ensure that this knowledge is not only archived but actively passed on. In line with global sustainability goals, it reframes earthen architecture as a viable, ecological, and culturally rich solution for modern construction challenges in Greece.

The study documents marginalised practices and examines the sociopolitical and regulatory factors contributing to their decline. In the specific case of Greece, where high seismicity has necessitated stringent building regulations, the application of earthen construction largely faces significant limitations. Earthen architecture is often permitted as a primary load-bearing system and is instead employed as infill within structural frameworks, such as wooden, steel, or reinforced concrete.

Beyond identifying obstacles, the research also investigates parameters and strategies for the dissemination, rescue, and contemporary application of earthen construction techniques. It explores how such practices might be meaningfully integrated into the Greek regulatory framework, thereby enabling the evolution and expansion of earthen architecture in Greece today. In addition to identifying current limitations, the research explores practical parameters and forward-looking strategies for integrating earthen construction into contemporary Greek architectural practice for constructions, renovations and regulatory frameworks. The study proposes new education pathways—both formal and community-based—to ensure that knowledge is not only archived but actively transmitted.

Ultimately, the study supports a more comprehensive cultural and architectural reawakening. That is to say, this support is evidenced by how this work celebrates Greece's earthen past, as well as how it functions as a catalyst through the means of education and research. Moreover, the promotion of global expertise in the domain of earthen technology is instrumental in providing a comprehensive framework, applicable to contemporary and future architectural practice in Greece in the present circumstances.

1.5

Foundations in Earth: A Geoarchaeological Study of Mozia's Earthen Architecture

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This paper explores the use of mudbrick in Phoenician-Punic architecture, focusing on Motya at the height of its prosperity in the 5th century BCE. Combining stratigraphic and micromorphological investigations with a geoarchaeological approach to earthen building materials—including petrographic thin sections and bulk phytolith extractions—the study highlights the central role of earthen techniques in shaping the urban landscape and managing local resources. Conducted in the frame of the #BuildinginNewLandsresearch project, the analyses show that at Motya mudbrick was not simply an economical or "provisional" solution, but a deliberate building practice rooted in the interplay between environment, technology, and community identity. This case study thus contributes to reassessing the significance of earthen architecture in the ancient Mediterranean, restoring complexity and value to a material heritage too often overlooked.

1.6

From Earth to Architecture; From Earthen Craft to Social Practice. Reconstructing the Chaîne Opératoire of Mudbrick Building Technology at Prehistoric Thessaloniki Toumba

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Earthen building materials have played a significant role in architecture worldwide; their use being attested over millennia. In prehistoric Central Macedonia, Greece, mudbricks specifically dominated as the key building component in a centuries long architectural tradition. The persistence in their use and their degradation over the same areas led to the creation of the hallmark mound settlements of the region. Yet they remain largely underexplored, creating a significant gap in the research of building technology in prehistoric Greece. This study aims to fully reconstruct the

chaîne opératoire of mudbrick production and use, using the prehistoric mound settlement of Thessaloniki Toumba as a case study. By employing a transdisciplinary methodology, integrating experimental and ethnoarchaeological methods, we aim to delve deep into the possible social and symbolic values that may have factored into the decision-making process of crafts(wo)men.

SESSION 2
Sustaining the Legacy: Preservation of Earthen Architecture in a Changing Climate

2.1

From Archaeological to Contemporary Earthen Architecture between Evolution and Adaptation

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The Oasean earthen building techniques had evolved throughout the ages; the choice of building materials, their composition, as well as architectural and urban patterns. This research discusses the different building techniques used in the oases of the Western Sahara of Egypt from the ancient era until modern time, their evolution, adaptation, and choices for stylization, which includes the introduction of modern materials and construction techniques for structural stabilization and change in style of living. Selected examples of contemporary earthen buildings are studied in the light of their precedent models of traditional Oasean architecture.

2.2

Earth constructions in Morocco: Bioclimatic response of various vernacular and cultural constructions

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The studies about rammed earth, as far as the various technologies which this material (the not cooked clay) allowed are concerned, have been carried out lately with more intensity for two main reasons: firstly due to the sustainable task that these systems play within the ecological process of architecture, and secondly due to the great value that the enormous heritage of cultural architecture, specifically the vernacular and pre-industrial stock, have been discovered to provide to younger generations of architects, historians and artisans. The preservation of a great number of built goods, very often also listed in the UNESCO elements, can in fact ensure continuity to the wide cultural traditions and background of a number of civilizations. The paper intends to present a team research dealing with some of these cultural-heritage architectural goods in the Moroccan regions, where the rammed earth has been employed with a specific role within the whole architecture's performance, in particular, the response to the climatic conditions. The methodology of this study starts in fact from the analysis of the case studies, with a number of tools aimed at identifying the bioclimatic performance of the built heritage, and then compares the different case studies so as to find the links between them, aimed at suggesting the appropriate intervention technologies. The case studies that have been under study are two different villages in rammed earth in Morocco (Ait Ben Haddou and Azrou in the district of Marrakech) and two fortified structures. The result will show the similarities of these cases, the differences, their use destination in the past, and their potential to be re-used and enhanced so as to continue the tradition and the cultural values. In the conclusion, a proposal of guidelines for interventions within these cases, and obviously similar examples of rammed earth within traditional architecture, will be proposed and discussed.

2.3

Preservation of Earthen Architecture in a Changing Climate: Results and Reflections on Some Key Experiences Gained Within the UNESCO WHEAP Project

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The paper intends to report some key experiences gained by the author within the UNESCO WHEAP programme (1), experiences that can contribute to providing useful indications for a constructive debate on the topics proposed by the conference.
The first part describes methodology, goals and results of the WHEAP Programme, for which the author is scientific advisor, and the second part analyses the key pilot project in Timbuktu (2) which, due to its duration, the problems faced, the methodology followed and finally the results obtained, offers a broad spectrum of answers to some of the topics proposed by the conference.
In addition to the key case of Timbuktu, other experiences carried out by the author are also proposed regarding preventive maintenance fields of earthen architectures in archaeological sites. The results of the preservation sites

carried out are rich in operational results considering the diversity in terms of geographical area and climate zone, such as Uch Kulach (Uzbekistan) or Qatna (Syria), and have furthermore contributed to the development of the WHEAP guidelines.
1) For a broader understanding of the methodology and the operational phases of WHEAP-UNESCO, see:https://whc.unesco.org/en/earthen-architecture/#:~:text=The%20World%20Heritage%20Programme%20on,of%20earthen%20architecture%20sites%20worldwide.
2) The author has been involved for over a decade in various projects for the preservation of the city's earthen architecture and has edited the Timbuktu conservation manual published by WHC-UNESCO:
See:https://whc.unesco.org/en/news/1161/

2.4

Climate, Materiality, and Decay: An Archaeological Perspective on Adobe Architecture in Castilla y León

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The Duero Valley encompasses one of the largest territories in Europe, specifically the region of Castilla y León. The river traverses the entire region from east to west, a high plateau framed by mountain ranges that confer upon it a continentalized Mediterranean climate, characterized by long, harsh winters and short, extremely hot and dry summers. In this context, the insulating and thermoregulatory properties of adobe have made it a highly valuable and versatile construction material, well-suited to the region's severe climatic conditions. Consequently, since its introduction at the beginning of the first millennium BCE, adobe has been continuously employed up to the present day, combined with other techniques such as rammed earth, brick, wood, and stone.
This paper aims to analyze how various archaeological sites and examples of vernacular architecture respond to the continentalized climate of this region. Three case studies, spanning an extensive chronological framework, will be compared in order to examine the factors most significantly influencing their deterioration, with particular emphasis on environmental factors. The study will focus on a tell from the Early Iron Age, an oppidum from the Late Iron Age, and examples of abandoned vernacular adobe architecture from the region. The objective is to identify the causes of deterioration, propose strategies to promote the preservation of architectural heritage and its cultural value.

ABSTRACT CASE STUDY REPORT:
The beginning of the Iron Age in Iberia is broadly linked to the arrival and assimilation of technologies such as iron, wheel-thrown pottery, and adobe, introduced by Phoenician communities around the turn of the second to the first millennium BCE. In many Iberian regions, adobe transformed settlement architecture. In the Duero valley, from the 9th century BCE onwards, communities repeatedly occupied the same sites, creating tells and building standardized houses. This case study explores Early Iron Age architecture in the northern plateau through Cerro de San Vicente, a visitable site in Salamanca (UNESCO World Heritage City), offering an overview from the 9th to 5th centuries BCE, the operational chain of adobe production, types of roofs recorded, and portable features made of earth, such as ovens, hearths, and storage benches.

2.5

The Impact of Material Thickness on the Thermal Performance of Wattle and Daub Residences in Sri Lankan Vernacular Architecture

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The impact of material thickness on the thermal performance of wattle and daub residences is a crucial aspect of understanding the efficacy of traditional vernacular architecture in Sri Lanka. Wattle and daub, known locally as Katu Mati Gewal, is an ancient building technique that utilizes locally sourced materials, primarily clay, mud, and straw, to create resilient structures well-adapted to the tropical climate of the region. As Sri Lanka faces increasing temperatures and changing weather patterns, the relevance of these traditional construction methods becomes paramount in developing sustainable architectural practices.
This research focuses on examining how variations in wall thickness influence the thermal properties and energy efficiency of wattle and daub residences. The study posits that increasing the thickness of the walls can significantly enhance their thermal mass, allowing for better heat absorption and regulation of indoor temperatures. High thermal mass materials, such as those used in wattle and daub construction, absorb heat during the day and release it slowly at night, creating a stable indoor environment that mitigates the reliance on mechanical cooling systems. Utilizing EnergyPlus, a sophisticated thermal simulation software, the study will model different wall thicknesses in a representative Katu Mati Gewal house situated in a tropical region of Sri Lanka. By inputting local climate data, the model will simulate real-world conditions and analyze indoor temperature fluctuations across various wall thickness scenarios. Furthermore, this research aims to provide a comprehensive assessment of potential energy savings associated with optimized wall thickness. The findings will be instrumental for practitioners in adopting traditional

building techniques in modern constructions, highlighting the benefits of vernacular architecture in achieving thermal comfort and energy efficiency in tropical climates.
Ultimately, this study not only seeks to document the thermal performance of wattle and daub residences but also aims to reinforce the importance of preserving and revitalizing these architectural practices. By demonstrating the advantages of material thickness in wattle and daub structures, the research contributes to a broader understanding of how traditional techniques can be harmoniously integrated into contemporary design.

2.6

Closing the Circle for the Earthen Construction: Heritage and Contemporaneous Buildings between Perishability and Mediterranean Identity

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Although the adobe technique has been defined as a construction "koine" that in ancient times united the peoples of the Mediterranean area, today, earthen construction does not have an identity value in this context, and it is marginal compared to the dominant practice. This creates a divide within the interest in earthen construction that has developed over the last twenty years. In fact, the built heritage (archaeological or vernacular) on the one hand and contemporary building production on the other risk remaining parallel, if not divergent, areas of research. Considering that construction is an activity deeply rooted in culture, when looking at any building technique, it is important to understand its roots in the specific natural and anthropic context. For this reason, this paper proposes a comparison between what unites and what distinguishes heritage and new earthen construction.
The main common aspect between remote and contemporary uses is immediacy, which is the basis of the high environmental sustainability attributed to earthen construction today (availability on site; low-impact and reversible processing; absence of waste). One of the divergent aspects is the character of necessity: while in ancient times raw earth was used when an economical and quick solution was needed for construction (both for large-scale works and minor interventions), in contemporary scenarios – excluding informal habitats – raw earth has become a niche building material, much more expensive than standard alternatives and very difficult to implement.
The sharp discontinuity in operational practices, the vast distance between traditional and contemporary production processes, and the lack of communication between tacit and explicit knowledge are factors that make it difficult to connect the built earthen heritage with contemporary earthen construction. To close the circle, transforming heritage conservation and new buildings into two sides of the same coin, the EARTHERITAGE project has focused on perishability as a critical common feature, developing an experiment on "Stabilised Compressed Earth Blocks", a globally widespread technique that is relativised to specific contexts through the composition of the constituent mix design.
This experiment should be seen as a small part of a larger ambition: to move beyond the now obsolete linear view of Time, in which the Past, Present and Future are separate phases, and to bring them together in a virtuous circle, in which knowledge, conservation, and contemporary uses of earthen construction can feed into each other.

SESSION 3 – Building with Earth: Archaeological and Vernacular Construction Practices

3.1

Shaped by Earth, Built by Many: materials and techniques in mudbrick production at Middle Bronze Age Erimi and Pyrgos, Cyprus

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Mudbrick was a fundamental component of prehistoric architecture in Cyprus, serving not only as a building material but also as a medium for expressing technological choices and social organization. This study presents the results of a multi-proxy geoarchaeological analysis of mudbrick samples from the Middle Bronze Age sites of Erimi-*Laonin tou Porakou* and Pyrgos (c. 1950–1650 BCE), offering new insights into the material and social dimensions of earthen construction in southern Cyprus.
Mudbricks were initially examined at the macro-scale and subsequently analyzed using high-resolution micromorphological, spectroscopic, and geochemical techniques. These interdisciplinary methods enabled the reconstruction of procurement strategies and technological practices employed by local communities. The findings suggest that raw materials were predominantly sourced from nearby environments, chosen for their accessibility. However, the deliberate selection of specific sediments and tempering agents indicates a sophisticated understanding of material properties and points to a systematized, possibly more specialized, mode of production.
The recurrence of standardized recipes, along with the uniformity in shape and size of intact mudbrick, implies a level of technological consistency and planning. These patterns support the hypothesis that mudbrick manufacture and

construction may have been organized beyond the household scale, involving cooperative labor and shared technical knowledge. The study provides valuable insights into the practical aspects of earthen construction, while also shedding light on the broader social dynamics of Middle Bronze Age communities in Cyprus, opening new avenues for future research.

3.2

Building with daub: evolution, contexts, and continuities in Late Prehistoric Greece

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Daub technique stands among the earliest construction techniques known in Greece. It consists of applying earth onto a load-bearing wooden framework, where the earth serves primarily as an infill material.
This paper explores the development of this technique in Greece from the Neolithic through the Protohistoric periods, examining both its technical variations and its connections to the environmental and social contexts in which it was practiced. As not all frameworks from the periods examined correspond to "wattle", we prefer to avoid the term "wattle-and-daub" to define the technique in order to encompass the broader technical variability observed.
We will first provide an overview of the distribution and technical evolution of the daub technique. In Eastern and Central Macedonia, for instance, it was the predominant construction technique from the Early Neolithic (ca. 6400 BCE) until the Middle Bronze Age (ca. 2000–1600 BCE), where a clear shift toward mudbrick architecture can be observed. Interestingly, the Iron Age (ca. 1100–800 BCE) sees a reemergence of daub on several sites. In contrast, in southern Greece, and particularly in Crete, this method appears to have occupied only a marginal role from the earliest periods, with stone and/or mudbrick constructions predominating instead.
In the second part of the paper, we will explore the factors that shaped builders' choices to adopt or abandon the daub technique: climatic conditions, the availability of construction wood — an essential resource for this technique — and major socio-political transformations. The rise of the Minoan civilization in Crete during the Middle Bronze Age, followed by the emergence of the Mycenaean civilization some five centuries later on the mainland, profoundly reshaped architectural practices.
Finally, we will turn to the present day, examining the survival of daub within Greek vernacular architecture, considering both current construction methods and the social and environmental contexts that continue to sustain this ancient tradition

3.3

Building with earth and timber in Neolithic northwestern Greece

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The centrality of clayey earth in the habitus of Neolithic Balkan communities and the creation of the archaeological record have long been recognised. Nevertheless, the analysis of daub, which constitutes a major corpus of architectural information, has not gained much attention in northern Greek excavation or research programmes. Occasional systematic studies during the last two decades have enriched our understanding of the construction process and have highlighted the analytical potential of this category of archaeological remains. In addition, intense fieldwork has multiplied the available material to be studied.
The present paper will primarily focus on two case study sites, namely Avgi and Kleitos, which are situated in the region of northwestern Greece and are characterised by the presence of earthen, post-frame architecture. The macroscopic study of daub and the petrographic analysis of selected samples of rubble material from both sites reveal the degree of standardisation and the sharing of technological know-how on the intra-site and the intra-regional level. Evidence from neighbouring sites, including Dispilio, Koromilia, and Sossandra, is juxtaposed in order to approach the idiosyncrasies of the regional architectural repertoire.

3.4

Rethinking Celtiberian Earthen Architecture: Building Techniques, Materiality and Cultural Transitions in Iron Age Iberia

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Earthen architectural heritage in the Celtiberian region during the Iron Age remains significantly underexplored, despite extensive archaeological investigations conducted at prominent sites such as Numantia (Garray, Soria). Located within the contemporary context of rural depopulation in inland Iberia, the so-called España vaciada offers

exceptional yet scarcely analysed evidence of earthen building traditions, which hold considerable potential for re-examining historical narratives concerning settlement patterns and technological adaptation.
Recent analyses of archaeological earthen materials from Celtiberian contexts have been undertaken, including adobe blocks, mud roofs, earthen furnishings, interior finishes… Though modest in volume, this corpus provides critical insights into local architectural practices, construction processes, and technical operational sequences (*chaînes opératoires*). Preliminary findings not only elucidate previously overlooked aspects of Iron Age material culture but also challenge long-standing assumptions regarding habitation practices, continuity, and transformations experienced by indigenous communities before and after the Roman colonisation.
Framing these outcomes within broader Mediterranean perspectives on sustainability, resilience and environmental adaptation, this study underscores the necessity of integrating micro-scale material analyses with macro-scale interpretations of architectural strategies, thereby enhancing our understanding of Celtiberian society's capacity for technical innovation and cultural persistence.

3.5
Shaping home, shaping landscape: domestic architecture in nuragic Sardinia
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Understanding the construction techniques of domestic architecture and the organisation of space within settlements is crucial for reconstructing various aspects of past communities. In nuragic Sardinia (1600–700 BC), only in recent decades has research begun to focus on the formal characterisation of dwellings, with the aim of identifying models, typologies, and their development through the Bronze Age. This approach, however, has so far concentrated mainly on the analysis of built structures.
Although the importance of investigating the process of building—as distinct from its material outcomes—is increasingly acknowledged, this perspective remains underexplored and requires a more defined methodological and theoretical framework. In this context, the study of perishable materials such as earth, wood, and cork proves especially informative. These materials shed light on technological choices, construction techniques, and the broader social and economic dynamics that shaped the built environment.
Ethnoarchaeology and ethnography are particularly valuable in this regard, as the house reflects both individual and collective cultural values. Sardinia's vernacular architecture—still visible today in entire sections of villages built with earth—offers a privileged context for investigating ancient building practices. The survival of these structures suggests a continuity of anthropised earthen landscapes that may echo those of the past.
This integrated perspective allows for a deeper understanding of the relationship between human groups and their environment, revealing how such interactions contributed to shaping the cultural landscape of Protohistoric Sardinia. Therefore, the aim of this contribution is to propose a typology of Nuragic domestic dwellings based on archaeological evidence, integrated with insights from ethnographic sources.

3.6
Rediscovering earthen architecture in ancient Sicily: resilience, sustainability and innovation
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Recent research on earthen architecture in the Greek colonies of Sicily offers a fresh perspective on ancient construction techniques that have long been overlooked, revealing their contemporary relevance. In a Mediterranean context increasingly defined by climate adaptation and environmental challenges, the investigation of traditional building practices—such as those documented at Himera and Gela—gains renewed importance. This interdisciplinary project in collaboration with the University of Bern and the Archaeological Park of Himera, which began in 2022 as a doctoral research initiative, combines archaeology, structural engineering, and experimental archaeology to examine the performance, longevity, and resilience of earthen buildings in the face of natural disasters, including earthquakes, floods, and fires. Full-scale reconstructions and digital simulations allow for a better understanding of ancient materials and construction choices, while offering concrete data on their structural integrity and environmental response. Beyond its technical scope, the project engages local communities through workshops and participatory activities, encouraging the preservation and transmission of vernacular knowledge. Earth, as a construction material, emerges here as a key resource for contemporary sustainable architecture—one that unites low environmental impact, circular economy principles, and climate adaptability.

3.7
Etruscan and Roman raw earth architectures in Tuscany. Traditions, adaptations and transformations of construction practices.
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Studies on ancient architecture have long relegated buildings made of perishable materials to a secondary role, promoting the image of an architectural landscape characterized solely by grand constructions in stone and brick. Driven by new European debates over the past 30 years, only recently has there been a renewed interest in earthen architecture from antiquity, including in Italy. Recent research has shown that in the Classical period, the use of earth-based construction was in fact widespread and prevalent in both rural and urban contexts, demonstrating that this building material was an integral part of the built environment in pre-Roman and Roman Italy. Etruria offers a particularly interesting example in this regard. The apparent lack of knowledge about perishable architecture in the region actually conceals a long-standing tradition of "building with earth," facilitated by the abundant availability of raw materials such as wood, water, and clay.
This contribution aims to provide an overview of the building techniques found in the region, focusing—through selected case studies—on a transitional period: the Romanization of Etruria. Given its long architectural tradition, Etruria serves as an interesting case study to understand how Etruscan and Roman earthen construction practices came into contact and how (and whether) they evolved over time. Like other archaeologies of production, architecture, too, can serve as both a tool and a guiding fossil for analyzing cultural interactions, which are revealed within the study of construction knowledge, through the recognition of transmission methods, borrowings, and external influences.

3.8

Reflections on the origins of the different earth building techniques in the Mediterranean

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Earth has been the most indispensable building material for humans since millennia, under different construction techniques still in use today. With their many variants, they are currently classified in five main “families”: from shaped mud (puddled and put in place at the time in a plastic state, also known as cob), to mud on a vegetal frame (often named wattle and daub as an umbrella term), blocks cut directly from the ground (as turf or sod), mud bricks (hardened by drying in the open air before use), and rammed earth (compacted with a tool, in a formwork).
The majority of the population living around the Mediterranean Sea during the wide timeframe between the emergence of agropastoral communities and the change of era, built and inhabited spaces created with those earth construction techniques.
Nevertheless, there are big knowledge problems in respect to these building solutions: which were they specifically, where and when they originated and, in consequence, what their adoption tells us about those past societies.
The origins of earthen architecture are often directly placed along with the emergence of the first sedentary settlements in the Eastern Mediterranean, in the so-called Near East, and mainly linked to the invention of mud bricks, technique also at the centre of a classic debate between diffusion and autonomous, local developments. Research carried out for many decades now gives us a start frame of knowledge for the emergence and expansion of mud bricks in this part of the world, being by far the best known early earthen technique for now in this respect.
But the origin of earthen architecture certainly lies earlier than the emergence of mud bricks and this has hardly been explored so far. And we should not necessarily assume a Near-Eastern perspective for the origin of other ancient earth building techniques, for which such a starting point is not available yet to situate their beginnings, scarcely known beyond certain references.
Early earth building techniques are not often studied together, in relation with each other and with a broad perspective, at a historic and comparative level. This would allow us to acknowledge that they have different dynamics each, as well as to raise big questions about their development that now remain unsolved.

3.9

Teaching and Research on Adobes at the Department of Architecture, University of Cyprus

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Earth architecture has been the subject of several research and teaching activities, which I have developed and coordinated over the past 15 years as Professor of Architecture at the University of Cyprus. Teaching and research on earth materials are very important to graduate and undergraduate studies in architecture.
As part of the undergraduate course ARH 311. Vernacular Architecture and Contemporary Issues, a comprehensive record of around 100 traditional settlements – most of which use earth as one of the main building materials – has been compiled through student projects. This underlines the great importance and widespread use of this material on the island, especially in plains and semi-mountainous areas. All this information has been added to a digital platform (www.vernarch.ac.cy), which is currently being further developed to integrate more than 10,000 traditional building records derived from the Department of Town Planning and Housing. At the same time, the diachronic and more recent use of earth in the island’s architecture have been investigated through doctoral theses. These theses identified the earliest use of adobes on the island, dating back to the prehistoric period, as well as their diachronic

use. In addition, research was also carried out through master's theses on alternative earth building methods, such as rammed earth, even though this is not a traditional method strongly represented on the island.

As part of the research activities on earth architecture, and in addition to the Vernarch project, two research projects on the environmental dimension of vernacular architecture in Cyprus (biocultural, biovernacular) have recently been completed. These projects involved the study of earth buildings. Finally, the ADOBES research programme on the thermal properties of earth was recently completed, highlighting that earth is an excellent, sustainable building material.

Based on the above-mentioned teaching and research activities, this paper highlights the importance of linking research and teaching in the field of earth materials. Research can inform teaching, and teaching outcomes can, in turn, serve as tools for further research. The analysis of these activities shows that the interaction between teaching and research can improve knowledge about earth materials, yielding many benefits.