Abstracts

(Presentations and Posters)

AEA 2016 Rome

37th International Conference of the Association for Environmental Archaeology



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**Preliminary data on the exploitation of aquatic resources at Gabii during the Roman period**

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**Poster Abstract**

During the excavations carried out by the University of Michigan at Gabii (Montecompatri, Rome) some fish hooks were recovered; this finding suggested that, at least occasionally, fish was exploited as a food source by the people living at the site. The ancient town of Gabii was located on the slopes of a volcanic lake, now drained, therefore our first hypothesis was that the fish was obtained from the lake or from the streams that were present in the surrounding environment. However, the few fish remains collected so far seem to suggest that marine resources were more often used as also supported by the prevalence of marine mollusks (some of them coming just from the same SUs that yielded the fish hooks), while fresh water species, both fish and mollusk, are more rare and to date they seem to appear at the site only in the first centuries AD. The reasons for this selection of marine resources in the earlier periods will need to be better explored because it may be related to cultural preferences or to changes in local environmental conditions (e.g., lake levels) and therefore fish availability in the surrounding area.

**Historic England Guidance in Environmental Archaeology: Supporting Best Practice in Archaeological Projects**

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**Abstract**

Historic England guidelines in environmental archaeology aim to promote best practice and professional standards in archaeological projects from planning through to dissemination and archiving. To date we have published guidance on geoarchaeology, environmental archaeology, animal bones, waterlogged wood and human osteology, including destructive sampling of human remains. Our guidance supports curators, project managers, field staff and specialists through outlining the potential of the archaeological resource, establishing common methods and approaches and raising awareness of the ways environmental evidence can be used to answer questions about the past.

The promotion of standards and best practice is crucial to realising the research potential and significance of archaeological sites and historic landscapes affected by development. This ranges from the interpretation of specialist data from a single site, synthesis of local, regional and national datasets, to addressing research questions of international significance. This poster discusses the purpose and benefits of such guidelines, as well as highlighting new approaches to dissemination.

**Pleistocene Rock Art in Egypt and Italy: Possible Contacts?**

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**Abstract**

During the last decade some rock art sites dating to the Paleolithic have been found in the Nile Valley, such as the site of Qurta (situated on the eastern bank of the Nile in Egypt between Edfu and Kom-Ombo), which yielded the oldest discovered Pleistocene rock art in North Africa (according to the Qurta OSL dates). Similar Upper and Late Paleolithic rock art was discovered in other Upper Egyptian sites, such as El-Hosh and Abu Subera, as well as in North-East of Egypt (North-Central Sinai).

Looking to the Mediterranean region, especially to the Italian sites, the closest ones to Egypt, we will discover that, this seems to not be an isolated phenomenon. This appears in animal (Aurochs) and anthropomorphic representations in the Egyptian sites, which show some thematic and stylistic features in common with some Italian sites dating to Late Glacial period, such as Romito cave-shelter, Grotta del Genovese (on the Island of Levanzo of Sicily’s western coast) and the Grotta di Romanelli in southern Apulia.

This paper studies the above mentioned Egyptian and Italian rock art sites dating to the Paleolithic and reveals their common features and their environmental context. The aim of this paper is to shed more light on this prehistoric phenomenon in order to understand whether such similarities between these sites in Egypt and Italy resulted from an actual intercontinental contact (trans-Mediterranean contact with North Africa?) during the Late Glacial period or could they be caused by similar environmental conditions? or both of these factors?

For better understanding of this problem researchers will deal also with a North African rock art site in Cyrenaica, northern Lybia (Caf Eligren).

**How can environmental archaeology respond to archaeology’s ‘grand challenges’?**

Graeme Barker

McDonald Institute for Archaeological Research

University of Cambridge

**Abstract**

In *American Antiquity* 2014 (79,1: 5-24) Keith Kintigh and colleagues identified a series of ‘grand challenges’ for archaeology, distilling the responses from a crowd-sourcing campaign in 2012 and subsequent seminars analysing the 181 responses. They ordered the challenges under five headings, noting how all were characterized by an increasing concern with relevance to the contemporary world: A. Emergence, communities and complexity; B. Resilience, persistence, transformation and collapse; C. Movement, mobility and migration; D. Cognition, behaviour and identity; E. Human-environment interactions. The obvious focus of interest for environmental archaeologists is the fifth theme, with topics identified such as population growth, health and well-being, domestication, agricultural intensification, and responses to climate change. However, all the challenges, they wrote, “focus on understanding the dynamics of cultural processes and the operation of coupled human and natural systems, recognizing that humans – mediated by culture – both affect and are affected by their natural environments”. In this lecture I want to explore some of the ways in which environmental archaeology has responded to the ‘Human-environment interactions’ theme and the challenges it faces no only if it is to be more successful in this arena, most obviously the climate change debate, but also if it is to contribute to other broader political and cultural issues in the modern world such as inequality and intolerance.

**Advanced ground penetrating radar applied to environmental archaeology in the Mediterranean area**

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**Abstract**

If the traditional tools applied to Archaeology (i.e. trowels, shovels, bulldozers, etc.) produce, generally, a fast and invasive reconstruction of the ancient past, geophysical instruments seem to go in the opposite direction by giving geoarchaeological and environmental information in a quick and non-destructive way, together with an economic advantage which has not be underestimated.

In particular Ground Penetrating Radar (GPR) has recently become the most important physical technique in

archaeological investigations, allowing the detection of archaeological targets with a very high resolution, vertically and horizontally. When the obtained data and maps are used to test ideas about human adaptation to landscapes, or to understand developments of construction techniques, or to plan a precise restoration, they offer a powerful and time-efficient way to study ancient human behaviour, social organization, damages suffered during centuries, and other important cultural or environmental concepts.

GPR configuration, antenna frequency, survey modality, all these elements can be different, depending on the scope of the measurements, the nature of the site or the type of targets. In this presentation I am going to present several examples of successfully applied radar investigations to different case studies like: i) the reconstruction of the development of an ancient environment; ii) the possibility to bring to light a new archaeological site with new information; iii) the analysis and evaluation of an ancient Mediterranean landscape.

These examples show that the possibility to generate an image (from which the geometry, dimension and depth of the searched object can be determined) is very useful not only to identify a “highly valuable” archaeological site and to restrict the excavation to a more “fruitful” area, but also to understand the evolution of Mediterranean landscapes during the centuries.

**Editing of the Past: Cultural Heritage and Identity construction in a Sicilian town**

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**Poster Abstract**

This research started as a development of the Troina Project, a preliminary study of Troina’s cultural landscape in preparation of a new museum. The central question of this work is to understand what role the destruction and reconstruction of cultural heritage plays in building local identity. To explore identity construction interviews and questionnaires were submitted to local population to explore collective memory of their past. In post-conflict scenarios when attempts are made to mould a public memory, some memories are emphasised and others are censored to establish just one official memory. As I shall show, what happens in a small town is that there is almost no resistance to memories that are alternative to the official version. In the case of the narrative about official past and its importance in Troina’s *immaginario collettivo* we must refer to Anderson’s imagined community (Anderson 1991). The concept of community is imagined because inhabitants never really meet each other, but can be defined as a community on an imaginary constructed national level. This is also the case for small towns, were the sense of local community is maybe stronger, but equally fragmented and imagined.

**Late quaternary human occupation of NW Sahara: preliminary results of a geo-archaeological research project in southern Chott el Jérid and nearby areas (Tunisia).**

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**Abstract**

Fluctuating ecological pulsations in late Quaternary North Africa set the conditions for human communities to explore, settle, expand, contract or even retreat, also in base of their cultural means to adapt to unknown or rapidly changing environments. Although many aspects have received a great wealth of investigation leading to reliable reconstructions of past population dynamics, major chronological and behavioral aspects related to vast areas of North Africa are still much biased because of preservation constraints. In order to contribute knowledge on NW Sahara occupation, we present the preliminary results of a Tunisian-Italian project of scientific collaboration in the field of environmental studies and prehistoric and anthropological research in southern Tunisia which is focused on four main issues: i) assess the geographic meaning of the Saharan routes traveled by Homo sapiens in the Late Quaternary; ii) explore the timing, methods and ways of human migrations in North Africa at the Holocene threshold; iii) define the character of late Neolithic societies trough funerary archeology; iv) define the genetic composition of sedentary and mobile southern Tunisian people in order to contribute to the reconstruction of the peopling history of the Maghreb and northern Sahara. The research is ruled by an interdisciplinary approach that includes geoarcheology, geochronology, geochemistry, palynology, paleoanthropology and population genetics. The research area is south of the Chott el Jerid and its surroundings, where the major physiographic feature is a large playa which contained one of the mega lakes that existed in the Sahara during wet periods in the late Quaternary. The region is a pivotal area between the Mediterranean and the Sahara, then favorable to study the cultural diffusion and human displacement through different environments.

**Investigating the paleoecological context of the earliest hominin settlement in Western Europe**

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**Abstract**

In the last decade, new paleontological and archeological evidence has challenged previous views on the early human settlement of Europe. In particular, the Georgian site of Dmanisi, which dates back to the Early Pleistocene (some 1.8 million years ago) has provided significant data on the physical characteristics of these first hominids to emerge from Africa. A second area of interest is centered in Spain, where the first evidence of early human settlement in Western Europe is present in the Guadix-Baza Basin (Orce region, southern Spain) and the Atapuerca karstic complex (Sima del Elefante section) dating to 1.2–1.4 Ma. Given the importance of these discoveries, every effort is being made to reconstruct the landscapes where these hominins once thrived. Pluri and cross-disciplinarity has been a key for the interpretation of such sites crossing the results coming from the study of large mammals, small mammals, amphibians and reptiles, pollen analyses, numerical dates, etc. that permit to yield a scenario for the paleoclimatic and paleoenvironmental conditions that were in place at the time of the first hominin occurrence in Western Europe.

Recovered fauna and pollen elements suggest that the terrestrial landscape was composed of open environments (mainly dry meadows, rocky-stony areas and Mediterranean scrubland), although there were some wet wooded areas and the existence of a sunny permanent aquatic environment. Temperature and precipitation were higher than they are now on the Iberian Peninsula. The contrast between summer and winter temperatures was less pronounced, mainly due to warmer conditions during winter. Rainfall distribution indicates a considerable increase in precipitation in every season but summer, which was drier and consistent with the Mediterranean climate pattern.

**A contribution to the reconstruction of the 11Th century Roman landscape through archaeofaunistic investigation: the *Templum Pacis* case**

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Università Roma Tre

**Abstract**

The work presents some of the results from the study of the archaeofauna coming from the 11th century fireplaces identified in Rome, specifically in the *Templum Pacis’* post-antiquity *in-situ* phases. Traditionally, environmental reconstructions are linked to the presence of wild or “intrusive” species in faunal assemblages (micro mammals, insects, non-edible molluscs etc.), which are sensitive to environmental indicators, and not directly connected to anthropomorphic activity. In this case, however, the absence of wild species seems to be linked to the gradual decline in untamed urban species which is well attested in the historical sources. The almost exclusive presence of domestic fauna – and the economic models that can be deduced from inter-site comparisons – suggests an increasingly rational use of the territory.

The most promising results came to light from the study of the aquatic fauna, the object of fishing and gathering. The total sieving of excavated soil allowed the recovery of a relatively high quantity of fish and non-edible mollusc remains. The percentage of marine life to fresh-water remains opened an interesting glimpse on themes that are still being discussed in the historical context - such as the consumption of fish during Middle Ages and the internal water’s role in the supply of fish resources. Historical sources have traditionally been interpreted as conferring a dominant role for fresh water fish, due to a strong contraction of marine fishing activity, in comparison to the Roman period. The *Templum Pacis* osteological remains, instead, show the two ecological groups as being substantially in balance.

Furthermore, the taxonomic study stressed the presence of a *Perca fluviatilis* example – a species considered non-indigenous by ichthyologists1 – in addition to that of a *Cerastoderma edule* – currently only found in the west Mediterranean and Atlantic Ocean2. The *Perca* presence is extremely interesting as it would place the species in Italy as far back as the 11th century along with the beginning of the aquatic environment transformation.

**The Contribution of Archaeobotanical Data to the Reconstruction of Protohistorical Agriculture in Campania**

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ISMEO - Associazione Internazionale di Studi sul Mediterraneo e l’Oriente

**Abstract**

The study of seeds and fruits allow us to extend our knowledge on the various aspects of the ancient agricultural practices, giving the basic information to understand the evolution of the agricultural phenomenon, to determine the level of the food production and, to some extent, the state of the local environment. Only in recent years, Campania has witnessed an increased growth in research focused on highlighting this important aspect of Italian protohistory. Such investigations have thus filled the gap that has been generated by the special attention that researchers have paid for long time to deep increase their knowledge on the ancient relationship between man and the environment mainly through the study of the large quantity of data available in the Roman cities buried by the eruption of Vesuvius in A.D. 79.

Information obtained contributed to enhance our knowledge of the agricultural practices and the processing of the harvest carried out during protohistory. This research, confirming the facts already known from the archaeobotanical point of view for Southern Italy, defines the use of some plants, which were little attested in archaeological sites in Campania and south-west Italy. Agriculture was based on the cultivation of main cereals, such as barley, emmer, naked grains and marked by the beginnings of millet consumption. The cultivation of cereal crops was associated with the exploitation of legumes, such as fava beans and lentils, and with the harvesting of some fruits like cornel, figs, hazelnuts, almonds, blackthorns and acorns.

Finally, in some cases, the correlation of data from the study of the archaeobotanical evidence with the sampling context, well related to daily life activities, offers a unique glimpse into the agricultural cycle mainly concerning to various phases of crop processing as never before possible: from transport from the fields to the village, to the threshing process, until the storage prior to food production.

**Mobility and breeding practices in Eastern Languedoc from the Iron Age**

**to the Roman period: zooarchaeological and isotopic data**

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**Abstract**

Several zooarchaeological studies have recorded a size decrease in domestic mammals, especially cattle, between the Neolithic and the Iron Age in different parts of Europe. In the Iron Age, this size reduction stands in contrast with agricultural and technical improvements occurring at that time. Several explanations have been suggested, such as the selection of smaller animals for their docility, the breeding of livestock at an earlier age, and the absence of competition between males. However, the continuous decrease in size up to the Iron Age in some areas, together with the significant increase in size in Roman times and the subsequent reduction of size in Late Antiquity, does not fit these hypotheses, so the matter is still inadequately explained.

The present study describes the zooarchaeological and isotopic results (strontium isotopes 87Sr/86Sr) from two Iron Age Mediterranean trading sites in Southern France –Lattara and La Monédière–, and relates the results to the social changes occurring in that period. The results are consistent with a previous study in which the size variation in cattle in England was related to changes in their mobility (Valenzuela, 2015).

**Historic landscapes and intangible cultural heritage**

Valerie Higgins

The American University of Rome

**Abstract**

At a recent conference in Hawaii, ICOMOS and IUCN (International Union for the Conservation of Nature) proudly announced their partnership on a ‘Nature-Culture Journey’ in order to confront the ever more pressing issues confronting all heritage from population growth, climate change and mass tourism. The tendency towards collaboration and harmonization on projects that stretch across traditional divides of culture-nature is also apparent in World Heritage listings.

When the World Heritage List was first conceived in 1972 sites were listed as either cultural or natural depending on the criteria used in their inscription: in 1979 three sites were admitted as mixed sites that combined both aspects. Since that point, a small number of sites have been admitted to this category in most years but the overall number remains low at 35. In 1992 the relationship between culture and nature was more radically redefined by the introduction of the category of ‘Cultural Landscapes’, defined by UNESCO as ‘combined works of nature and humankind, that express a long and intimate relationship between peoples and their natural environment’. This was a response to a growing awareness that most landscapes are affected by human activity and that perceptions of value in landscapes are, in any case, culturally determined.

However, it is not only in the category of Cultural Landscapes that the environment has become more prominent. In 2015 the wine growing areas of Champagne and Burgundy became World Heritage Sites on the basis of their ‘climat’, which was defined as a unique combination of geological, environmental and cultural customs. Also in the area of intangible heritage the environment is playing an increasingly important role, as many of the listed elements relate to food and drink and, therefore, incorporate the unique environment that produces them. This paper will explore changing perceptions of the relationship between cultural and natural heritage and the implications for future research.

**Rome’s Aqueducts between Geology and Climate**

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The American University of Rome

**Abstract**

This paper will explore ancient Roman aqueducts as a potential source for geological and climate studies. Special focus is dedicated to the Aqua Alexandrina.

A sufficient water supply is fundamental for any human settlement. Early Rome could rely on water from the Tiber river, some sacred springs, wells, and rainwater cisterns. The population growth during the Republican period led to an increased need for fresh water; few is known about how pollution of the river, or variations in rainfall and the groundwater level, contributed to the emergency. After the Aqua Appia and the Anio Vetus had at the end of the 4th c. BC successfully introduced the transport of water over long distances, many other, always more powerful, aqueducts followed. In the 2nd c. BC the Aqua Marcia set new standards both for volume and for quality of water that remained valid throughout the Imperial period, when construction details of an advanced technology can be observed

As a case study will be presented the so-called Aqua Alexandrina. Ancient Rome’s last aqueduct did never receive the merited scholarly attention. It was built about AD 226 under Emperor Alexander Severus and remained probably in use until the Middle Ages (9th c. AD?). This long life span, and the consistent material remains of under- and above ground sections allow for a variety of approaches that will be applied in a just initiated research project. Some questions closely related to climate changes are: Can the sediments in the *specus* and the calcareous deposits along the aqueduct help to measure the water volume, and consequently seasonal or long-term changes? How did the marshy territory at Pantano Borghese determine the construction? Did branches deviate aqueduct water to villas and gardens in the countryside, causing a different micro-climate? First preliminary results will be presented in this paper.

**Does cooking mollusks affect paleoenvironmental reconstructions?**

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**Abstract**

Mollusk shells are excellent paleoenvironmental archives. They precisely record environmental variables in form of geochemical and structural properties. Oxygen stable isotope composition (δ18O) is a common proxy used as water paleothermoter. Water temperature is reconstructed with extremely high resolution and its record is temporally contextualized thanks to the periodic growth structures in the shell. Given that human exploitation of mollusks as food resource and tool manufacturing dates back to 160-150 ka, mollusks can provide critical information on the relationship between humans and the environment in which they lived. For instance, it is possible to reconstruct prehistoric marine resource exploitation, subsistence behaviors and mobility patterns. Because part of the diet, it is likely that mollusks were cooked prior their consumption. The present study examines the shell response to cooking treatments at different temperatures by using a multiscale approach from macroscale appearance to microstructural organization and geochemical composition. The aim is to understand to which degree shell material and its δ18O composition are influenced by heat treatments and how this affects paleoenvironmental and paleoseasonality reconstructions. The species used in this experimental study is the topshell *Phorcus turbinatus,* which commonly dominates the marine mollusk remain sequences in various sites of the Mediterranean area (i.e. Sicily, Lybia, Lebanon). Our study identifies significant alterations of structural and geochemical properties starting at the cooking temperature of 300°C. This leads to water temperature overestimate and incorrect assessment of the collection seasonality. Therefore, an accurate material selection with specific techniques is advised before any paleoenvironmental reconstruction. Our results also provide deeper insights into the identification of cooking methods used by prehistoric groups, enabling a more detailed reconstruction of subsistence behaviors.

**The State of Multiproxy Environmental studies in the Mediterranean Region from the Roman Period (200BC-200AD): a comparison and critique of data types, and methods of synthesis**

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**Abstract**

Scholarship in environmental archaeology is progressing well, with increasing attempts to synthesize different data types under complex conditions. This paper will attempt to audit the papers published on synthetic studies on the Roman Mediterranean with a view to classifying the different approaches to synthesis from simple enumeration of specialist disciplinary results to truly integrated analyses. In the case of the latter, further refinement of the examination of these analyses will explore how integration occurs, and rate the different methods for their utility and benefits. It is hoped that progress will be made towards development of an agreed understanding of the requirements for high standard syntheses in the discipline of environmental archaeology in the future.

**The recovery and enhancement of the Cimina variant of the Via Francigena in the territory of Lake Vico**

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Simone Quilici2

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2. Officer architect at the Cultural Heritage Department of Lazio Region

**Poster Abstract**

Some recent restoration and enhancement of the cultural heritage along the Cimina variant of the Via Francigena in the Tuscia territory have highlighted the potential for development of a sustainable tourism linked to the historical, architectural ​​and landscape values of the areas crossed by cultural itineraries.

In the context of regional programming of European funds (ERDF 2007-14) some significant monuments have been identified to be recovered, placed along the route of the Via Francigena. The masterplan 2008 of Lake Vico Natural Reserve has laid the groundwork for two interventions on the cultural heritage located in high value landscapes and natural environments.

The first of these interventions was to consolidate the ruins of the old customs of the Renaissance Farnese Duchy of Castro and its post station, located up the mountain on the heights of the Monti Cimini between Viterbo and Ronciglione, overlooking the volcanic caldera of Lake Vico.

The second intervention was aimed at the enhancement of an aqueduct water tower of Caprarola, built in the fifties over the ruins of the medieval Castle of the Prefects of Vico, reused, thanks to the construction of a steel frame supporting a series of ramps, as panoramic observation point on the entire lake.

**Long-term population dynamics and pollen-derived land cover change in the Mediterranean basin: some preliminary results.**

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Bevan, A1,

Shennan, S1,

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**Abstract**

The “*Changing the Face of the Mediterranean* project” is a Leverhulme-funded Plymouth-UCL collaboration which aims to reconstruct long-term trends in population dynamics and vegetation change from the introduction of Neolithic farming to Medieval times (ca. 9000-1000 BP), on a pan-Mediterranean scale, in order to assess if and how human impact has shaped natural landscapes over the millennia. We compare radiocarbon dates, archaeological survey data and pollen records from several case study regions in order to understand how human demography and vegetation/land cover change are related to one another over the *longue durée*. In the present paper we consider some preliminary results from two of our Western Mediterranean case studies: southern France (centred on the Rhône valley) and central Italy (Tuscany, Lazio) and reflect both on the substantive conclusions they raise and how some of the previously-emphasized methodological challenges associated with these datasets can be overcome.

Web site:

<https://www.plymouth.ac.uk/research/changing-the-face-of-the-mediterranean-land-cover-and-population-since-the-advent-of-farming>

**Terrestrial movements and urban transformations in *Telesia* between the 4th and 5th century AD : new archaeological data**

Pedroni et al**.**

**Abstract**

The excavation campaign of 2015 in ancient Telesia, the second since the Telesia Archaeological Project was inaugurated, provided data of outstanding interest for the understanding of the forum area of the Roman city of Telesia (i.e. S. Salvatore Telesino – Benevento). First of all, elements emerged that confirm the hypothesis proposed at the end of the first campaign, which concerned the identification of a rectangular public building of great dimensions along with the city basilica of imperial age, connected to the *tribunal*. In Late Antique time, profound transformations, maybe caused by one or more earthquakes (346 and 375 AD), radically changed the appearance of the building leading to the progressive destruction of the giant colonnade - until now only partially excavated - which was situated in the foreground and overlooked the forum. In between the *porticus duplex* columns, evidence was found of some honorary monuments which were also destroyed and sacked.

In front of the northern side entrance of the basilica, above the ancient *porticus duplex,* an extended stockpile of materials was highlighted; inside a small structure made of tufa slabs (80 x 40 x 50 cm ca.) was found. Unfortunately, it was broken in its western side. We are dealing with a sort of box of almond (boat) shape covered with a tufa slab, and whose terminal on the north side was supported by two shingle fragments set in between the tufa and the *porticus* pavement. On its inside, the bones of a piglet were brought to light along with a small fragment of white glass. The function of this structure is uncertain; that it represents a ritual of re-founding, or of atonement, made due to the last earthquake cannot be excluded.

**Animal mobility in Late Glacial Central Italy and implications for Upper Palaeolithic hunting strategies**

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**Abstract**

In Central Italy seasonal pastoral movements (transhumance) from lowlands to highlands have historically been used to provide animals with fresh pastures in the summer and protection in winter. This strategy likely functioned also for wild animals in the region, entailing Pleistocene hunter-gatherers to follow them. We tested this hypothesis by measuring combined sequential 18O/16O, 13C/12C and 87Sr/86Sr isotopic ratios along the growing direction of equids and cervids tooth enamel to explore the animals’ timing and ranging behaviour. Enamel formation of the M3’s in both animals occurs over a sufficient time to record more than one winter-summer shift, in which oxygen and carbon isotopes act as proxies for climate and environmental conditions (temperature, humidity and vegetation cover), and strontium isotopes for the geological substrates covered during this period. Sequential 18O, 13C and 87Sr/86Sr were measured in archaeological animal remains from the Grotta di Settecannelle (Latium) sequence. The studied teeth come from three layers of the succession, assigned to stadial, interstadial and again stadial climatic intervals, in order to test the effects on the isotope data of the sharp, high amplitude temperature changes known to have occurred at these times. Isotopic results were compared to those determined in modern animals, and to 87Sr/86Sr ratios measured in rocks, waters, soils and plants collected across the area. The intra-tooth sequence data shows strong 87Sr/86Sr attenuation compared to the variability observed in the environment. Nonetheless, isotopic variation observed in the archaeological animals shows consistent patterning that can be associated with seasonal movements across the region. The results are inconsistent with our hypothesis, hinting rather that both equids and cervids moved opposite to predictions. Further, these mobility patterns seem to have changed little across major climate shifts, while absolute values for 18O tooth sequences show little relationship to colder versus warmer deglaciation phases.

**Sub-seasonal resolution Mediterranean sea surface temperature records and human behavioural changes during MIS 3 in the Levant**

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**Abstract**

Humans respond to changes in their local environment on daily to seasonal timescales. Therefore, a robust assessment of the impact of environmental change on human behaviour requires an understanding of local environmental change at seasonal to sub-seasonal resolution. Stable isotope records from mollusc shells provide one of the few sub-seasonal resolution palaeoenvironmental proxies in the Mediterranean. Obtaining these records from food-refuse archaeological specimens enables the reconstruction of a more detailed picture of how humans responded to changing climatic regimes in the past. Here we present sub-monthly resolved SST reconstructions from stable isotope analyses of intertidal gastropods (*Patella caerulea* and *Phorcus turbinatus*) from the Palaeolithic archaeological site of Ksar Akil in Lebanon. We found evidence for fluctuating temperature and seasonality regimes throughout marine isotope stage (MIS) 3 which appear to be linked to northern hemisphere millennial-scale climate oscillations. Shells dating to cooler stadial and Heinrich events showed mean sea surface temperatures around 4ºC lower than interstadials. At these times, seasonality was increased due to lower winter temperatures. Conversely, during warmer interstadials, seasonality was reduced. The Upper Palaeolithic human occupation of the site occurred during both warmer and cooler phases and during both high and low seasonality regimes, indicating that modern human populations were resilient to the resource uncertainty that would have accompanied these changing temperature and seasonality regimes.

**Isotopic investigation at Grotta Breuil (Monte Circeo, Latium). A paleoecological exploration of the faunal fossil record**

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**Abstract**

Survival in *refugia* could have been a critical aspect in the demise of Neanderthals, in a way that makes it crucial to investigate human dispersal and paleoecology of the last Neanderthal populations during the Late Pleistocene. South of the Alps and bound by the Appennines to the east and the Tyrrhenian coast to the west, southern Latium, constitutes a geographical *cul de sac* and a possible refuge area during the Pleistocene, as also mirrored in the fossil record. In this perspective, we present a reappraisal of the Middle Paleolithic site of Grotta Breuil (Monte Circeo), within a multidisciplinary investigation. The cave, a Mousterian site with Neanderthal fossil remains belonging to two different individuals, was in use while, elsewhere in the Peninsula, Upper Paleolithic contexts were already present. Zooarchaeological analysis revealed changes is hunted species~~,~~ suggesting variations changes in adaptive strategies across layers of occupation, with lower layers showing residential use and upper ones associated with a sporadic use of the cave, possibly related to changes in climatic and environmental conditions. Our project envisages ~~a~~ paleoanthropological, archaeological, and palaeoecological investigations paired with a systematic isotopic study of human and animal fossils. We present here the preliminary results of an isotopic investigation, which include oxygen (δ18O), carbon (δ13C), and strontium (87Sr/86Sr) isotope ratios of carbonates from teeth of fossil faunas. We aim at reconstructing the paleoecology of the later phases of the Middle Paleolithic with the isotopic ratios from the fossil record found at the cave eventually reconnecting human behavior with a wider ecological context.

**Archaeobotanical and Archaeological Indicators for the Olive Economy in ancient Campania: data types and their synthesis**

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**Abstract**

Olive oil’s status as a staple in the ancient Mediterranean is well known. The production of olive oil, and its resultant by-products leave a range of traces in the archaeology, including archaeobotanical (charred, dried or mineralized olives or olive stones; olive pressing waste (pomace); wood charcoal, and pollen. Occasionally olive leaves may be found as impressions or in carbonized form. Other indicators for oleoculture include of course olive presses, and ceramics (those specifically known for use in olive oil storage and transport). Along with grapes for wine, olives are presumed to have been cultivated in quantity in Republican and Imperial Campania, although the matter has never been closely examined. This discussion will focus on the archaeobotanical evidence for olive found in ancient Campania, examining levels of presence/absence of different data types; the significance of these; and their respective levels of bias. The contribution of these data to an understanding of the economic importance of olive in the Campanian landscape will be framed more generally in light of complementary evidence from ceramic, glass and standing remains.

**Combining phytolith analysis and geochemistry to study ephemeral sites in dynamic environments**

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**Abstract**

In recent years, the use of a combination of methods and techniques in order to explore various archaeological research questions has increased, enabling us to study past lifestyles in greater detail. Although combining different sources of information is a promising avenue for future research, the compatibility of the different results and the approach taken to synthesise these need to be considered. This paper will discuss the challenges and potential involved in combining environmental- and science-based archaeological techniques through ethnographic and archaeological case studies from Jordan. Soil samples from occupied and abandoned Bedouin campsites at Wadi Faynan and Neolithic sites from Wadi el-Jilat were analysed in order to examine the potential of a dual phytolith and geochemical methodology to better understand the past use of ephemeral sites. An important part of this research was the statistical synthesis of the different sources of information, which allowed us to observe the compatibility of the two analysis methods and explore ways to combine the results of both of these. The outcomes of the phytolith, geochemical and statistical analysis suggest that the combination of multiple proxies carries much value for the interpretation of ancient lifestyles, and that soil signatures can preserve even in ephemeral sites located in dynamic environments.

**Middle to late Holocene Landscape and Human Dynamics** **in the Apulian-Lucanian Border Area of the Southern Italian Interior: Analogues for Current Trends in Human Disturbance and Landscape Deterioration.**

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**Abstract**

Although climate has been the main driver of Holocene landscape dynamics, at times, human land use has been as important or even more important. Today the relative affect of people and climate upon the landscape is obvious, however, in the past their relative impact has been difficult to assess. The country straddling the Puglia and Basilicata border region in southern Italy (the Mezzogiorno), due to its geology, is particularly sensitive to climate and human interaction, and provides an ideal laboratory where these relationships can be studied. Recent palaeoecological

and archaeological research is providing hints regarding the role of climate and land use in landscape dynamics, and of the affect of changing landscape upon the people. Today’s conditions have occurred previously and can provide not only understandings of past relationships between climate, people and landscape, but through the application of past analogues and models may be used to predict future outcomes during global climate change. A model integrating a mesoscale climate model (MCM), and relationships between effective precipitation and sediment yield developed in the American Middle West during the last 50 years, has been correlated to currently available alluvial histories in the Mezzogiorno. We have established correspondences between past effective precipitation, vegetation cover, land use and erosion. We are refining data input with a more robust regional alluvial history, and with GSI conversion of archaeological surveys into spatial distributions of where people lived, their relative numbers, and pursuits for land use reconstruction. The model identifies erosional episodes at 7,000 and 3,000 B.P corresponding to land use changes, not climate, and scales the relative impact of climate versus land use, especially during the last 2,000 years. Clearly the impact of prehistoric land use in the Basentello/Bradano river valley is significantly underestimated.