



The **24th edition of GMPCA-Archaeometry symposium** will take place for the first time in **Nice, from 17 to 21 April 2023**.

The conference is organised by the **CEPAM (CNRS/Université Côte d'Azur)**, an interdisciplinary research unit characterised by a broad interface between the humanities, natural sciences and physicochemical sciences, allowing the study of diverse archaeological remains, from artefacts and ecofacts to landscapes, over a wide chronology from the earliest prehistory to the Middle Ages.

From the Acheulean settlements to the 19th century winter resort town, Nice has a rich heritage over a very long period of time, which can be experienced at this next GMPCA conference.

**Papers in both French and English are welcome!**

**Paper proposals can be submitted until 20 November 2022  
on the conference website:**

<https://gmpca2023.sciencesconf.org/>



## Theme 1: Socio-economic trajectories and interactions

**Coordinators:** Léa Drieu, Louise Gomart

Understanding past social structures implies the understanding of the shared codes and individual behaviors related to the exploitation and transformation of natural resources, the modes of production, consumption and abandonment of artefacts, as well as the mechanisms of exchange and mobility. In archaeological context, the integrated study of these parameters constitutes a privileged entry key to reconstruct the perimeter of social groups and to conduct their detailed anthropological analysis.

This first theme thus places the material and biological evidence of human activities at the center of investigations to grasp the socio-economic dynamics of groups, as well as their interaction networks. Using multi-proxy and multi-scale archaeometric approaches, the proposed sessions will explore the techno-economic behaviors of past societies: exploited resources (mineral, animal, plant, etc.), craft activities (technical traditions, uses, reuses, etc.), modes of subsistence, contact and exchange networks, in order to reveal their spatial trajectories, but also their relationship to the environment and its impact on lifestyles.

### Session 1.1: Multi-proxy, multi-scale, multi-instrument approaches...: Opening up functional analysis to reconstruct gestures from the past

**Coordinators:** Juliette Guibert-Cardin, Léa Drieu, Caroline Hamon

**Keywords:** function and uses; use-wear traces; residues

Ancient objects keep in memory the actions for which they were used. The detection and interpretation of the traces and residues generated by their use and function provide information on past gestures, invisible by nature.

The slight nature of the use traces requires the development of adapted methods and reference collections. It is linked to the specific characteristics of the materials (ceramics, lithics, bone, metal, etc.) and objects' functions, which might lead to disciplinary compartmentalization. However, the most significant studies are often multi-approach.

Multi-proxy approaches (organic residues, use-wear traces, botanical remains, etc.), multi-scale (macro-, meso-, micro-, molecular), multi-analysis equipment (optical microscope, scanning electron microscope, confocal microscope, mass spectrometry, isotope ratio spectrometry, etc.), develop complementary hypotheses, reinforce interpretations and nuance conclusions, which are essential for reconstructing past gestures. Interpreting the traces means understanding their formation and therefore requires complementary and indispensable knowledge about the properties of the raw material, the manufacturing processes, the taphonomic phenomena, etc.

This session aims to bring together works that contribute to the opening up of functional studies and invites in particular presentations and posters with multi-scale, multi-instrument and/or interdisciplinary approaches to object function.

### Session 1.2: From acquisition to consumption: exploring the facets of food systems

**Coordinators:** Léa Drieu, Julien Vieugué, Estelle Herrscher

**Keywords:** diet; food and foodways; predation/production; storage; preparation; cooking; serving and consumption

Essential to the survival of individuals, food is a social phenomenon that involves complex chains of acquisition, distribution, storage, preparation and consumption of natural resources by human societies. At the heart of "food and foodways" are intrinsically intertwined biological and cultural

aspects: physiological needs, resources available in the environment, production techniques, knowledge and representations of what is edible, memory and transmission of culinary know-how, manufacture and use of adapted or specific utensils, representations and knowledge relating to the body and health, etc.

In archaeological contexts, this complexity can only be understood through the combination of a multitude of proxies. Archaeometric approaches provide information on the commodities consumed (bones, carpological remains, phytoliths and starches, etc.), the utensils and resources used for their acquisition, distribution, transformation and consumption (storage and cooking structures, fuels, containers, tools for collecting, grinding, mixing, separating; made of ceramic, stone, metal, glass, wood, leather, etc.), or their effect on the human body (stable isotopes, paleopathology, paleoparasitology, etc.). These approaches shed light on acquisition methods (hunting and fishing techniques, agricultural and pastoral strategies, etc.), processing methods (cutting, cooking, grinding, drying, smoking, etc.), and even consumption patterns (domestic consumption, feasting, differences in diet according to age and gender, etc.).

Using a variety of archaeometric methods, this session will explore the different dimensions of the food system, from acquisition to consumption, through the different stages of processing and distribution.

### Session 1.3: The who, how and what: biological, chemical, and material evidence of human mobilities and interactions

**Coordinators:** Elsa Defranould, Gaspard Pagès, Maïté Rivollat, Hala Alarashi

**Keywords:** origins; cultures and material productions; biological; cultural and social identity; networks and circulations; diffusions; transfers

Studies on the provenance and the trajectory of materials and products in prehistoric and historic societies are at the heart of archaeological and archaeometric research and have played an important role in the GMPCA meetings. Technical and methodological developments now allow for a more detailed understanding of the mobility and interactions of human societies. For a long time, the approach has consisted in observing the circulation of materials or manufactured objects as evidence of contacts, exchanges or trade, leaving aside the very actors of these interactions, whose biological identity is also the subject of debate and research. Therefore, it seems important today to place the notions of mobility and interaction through the articulation of four fundamental axes: the human beings, their productions, their culture and finally their space.

The combination of different biological data (anthropology, genetics, isotopes) makes it possible, on the one hand, to discuss the identity of human groups and, on the other hand, to access different scales of their mobility: population migrations, local and/or functional mobility (seasonal, generational) involving movements of individuals or parts of groups within a social and cultural entity. In parallel, the study of material productions, from the characterisation of their origin to their use, allows us to reconstruct supply and production strategies and thus to outline the contours of various circulation, exchange and trade networks.

In this session, we wish to give an account of the diversity of approaches to these questions of mobility and exchange, and to explore, when possible, the areas of encounter between biology and material culture. We invite any contribution, whether it is a case study, a multi-scalar and/or multi-proxy study, or methodological developments.

## Theme 2: Socio-ecosystems: biodiversity, adaptations & trajectories

**Coordinators:** Auréade Henry, Lionel Gourichon

The kind of relationships humans have forged with their environment is a central issue for the understanding of the economic, cultural and social organization of past societies.

From arctic tundras to tropical forests, from high plateaus to littoral areas, humans have peopled a wide variety of ecosystems. The process of adapting to the environment may have been extremely challenging and human societies have addressed different kinds of constraints by developing complex adaptive schemes through varied and innovative strategies in what regards settlement and territorial patterns, developing specific resource acquisition, use and transformation systems.

As an integral part of quaternary ecosystems, whose history is as complex as it is dynamic, societies may have been strongly affected by climatic and environmental variations, but they could also have contributed to ecological forcings and tipping points. The repercussions of the various trajectories followed by these socio-ecosystems run deep, affecting living organisms at their very core. For instance, the development and evolution of pathogenic agents impacts the health of humans, animals and plants.

The four sessions included in this theme focus on the evolution of biodiversity and ecosystems, human, animal and plant adaptations to the environment, the exploitation by humans of ecologically contrasted territories, the management of wild and domestic resources and questions related to human and animal health in the past. They aim at exploring socio-ecological trajectories and systems, especially through integrated/multi-proxy approaches, welcoming classic as well as exploratory approaches within all kinds of archaeology, archaeometry and paleoenvironmental disciplines. Within the perimeter of each session, contributions may focus on long-term reconstructions or, on the contrary, provide snapshots of human-environment interrelations in the past without any geographical or chronological boundaries.

### Session 2.1: Evolutions, fluctuations and tipping points of past ecosystems: ecological successions, climate and anthropogenic forcings

**Coordinators:** Tatiana Theodoropoulou, Emmanuel Desclaux, Sophie Martin

**Keywords:** ecosystems; environmental dynamics; ecological successions; climate fluctuations; anthropogenic impact; interdisciplinary approaches

Ecosystems are not static over time, they can evolve according to natural ecological successions, be gradually transformed under the influence of slow climatic or environmental changes, undergo abrupt shifts following specific disturbances, or be impacted to varying degrees by anthropogenic activities.

This session is dedicated to all palaeoenvironmental and palaeoecological disciplines that propose to study these variations at different spatio-temporal scales, relying on the fossil record or using bio-, geo- or physico-chemical methods or ecological models/proxies. In particular, it will focus on integrated approaches that help to overcome the limitations of the archaeological record in order to better understand the interactions between climate, landscape and past ecosystems, to assess the degree of resilience of the latter, and to identify indicators of anthropogenic pressure.

## Session 2.2: Lands of contrasts: territorial organization and resource exploitation in areas with strong environmental gradients

**Coordinators:** Aude Civetta, Claire Delhon, Valentina Villa

**Keywords:** resources; mobility; seasonality; territory; environment; economic specialization

Such as the *Alpes-Maritimes* (France), where mountains plunge into the sea, giving access to biotopes of great diversity over a short distance, some geographical areas appear to be particularly attractive to human societies because of the variety of resources they contain. This session proposes to show how archaeometric methods in the broadest sense can document the way in which these societies have organized themselves since prehistoric times in order to take advantage of contrasting territories. It will primarily focus on the patterns of occupation and exploitation of territory, resource and raw material exchanges, seasonality of activities, mobility and specialization of human groups. Contributors are also invited to present examples highlighting a focus on one type of environment or resource, while others are available in the immediate environment.

## Session 2.3: Exploitation and management of plant and animal resources

**Coordinators:** Lydie Dussol, Lionel Gourichon, Manon Vuillien

**Keywords:** biological resources; subsistence strategies; hunting; fishing; farming; plant gathering; agriculture; pastoralism; agrosystems; zootechnics; technology; interdisciplinary approaches

A significant part of the interactions between human societies and their environment is demonstrated through the use of plant and animal resources, whether wild or domestic, for subsistence or for various techno-economic, cultural, social or even symbolic purposes. The strategies of acquisition and production of these resources, their management, the techniques of transformation of raw materials or associated products The manners in which these resources were acquired, produced, managed, transformed and used constitute a vast field of research. This field has for a long time led to the elaboration and development of new archaeometric approaches in various archaeological disciplines. This session calls for scientific contributions that draw on such approaches to address questions related to hunting, fishing or gathering practices and strategies, plant or animal domestication, agropastoral systems and agrarian, agroforestry or zootechnical practices, as well as butchery or plant processing techniques and pyrotechnology, in a variety of cultural, socio-economic and environmental contexts. Contributions that closely link wild and domestic resources, or animal and plant resources, will be particularly welcomed.

## Session 2.4: Human and animal health, transmissions, interactions and care

**Coordinators:** Annelise Binois, Yann Ardagna, Aude Civetta

**Keywords:** human paleopathology; animal paleopathology; zoonosis; methods; paleomicrobiology; paleoepidemiology

The development of archaeological research has shown that the transmission of pathogens between humans and animals goes back to at least the first agropastoral societies, in which the increased frequency and intensity of interspecific contacts favored the emergence and spread of bacterial, viral and parasitic diseases. Given the improvement of biochemical, microbiological and genetic tools, could archaeometry in its broadest sense allow new joint human/animal studies for the same site, the same region or even the same pathogen?

This session, which is open to all papers dealing with the archaeometric exploration of human or animal diseases, aims to illustrate the contribution of archaeometric methods to our understanding of past

human and animal health and to explore the sanitary, economic and social impacts of disease in past societies:

- Zoonoses
- Health consequences of environmental crises
- Recurrence and appearance of new human and animal epidemics (plague, cholera, brucellosis, etc.)
- Impact of interspecific diseases in populations (immunity, favoring terrain...)
- Invasive and non-invasive methods for identifying pathogens in past humans and animals (infection, parasitosis)
- Identification and evocation of therapeutic gestures in humans and animals

Submissions inspired by the One Health initiative (<https://www.anses.fr/fr/content/one-health>) and addressing the interface between societies, animals and environments will be particularly welcomed.

## Theme 3: Methodological developments and innovations

**Coordinators:** Antoine Pasqualini, Manon Vuillien, Thibaut Devière

Research in archaeometry regularly benefits from technological and analytical advances that contribute to the consolidation of our knowledge of tangible and intangible cultural heritage (collective memory), thus promoting its conservation in different forms (physical, chemical or even digital). This theme of the conference focuses on new methodological developments for the study of archaeological contexts and artefacts, from the site to the laboratory. It will bring together contributions on the management of data sets and their accessibility (3.1), on minimally invasive and/or non-invasive analytical protocols developed in chemistry, physics, optics or even imaging (3.2), on experimental protocols and ethnographic studies (3.3) as well as on dating methods and chronologies (3.4)

### Session 3.1: Dataset management

**Coordinators:** Antoine Pasqualini, Matthieu Lebon, Thomas Huet

**Keywords:** acquisition; databases; datasets; storage; repository (publication); (re)use (processing; analysis); accessibility; open science; FAIR

Datasets management in archaeometry and archaeosciences is a central element of our research strategies. They are representative of our problems at a given moment and allow us to interpret, understand and thus enhance our cultural heritage. It is the foundation that ensures the relevance of the data processing and analysis and thus our understanding of the final results. Beyond their specific context of production (one of the archaeological sub-disciplines), data management has become a major issue as expertise has developed and it is likely that a single project cannot exploit the full potential of the data at its disposal. Open Science, which consists of making "as accessible as possible and as closed as necessary" [1], the principles of "Easy to find, Accessible, Interoperable, Reusable" (FAIR) [2], and Data Management Planning (DMP) [3] aim to be able to reuse this data in the long term to produce serendipity. This session invites us to question the way we use and interact with our data sets.

[1] CNRS, Science Ouverte, <https://www.science-ouverte.cnrs.fr/>, access on 20/09/2022

[2] Wilkinson, M. D., Dumontier, M., Aalbersberg, I. J., Appleton, G., Axton, M., Baak, A., ... & Mons, B. (2016). The FAIR Guiding Principles for scientific data management and stewardship. *Scientific data*, 3(1), 1-9

[3] INIST-CNRS, Plan de gestion de données, <https://dorum.fr/categories/dmp/>, access on 20/09/2022

### Session 3.2: Developments and new low/non-invasive analytical methods

**Coordinators:** Manon Vuillien, Thibaut Devière

**Keywords:** non/less destructive analytical techniques; methodological updates; measurement; archaeological object; preservation

For many years, paleontologists, archaeologists, historians, chemists, physicists and mathematicians have been working together to reconstruct the origin, nature, path and uses of heritage objects and materials. Benefiting from recent analytical advances, our knowledge of archaeological artefacts is being consolidated, thus improving the protection and preservation of our (im)material heritage.

Indeed, the updating of analytical approaches requiring sampling now allows us to reduce and limit the quantity necessary to take measurements. Moreover, the multiplication of non-destructive analysis techniques enables the study of a wide range of materials while preserving the integrity of the archaeological object.

This session aims to bring together scientific contributions proposing new or renewed approaches to minimize or non-invasive analyses performed on archaeological artefacts, from the laboratory to the site.

### Session 3.3: Make, see make, analyze: experiments and ethnographic enquiries in archaeology

**Coordinators:** Pauline Debels, Maxime Rageot, Caroline Robion Brunner

**Key words:** experiments; ethnography; techniques; experimental protocol; actualist studies; reference collections, *chaînes opératoires*

Controlled experiments and ethnographic surveys serve an important role in informing archaeological interpretations as they can contribute to understanding past technical practices and social dynamics. These two fields may be defined as a « science of references » (Roux, 2007). These references, which are constantly under construction, are based on rigorous methods of inquiry and experimental protocols. The communication of these studies to the scientific community is the responsibility of their developers. Such research may address resources acquisition strategies, methods of transforming materials, the technical means of production and function of objects, as well as the post-depositional processes surrounding them.

In this session, we invite contributions related to experimental protocols and ethnographic survey methods, that should detail their objectives and limitations. Contributions that relate their findings to the interpretation of archaeological contexts will be encouraged. How can ethnographic studies and experiments move beyond mere technical observations and contribute to understanding socioeconomic concerns? What links can be established between material culture, technical gestures and cultural phenomena?

This call for papers includes research concerning all materials (metal, lithic, biological/ organic, ceramic) and methods of analysis (*chaînes opératoires* studies, physico-chemical analyses, macro and microscopic studies and statistical analyses), with an emphasis on promoting interdisciplinary approaches.

### Session 3.4: Dating methods and chronologies

**Coordinators:** Thibaut Devière, Lucile Beck, Chrystele Verati, Véronique Michel

**Keywords:** absolute dating; relative dating; chronostratigraphy; methodological developments; sample pretreatment; Bayesian modeling

The chronological study of Quaternary sedimentary archives is an exceptional temporal observatory of historical and prehistoric cultures and their environment. This session will bring together recent studies in absolute and relative dating, addressing both the latest technological advances and the applications of dating in archaeology. It will include communications on the current state of dating methods, on their use according to the problems raised, on the interpretation of the results, on the problems of representativeness. The different dating methods applicable to Quaternary archaeological sites are very often confronted with problems of conservation or contamination of the material to be dated, geological issues or methodological limits, thus limiting their range of application. The multi-method approach applied on the same site allows comparisons and can lead to chronological readjustments.

This session will then focus on multidisciplinary studies and technical developments of dating methods allowing to better constrain the chronology of archaeological and environmental sequences of the Quaternary.

## Theme 4: Archaeology and archaeometry in times of crisis

**Coordinators:** Martine Regert, Maxime L'Héritier, Marie-Yvane Daire

**Keywords:** natural and cultural heritage; crises; climate change; environmental constraints

The fire at Notre-Dame de Paris on April 15, 2019 has brutally reminded us of the fragility of our cultural heritage. At the same time, it was at the origin of the largest scientific project ever launched on a heritage building, mobilizing researchers from many specialties on a multitude of research themes, transforming the damaged object into an object of research in a particularly remarkable way.

This disaster is not an isolated case: in a few years, destruction by fire has affected the Museum of Anthropology in Rio de Janeiro, Brazil, in September 2018, the Shuri Castle in Japan in October 2019, and the Nantes Cathedral in 2020. Wars, natural disasters, ongoing climate change that erodes coasts, burns forests or floods entire regions, are other events that weaken the material traces of the populations of the past. Such events also sometimes bring to light unsuspected vestiges, as allowed by the lowering of water levels during periods of drought or the melting of glaciers for example. The current crises also turn archaeometry itself into an object of thinking: a science that often requires costly analytical means and protocols that are sometimes energy-consuming and polluting; reflection on the implementation of new practices is thus necessary.

In summary, this theme is dedicated to all the crises that we are currently experiencing, or that have occurred in the past, and to their impact on cultural and environmental heritage. Paper proposals should address these issues through the lens of archaeometry, whether it is to transform a disaster into an object of research, to prevent risks or to develop innovative methods of observation or analysis.