

## **ENGLISH**

#### **Topic/Title**

Ancient ceramic production and raw materials in the Bay of Naples area

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#### **Research proposal**

The Bay of Naples, archaeologically defined as the area extending from the ancient Cuma to the Sorrento Peninsula, including the peri-vesuvian plain, is renowned for its rich archaeological record. Ceramic evidence dates as early as prehistoric times till the Greek-Roman period and later and represent a significant product of the material culture.

Several sites in the Bay of Naples (i.e., Ischia, Cumae, Puteoli, Pompeii, Surrentum, Neapolis) produced ceramic with different functions, from high-quality fine pottery to common ware, including transport amphorae and building materials.

Circulation of these products was intense and favored by access to the sea and communication routes. For this reason, the study of ceramics plays a fundamental role for reconstructing the contacts between the populations, commercial exchanges, and ancient production technologies.

Archaeometric studies of provenance and technology, most of them conducted over the years by the DiSTAR research team, have outlined a general overview of the production and circulation dynamics in the Bay of Naples over a broad time span.

In order to more precisely define the characteristics of local production, this research program will deal with the analysis of materials belonging to different ceramic classes (e.g., fine pottery, common ware, amphorae, bricks), along with of



materials directly linked to the production workshops (e.g., kiln waste and parts of the furnaces, spacers, etc.) and which, not being objects of sale or exchange, represent important production indicators.

Furthermore, it is very important to identify the raw materials used by ancient craftsmen in order to address issues related to the exploitation of the territory and define the origin of the ceramics. This approach also allows us to understand the technological potential of local clays used in ceramic production, depending on the different end-uses. The area under examination, however, is characterised by a particular geological complexity, being dominated by volcanism and subject to various transformations over time, in addition to being heavily impacted by anthropisation and urban development.

In recent years, archaeometric research has provided new data to outline a reliable general picture characterised by a well-developed distribution system of ceramics and even raw materials, including clays and temper. More specifically, Ca-rich clays from the nearby island of Ischia were sourced for fine pottery production, especially in the Greek period. In the Roman age, a more organised system emerged, with evidence of the importation of Ca-rich clays from marine deposits on the Apennine ridge, located several dozen kilometres away. This evidence has suggested a transport system by sea (for example from Salerno to Pompeii) or by internal communication routes, probably also by river.

Important questions remain, especially regarding the Ca-poor clays mainly used to produce cooking ware. These could be represented by a particular type of clay derived from the alteration of pyroclastic deposits, still used for the traditional craft of cooking ware in some areas of northern Campania and refractory bricks in the Sorrento Peninsula. Furthermore, the role of alluvial clays should not be underestimated. For example, clay sediments from the Volturno floodplain, which could be exploited for production in the Phlegraean area and those from the Sarno floodplain, allegedly sourced in the peri-Vesuvian area (including Pompeii). In



addition, clayey materials possibly present in volcanic-sedimentary deposits associated with small watercourses or ancient marshes in the plain should also be considered. For these reasons, geomorphological information aimed at paleoenvironmental reconstruction will also be considered, along with possible core drillings in flat areas (e.g., northern Phlegraean plain, Sarno and Volturno floodplains) to sample clay sediments in levels once accessible to ancient populations.

## **Research Plan**

Research activities will be carried out using the facilities of the DiSTAR at the Federico II University of Naples, where the PhD student will have the opportunity to learn technical skills and analytical methods used in ceramic archaeometry and for the characterisation of clay raw materials.

A period will be spent by the PhD student on a visiting fellowship abroad. This will allow the PhD student to learn different analytical methods and meet other scholars, providing the opportunity to further develop one's career.

The results of the study will be presented at conferences and published in international journals.

During the PhD research programme, training courses of the "Scuola di Dottorato" will be also available for the student at the DiSTAR, along with the possibility to attend external courses for improving knowledge on different topics.

Research activities will be carried out over the three years according to the following work schedule.

## l° year

• Research of the archaeological, archaeometric, and geological literature on



the ancient ceramic production in the Bay of Naples and raw material sourcing.

• Sampling of archaeological ceramics, including kiln waste and other production indicators.

• Characterisation of archaeological ceramics via mineralogical-petrographic techniques: polarized light microscopy (PLM), chemical analysis (XRF), mineralogical analysis (XRPD), scanning electron microscopy (SEM) in fresh fracture and microanalysis (SEM-EDS).

• Planning the sampling of clay raw materials possibly exploited in antiquity. In addition to the consultation of literature and geological cartography, the sampling strategy includes the collection of historical information and an ethnographic approach carried out by directly interviewing craftsmen, who still use local raw materials and traditional ceramic production technologies.

• Field activities for sampling clay deposits. Core drilling is planned for sampling sediments in historical levels of floodplain/marsh areas.

## ll° year

- Continuation of the characterisation of archaeological ceramics.
- Continuation of sampling of clay deposits.

• Characterization of clay raw materials using the mineralogical-petrographic techniques indicated above and of their technological properties via grain-size and physical analyses (i.e., Atterberg limits).

• Interpretation of the results and comparison between the compositions of archaeological ceramics and raw materials from the Bay of Naples, including the surrounding areas, to identify the clays sourced in the past. Data acquired during the project and from literature will be used, together with unpublished data from the DiSTAR research team.

• Preparation of ceramic replicas via experimental firings of the most



representative clay raw materials of the ancient ceramic productions in the Bay of Naples. The clays will be selected based on the different technological features of the end-products. Firing will be carried out experimentally in the DiSTAR laboratories and also in wood-fired kilns at traditional workshops to evaluate the technological characteristics of the final products made in real conditions.

• A research period is planned to be carried out at the end of the second year at a foreign research institution (possibly the University of Granada, Spain). Research activities will include the characterisation of the ceramic replicas using mineralogical-petrographic techniques to analyse the mineralogical and microstructural transformations that occurred during firing.

## III° year

• Completion of the research period abroad for the characterisation of the ceramic replicas using physical-mechanical tests to evaluate their technological features (i.e., resistance, pore system, hydric properties, thermal behaviour, color). The specimens will have standard dimensions to carry out the tests according to regulations.

• Interpretation of the results obtained from the study of ceramic replicas to define, in a comparative manner, the technological characteristics of archaeological materials according to their different end-use (e.g., table ware, cooking ware, transport and construction ceramics).

#### Additional notes:

The research program is supported by departmental research and project funds of the proponent and the co-tutor.