

**Title:**

**Archaeometric study on ceramic finds from the Marzamemi II wreck and surrounding marine area**

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**Research program**

The Marzamemi II wreck has a fundamental role in the underwater archeology of the Mediterranean Sea and is one of the first most investigated wrecks, thus representing a methodological example for the scientific research in marine contexts. The ship is dated between the beginning and the half of the 6th century and the type of the shipment suggests that the finds were part of an imperial commission. This mainly included architectural and decorative elements that gave the wreck a special place in debates on large-scale trades of building materials used for monument construction.

Among the found materials there is a big load of columns displaying religious symbols and for this reason the site is also known as the “wreck of the church”. These columns, together with other sacred elements and furnishings, indicated their use for a Christian basilica and highlighted the nature of the connections in the Mediterranean during the late roman period.

Most recent investigations brought to light new materials from areas never explored before, including a large amount of architectural elements that raised doubts about the first interpretations, suggesting the presence of interior furnishings of more basilicas.

Apart from the peculiar architectural and decorative materials, other finds have provided new information regarding life on board and the maritime contexts through which the ship traveled. These include small pieces of wood, plating fasteners and, above all, pottery. As in similar cases, the pottery is largely represented by amphorae and their lids, as well as various utilitarian ware used by the crew. The archaeometric study of these materials will serve as a fundamental support to archaeologists, allowing them to define with greater precision the sites that this transport ship touched during its numerous travels. The study will also concern other materials found along the entire arm of the sea that goes from Vendicari to Punta delle Formiche in order to draw a broader framework on the circulation of ceramics in this important coastal archaeological area, as well as on anthropization activities related to fishing and the processing of tuna fish in ancient times.

Archaeometric investigation will be carried out via mineralogical-petrographic methods for obtaining important clues on the origin of the pottery. As a matter of fact, ceramics are produced from raw materials of geological origin (clay and temper) and, hence, have a specific compositional fingerprint that can be compared with that of

the geological materials of the hypothetical production site or with other ceramics already well identified by archaeometry. This approach also allows one to define important technological features, such as the preparation of the clay mixtures and the firing dynamics carried out in the ancient kilns.

The adopted methodology is based on the main techniques used for provenance and technology studies of archaeological ceramics, in which the DiSTAR research group has acquired decades of experience. Mineralogical and petrographic techniques will be applied, such as: polarized light microscopy for the examination in thin section of the components of the ceramic body (matrix and inclusions), X-ray diffractometry for the analysis of minerals - also submicroscopic - and the identification of phase changes due to firing process, scanning electron microscopy for the observation of microstructural characteristics as a function of firing temperatures, micro-chemical analysis to examine the composition of points and areas of specific phases of the investigated material, X-ray fluorescence for bulk chemical analysis of samples. In addition to these techniques, Sr-Nd isotope analysis can also be applied, as it already provided interesting results for provenancing archaeological pottery.

The project will be part of a broader research, in which the study of materials will benefit from an intense 3D digitization of the seabed and archaeological finds by using Artec Eva structured light scanner, along with new generation photogrammetric systems. This technique will make it possible to obtain important information on the conservation state of the artifacts and to detect processing traces for the determination of production techniques, as well as decorative details useful for frame the finds in a wider cultural and historical-artistic context of the ancient Mediterranean. A GIS platform under development will be used to relocate the finds to the points of discovery and to create a data management system for simulating the dynamics of the impact and for verifying possible strategies for their musealization.

### **Proposal for a PhD position**

A doctoral position will be applied for a candidate who can carry out research on the above specified topic that should be completed within three years. The work programme will include the study of the available literature and a selection of pottery following a strategy carefully planned with the expert archaeologist(s) responsible for the materials. The analytical programme will be performed by using the instrumental facilities at the DiSTAR of the Federico II University of Naples (Italy), where the PhD student will have the possibility to acquire technical skills in mineralogical, petrographic and physical methods, such as chemical analysis (XRF), mineralogical analysis (XRPD), polarised light and scanning electron microscopy with microanalysis (EDS/WDS), non-destructive spectroscopic techniques (Raman, FT-IR, portable XRF), and Sr-Nd isotope analysis. Furthermore, the student will become familiar with techniques used in the field of three-dimensional digitization and in the

management of digital numerical models. Training courses of the “Scuola di Dottorato” will be also available for the student at the host University for improving its knowledge on different topics.

A period of at least five months for a visiting fellowship abroad is also included in the work programme in order for the PhD student to learn different analytical methods, make useful discussion with other scholars, and have the possibility to develop further its career.

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