

Compositional Characterization of Prehistoric Pottery from Kephala Vasilikis, Ierapetra Crete (Greece)

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Introduction.

In the present study petrographic and mineralogical techniques are employed for the compositional characterization of a ceramic assemblage from the site of Kephala Vasilikis, situated on the northern part of the Ierapetra Isthmus in east Crete. The aim is to investigate the provenance of the raw materials and the technology of manufacture of the ceramics.

Geological and archaeological setting.

The geology of Vasiliki is characterized by marine formations of Miocene age with lithologies varying from marl and sandstone to conglomerate. To the east of Vasiliki extend the alluvial deposits of the Ierapetra Isthmus dating to the Holocene (Papastamatiou, 1959). Archaeological excavations undertaken in the area of Vasiliki have brought to light evidence for human occupation spreading from the earliest prehistory to Roman times. The site under study is situated on the small hill of “Kephala” near the modern village. It is an advantageous position overlooking the Isthmus and the north-south passage. Excavation by Th. Eliopoulos (1994-1996) uncovered part of a Minoan settlement dating to the “Dark Ages”, i.e. the Late Minoan (LM) IIIC/Early Geometric period (ca. 1200 BC). The main building of the multi-room complex bears strong evidence for ritual use, the most prominent find being the figurines of the “goddess with upraised arms” (Eliopoulos 1998). Although this is a single-phase architectural complex, excavation revealed vestiges of a much earlier occupation level dating to the Final Neolithic/Early Minoan I (FN/EM I) period. The pottery is very fragmentary but due to its early date it is of great interest because it confirms continuity of occupation in the area.

Samples and methods.

A total of 72 pottery samples were analyzed using petrographic and mineralogical techniques. The majority of the samples date to the LM IIIC which is the main period of occupation and comprises domestic vessels (cooking pots, jugs, basins, pithoi), fine wares (cups, bowls, kylikes) as well as parts of ritual figurines from the shrine. A smaller part of the sampled pottery comes from the earlier strata and comprises small- and medium-sized open vessels of FN/EM I date. For the petrographic analysis we used thin sections which were studied under a Zeiss AxioScope A.1 polarizing microscope. Also, for the mineralogical analysis we used a Bruker D8 Advance X-ray powder diffractometer (XRPD). All the analyses were carried out in the Department of Geology at the University of Patras, Greece.

Results and discussion.

The petrographic analysis established six main fabric groups (Table 1) and a few loners. Fabric groups A and B are coarse-grained consisting of igneous rocks, namely granites and granodiorites with the associated rocks and minerals.

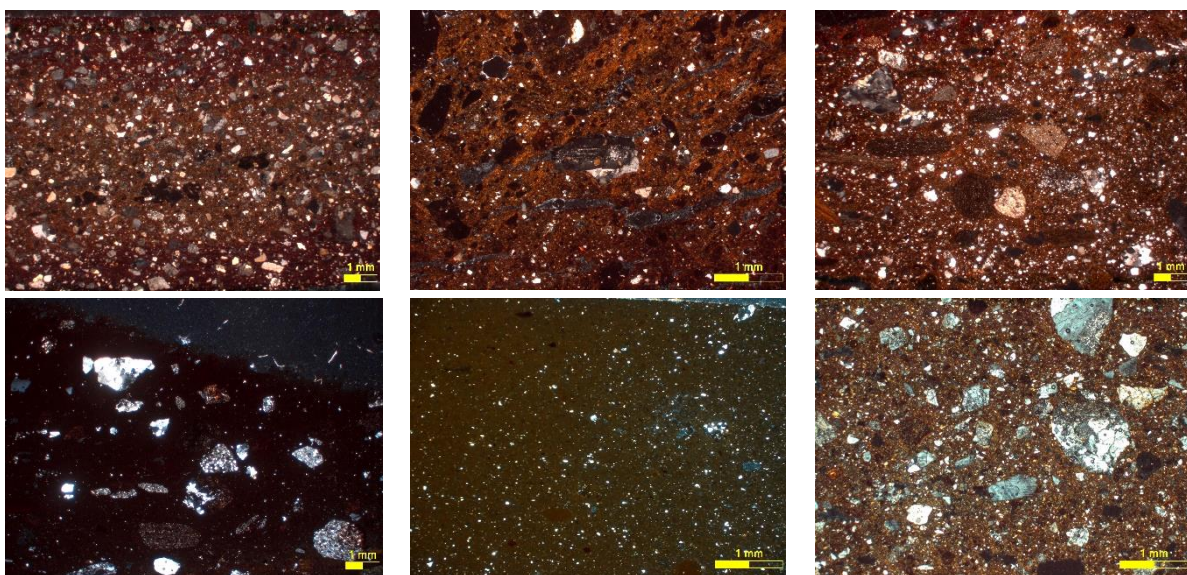


Figure 1. Upper row: Petrographic fabrics A (left), B (center) and C (right). Lower row: Petrographic fabrics D (left), E (center) and F (right).

This geology is not compatible with a strictly local origin, rather is attested in the northern part of the Isthmus, in the area of the Gulf of Mirabello (Papastamatiou, 1959, Nodarou & Moody, 2014). Fabric group C is also coarse-grained and contains metamorphic rocks, namely phyllites and quartzites, compatible with the Phyllite-Quartzite series outcropping on the north-eastern part of the Isthmus. Fabric group D is characterized by a fine matrix with coarse inclusions of phyllite, sandstone, and serpentine. This composition is compatible with the Ophiolite series and the Flysch mélange of the south coast (Liard, 2017, Liard et al., 2018). Fabric group E is characterized by a very fine matrix and is devoid of non-plastics. Finally, fabric group F is coarse-grained and comprises gabbros, diorites, and some phyllite fragments and is most likely connected to fabric group A. Among the loners it is worth mentioning one that is compatible with the local geology: it is a semi coarse fabric with micritic limestone and bioclasts.

Table 1. The petrographic fabric groups and their main characteristics.

Fabric group (code)	Fabric group (full name)	Main coarse Inclusions	Comments
A	Granite-granodiorite	Quartz, plagioclase, feldspars, biotite, chert fragments, sandstones fragments	Altered plagioclase and feldspars.
B	Granite-granodiorite-grog	Quartz, feldspars, plagioclase, chert fragments, phyllite fragments	High porosity, altered plagioclase and feldspars.
C	Metamorphic phyllite	Quartz, feldspars, chert fragments, quartzite fragments, igneous fragments	Some of the samples have quartz-rich matrix.
D	Ophiolite-bearing	Quartz, chert fragments, phyllite fragments, sandstones fragments	Pure clay paste.
E	Fine-very fine	Quartz, feldspars, chert fragments	Pure clay paste.
F	Diorite-gabbro	Quartz, calcite, plagioclase, feldspars, amphiboles, chert fragments, phyllite fragments	Altered plagioclase.

The mineralogical analysis was conducted on 25 representative samples from all the petrographic fabric groups. Five different classes were established on the grounds of their mineralogical composition. Quartz and plagioclase are present in all classes. Two classes are characterized by the presence of newly formed mineral phases: diopside and gehlenite, indicating that these samples were fired in higher temperatures (850-950 °C). On the contrary the absence of neo-formed phases in the rest of the classes possibly indicates that those samples were either fired in lower temperatures (<850 °C) or their chemical composition inhibited the formation of any new phase.

Conclusions.

The analysis of the ceramic material from Kephala Vasilikis demonstrated that the pottery consumed at the site was not strictly local, rather it was imported from different areas on the north and the south coast. The majority was produced with raw materials connected with the acid igneous rocks of the Gulf of the Mirabello, whereas the rest was connected with the Phyllite-Quartzite series on the northeastern part of the Isthmus and the Ophiolites of the south coast.

Fabric group B is tempered with grog and characterizes the FN/EM I pottery. This is a well-known clay “recipe” of the Early Bronze Age and is encountered in many sites in east Crete.

The next step of this study is to examine the samples with Scanning Electron Microscopy (SEM) in order to investigate the chemical composition of the clay pastes and establish the firing temperatures.

Acknowledgements

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