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Towards a spectral library of Roman to Early Christian Cypriot floor mosaics

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ABSTRACT

Floor mosaics are of great interest for archaeologists and art historians. While in the last decade other scientific sectors supported their study mainly from a technical point of view, through traditional archaeometric analysis, this paper suggests an innovative methodological approach and presents some preliminary results aiming to a non-destructive investigation based on the spectroradiometric analysis of stones used for manufacturing the ancient floor mosaics of Cyprus. This method evaluates the results of spectroradiometric analysis in relation to reliable destructive analysis completed in the past on the hereunder examined samples. In addition, the results of the proposed approach foresee to contribute to the expansion of the existing Cypriot database of floor mosaics, improving their characterization by collecting their spectral signatures in the range of 350–2500 nm. The proposed methodology has been applied to a number of stone samples directly linked to pavement floor mosaic tesserae from Cyprus. The results have shown that spectroradiometers may be used in order to identify mineralogical compositions of the stones with an accuracy of nearly 90%. To the best of our knowledge, this is the first time that a comprehensive spectral library related to Cyprus floor mosaics is derived.

1. Introduction

A series of complex and unique geological processes have made Cyprus a geological model for the earth scientists worldwide, and has been the primary factor in the creation of the island's natural environment (Dep. Geol. Surv., 2002) (Fig. 1). The singularity of Cypriot geology has played an important role in the course of history and helped significantly the cultural and socio-economic growth and development of the island.

Moreover, the geological variety of Cyprus contributed significantly to the development of the mosaic art on the island. The vast chromatic spectrum of the rocks along with their mechanical properties offered the opportunity to this form of art to flourish and manifest through exceptional examples, allowing the mosaic artisans of ancient times to create magnificent masterpieces and to experiment through their work. The Mamonian Complex provided the main material source for these artefacts (Charalambous et al., 2009a; Charalambous, 2011). The complex itself, as well as the Fasoula formation, was until recently the main source of primary material for the mosaic artisans, even of recent times (Charalambous et al., 2009a).

Ancient floor mosaics represent one of the greatest artistic expressions of the spirit of Hellenistic and Roman art in Cyprus, with the most exceptional examples dating to the late Roman, early Christian and Byzantine periods (Fig. 2) (Michaelides, 1987; Charalambous, 2012). These mosaics represent one of the most important sectors of art and archaeology for Cyprus for an extensive period of the ancient history of the island, and provide significant information regarding the trends of the corresponding periods both in terms of stylistic preferences and manufacturing technologies employed, including techniques and materials used. Therefore, the study of the floor mosaicsof Cyprus, especially of the Roman, late Roman and early Byzantine periods (2nd–7th century CE), is considered very important for different scientific sectors principally including archaeology, art history, archaeometry and mosaic conservation (Charalambous et al., 2009a; Charalambous et al., 2009b; Hadjicosti and Charalambous, 2011; Charalambous, 2012).

A comprehensive and detailed study of the manufacturing technology of floor mosaics in Cyprus was recently compiled by Charalambous (2012). In his work, among the various aspects of the floor mosaics taken into account, a special effort was given in identifying the geological provenance of the stone tesserae of mosaic pavements all over the island.A number of natural rocks and stone mosaic tesserae were analyzed in terms of microscopic observation, colorimetric analysis and diffractometry to determine their mineralogical composition. The achieved result evidenced the provenance of stone mosaic tesserae and their correlation to specific geological formations of the island. In

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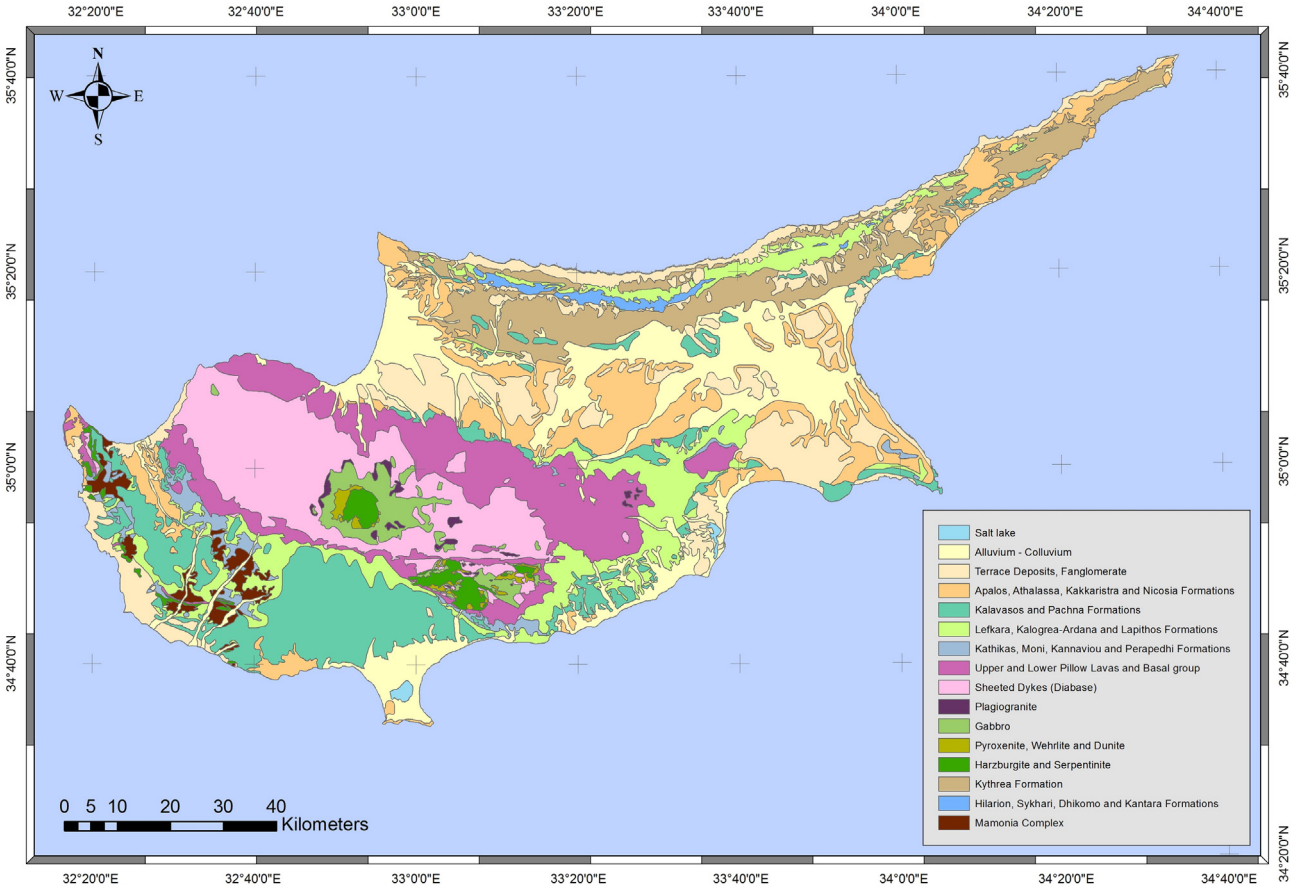

Fig. 1. Geological map of Cyprus.

Fig. 2. Nea Paphos: floor mosaic pavement from the 'Villa of Theseus' 3rd–4th century CE (photo taken by Dr. E. Charalambous).

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