A multi-disciplinary materials study as a contribution to evaluate degradation issues of monuments and archaeological sites towards their preservation

Antonella Curulli1, Giampiero Montesperelli2, Sara Ronca3, Fernanda Carvalho4, Joao P. Veiga4, Nicola Cavalagli5, Filippo Ubertini5, Hugo Aguas4, Elisabeth Kavoulaki6, and Giuseppina Padeletti1

1CNR, ISMN, Roma, Italy (antonella.curulli@cnr.it; giuseppina.padeletti@cnr.it)
2Dip. Ing. dell'Impresa, Univ. di Roma Tor Vergata, Roma, Italy (montesperelli@stc.uniroma2.it)
3Dip. Scienze della Terra, Sapienza Università di Roma, Roma, Italy (sara.ronca@uniroma1)
4CENIMAT/13N, UNINOVA, Lisbon, Portugal (jpv@fct.unl.pt; fb.carvalho@campus.fct.unl.pt; hma@fct.unl.pt)
5Dip. Ingegneria Civile ed Ambientale, Università di Perugia, Perugia, Italy (filippo.ubertini@unipg.it; nicola.cavalagli@unipg.it)
6Ephorate of Antiquities, Heraklion, Greece (ekavoulaki@culture.gr)

The preservation of archaeological sites, often considered as open-air museum, is a priority and a challenge due to their exposure to environmental actions and natural hazards. Every day, the artifacts populating these sites, which can have either structural or decorative functions, are subjected to continuous degradation processes, related to frost-thaw cycles, humidity and temperature variations, causing a deterioration of the materials mechanical properties. Anthropogenic pressure (visitors, human actions) can act towards his direction, as well. In order to evaluate the ongoing process of degradation affecting a specific site, the study of the actual conditions of the materials is typically one of the first steps of the analysis. With this perspective, in this work, the results of the investigations carried out on the constituent materials of the Knossos Palace in Crete are presented. The Knossos Palace is one of the most important archaeological sites in Crete. The main excavation work took place at the beginning of the 20th century, directed by Sir Arthur Evans. The importance of this site led him and his collaborators to design and perform preservation actions, which included the reconstruction of relevant parts of the Knossos Palace. In addition for preserving the site, reconstructions were a way of highlighting the palace magnificence and the importance of the Minoan civilization. At that time concrete was already one of the most widely used building material. Considered a durable material, the concrete was used in the construction of reinforcement structures and new architectural elements, often placed in direct contact with the original ones. Nevertheless, the restoration/reconstruction made by Evans, using concrete, is nowadays considered an integral part of the monument and its history, to be studied and protected.

In the context of the HERACLES Project [1], samples of stones and concrete used in the Palace of Knossos were analysed to determine their morphological and chemical characteristics and their mechanical properties. For this purpose, an integrated approach, i.e. the use of several analytical
techniques, was considered essential to support the material preservation actions.

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