MS114.O03

Red/yellow pigments in pompeii and herculaneum: which is which?

Gilberto Artioli[1], Michele Secco[2], Ivana Angelini[3], Leslie Rainer[4], Kiernan Graves[4]
[1]*Geosciences, UNIPD, Padova, Italy,* [2]*Civil Enginering DICEA, UNIPD, Padova, Italy,* [3]*Dipartimento di Beni Culturali DBC, UNIPD, Padova, Italy,* [4]*Getty Conservation Institute GCI, Los Angeles, United States*
E-mail: gilberto.artioli@unipd.it

In Pompeii, Herculaneum, Oplontis, and other archaeological sites destroyed by the 79 AD eruption of Mt. Vesuvius, in large areas of the wall paintings, the original paint has suffered from the high temperature reached because of the hot lapilli fall, the hot gases, or the hot pyroclastic/mud flow, depending on the distance from the volcano. This has produced visible changes in the color of the pigments. The most well-known case is the conversion of yellow goethite to red hematite, causing extensive yellow background panels of many frescoes to turn red [1]. This transformation has been studied as an effect of heat, both as an unintentional result of fire, and as traditionally practiced by artists and craftsmen to intentionally calcine yellow ochre to achieve a broader palette. The induced phase transition can actually be observed directly under the Raman laser beam if the laser energy is not properly controlled [2]. This poses the interesting question of recognizing what was originally red and what turned red during the eruption. A number of measurable parameters were adopted for the identification of yellows and reds from specific locations affected by high temperatures, including the mineral composition of the pigment mixture, the broadening of the XRPD and RS peaks of hematite due to the high temperature transition, and the trace element impurities contained in the mineral pigments. Yellow and red pigments from sites subject to the Vesuvian eruption effects (Pompeii, Hercolaneum) were characterized and compared to similar pigments from other archaeological sites (Nora, Aquileia). The samples from the tablinum of the Casa del Bicentenario in Herculaneum were investigated through a joint collaboration between GCI and the Parco Archeologico di Ercolano in the frame of the Herculaneum Conservation Project (HCP). The puzzling and almost ubiquitous presence of Pb in the red/yellow pigments will also be discussed.

[1] Baraldi, P. & Bensi, P. (2006) Atti della giornata di studio "Salvati dalle fiamme", Lugano, 6 October 2006, pp. 15-29.
[2] Bersani, D., Lottici, P.P. & Montenero, A. (1999) Journal of Raman spectroscopy, 30, 355-360.

Keywords: red/yellow pigments, Roman frescoes, phase transitions in Fe oxo-hydroxides