PHYSICO-CHEMICAL CHARACTERISATION OF PIGMENTS AND BINDERS OF MURALS IN A CHURCH IN ETHIOPIA

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ABSTRACT

We here report the physico-chemical characterisation of wall paintings from Petros Paulos Church in Ethiopia. It represents the first technical study of paintings located in Ethiopia, rather than paintings in museum collections outside the country, using diverse analytical techniques. In situ examination with a portable X-Ray Fluorescence Spectrometer (pXRF) was followed by analysis of samples using Optical Microscopy (OM), Scanning Electron Microscopy coupled with Energy Dispersive X-ray Spectroscopy (SEM/EDS), micro-Raman Spectroscopy (MRS), Attenuated Total Reflection-Fourier Transform Infrared Spectroscopy (ATR-FTIR), X-Ray Powder Diffraction (XRD) and Pyrolysis Gas Chromatography-Mass Spectrometry (Py-GC/MS). Paint stratigraphy, the compositions of support material, preparatory, and painting layers as well as morphology of the pigment particles were studied. Results revealed the use of earth pigments and carbon black. The preparatory layer was uncommon and composed of sand, dolomite and clay rich in clinochlore in contrast to the more common gypsum and calcite. Binder and the stratigraphic analyses suggested distempera technique.

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