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The magnetic properties of natural pigments: preliminary analyses for their identification in Fine Arts

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A multidisciplinary approach, including compositional, spectroscopic and microscopic methodologies, is often used for the analysis and identification of pigments in Fine Arts. Although a large part of widely used natural and synthetic pigments contain Fe-oxides and hydroxides, their magnetic characterization is still poorly explored. The application of rock magnetism analyses through fast, cheap and non-destructive measurements, can be instead useful for the identification and discrimination of pigments through their distinctive magnetic properties.

In this preliminary study, the magnetic properties of several iron-based commercial pigments together with paintings models and supports, were analyzed.

In order to investigate the compositional differences of pigments by means of their magnetic behavior, the magnetic susceptibility, the hysteresis properties and the magnetic susceptibility variation at low and high temperature were measured on selected samples.

All the pigments showed different magnetic properties, mainly related to variable proportions of magnetite, hematite and maghemite as the main magnetic carriers.

Further studies will be addressed to define a protocol for applying the magnetic techniques to the characterization of pigments, including tests on samples produced by different brands and different periods, with the final aim of integrating the magnetic measurements with the different spectroscopic techniques commonly employed for the preservation and the analysis of cultural heritage.