MARBLES: Sr and Nd isotope analysis of Mediterranean white marbles as provenance markers for archaeometric studies

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The provenance of white marbles used in antiquities is of great importance to archaeologists, historians and conservators, because it allows to attribute sculptures to a specific area of production, to draw ancient trade routes and connection between various geographic regions over the times, to date monuments and the starting exploitation of the Mediterranean quarries, to find sound material for the purpose of restorations, replacements, copies, etc. of damaged marble architectures or artifacts.

Microscopic features, such as the grain boundaries' shapes, maximum grain size, accessory minerals and microstructure, frequently help to discriminate marbles according to their origin, despite some similarities can be observed, both when considering the variability within each quarry area and the mineralogical-petrographic features of some varieties from different regions. Stable isotopes (O and C) are therefore usually used as an integrated method to better constrain this issue. Recent studies have indicated that the isotope signature of Sr and Nd can discern the provenance of specific marbles, being very similar under a microscopic point of view and in terms of O and C isotopes. The research here proposed is therefore addressed to analyse the Sr and Nd isotope ratio of white marble not always easily distinguishable with other methods, such the Micro Asiatic Proconnesian one and that from the Lakkoy district in the Cycladic Island of Paros (Paros 2 variety). Samples from ancient quarries, already petrographically and geochemically characterised as for their O and C isotopic signature, will undergo Sr and Nd isotopes analysis by MC-ICP-MS (multi-collector – inductively coupled plasma – mass spectrometry) on the bulk sample, and by LA-ICP-MS on microsamples. The isotope measurements will be performed using these two different methods in order to compare the results and define the comparability between them and the opportunity of applying a micro-destructive method on archaeological samples which cannot be sampled or very little.

Collaborations: prof. Antonelli - UIAV University of Venice; Virginie Renson - Missouri University Research Reactor (USA); Isotope Laboratory at the University of Poznan.

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