

New methodological developments in the measurement of Pb, Fe and Cu isotopes in ancient gold for the purpose of provenance studies

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A new separative chemistry methodology is developed for ancient gold matrices to recover purified fractions of Pb, Fe and Cu. Isotopic measurements of these elements on ancient gold coins as well as on new gold home-made standards were carried out by MC-ICP-MS. The results validate our new separative protocol. Moreover, they provide values to our standards, that could be used in future studies.

The aim of these developments is to overcome the limitations of the elemental analysis of ancient golds in the context of provenance studies. Such analyses of ancient gold can indeed characterize metallic stocks and highlight metal circulation in a given space [1, 2], but they cannot point to a specific geologic province and/or ores. In contrast, isotope analysis offers a valuable insight to provenance studies. Lead isotopes, that have been used for a long time, allow to shed light on the geodynamic provinces of the host mineralization [3, 4]. Iron and copper isotopes allow to characterize the ore type e.g. supergene versus hydrothermal or igneous [5, 6].

Our results show it is possible to obtain precise and accurate measurements of Pb, Cu and Fe isotope composition in a gold matrix. The potential of these new tracers, for instance for well-defined archaeological questions such as the provenance of Islamic medieval gold is also emphasized.

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