

Chronological methods applied in archaeology

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ABSTRACT

During an archaeological discovery there are issues related to the chronological context of the objects discovered in the excavation, as well as of the archaeological horizon where the objects were discovered. Archaeology alone and/or existing historical data of the excavation region is not always enough to define the chronology of the findings accurately. In this case the collaboration with other sciences (e.g. physics, chemistry) can assist the accurate chronology of the archaeological findings.

The methods used for chronology can be either physical or chemical. The physical methods include dendro-chronology and palaeo-magnetism. Other techniques rely on physical and chemical treatment of small parts (non destructive methods) or use of adequate quantity (destructive methods) of archaeological objects or soil in the case of archaeological horizons. In a primary stage, enrichment of materials used for chronological determinations, is achieved. The materials used in archaeochronology are usually some minerals such as quartz or feldspar, while many radioisotopes like carbon-14 (^{14}C), potassium-40 (^{40}K), argon-40 (^{40}Ar), uranium and thorium isotopes (^{238}U , ^{235}U , ^{232}Th) are extensively used. Quartz and feldspars are also used extensively in the dating of objects of archaeological interest, either following the thermo-luminescence (TL) or the optical stimulated luminescence (OSL) methods. When implementing this methodology, the important part of the process is the determination of natural radioactivity of the soil surrounding the discovered object or area of the archaeological horizon studied.

The Archaeometry Center of the University of Ioannina has the appropriate infrastructure for the chronological determination of objects of archaeological interest as well as of archaeological horizons. Specifically, the UOI Archaeometry Center is equipped with a low background HPGe detector for γ -spectroscopy measurements of radioactive isotopes and a TL/OSL Reader for acquiring luminescence signals from quartz and feldspars. Also, it provides X-Ray Fluorescence (XRF) and X-Ray Diffraction (XRD) spectroscopy analysis, in collaboration with XRF and XRD units of the UOI, for stoichiometric and mineralogical analysis of the archaeological objects and the geoenvironment of the archaeological horizons that are revealed during an excavation. The same methods can also be applied in geological surveys and palaeoseismology. The Archaeometry Center of UOI is operating since 2008 and it has collaborated with many national and international archaeological and geological research teams.