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Archaeometry with INAA at the Research Reactor TRIGA Mainz

Wednesday, 19 September 2012 18:00 (1h 50m)

At the research reactor TRIGA Mark II of the Institute for Nuclear Chemistry of the Johannes Gutenberg-Universität Mainz, Germany, the interdisciplinary field of archaeometry is studied by instrumental neutron activation analysis (INAA). Currently the work is concentrated on three different projects in archaeological context: Provenance analyses of ancient Roman limestone findings in the Rhine-Moselle region, determination of the composition of glass beads of the late La Tène era, which were excavated in southern Bavaria, and the analysis of sinter profile from ancient Mediterranean aqueducts to interpret its layers as climate archives. For all samplings, a method with a low risk of contamination is applied. To get a wide spectrum of elements (chemical fingerprint), the irradiations and the gamma-ray measurements are adjusted to the sample composition.

For the provenance project ancient limestone quarries as well as interesting archaeological objects are prospected and systematically sampled. Chemical fingerprints measured by INAA combined with multivariate statistics are used to determine the origin of the objects to shed light on the complexity of logistics, transport and trade routes in former times.

Glass beads from an ancient ritual place near Oberammergau in Bavaria, Germany are analyzed via INAA to determine the glass type, coloring elements and trace elements. The lanthanide concentrations deliver information about the raw glass production and give archaeologists clues as to the origin of the raw materials. Measurements from X-ray photoelectron spectroscopy together with the results of the INAA analyses provide insight into the historic manufacturing process of the beads.

To garner a better understanding of extreme weather event risks and the frequency of earthquakes in the present, the knowledge of the occurrence of these events for long periods of time is necessary. In the initiated project, sinter layers from ancient aqueducts are used as climate archives with proper chronological resolution.

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