IAEA Workshop on Innovative Approaches of Accelerator Science and Technology for Sustainable Heritage Management

Contribution ID: 80

Type: ORAL

The Determination of the Age of Creation of Metal Artefacts Using Radiogenic Helium

Thursday, 16 June 2022 09:40 (20 minutes)

Metal artefacts are difficult to date from the time of their manufacture. It is not the age of the material that requires dating, but the time at which the material was worked into its final shape. This often involves melting and casting the metal to produce the final shape. We are interested here, in the production of some lead books, originating in and around Jordan and often referred to as the "Jordan Codices". These item have been very controversial in their claimed origins. Some historians claiming them to be modern items of "tourist tat" and others claiming them to be around 2,000 years old and providing keys to the gospels. The writings found on them have proven almost impossible to translate. Until now there has been no way to demonstrate the true nature of these items and much mystery and controversy surrounds them. We have previously managed to show that the lead that these books are made from is deficient in 210Pb and is therefore at least 200 years old, but this does not prevent someone using old lead to manufacture "modern artefacts" nor does it show the items to be truly old.

We have now investigated a technique, used to date gold artefacts, to show demonstrate the true age of this items. The technique measures the small amount of He released and captured in the metal by the gradual decay of U and Th contamination in the original metal. The beauty of this technique is that when the metal is melted the He is released, effectively starting the clock for the technique, so that we are able to measure the time at which the metal was last melted, ie manufactured, not the age of the metal itself. We will give details of this method and the preliminary results that we have found in analysing these artefacts.

Primary author: Mr WEBB, Roger (Surrey Ion Beam Centre, United Kingdom)

Co-authors: Mr STUART, Fin (Scottish Universities Environmental research Centre); Ms OLIVE, Valerie (Scottish Universities Environmental research Centre)

Presenter: Mr WEBB, Roger (Surrey Ion Beam Centre, United Kingdom)

Session Classification: Application of accelerator science and technology for characterization and treatment of heritage objects

Track Classification: Track 1: Application of accelerator science and technology