Contribution ID: **232** Type: **Invited Lecture**

INVITED LECTURE - Determination of the isotopic ratio ²³⁶U/²³⁸U in environmental samples

Friday 21 September 2012 08:40 (20 minutes)

236U with a half-life of 2.3·107 years is produced via thermal neutron capture on 235U. In nature these neutrons may result from (α,n) reactions on lighter nuclides, spontaneous fission of 238U, induced fission of 235U and at the Earth surface they are part of the cosmic rays. Only small amounts of 235U are produced naturally from uranium in ores, soils and rocks, but a huge amount is produced in nuclear power plants. While naturally 236U occurs in ultra trace concentration in the environment with an expected isotopic ratio of 236U/238U in the order of
10-14 to 10-13(1), nowadays the ratio measured in surface samples is clearly elevated due to the anthropogenic input.
For the analysis of the 236U/238U ratio, water samples from rivers and creeks were collected in the alpine region of Austria, from the Danube, the Black Sea, Irish Sea, and from the Atlantic and Pacific Ocean. From areas in Salzburg and from the clean air site LaPalma Island, Spain, also soil samples were investigated. Retrospective 236U levels were measured in the antlers of red deer. Natural ratios without any anthropogenic contamination were measured in uranium ore and yellow cake samples from Australia, Brasil and Canada.
After a pre-concentration and an anion exchange step the uranium fraction was
co-precipitated with NdF3 and thin sources were prepared for α-spectrometry to determine the activity ratio of 234U/238U and the chemical yield. Afterwards these filters were reprocessed for the analysis of the isotopic ratio 236U/238U by AMS (Accelerator Mass Spectrometry) (2). The special aim of our research was the characterization of the 236U/238U ratio in environmental samples, and to investigate the contribution from anthropogenic sources.

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