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Protactinium-231 a new Radionuclide for AMS

Marcus Christl (1), Lukas Wacker (1), Jörg Lippold (2), Martin Suter (1)

(1) Institute of Particle Physics, Ion Beam Physics, ETH-Zurich, Switzerland (2) Heidelberger Akademie der Wissenschaften, University of Heidelberg, Germany

To the first time, a (compact) AMS-system (0.6 MV TANDY, PSI/ETH Zurich) was used to determine the actinide Protactinium-231. Pa-231 has two important applications in Earth's sciences. First, as a part of the U-decay chain it can be used for dating. Second, in paleoceanography, the sedimentary Pa-231/Th-230 ratio is used to estimate Ocean circulation over the past about 100.000 yr. In a first step, standard-dilution series were measured. The results show that with the compact AMS-system TANDY it is possible to determine Pa-231 amounts in the lower femtogram (10-15 g) range, currently limited by the laboratory blank (typically 5 - 30 fg). First test samples from very different climate archives (marine sediments, fossil corals, and speleothems) were successfully processed and measured with the TANDY. Our first results show that Pa-231 concentrations between 5 and 0.5 pg/g yet can be determined with an error of about 3% (one sigma). The precision of the measurements is around 1%.