Oral | Symbol H (Human Geosciences) | H-TT Technology & Techniques

[H-TT35_1PM1]Developments and applications of AMS techniques for earth and human environmental research

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Accelerator mass spectrometry (AMS) is a technique developed in 1977, to detect and count the small amount of nuclides in the environment, and to measure precisely the isotope ratios of the nuclides. In particular, by means of measuring rare radioisotopes in the environment, AMS techniques are applied for age measurement of samples from various application fields, such as geology, archeology and cultural properties. AMS can measure isotope ratios in the order of as low as 1.0E-10 to 1.0E-16, by the process of producing negative ions of specific nuclides by an ion source, accelerating the ions by a tandem accelerator, analyzing mass of the isotope ions by an analyzing magnet, and identifying the specific nuclides by an ionization detector. Thus AMS is used to measure isotope ratios of natural radionuclides of quite low natural abundances. AMS can be applied for studies of materials recycling and environmental science by using rare isotopes as a chemical tracer, and investigations of time sequence of tephra layers, land deposits, lacustrine and ocean sediments that are quite important for Quaternary research. This session offers a brief outlook of present status on technical progresses going on present days and interesting application programs, given by specific researchers and students engaged in AMS studies.

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[HTT35-P01_PG]Geoscience studies using by AMS at JAEA-AMS-TONO in the Tono Geoscience Center of the Japan Atomic Energy Agency

3-min talk in an oral session

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The JAEA-AMS-TONO facility was established in 1997 at the Tono Geoscience Center, Japan Atomic Energy Agency (JAEA). Our AMS system is a versatile system based on a 5MV tandem Pelletron type accelerator (National Electrostatic Corporation, US) and has been made available for ^{14}C-, ^{10}Be- and ^{26}Al-AMSs. These multi-nuclide AMSs have been mainly applied to neotectonics and hydrogeology, in support of our research on geosphere stability applicable to the long-term isolation of high-level radioactive waste. Furthermore, the ^{14}C- and ^{10}Be-AMSs are used for geoscience, environmental science and archaeology by researchers of universities and other institutes under the JAEA's common-use facility program.Major contribution of radiocarbon (^{14}C) dating through our ^{14}C-AMS to geoscience studies are as follows. Yasue *et al.* identified fault displacement and stratigraphic correlation of black soils based on ^{14}C ages (presented in this conference). They conducted ^{14}C dating of the black soil collected from a trench wall of the Atera Fault, Gifu. The results of ^{14}C date show that the soil age varies from 4,000 to

2,000 y with depth of the sampling points and the soil was deposited at approximately constant rate. Imaizumi *et al.* (2006) estimated the faulting age based on ^{14}C dating of soils at the Senya Fault in the Toen Fault Zone, Yokote Basin, Akita. It was found that the ages range between 1000 - 1300 y, indicating that the Senya Fault was caused by the Rikuu Earthquake in the year of 1896. Sasaki *et al.* (2006) studied local climate change in an inland basin. Pollen records and ^{14}C ages of sediments in Ohkute Basin, Gifu were used to reconstruct past climate change. The results suggested that the local climate has been warmer for the last 10000 yBP.Since the fiscal year of 2013, the ^{10}Be-AMS has been routinely measured and used to study long-term erosion rates of weathered granitic soil surfaces using cosmogenic ^{10}Be depth profile under the joint research program with the National Institute of Advanced Industrial Science and Technology (AIST). Recently, we have started development of ^{26}Al-AMS. The system tuning and test measurement have been carried out for routine measurement. The development has so far done well and the routine measurements of the ^{26}Al-AMS will be started in near future. The ^{10}Be- and ^{26}Al-AMSs will be used to estimate the exposure age of basement rocks as well as the sedimentation rate and the assessment of volcaniclastic material ejected during volcanic eruptions.