New (U-Th)/He dating systems and ages in Japan Atomic Energy Agency

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Japan Atomic Energy Agency has jointly set up the system of the (U-Th)/He dating in cooperation with Kyoto University and National Institute for Earth Sciences and Disaster Prevention. Through these two years, helium extraction machine using an electronically-cooled diode laser, micro crucible system using XRF bead sampler and uranium and thorium quantification procedure without artificial spikes are developed. Now we produce new ages of some age known samples. At the present stage, the accuracy and precision are roughly 20 and 10%, respectively, using the age standard zircon from the Fish Canyon Tuff (FC3). In the presentation, we will introduce our systems and the ages in detail.

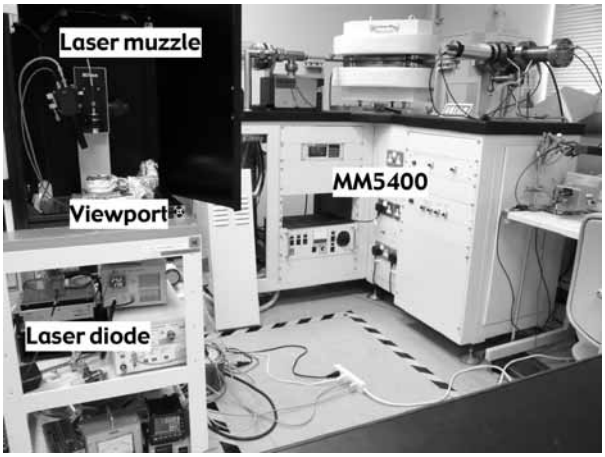

Figure 1: Helium extraction machine and MM5400 mass spectrometer.

Late Cenozoic magmatic evolution in the NE Honshu arc

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The NE Honshu magmatic arc was formed through back-arc spreading (21-19Ma), subsequent multiple rifting (18-13.5 Ma), and island-arc uplifting (13.5 Ma to the present) stages after continental margin volcanic period. The volcanic activities have evolved from andesites in terrestrial condition, submarine basalt flows and bi-modal volcanic activity in rift zones, caldera-forming silicic eruption in a shallow water to terrestrial environment, and lastly subaerial andesitic volcanism. Back-arc spreading and subsequent rifting created eight petro-tectonic associations; the Yamato Basin, three sets of Horst-Graben zones and the fore-arc range. The volcanism in the back-arc period gradually changed its composition from west to east with time. MORB-like basalts were dominant in the west, through back-arc basin basalts were dominant in the midway, and bi-modal volcanism with abundant silicic volcanics became dominant with subordinate island-arc type basalt in the east. The strongly depleted magma source intruded into the back-arc side at about 20 Ma and the interaction with more fertile source has been continued to 16 Ma in the Aosawa rift area, then weakly depleted source originated primary basalts in the Babame and Kuroko Rifts during 16-13.5 Ma.

Large volume of silicic volcanism occurred at the final stage of the back-arc rifting. The rhyolites related with rift formation are characterized by aphyric feature with higher HFS elements than the later quartz-phyric silicic magmas from the island-arc stage. The rifting-stage high temperature rhyolites must be derived from relatively deep seated magma chambers than the island-arc stage rhyolites with hydrous phenocrysts. During the later island-arc stage, the magmatic temperature at volcanic front was falling down with time, and lastly hornblende-phyric low-K andesites erupted.