

Zircon U-Pb dating with NanoSIMS

Tadashi Usuki (Institute of Earth Sciences, Academia Sinica, Taipei)

The last decade U-Pb dating methods have explosively been applied to geological research field and now they become one of the most popular dating methods. Zircon is most common mineral for U-Pb dating, but other high U-minerals such as monazite, apatite, xenotime, rutile, titanite, baddeleyite, allanite and perovskite are also utilized for U-Pb dating. The U-Pb measurement is performed using TIMS, SIMS and LA-ICPMS. The LA-ICPMS has a great advantage to get plenty of age data in a short time. However the analytical spot sizes by LA-ICPMS is generally larger ($\sim 30\text{ }\mu\text{m}$) than those of SIMS analyses ($5\text{-}20\text{ }\mu\text{m}$). Thus, the SIMS analyses are more suitable for measurements of zoned zircons or tiny zircons, especially in metamorphic rocks. In Taiwan, the only way for in situ U-Pb dating has been with LA-ICPMS. Recently a NanoSIMS was installed in Academia Sinica, Taipei. NanoSIMS is an instrument capable to analyze further smaller area than other SIMS (and SHRIMP) or LA-ICPMS. However, NanoSIMS U-Pb dating is not so popular in geological community yet. Thus, I will introduce the U-Pb dating method by NanoSIMS in this lecture.

A dive report of "Shinkai 6500" submersible and high-pressure metamorphic rocks from the Ohmachi Seamount in Izu-Bonin arc

Tadashi Usuki (Institute of Earth Sciences, Academia Sinica, Taipei)

Izu-Bonin-Mariana (IBM) arc is a representative active oceanic island arc. A serpentinite body associated with high-pressure metamorphic rocks is exposed as the basement of Ohmachi seamount (Ueda et al., 2004, 2011), which located in 20 km east of the Quaternary volcanic front and 180 km west of the trench ($20^{\circ}0'30''\text{N}$, $140^{\circ}53'55''\text{E}$). The body crops out on the western foot of the seamount ($\sim 3400\text{ m bsl}$). We have performed geological survey and sample collection using JAMSTEC submersibles (SHINKAI 6500 and KAIKO 7000II) and dredge survey for fifteen years. The serpentinite body is partially covered by Eocene to Miocene

volcanic and sedimentary rocks. Thus, it probably exhumed before the formation of IBM arc (~50 Ma). The eastern part of Philippine Sea plate was formed by backarc rifting of Shikoku and Parece Vela basins during Miocene (~15 Ma). Before the rifting, Pacific plate was subducted in the position of Kyushu-Palau Ridge. If we reconstruct the paleoposition of Ohmachi seamount, it could be located in the extension of Cretaceous remnant arcs, such as Amami plateau, Daito ridge and Oki-Daito ridge, in western part of Philippine Sea plate. Because serpentinite body + high-pressure metamorphic rocks found in the Ohmachi seamount suggests the existence of previous subduction zone, we can expect that they may be generated in a subduction zone of the Cretaceous arcs. Thus, we plan to date zircons in high-pressure metamorphic rocks from the Ohmachi seamount in order to reveal the timing of subduction system existed in early stage of the Philippine Sea plate.