

## Observation of zircon by atomic force microscope for establishing Alpha Recoil Track method

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ART method calculates a date by measuring U and Th concentrations and the number of ARTs which are proportional to the time passed. ART method for zircon can date samples of hundreds to 100 hundreds years old (it depends on U and Th concentrations). For the size of ART is smaller than FT, it is difficult to observe ART by using optical microscope, but by using atomic force microscope (AFM), it is possible because it has high resolution of the nano-order. Previous works observed concaves which are clearly different from FT in zircons with the age of, 20a (Ito, 2014) and 58ka (Kozaka, 2015). In the previous work (Kozaka,2015) on a zircon(HKS08, 58ka), the areal ART density was estimated by counting the number of ART.

First, U-Th concentrations on HKS08 were surveyed by LA-ICP-MS. U and Th concentrations of three area, A, B and C in the zircon crystal were 150~270ppm and 86.5~210ppm, respectively. Because areal track density was estimated for the area close to point B, we calculate the age with U and Th concentrations of point B, 211.9ppm and 178.3ppm, and estimated age was 13.8ka, younger than expected HKS08 age (58ka).

Second, zircon from Aira-Ito pyroclastic flow (ITO) was observed. This is a wide-spread tephra and its expected eruption age is 22ka to 25ka (Machida and Arai, 1992). Six zircons were observed and area ART densities were measured. The results were 0.001~0.116/ $\mu\text{m}^2$ . U and Th concentrations were measured on other ITO zircons. U and Th concentrations were 130~270ppm and 60~160ppm, respectively. As a result, these estimated ages were younger than the expected ITO age (22~25ka). It might be caused by inappropriate factor in age equation or wrong criteria for ART identification. For establishing ART method, it is necessary to discuss whether the concave is ART or not by additional step-etching and observing many samples with known age.

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Kozaka A., Hasebe N., Matsuki A. and Ito K. (2015), Observation of alpha recoil track in zircons by atomic force microscope; An attempt, *Fission Track News Letter*(2015), 28, 13-15

Machida H. and Arai F. (1992), Atlas of tephra in and around Japan, *University of Tokyo Press*

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