

Compilation of thermochronologic ages of bedrocks in Japan: For understanding the deformation over geologic time

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For understanding of the relationships between stress and strain and separation of elastic and inelastic deformations in the crust of the Japanese Islands, comparison and investigation of deformations over various time scales are significant (e.g., Ikeda et al., 2012; Nishimura, 2014). The authors are attempting to estimate vertical strain rate of the NE Japan Arc over geologic time by using low-temperature thermochronology, as a part of “Crustal dynamics — Unified understanding of intra-island deformation after the great Tohoku-oki earthquake — ”. Although vertical deformation in the NE Japan Arc over the geologic time has been investigated in the plains and coastal areas on the basis of the relative heights and formation ages of the marine and fluvial terraces (e.g., Koike & Machida, 2001; Tajikara & Ikeda, 2005; Matsu’ura et al., 2008, 2009), few quantitative data is available in the mountainous regions where higher uplift rates are possible. As the preliminary step toward thermochronometric studies in the mountainous regions in the NE Japan Arc, we compiled previous thermochronometric ages over the Japanese Islands to review previous thermochronometric data in the NE Japan Arc and to understand vertical deformation of the Japanese Islands over the Japanese Islands. We are compiling mainly about fission-track (FT) ages regarding the items, such as author(s) and year of publication, journal, study area, lithology, sample code, latitude, longitude, altitude, apatite FT age and error, zircon FT ages and error. At present, we have compiled >350 apatite FT ages and >600 zircon FT ages from >70 articles including unpublished data. The result of the compilation suggests: 1) still more data have been reported in the SW Japan Arc than in the NE Japan Arc, 2) in the Kitakami and Abukuma regions, pacific coasts of the NE Japan, apatite FT and zircon FT ages of late Cretaceous were reported (Goto, 2001; Ohtani et al., 2004), indicating total denudation since that era is less than 2-3 km, and 3) in the Iide and Echigo mountains along the Japanese Sea coast of the NE Japan, a few apatite FT ages younger than the end of Neogene were obtained (Goto, 2001; Sueoka unpublished data), implying recent rapid uplift and denudation. By following the compilation results, we are planning to apply thermochronometric methods, e.g., FT analyses and (U-Th)/He dating, to the mountainous regions in the NE Japan Arc, especially in the areas where young ages were reported or no age was obtained.

Keywords: thermochronology, data compilation, deformation over geologic time