

Uplift and denudation histories of mountainous areas of the Japanese Islands based on low-temperature thermochronology

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We used low-temperature thermochronology to provide quantitative constraints on the denudation and uplift history of some mountainous areas in the Japanese Islands. Quantitative analysis of uplift/denudation history requires estimate of uplift/denudation (rates) for a period of longer than 10^6 years, but only a few methods are available for its achieving. Over the last 40 years, thermochronometric methods have been successfully applied to major orogenic mountains, such as the Alps and Himalaya, to reveal their uplift/denudation histories. However, thermochronometric methods have hardly been able to make a significant contribution in revealing denudation history of mountains in young and low-relief orogens, such as the Japanese Islands because of precision and applicability of the methods. Over the past decade, the applicability of low-temperature thermochronology has extended considerably by practical use of (U-Th)/He thermochronometry, a rigorous understanding of annealing kinetics of the apatite fission-track system, and the improvement in inversion techniques for reconstructing thermal histories. In this study, currently available low-temperature thermochronometric methods, such as fission-track and (U-Th)/He methods, were comprehensively applied to the Rokko Mountains (Sueoka et al., 2010), Kiso Range (Sueoka et al., in press), and Akaishi Range (Sueoka et al., 2011) to reveal their uplift and denudation histories and to verify applicability of low-temperature thermochronometric methods to mountainous areas in a young orogen.

Keywords: low-temperature thermochronology, fission-track method, (U-Th)/He method, Rokko Mountains, Kiso Range, Akaishi Range