

Tectonic history of Rokko area, southwestern Japan, based on fission-track dating method

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This study was conducted to clarify tectonics of an inland upheaval area. Generally, it is difficult to determine displacement and/or age in inland upheaval areas where sediments are scarce. Therefore, the number of methods for measuring the movement of inland upheaval area is limited in the field of geomorphology and geology.

On the other hand, denudation rate of mountains has been revealed by the technique using radiometric age, as the thermochronology evolved for the past 30 years. This technique needs only rock samples to reveal denudation rate, so it can be widely applied. Especially, the fission-track method is widely used to estimate denudation rate of the mountains because of its sensitivity to temperature. However, previous studies in Japan using this method were mainly conducted in the areas that have comparatively high altitude (i.e. denudation rate) and/or geothermal gradient. Therefore, it is necessary to accumulate data in more general cases to test the effectiveness of this technique in the Japanese Islands.

In this study, we attempted to reveal the tectonic history of the Rokko Mountains (altitude 931 m) by using the fission-track method. The tectonic history of the Rokko Mountains after 1 Ma was revealed from studies of geomorphology, geology, and geodesy. However, many questions remain about the tectonic history prior to 1 Ma, because there are few indicators that can be treated by these techniques.

By applying the fission-track method to Rokko granite that constitutes most of the Rokko Mountains, we determined the apatite FT age at about 50 Ma and the zircon FT age at about 70 Ma. From these results, we concluded the following: 1) Rokko granitic body was cooled mainly by heat conduction rather than denudation of surface, 2) the depth Rokko granitic body first intruded was comparatively shallow, 3) the amount of cooling of Rokko granitic body was about 100 degrees C since about 50 Ma. Therefore, tectonics of Rokko area seems to have been relatively non-active prior to the Quaternary.