

Fission track ages for baked country rocks adjacent to the mafic dikes in the Takato area, central Honshu

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We present new fission track (FT) ages for apatites and zircons separated from baked zones of country rock (granite) adjacent to dolerite dikes in the Takato area, Nagano Prefecture. The dolerite dikes form a dike swarm with a dominant NW-SE strike and vertical or subvertical dips, from which a minimum principal stress (σ_3) axis trending NE-SW is deduced. The country rock is the Takato granite of late Cretaceous age. There are a number of good exposures where the contacts between the dolerite dikes and the granite can readily be recognizable. In order to determine the age of this dike swarm by FT dating, rock samples were collected from three baked zone sites of the granite that are located adjacent to the dolerite dikes. At the baked zone sites, we carefully sampled tiny rock fragments and mineral grains within 8 mm from the contact. We determined FT ages of ca. 17-16 Ma for zircons from all the baked zone sites, compared with the zircon FT ages of ca. 55 Ma determined for granite samples far from dikes. Confined FT length measurements suggest that the zircon FT ages for the contact zones have totally been reset by the heat from dolerite dikes. These FT results indicate that the dolerite dike intrusion took place at ca. 17-16 Ma and that mafic igneous activity occurred in this area in the latest Early Miocene. This finding has an implication that the 17-16 Ma volcanic front probably lay through or close to this area of central Honshu. For apatites, consistent ages of ca. 4 Ma were determined for both the baked zone and distant sites. Such significantly young apatite FT ages can be explained by assuming (i) significant uplift and denudation in and around the Takato area after 4 Ma, or (ii) a local thermal event at that time.

Keywords: fission track age, dolerite dike, Takato granite, central Honshu, thermochronology, Miocene volcanic front