The thermal history analyses of rocks nearby Mozumi-Sukenobu fault using zircon fission track method

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Investigating heat generation and transformation along the fault is a key to understand dynamics of faults.(1) Temperature is the only factor to cause track annealing.(2) Minerals such as zircon used for analysis are relatively resistant.(3) Closure temperatures for FT methods are relatively low so that they can serve as sensitive indicators for thermal events in the upper crust.(4) FT length measurement allows quantitative analysis of the heating or cooling behavior of rocks by means of modeling.

Fourteen sandstone samples from Tetori Group were collected from the research tunnel which penetrates through the Mozumi-Sukenobu fault, central Japan, which belongs to Atotsugawa fault group. FT ages and length distributions of zircons were measured.

All fourteen samples, except for two samples with small number of counted grains, failed the kai2-test. Therefore, obtained sample ages represent mixed ages not corresponding any thermal events. Age spectrum analyses show that most of grains are younger than the depositional age of Tetori Group (~150Ma), indicating heating event after the deposition.

Between two fracture zones identified in the tunnel, ages are younger compared with other sampling points, while track lengths are longer. These facts indicate that the paleo-temperature by the heating event was the highest in rocks between fracture zones.

Assuming that all samples were heated by the same thermal event at different levels, the age of the event was estimated to be ~50Ma based on age-length relationship of all samples. This age is concordant to the age of the andesitic dike intrusion and ore formation, suggesting the source of the heat may be related to magmatic event. Present structure in paleo-temperature might be explained by the selective uplift of rocks between fracture zones or by the selective heat transfer in there.