Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SIT038-P01 Room:Convention Hall Time:May 27 14:00-16:30

Evaluation of tilted uplift of the Kiso Range, central Japan, based on low-temperature thermochronology

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Fission-track (FT) and (U-Th-Sm)/He (He) analyses are used to constrain the denudation history and pattern of the Kiso Range, a Japanese fault-block mountain which has been uplifted since ˜0.8 Ma. Zircon FT ages from 9 samples ranging from 59.3 to 42.1 Ma, apatite FT ages from 18 samples ranging from 81.9 to 2.3 Ma, and apatite He ages from 13 samples ranging from 36.7 to 2.2 Ma are reported. The apatite FT and He ages are divided into an older group and younger group. The younger ages are interpreted to reflect uplift of the Kiso Range because younger ages are obtained at a lower elevation for both the eastern and western slopes of the Kiso Range and the estimated event ages from apatite FT data are consistent with the initiation of the Kiso Range. Although distribution of the younger ages is asymmetric between the eastern and western slopes, the ages on the both slopes can be explained by subsequent denudation to the uplift of the Kiso Range by assuming westerly tilting uplift between the boundary fault of the Inadani fault zone and Seinaiji-touge fault. Elevations of the original surface are estimated at ˜2700-4900 m. We also estimated denudation rates at ˜1.3-4.0 mm/yr and maximum bedrock uplift rates at ˜3.4-6.1 mm/yr for the sampling sites. The estimated elevations of the original surface imply an intermediate type of bedrock uplift between two existing models. Taking the intermediate model and some previous observations of the Inadani fault zone and Seinaiji-touge fault into account, the Seinaiji-touge fault is interpreted to be a back-thrust of the Inadani fault zone. The older group of the apatite FT and He ages is interpreted to reflect long-term peneplanation whose denudation rate is probably $<$0.1 mm/yr.

Keywords: fission-track thermochronology, (U-Th-Sm)/He thermochronometry, Kiso Range, denudation, tilted uplift

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Fault kinematics of the Itoigawa?Shizuoka Tectonic Line in the western Yamanashi area based on fault-rock structures

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We deduced fault kinematics of the Itoigawa-Shizuoka Tectonic Line (ISTL hereafter) at the eastern foot of Mt. Hoh-oh and along the Hayakawa River, based on the structures of fault rocks.

In the eastern Mt. Hoh-oh area, the ISTL striking NE and dipping 50-60NW is the boundary between the Kai-Komagatake granite emplaced at ca. 15 Ma (Sato et al., 1989) on the west and the Miocene Momonoki Subgroup on the east.

The granite is mylonitized along the ISTL, where foliation striking NE and dipping 40-60NW, and lineation in the dip direction are developed. Oblique foliation of dynamically recrystallized quartz and asymmetric quartz c-axis fabrics indicate reverse shearing during the mylonitization, as reported by Shimamoto et al. (1991). The dynamic recrystallization microstructures and c-axis fabrics of quartz also suggest that the mylonitization occurred at temperatures of 300-400 degrees C. From the cooling history of the granite (Sato et al., 1989) together with this temperature range, the mylonitization likely occurred at 12-13 Ma.

Cataclasites are distributed on both sides of the ISTL in the eastern Mt. Hoh-oh area. Cataclasites in the Momonoki Subgroup develop shear planes striking N-S and dipping 40-60W with shallow N-plunging striations. The Riedel shears observed suggest that the cataclasites have been formed by sinistral faulting.

In the Hayakawa River area, the ISTL striking NNW and dipping steeply W is the boundary between the Eocene to Miocene Amahatagawa Formation on the west and the Miocene Kushigatayama Subgroup on the east.

Slaty cleavage striking NNW and dipping steeply W, and lineation steeply N-plunging are developed in the Amahatagawa Formation near the ISTL. Asymmetric pressure fringes around pyrite grains indicate reverse shearing during the cleavage development. Asymmetric folds and boudins of quartz veins with a sinistral sense of shear are also developed in the Amahatagawa Formation adjacent to the ISTL, based on which sinistral faulting along the ISTL was presumed (e.g., Kano, 2002). This sinistral faulting likely occurred after the reverse shearing, because quartz veins formed during the cleavage development synchronous with the latter are deformed by the former.

Cataclasites distributed along the ISTL in the Hayakawa River area develop shear planes generally striking NNW and dipping 40-80W as well as shallow-plunging striations. Riedel shears observed in the cataclasites indicate a sinistral sense of shear in most cases. However, cataclasites outcropped near Nishiyama Spa develop dextral Riedel shears.

In addition to mylonites and cataclasites, incohesive and clayey fault gouges are also distributed along the ISTL. At the Ootana creek in the eastern Mt. Hoh-oh area, steep S-plunging striations are developed in the fault gouge, where reverse-sense Riedel shears and foliation drags are observed. Steeply plunging striations are also dominant in the fault gouges in the Hayakawa River area. Thus the fault gouges along the ISTL have likely been formed by reverse faulting.

In summary, the following thee stages of faulting along the ISTL is recognized. 1) Reverse shearing synchronous with the emplacement of the Kai-Komagatake granite, which resulted in mylonitization of the granite. Reverse shearing in the Amahatagawa Formation also likely occurred during this stage, because development of slaty cleavage is considered to be synchronous with the granite emplacement (Karasawa and Kano, 1992). 2) Sinistral faulting by which asymmetric folds and boudins of quartz veins in the Amahatagawa Formation as well as cataclasites along the ISTL have been formed. Cataclasites have also been formed locally by dextral faulting, the context of which remains unknown. 3) Reverse faulting by which fault gouges have been formed. In this sequence from 1) to 3), these three stages of faulting occurred, and the pressure and temperature during faulting decreased.

Keywords: Itoigawa-Shizuoka Tectonic Line, fault rocks, fault kinematics, the western Yamanashi Prefecture

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Continental deep drilling by NIED

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National Research Institute for Earth Science and Disaster Prevention (NIED) has been done a lot of continental deep drilling for each purpose. We already published about these boreholes data, but some of that has not yet. We will introduce it this time.

Keywords: NIED, Continental deep drilling, Underground water observation, Geophysical logging, Rock examination, Stress measurement