Low-temperature kinematics of the Hatagawa Fault Zone developed in Fukushima Prefecture, northeast Japan, based on deformation microstructures of fault rocks

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The Hatagawa Fault Zone (HFZ) is located at the eastern margin of the Abukuma Mountains, northeast Japan, and trends in the NNW–SSE direction. Three structural zones are developed along the HFZ: a cataclasite zone, sinistral mylonite zones and small-scale dextral shear zones rarely with pseudotachylyte (Takagi et al., 2000; Shigematsu and Yamagishi, 2002; Tomita et al., 2002). The formation of cataclasite in the HFZ started after 110 Ma and terminated by 98.1 Ma (Tomita et al., 2002; Ohtani et al., 2004). However, the kinematics of cataclasite deformation along the HFZ is not well determined. In this study, the kinematics in the low-T regime (below ~300°C; Stöckhert et al., 1999) is estimated from deformation microstructures of foliated granitic cataclasite and calc-mylonite, and the deformation condition of calc-mylonite is estimated based on the lattice preferred orientation (LPO) of recrystallized calcite measured using SEM-EBSD.

Foliated granitic cataclasite striking NNW–SSE occur along the Ohta river. The composite planar fabric indicates a sinistral shear. Calc-mylonite striking NNE–SSW occur near granitic mylonite along the Niida river. The recrystallized calcite grains are equigranular and a polygonal shape. The *c*-axes distribution is characterized by a girdle distribution in the YZ plane. Calc-mylonite striking NNW–SSE occur close to granitic cataclasite along the Takase river. The recrystallized calcite grains are relatively elongated and display a core-mantle structure. The *c*-axes distribution is characterized by Z-maximum. A sub-maximum in the Z direction rotating clockwise is also observed. Shape preferred orientation indicating sinistral shear is developed in all calc-mylonite samples. The shape of calcite grains and the LPOs of the calc-mylonite sample along the Niida river similar to the result of the high-T deformation experiment (Pieri et al., 2001). On the other hand, the sample along the Takase river similar to the result of the low-T experiment (Barnhoorn et al., 2004). The calc-mylonite samples along the Niida and Takase rivers deformed at the high-T and the low-T regime, respectively, based on the deformation microstructures and the deformation conditions of fault rocks surrounding the samples.

In conclusion, it is estimated that the foliated granitic cataclasite along the Ohta river and the calc-mylonite along the Takase river deformed at the low-T regime, and the samples indicate a sinistral shear. The HFZ has been deformed in a sinistral sense of shear by mid-Cretaceous (~98 Ma). The timing of dextral shear recorded in the N–S trending small shear zones (Takagi et al., 2000) should be clarified in the future.

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