Tectono-metamorphic evolution of Kashio mylonite in Oshika area, Nagano, Japan

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Kashio mylonite is one of the most representative mylonite along the Median Tectonic Line (MTL) in Japan (e.g., Takagi, 1986; Michibayashi, 1993). The mylonites originated from Hiji tonalite and pelitic rocks in Ryoke metamorphic belt change their microtextures with increasing mylonitization toward the MTL. In this area, it is well known that P-type mylonite, suggesting the formation under high-temperature and low-strain rate, has been occurred (Hayashi and Takagi, 1987). This texture indicates the thermal annealing of Kashio mylonite by intrusion of Minakata granodiorite after the mylonitization in MTL. However, there is still lack of understanding on how Kashio mylonite was metamorphosed by later thermal event after mylonitization. Detailed analyses of metamorphic process combined with structural approaches are required.

Kashio mylonite is exposed in the Oshika villege, Nagano, Japan, and extends about 20 km from Bunkui to Jizou passes with ~500m thick. In the fault core along the MTL, thick fault boundary with a fault gouge between Ryoke granite and Sambagawa metamorphic rocks are observed. The fault gouges in the cataclasite strike NNE-SSW with a dip of about 70°E. The slicken lines with a gentle plunge to the NNE or SSW, suggesting the right lateral shearing, are well developed. On the other hand, the lineation defined by porphyroclast in the Kashio mylonite shows left lateral shearing. In the weakly deformed mylonite, the thick layer of biotite-garnet gneiss was observed. The garnet in the gneiss displays a chemical zoning of the almandine (X_{Alm}) and pyrope components (X_{Prp}), which decrease in abundance from core to rim. X_{Mg} [= Mg/(Mg+Fe)] of biotite ranges from 0.45 to 0.54. The biotite-garnet gneiss in the highly deformed mylonite shows a white thin layer which is comprised of recrystallized quartz, feldspar, garnet and mica. X_{Mg} of recrystallized biotite in the mylonite ranges from 0.20 to 0.26, suggesting temperature decrease compared with protolith. In addition, the garnet in the highly deformed mylonite show a chemical zoning of the grossular (X_{Grs}), which significantly increases in abundance from core to mantle, and rim. Based on the chemical analyses of recrystallized minerals, we attempted to apply the geothermometry and barometry for both mylonites. The *P-T* conditions of weakly and highly deformed mylonites are estimated at ~590 degree C/0.2 GPa and ~540 degree C/0.9 GPa, respectively. The former *P-T* condition corresponds to the metamorphic condition of Ryoke metamorphic belt in the Ina district, Nagano (Hokada, 1998), and the latter corresponds to the *P-T* condition in the garnet to albite-biotite zones of Sambagawa metamorphic belt (Enami et al., 1994). The results suggest that the P-type mylonite might be formed by Sambagawa metamorphism during mylonitization, not contact metamorphism after mylonitization. Our new *P-T* estimations imply that the protolith of Kashio mylonite has been also subducted with Sambagawa metamorphic rocks along the MTL during mylonitization.

[Reference: Takagi, 1986; JSG. Hayashi and Takagi, 1987; J. Geol. Soc. Jpn. Michibayashi, 1993; Tectonophysics. Hokada, 1998; Island Arc. Enami et al., 1994; CMP.]

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