Does the Median Tectonic Line in the Chubu district, Japan preserve a subduction interface?
Implication for a paired metamorphism in subduction zone

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The Juxtaposition of Sanbagawa (High-P/T type) and Ryoke (Low-P/T type) metamorphic belts is classically called as a “paired metamorphic belt”. The two belts formed at a different part of a single convergent margin with different types of ridge interaction were amalgamated by Median Tectonic Line (MTL) along the arc-parallel tectonic boundary during late Cretaceous age. Therefore, the detailed *P-T-D* estimations of MTL lead to a further understanding of the formation tectonics of a paired tectonic belt in the Circum-Pacific region.

We here present detailed petrographic and microstructural studies using the Kashio mylonite and ultramylonite derived from the Ryoke metamorphic rocks along the MTL. Located in the Kashio area, Chubu district, Japan, the Kashio mylonite is a good example for investigating the detailed *P-T-D* conditions during mylonitization. A minor amount of mylonitic metasediments occurs as a small block in the gneissose Hiji tonalite. The peak *P–T* conditions of the metasediments were estimated at 750–800 ℃ and 4.5–5.5 kbar combined with the biotite-garnet thermometry and the garnet-biotite-plagioclase-quartz barometry. The gneissose Hiji tonalite, which is a candidate for the protolith of Kashio mylonite, was intruded as sheet-like bodies, and its granitic magma was emplaced at around 680–720 ℃ under pressures of 4.6–5.8 kbar based on the Al in the hornblende barometry and hornblende-plagioclase thermometry.

After peak metamorphism with magmatic intrusions, the estimated temperatures inferred from the rim of zoned garnet and mylonite foliations (e.g., muscovite and chlorite) exhibit the sigmoidal decrease from 700 to 400 ℃ with increasing deformation. On the other hand, the estimated pressure conditions show roughly the same at around 3.8–5.1 kbar from protolith to ultramylonite zone. Our pressure estimations indicate the Kashio mylonite was deformed at the depth of 14–19 km, applying an average crustal density of 2700 kg / m^3. In particular, a part of ultramylonite records P ~ 7.5 kbar at T ~ 400℃, suggesting the subsidence of mylonitic metasediments before exhumation.

Previous studies argued that MTL was one of the most prominent "intraplate" fault boundaries in Japan and thought to be results of rapid cooling of Ryoke granitoids by exhumation. However, our detailed *P-T* estimations demonstrated that the Kashio mylonite was formed by isobaric cooling at the middle crust (14–19 km), and a part of mylonite was also recorded by further ductile deformation with Sanbagawa metamorphic rocks at the subduction zone. Thus, these data imply that the thick mylonite zone along the MTL was formed by rapid cooling due to the underplating of high-P/T metamorphic rocks. The amalgamation of high-P/T and low-P/T type metamorphic belts might result in the large-scale ductile shear zone, which serves as a subduction interface.

Keywords: Median Tectonic Line, Kashio mylonite, P-T-t-D path

