Revisiting the metamorphic condition of the Sambagawa pelitic rocks, central Shikoku, Japan

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The Sambagawa metamorphic belt is the pacific type high-pressure metamorphic belt. The Iratsu amphibolite (former eclogite) and the Higashi-Akaishi peridotite bodies occur in the highest metamorphic grade of this belt in the central Shikoku area. These mafic-ultramafic bodies have been considered to be tectonic blocks intruded into the Sambagawa schists, because they were subjected to substantially higher metamorphic pressure than the Sambagawa schists. However, recent studies reported evidences of higher metamorphic pressure, which reaches to the eciogite facies from the Sambagawa schists around the mafic-ultramafic bodies. Hence, needs for reexamination of the other Sambagawa schists has arisen.

In the present study, we applied multiphase thermobarometry using an internally consistent dataset to pelitic mineral assemblalges. We also examined zonal structure and inclusion minerals of garnet, and reconstructed a mineral assemblage at the peak metamorphic conditions. Then, we estimated the peak metamorphic conditions of the pelitic rocks. We investigated a quartz schist in the albite-biotite zone , which consists of quartz, piemontite, albite, talc, chlorite, phengite, and hematite, and a pelitic gneiss in the oligoclase-biotite zone, which consists of quartz, albite, phengite, chlorite, garnet, and small amount of rutile.

A distinct P-T condition around 21.5Kbar, 550C was estimated by a thermodynamic calculation using chemical compositions of the minerals in the equilibrium assemblage of talc, phengite, and chlorite in the quartz schist. This pressure is much higher than the conditions which have been widely accepted. In the pelitic gneiss, garnet porphyroblasts(1-0.5mm) exist in the matrix composed of chlorite, phengite, quartz, and albite. Garnets have zonal structure of inclusion minerals, as well as chemical zoning. The chemical zoning suggests that the garnet grain preserves an information during prograde to retrograde metamorphism. Paragonites and epidotes only appear as inclusions in garnet. We will discuss the P-T path for the pelitic gneiss reconstructed by the chemical zoning and inclusions of garnet using a phase diagram and geothermobarometry.