Thermobaric structure and metamorphic evolution of the Iratsu eclogite body in the Sanbagawa belt, central Shikoku, Japan

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http://www.geo.titech.ac.jp/maruyamalab/f_maruyamalab.html

The Iratsu eclogite body in the Sanbagawa belt, central Shikoku, is situated in the intermediate structural level of the Sanbagawa schists with pumpellyite-actinolite, through blueschist/greenschist transition and epidote-amphibolite, up to eclogite-facies grades. The Iratsu body, overlying the Higashi-Akaishi peridotite body, has been regarded as a single layered-plutonic body. However, it consists not only of metabasites of gabbro and basalt origin with intercalations of ultramafic rocks, but also supracrustal rocks such as quartz schist and metacarbonate. Although the Iratsu body has been intensely retrogressed by infiltration of an external fluid associated with deformation into gneissose garnet-amphibolites during late stages, many eclogites have survived the retrogression and occur as boudins and layers of various sizes throughout the Iratsu body.

The eclogites contain garnet, omphacite, sodic augite, quartz, epidote, rutile, phengite, paragonite, glaucophane, barroisite, zoisite and kyanite as minerals at the peak P-T conditions, which are partly recrystallized by hydration under epidote-amphibolite to greenschist-facies conditions. Geothermobarometry of eclogites yielded possible peak conditions of 1.5-2.4 GPa and 500-860 degrees C in the Iratsu body; the estimated P-T conditions gradually change in the body. Eclogites with higher P-T estimates are predominant in the southern part of the body, and the eclogites near a contact with the Higashi-Akaishi body show the highest temperature conditions.

Integration of these results with published P-T estimates for various rock types suggests a sandwiched thermobaric structure. The highest P-T area is situated in an intermediate structural level, i.e., in the upper part of the Higashi-Akaishi body near the boundary with the Iratsu body, and the metamorphic conditions systematically decrease towards the surrounding lower grade schists in the upper and lower levels. Our thermobaric structure implies that the Iratsu and Higashi-Akaishi composite mass is the thermal core of the belt, and is not a tectonic block but constitutes an integral part of the Sanbagawa belt together with the surrounding schists.