

Structural and metamorphic architecture of the Sanbagawa belt in the Omogiyama district, Shikoku, SW Japan

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The Sanbagawa belt represents one of the best-studied examples of a subduction-type high-P/T metamorphic belt in southwest Japan. Its structural and metamorphic architecture has been well documented in the Besshi–Asemigawa region of central Shikoku, where an eclogite-facies unit structurally overlies the non-eclogitic Shirataki unit. However, the along-strike continuity of this structural relationship remains poorly constrained. Here, we present the results of detailed geological mapping in the Omogiyama district (Sakuragi Bend of the Median Tectonic Line), located approximately 30 km west of the Besshi region.

In the Omogiyama district, the Sanbagawa belt also comprises two lithostructural units: the Shirataki unit and the Eclogite unit. The Shirataki unit is further subdivided into lower and upper subunits. The overall structure is characterized by a subhorizontal nappe-stacking architecture. The upper Shirataki subunit contains abundant north-vergent recumbent folds, likely formed by flexural slip along the boundary with the lower Shirataki subunit. The Eclogite unit occurs in two separate areas, and in both cases structurally overlies the upper Shirataki subunit.

Based on mineral assemblages and mineral chemistry (garnet in pelitic schist and amphibole in hematite-bearing mafic schist), metamorphic grade increases structurally upward from the lower Shirataki subunit (chlorite zone), through the upper Shirataki subunit (chlorite to garnet zone), to the Eclogite unit. In contrast to the Asemigawa region, the chlorite–garnet zone boundary within the upper Shirataki subunit is interpreted as an isograd rather than a tectonic boundary. Garnet in pelitic schist near the garnet-in isograd of the upper Shirataki subunit is Mn-rich and commonly contains detrital cores. In contrast, garnet in pelitic schist of the Eclogite unit is significantly coarser grained and exhibits two-stage growth textures. The cores of these garnets show resorption textures and contain inclusions of jadeite (80–85 mol% Jd) and paragonite, features characteristic of pelitic schist in the Eclogite unit of the Besshi–Asemigawa region. Mafic rocks in the Eclogite unit record two paragenetic stages: an early garnet + glaucophane assemblage (blueschist–eclogite transitional facies) overprinted by a later albite + barroisite assemblage (epidote–amphibolite facies).

Because the structurally underlying Shirataki unit in this district is of significantly lower grade (chlorite zone to partial garnet zone) than the epidote–amphibolite facies overprint in the Eclogite unit, the present nappe-stacking structure cannot represent the primary structural boundary formed during exhumation of the Eclogite unit and subduction of the Shirataki unit.

Keywords: Sanbagawa, subduction, garnet