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Metamorphism of dolomite-bearing eclogite in the Seba eclogitic basic schists, Sambagawa belt, central Shikoku, Japan

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The Sebadani area is located in the Sambagawa metamorphic belt, Besshi district, central Shikoku. The Sebadani metagabbro mass and surrounding Seba basic schists (Seba eclogitic basic schists), and pelitic and siliceous schists occur in the area (Takasu and Makino, 1980; Takasu, 1984). Eclogitic mineral assemblages are sporadically preserved in both the Sebadani metagabbro mass and the Seba eclogitic basic schists (e.g. Takasu, 1984; Naohara and Aoya, 1997; Aoya, 2001). The Onodani eclogites are preserved within the Seba eclogitic basic schists, and they have a complex metamorphic history, with two different eclogitic metamorphic episodes (first eclogitic episode 530-590 ^{o}C/19-21 kbar; second eclogitic episode 630-680 ^{o}C/20-22 kbar) (Kabir and Takasu, 2010). The second eclogitic episode is similar to that of the Seba eclogitic basic schist of Aoya (2001) (610-640 ^{o}C and 12-24 kbar). The pelitic schists intercalated within the Seba eclogitic basic schists also underwent eclogite facies metamorphism of 520-550 ^{o}C and c. 18 kbar (Zaw Win Ko *et al*., 2005; Kouketsu *et al*., 2010).

The eclogites exposed in the northeastern part of the Seba eclogitic basic schists consist mainly of garnet, epidote, amphibole (glaucophane, barroisite, taramite, Mg-taramite, Mg-katophorite, edinite), omphacite (X_{Jd} 0.27-0.43), phengite (Si 6.5-7.1 pfu). Minor amounts of albite, carbonates (mostly dolomite and few calcite), rutile, titanite, biotite, chlorite and quartz. The schistosity is defined by preferred orientation of phengite, amphibole and epidote. Garnets are almandine-rich in composition, with a compositional zoning of increasing almandine (X_{Alm} 0.54-0.60), pyrope (X_{Prp} 0.07-0.13) and decreasing spessartine (X_{Sps} 0.10-0.03) from core to rim. They contain inclusions of epidote, omphacite (X_{Jd} 0.27-0.41), dolomite, titanite and quartz. They also contain symplectite aggregates of barroisite/Mg-katophorite and albite. Omphacites in the matrix are zoned from pale green cores to colorless rims (X_{Jd} 0.27-0.43) and contain inclusions of epidote, and they are partly replaced by amphibole (barroisite/magnesiokatophorite) + albite symplectite. Amphibole in the matrix are zoned, barroisite/Mg-katophorite cores to edenite rims. Dolomites in the matrix are up to 0.5 mm across and they contain inclusions of omphacite, amphibole (winchite, barroisite, magnesiokatophorite), epidote, albite, calcite, rutile and quartz. A chemical zoning in dolomite is well defined by a continuous core-to-rim Mg increasing and Fe and Mn decreasing. Dolomites have mutual contact with eclogitic minerals of garnet, omphacite, barroisitic amphibole and phengite in the matrix.

Texturally abundant dolomites in the Seba eclogitic basic schists exposed in the northeastern part suggest X_{CO2} fluid might stable in the eclogitic facies conditions. Supposing the peak metamorphic conditions are the same as the second eclogitic metamorphic episode of the Onodani eclogites (630-680 ^{o}C and 20-22 kbar), considerable amounts of CO_2 (X_{CO2} 0.02-0.05) were included in metamorphic fluid during the peak metamorphism.

Carbonates are major constituents of the altered oceanic crust and of the sedimentary materials entering the orogenic cycle. Extensive experimental work on phase relationships in carbon-bearing systems reveals that carbonates are extremely stable up to mantle pressures and the transfer of carbon to the mantle wedge at subduction zones is linked to the extent of decarbonation and/or dissolution in aqueous fluids, or to the attainment of a carbonatitic solidus if a thermal relaxation occurs, e.g., upon subduction stagnation. Dolomite is a very common rock-forming mineral still waiting for further exploration and for innovative applications to the reconstruction of dynamic processes in the Earth's interior.

キーワード: Sambagawa metamorphic belt, eclogite, omphacite, dolomite, Seba basic schists
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