Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SMP43-P15 Room:Convention Hall Time:May 24 18:15-19:30

Metamorphic P-T evolution of the eclogitic pelitic schists in the Sambagawa belt, central Shikoku, Japan

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The Seba area in the Sambagawa metamorphic belt is located in the central part of the Besshi district, central Shikoku, and it is composed of the Sebadani metagabbro mass and surrounding Seba basic schists. Eclogitic mineral assemblages are sporadically preserved in both the Sebadani metagabbro and the Seba basic schists (Takasu, 1984; Aoya, 2001). Pelitic schists are intercalated within the Seba eclogitic basic schists, and they consist mainly of quartz, phengite, chlorite and garnet minor amounts of epidote, amphiboles (sodic, sodic-calcic and calcic-amphibole), omphacite, albite, biotite and carbonaceous matter. Rutile, titanite, calcite, chloritoid, K-feldspar, tourmaline, apatite and zircon are occasionally present as accessories. Amphiboles in the matrix sporadically grow oblique to the main schistosity. These amphiboles are strongly zoned, with glaucophane core, barroisite/Mg-katophorite mantle and edenite/actinolite rim.

Three distinct metamorphic events are identified from the pelitic schists. These are (i) precursor metamorphic event, (ii) first high-pressure metamorphic event, and (iii) second high-pressure metamorphic event. The precursor metamorphic event (i) is defined by calcic amphibole (pargasite, Mg-hornblende and taramite) and muscovite (Si 6.05-6.13 pfu) inclusions in the core of the garnets. These minerals suggest relatively high-temperature metamorphic conditions such as high-temperature portions of the epidote amphibolite or the amphibolite facies. The prograde path of the first high-pressure metamorphic event (ii) is from the epidote?blueschist facies, passing through the epidote?amphibolite facies, to reach peak metamorphic conditions in the eclogite facies. P?T pseudosection (MnNCKFMASHO model system) was calculated and compositional isopleths suggested the peak metamorphic conditions of 640?660 ℃ and 21?23 kbar. The prograde metamorphic conditions were also obtained as 460 ℃ and 8 kbar.

Aoya (2001) suggested a prograde path of the Seba eclogitic basic schists that garnet and omphacite growth mainly occurred during the decompression stage after the pressure peak. During garnet cores growing pressure and temperature increased, and during garnet rim and omphacite growing temperature continuously increased whereas pressure decreased. According to the present study both omphacite and garnet grew under the conditions of temperature and pressure increasing. During decompression amphibole+albite±less-jadeite omphacite symplectites developed after omphacite, suggesting both pressure and temperature decreased into epidote amphibolite facies conditions after the peak metamorphism. The second high-pressure metamorphic event (iii) is defined by distinctly zoned amphiboles suggesting a prograde crystallization of the amphiboles from blueschist facies to epidote amphibolite facies conditions, and it is probably correlated with the metamorphism of non-eclogitic schists surrounding the eclogite bodies (Aoya, 2001; Kabir and Takasu, 2010).

References

Aoya M. (2001) P?T?D path of eclogite from the Sambagawa belt deduced from combination of petrological and microstructural analyses. Journal of Petrology 42, 1225-1248.

Kabir M.F. and Takasu A. (2010) Evidence for multiple burial-partial exhumation cycles from the Onodani eclogites in the Sambagawa metamorphic belt, central Shikoku, Japan. Journal of Metamorphic Geology 28, 873-893.

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Keywords: Sambagawa, eclogite, P-T pseudosection, garnet, Besshi, Seba