Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

SCG08-06 会場:311 時間:4 月 29 日 11:00-11:15

DEHYDRATED FLUID AND SEISMIC DEFORMATION IN DEEP SUBDUCTION ZONE ?constraints from lawsonite eclogite and olivine-opx sp

DEHYDRATED FLUID AND SEISMIC DEFORMATION IN DEEP SUBDUCTION ZONE ?constraints from lawsonite eclogite and olivine-opx sp

岡本 和明 [1*]
OKAMOTO, Kazuaki[1*]

[1] 埼玉大学大学, [2] 東京学芸大学連合大学院
[1]Saitama University, [2]Joint Graduate school, Tokyo Gakugei University

Introduction: It has been considered that there is a correlation between the double seismic zone and metamorphic dehydration reaction in deep slab. The location of the upper limits of the upper seismic plane correspond to metamorphic facies boundary where H2O contents change in subducting crust; nu-merous earthquakes from 60 to 110 km depths in the lawsonite-blueschist facies, many earthquakes in the lower crust of the slab from 110 to 150 km depths in the lawsonite-amphibole eclogite facies and few earthquakes in the lawsonite eclogite facies. It was considered that the dry eclogite is distributed in the area where there is few earthquake [1] . However, ultrahigh pressure experiments and thermodynamic calculation are both demonstrating that the lawsonite eclogite is stable [2] in the area. In order to unravel relation between dehydration and seismic defor-mation, we have investigated dehydration process of natural metamorphic rocks recording very cold geo-thermal history in the crust and lithosphere in the slab.

Lawsonite eclogite (Alpine Corsica): Alpine Corsica is the best representative field area exhibit-ing lawsonite eclogite and blueschist as a coherent high pressure, low temperature metamorphic belt. Ophiolite sequence (oceanic plate structure) is also well-preserved, and the pillow structure is clearly recognized in the lawsonite eclogite. Recent petro-logical researches have revealed that both blueschist (rims of the pillow) and lawsonite eclogite (core of the pillow) are stable in the same pressure and tem-perature condition [3] because chemical variation including water content creates both law-sonite-amphibole eclogite and lawsonite eclogite in different portion of suducted crust. We carefully observed microtexture of the lawsonite eclogite and blueschist and have found that omphacite vein and lawsonite vein in mylonitized blueschist matrix.

Olivine-opx spinifex in serpentinite (Cerro del Almirez, Nevado complex): Metamorphic olivine after antigorite has been de-scribed in Italian Alps and also from the Mt. Shiraga, Japan. However, the olivine was formed with talc and fluid by antigorite breakdown reaction in pressures lower than 1.5 GPa. Spinifex olivine with opx in the Cerro del Almirez, is the product at pres-sures (P >1.5 GPa) relevant to the lower seismic plane beneath Northeast Japan. In Cerro del Almirez, olivine-opx rocks underlie an-tigorite schist by a contact[4]. In the olivine-opx rocks, the blade-like, elongated olivine and opx were grown, representing spinifex texture. It clearly indi-cates the presence of large amount of water facilitate crystallization of elongated olivine with opx.

Discussion and conclusion: In the lawsonite eclo-gite in the Alpine Corsica, blueschist and lawsonite coexist together reflect-ing chemical difference in pillowed structure or lithology. Omphacite and law-sonite veins are observed along the shear band in mylonitized blueschist. It suggests that decomposi-tion of glaucophene causesd hydro-fracturing and precipitate omphacite and lawsonite vein. Garnet was grown statically close to the vein.

Olivine-opx spinifex in the serpentinite, Cerro del Almirez, were probably recrystallized in the presen-ce of large amount of water. The estimated dehydra-tion reaction has a negative P-T slope at pressures higher than 1.5 GPa. The reaction is volume reduc-ing reaction and the olivine-opx spinifex texture was formed under volume reducing reaction.

References: [1] S. Kita et al., Geophy. Res. Lett., 33, doi:10.1029/2006GL028239. (2006). [2] K. Okamoto et al., Geochem-istry, 46 205-215 (2013). [3] A. Vitale Brova-rone et al., J. Met. Geol., 29, 583-600, (2011). [4] V. Trommsdorff et al., CMP, 132, 139-148 (1998).

キーワード: 二重深発地震面, 上面地震帯, ローソン石エクロジャイト, 下面地震帯, 変成かんらん石、輝石スピニフェックす, 脱水脈
Keywords: double-seismic zone, upper seismic plane, Lawsonite eclogite, lower seismic plane, olivine-opx spinifex, dehydrated vein