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Li/B RATIO OF CRUSH-LEACHED FLUID OBTAINED FROM THE SANBAGAWA METAMORPCHI BELT: ITS AREAL DISTRIBUTION

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We investigated species and compositions of deep fluids trapped as fluid inclusions (FIs) in high-P met-amorphic rocks formed in the subduction zones. One of major goals of our deep fluid study is to testify an idea whether peculiar fluid soluble light elements, such as Li, B and Cl, can be used as an indicator of fluid generation depths in the subduction zones or not (Scambelluri et al. 2004).

Quantitative analyses of major and trace element composition of the deep fluid are still in the hard task. We adopted crush-leach (CL) technique (e.g., Banks and Yardley, 1992) for extracting FI from quartz veins/lenses developing parallel to the main foliation of Sanbagawa metamorphic rocks crystallized at 20 - 60 km depths.

Major cations/anions of CL fluids were analyzed by ion-chromatography, and Li and B were done by ICP-MS. Raman spectroscopy is adopted to determine the liquid and gas species of fluid inclusions in quartz. Microthermometry is adopted to estimate NaCl sa-linity and to identify the formation stage of FIss.

We extracted CL fluids from three areas of the Sanbagawa belt, 1) Wakayama area, 2) Asemigawa area and 3) Besshi area.

In Wakayama area, CL fluids were extracted from three samples of quartz veins hosted by metabasites covering the metamorphic grade from the chlorite zone, pumpellyite-actinolite facies equivalent, to the biotite zone, amphibolite facies equivalent. Their Li/B ratios increase with metamorphic grade of the host rocks from 0.02 to 0.10 (Sengen et al., 2009). The hydrochemical facies of CL fluids are X-HCO3 type and the intermediate type between Na-Cl type and X-HCO3 type. The texture of quartz grains, which retain FIs, show pervasively deformed and recrystal-lized type for all studied samples.

In Asemigawa area, CL fluids were extracted from six samples of quartz veins covering the metamorphic grade from the chlorite zone to the oligoclase-biotite zone. Their Li/B ratios mainly vary from 0.03 to 0.38, but there is no correlation between Li/B ratio and the metamorphic grade of host rocks. The hydrochemical facies of CL fluids are X-HCO3 type, except for one sample of Na-Cl type. The texture of quartz grains show pervasively deformed and recrystallized type for all studied samples. Some host rocks show distinct S-C fabrics. These observations suggest the rocks in the Asemigawa area pervasively deformed during the ex-humation stage.

In Besshi area, studied sample were collected from eclogite facies unit and neighboring schist units, equivalent with amphibolite facies. Li/B value of CL fluids varies from 0.10 to 1.99. Among all studied samples, relatively high Li/B ($>$ 0.4 up to 2.0) ratio is identified only in this area. The samples with high Li/B ratio are characterized by both the Na-Cl type hydro-chemical facies and undeformed polygonal quartz fabric.

Two samples of quartz vein intercalated with eclo-gite show high Li/B ratio (0.27, 0.44), higher ratio of which is almost identical with those of dehydrated fluid from eclogite (Sengen et al., 2009; Marschall et al. 2007). Furthermore, CL fluids extracted from three samples of quartz veins intercalated with metasedi-ments in the neighboring schist unit show much higher Li/B ratio (0.36-1.99). Yoshida et al. (2011) pointed out that Li/B ratio of dehydrated fluids was also con-trolled by the chemical composition of the host rock.

Raman spectroscopy and microthermometry clearly suggest that all samples applied CL technique contain fluids trapped at multi-stages, covering from prograde, peak and/or retrograde stages. However, some CL fluids obtained from quartz veins mostly free from post-peak deformation in the Besshi area have high Li/B ratio, which is almost identical with eclogite facies dehydrated fluids obtained from meta-serpentinite in Liguria and Betic Cordillera (Scambelluri et al. 2004). These facts suggest that Li/B ratio of dehydrated fluid has a potential for the indicator of the dehydration depth after considering some controlling factors.

Keywords: Deep fluid, Li, B, High-pressure metamorephic belt, Sanbagawa