Boron isotope variations of antigorite serpentinites associated with high-pressure metamorphic rocks: A case study in the Itoigawa–Omi area of the Hida-Gaien Belt, Japan

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Boron isotope study of serpentinites in the Franciscan Complex using an ablation volume correction (AVC) LA-MC-ICPMS discriminates two groups (Yamada et al., 2018 JpGU abstr.; Yamada et al. 2019, in press). Serpentinites associated with blueschists are characterized by lighter boron isotope than serpentinites without blueschist-facies rocks. The lighter boron isotope signature (< ~10 ‰) of blueschist-bearing serpentinites results from interaction with forearc slab fluids with low δ^{11}B in deeper depth. In order to evaluate the versatility of B isotopes and composition of high-pressure metamorphosed serpentinites, we investigated antigorite serpentinites associated with three different type of high-pressure metamorphic rocks in the Itoigawa–Omi area.

The investigated serpentinites can be grouped into two types based on the B isotopes. Antigorite serpentinite with blueschist- and eclogite-facies metamorphic rocks in the Yunotani Valley is characterized by moderate boron (12.5–48.4 $\mu g \cdot g^{-1}$) and lower δ^{11}B (+6.6 to +12.3‰ [mostly smaller than +8‰]; n= 10); Brucite-bearing antigorite serpentinite with barroisite-bearing mafic schist in the Kotaki-gawa River is characterized by very high boron (37.5 –302 $\mu g \cdot g^{-1}$) and lower δ^{11}B (+5.8 to +10.7‰ [mostly smaller than +8‰]; n= 10). In contrast, antigorite serpentinite with garnet amphibolite in the Omi-gawa River is characterized by a wide range of boron (9.1–145 $\mu g \cdot g^{-1}$) and relatively high δ^{11}B (+11.5 to + 14.8 ‰; n= 10).

Our preliminary reconnaissance shows significantly lower δ^{11}B (smaller than +8‰) in antigorite serpentinites of the 'Eclogite Unit' proposed by Tsujimori (2002). This trend is consistent with our earlier study in the Franciscan Complex. The antigorite serpentinites in the 'Eclogite Unit' might have been affected by a deep forearc slab fluids.

キーワード：蛇紋岩、ホウ素同位体、沈み込み帯
Keywords: Serpentinite, boron isotope, subduction zone

