Boron abundance of the Setouchi Volcanic Rocks

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We report boron abundances of Setouchi Volcanic Rocks in the near trench region of the middle Miocene SW Japan arc. Samples were come from Osaka, Sanuki plain-Shodoshima island, Matsuyama, and Oono regions, including high-Mg andesite (HMA), basalt, and dacite-rhyolite. Boron abundances were analyzed by prompt gamma-ray analysis at the thermal neutron beam guide of the JRR-3M reactor, JAEA. For some of the samples, As and Sb abundances were also determined by epithermal INAA. Major and trace element analysis by XRF and ICP-MS were also carried out. Based on these data, magma source of the HMA were discussed.

Boron abundances of HMAs are 14 -73 ppm, their average is 30.5+/-19.5 ppm (n=13). Boron abundance of basalts and dacites-rhyolites are 7-22 ppm, and 10-112 ppm, respectively. B/La and B/Nb ratio are well correlated with Pb/Ce ratio, which suggests addition of subducted sediment-derived component to mantle magma source. As/Ce and Sb/Ce ratios are correlated with B/La which was shown for analysis of many island arc magmas by Noll et al. (1996). These elemental ratios show significant regional variation. In the same region, the elemental ratios of HMA are larger than those of basalts.

Pb/Ce, As/Ce, and Sb/Ce ratios of some HMA (e.g., sample from Shodoshima island) were higher than those of sediment estimated from compilation of accretionary complex sediments in Japan (Togashi et al., 2000), terrigeneous sediment in the Nankai Trough and pelagic sediment of Shikoku Basin (Shimoda et al., 2003). Hence fluid and melt should be assumed as candidates for agency of addition of sediment-derived component to the mantle. Correlation of B/La and Pb/Ce alone could be explained by ˜5 % addition of sediment-derived fluid.

Some of the dacite-rhyolite in Osaka - Matsuyama region coexisting with HMA show depletion in Y and HREE. These felsic rocks were thought to be derived from felsic melt formed by partial melting of sediment with high mode of garnet residue at the pressure condition of mantle depth (Shimoda and Tatsumi, 1999; Shinjoe et al., 2007). B/La, Pb/Ce, As/Ce, and Sb/Ce ratio of these felsic rocks were not necessarily higher than coexisting HMA, so they cannot simply be regarded as proxy of slab derived mantle metasomatizing melt.