

Boron contents in lavas from the central part of the Mexican Volcanic Belt

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Lavas of various age and location were sampled from the central portion of Mexican Volcanic Belt (MVB) for boron analyses to evaluate the changes in subduction component input to the source mantle materials. High B contents observed among volcanic rocks in continental margins suggest that the fluids derived from subducted oceanic slab are important to explain their geochemical characteristics (e.g., Morris et al., 1990; Ryan et al., 1995; Sano et al., 2001). Analyzed samples include those of Michoacan- Guanajuato volcanic field (MGVF:0-5 Ma), La Ordena lava plateau (8-10 Ma), Queretaro and surrounding area (6-12 Ma). Subduction of Cocos plate at Middle America trench and volcanic activity of MVB started 16 Ma ago, thus the analyzed samples cover nearly the entire range of MVB volcanism. Lavas from La Ordena and Queretaro are located away from the trench, whereas those from the MGVF cover a wide range from 200 km to 450 km distance from the trench, although Holocene lava location is limited to the area less than 300 km from the trench.

Boron and some other elements (Ca, Na, Gd, Sm and H) intensity (cps/g) were determined by neutron induced prompt gamma-ray analysis at the thermal and cold neutron beam guide of the JRR-3M reactor, Japan Atomic Energy Research Institute (Yonezawa et al., 1999). The sample powders (0.5-0.6 g) were cold-pressed into disks (12 mm in diameter and 2-3 mm in thickness), then heat-sealed in 25 micron thick fluorinated ethylenepropylene resin film in a size smaller than 14 x 14 mm². A Compton suppression PGA spectrum was accumulated for 1200 (cold neutron) -12000 (thermal neutron) seconds, and normalized by internal silicon peaks for correcting neutron beam fluctuation and sample geometry. Details of the analytical procedures have been described in Sano et al. (1999).

Boron contents in basalt and basaltic andesite samples from the MVB are very low (1-10 ppm) compared with Northeast Japan and Central American arcs. When boron contents were plotted against large-ion lithophile elements (LILEs), lavas older than 6 Ma and OIB-type lavas show systematically smaller ratios of B/LILE than young calc-alkaline lavas from the MGVF, indicating small input of subduction component to the source mantle. In detail, however, temporal variation of boron content in lavas are not clear. Lavas with 6-12 Ma of age are all located farther away from the trench than the rest samples, thus may indicate across-arc variation. In addition, occurrence of OIB-type lavas disturbs the general trend. Rifting events along with subduction certainly characterize the MVB volcanism, where the subduction geometry of Cocos plate is not clearly observed.