Partial melting of oceanic crust: Anatectitites in the gabbro-dike transition of Oman ophiolite

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There are two different models for the origin of oceanic plagiogranite; 1) extreme fractional crystallization of mafic melts (Spulber and Rutherford, 1982) and 2) partial melting of crustal rocks. Furthermore, two different partial melting processes are debated; hydrous melting (Koepke *et al*., 2004) and dehydration melting (Beard and Lofgren, 1991). It is still unclear that which mechanism is most effective. We found numerous large blocks retaining partial melting processes from the basal part of the Suhaylah plagiogranite complex in the northern Oman ophiolite.

The Suhaylah complex, about 2.5 x 2.5 km, occurs between gabbro and sheeted dike complex. The complex shows heterogeneous occurrence and is composed of leuco gabbros-diorites, quartz diorites and tonalites.

The basal part of the complex is characterized by a frequent occurrence of metamorphosed dike blocks. The size of blocks is variable and attains about 20 x 5 m. They are tracable over 1.5 km slightly oblique to the boundary between gabbro and the Suhaylah complex. The blocks are composed of two pyroxenes, and plagioclase with variable amount of quartz. Texture is heterogeneous within one specimen and blocks to blocks. Most common textures are globular aggregates consisting of opx-cpx-oxide wrapped by quartz set in a matrix of pl-opx-cpx-oxide. Quartz occurs also as single rounded crystal, globular aggregate and irregular shaped vein. Thus, these blocks may reveal a dehydration melting as similar as the Troodos ophiolite (Gillis and Coogan, 2002).

Minor elment compositions of these anatectites show two contrastive behaviors; one group is characterized by highly depleted feature and the other group by evolved MORB signatures. The former group is composed of two-pyroxene assemblage with few quartz, and regarded as restite. While the latter group contain abundant quartz and is assumed to be melt-rich part.

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Temporal changes of the subduction components in volcanic products from Aso area, SW Japan.

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Aso volcano is located in a critical area where Philippine Sea plates (PSP) of old age (40-115 Ma) in the south and young age (15-26 Ma) in the north and Eurasian plate meet. To investigate the temporal changes of subduction signatures, we analyzed boron (B) and other major and trace element compositions in Aso basalts and andesites which erupted since 4 Ma. Boron is a key element for evaluating the slab influence on the subarc mantle compositions in subduction zones, because this element is enriched in altered oceanic crust and sea floor sediment.

We grouped volcanic activities of Aso area into four stages. Different geochemical types of magmas were found in all stages.

I) 4 Ma: High-magnesium andesites (HMA); II) 2-0.5 Ma: Adakitic andesites, arc-type andesites and high-alumina basalts (HAB);

III) 0.3-0.09 Ma (caldera forming stage): Arc-type andesites and HAB accompanied by large volume of dacites and rhyolites;

IV) 0.09-0 Ma (post-caldera stage): Arc-type andesites and HAB accompanied by small volume of dacites and rhyolites. The ratios of B to fluid-immobile elements are useful tracer of subduction, because they are not controlled by crustal contamination, fractional crystallization and/or partial melting processes. The ratios of B/Sm (1.0-0.4) and B/Zr (0.03-0.05) in the HMAs are lower than those of the HABs (1.3-5.0 and 0.06-0.17, respectively). B/Nb ratios in the HMAs (0.3-0.5) are similar to those of the mantle values (0.05-0.5). On the other hand, B/Nb ratios (1.4-4.0) in the HABs overlap with those of basalts from cool subduction zones (Kurile and NE-Japan).

These observations suggest that the released phase has slab component beneath Aso area changed from melt derived from dehydrated slab to hydrous fluid between stage I and II. This may have resulted from the lowering of geotherm beneath Aso area caused by the change of subducted plate from young PSP to the old one. This implies that the boundary between young and old PSP moved northward crossing Aso area from 4 to 2 Ma.