

阿蘇火砕流堆積物の地球化学

Geochemistry of essential fragments from Aso pyroclastic flow deposits, central Kyushu
Japan

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本研究課題の議論は, Yasuhara and Yokose (1988)*で一部報告されている。以下にその要旨を示す。

The Aso caldera, central Kyushu, Japan, was formed by 4 cycles of large-scale pyroclastic eruption, which are named Aso 1, 2, 3 and 4. Although Aso caldera is located on the volcanic front, some of the volcanic rocks are trachyte and trachy andesite that are rich in alkali compared with the other volcanic rocks on the volcanic front. In order to understand the geochemical characteristics of the volcanic rocks from Aso caldera, essential fragments from 26 different horizons have been analyzed.

Plausible mechanisms for enrichment of alkali elements in the magma system are derivation from enriched source rocks, low degree of melting and metasomatism. The only acidic rocks are rich in K₂O in this region. The basaltic rocks (the pre Aso volcanic rocks and Aso central cone) belong to high alumina basalt series and are not rich in alkaline elements. The chemical trends on Harker diagram imply that magma mixing is plausible process for the chemical variations. Mixing model for this chemical variations are also supported by the petrographic observations in the andesites and basaltic andesites from central cones. Therefore, the genesis of acidic rocks rich in alkali elements may be the key to solve the problem that is why such high K rocks occur on the volcanic fronts.

Because the positive correlations are observed in LILE-HFSE diagram, the metazomatic processes are ruled out from a candidate for the alkali enrichment. The ratios of LILE/LILE have a nearly constant. On the other hand, the ratios of LILE/HFSE and HFSE/HFSE are variable. Incompatible elements (Ba, Rb, K, Zr, Nb, REE)/SiO₂ ratios decrease with the volcanic eruption cycle. This dilution of the incompatible elements may not interpret as a crystallization fractionation, but as a increasing of degree of melting at the source region. This model is consistent with the eruption volumes that is increasing from Aso 1 to Aso 4.

The geochemical characteristics of the caldera forming magma are identical to a rift volcanism on continental region. The genesis of the trachytic magma in Aso caldera may involve in the spreading of Okinawa trough which is southern extent of Beppu-Shimabara graben, not in the subducting of the Philippine Sea plate.

* : Yasuhara M. and Yokose H. (1998), Origin of trachytic rocks of Aso volcano on volcanic front in central Kyushu, Japan. AGU 1998 Fall Meeting (San Francisco).