Geochemical evolution of magmas in Fuji Volcano for the last 100,000 years, Japan

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Major and trace element concentrations and Nd-Sr isotopes of island arc tholeiites from Fuji Volcano, East Japan arc, show compositional change of magmas with time for the last 100,000 years. Rocks from the Shin-Fuji-type magma (14ka-0 ka) have two or three time higher concentrations in incompatible elements at the same SiO2 level than those from the Ko-Fuji-type magma (100-3 ka). While the ratios of Zr/Y and Rb/Y of the magmas mostly increase with time, the Sr and Nd isotope ratios have kept almost constant and fall in the range of the most depleted island arc basalts.

Fresh basaltic magmas of Fuji have been repeatedly supplied in all stages, because FeO*/MgO ratios, Cr and Ni do not change simply with time. The concentrations of Cu and V decrease with increase of fractionation in the early stage of the Ko-Fuji-type magma and conversely in the other stages, in spite of the same level of the concentrations of these elements in less fractionated magmas. The observed two types of cumulate, enriched and depleted in V, TiO2 and Cu, can cause a different trend of these elements. The timing of the formation of titanomagnetite (+-orthopyroxene) controls the behavior of Cu, V and TiO2 under the different fO2 conditions of magma chambers.

The constantly high concentration of Sr and constantly depleted Sr and Nd isotope properties are in contrast to the wide variation of the other incompatible elements, which inherited the characteristics of the old source mantle due to slightly high and variable (0.5- 1%) degrees of depletion. The recent constantly low degrees of partial melting (about 5%) accomplish the constantly high Sr concentration of the magma in the second stage.