Petrological Study of Drilling Slime within the Summit Caldera of Izu-Oshima

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Scientific drilling within the summit caldera of Izu-Oshima (WIC site) was carried out by Earthquake Research Institute in 1996-1998 for geophysical monitoring of volcanic eruption and clarifying the caldera genesis. The stratigraphy of the volcano is Senzu, Older Oshima, and Younger Oshima Groups in the ascending order (Nakamura 1964). Based on petrological analyses mainly of lavas on the ground, Kawanabe (1991) proposed temporally gradual evolution of magma in this volcano, in term of Mg/Mg+Fe. WIC drilling reached at 1 km depth, core samples were collected from the Older and Younger Oshima Groups, and slime was from the Senzu Group and the basement rocks. Core samples of the Older and Younger Oshima Groups, were studied petrologically by Santosa (2000MS). In this study, I investigated magma evolution throughout the history of Izu-Oshima Volcano, using untreated drilling slime of the Senzu Group and the result of Santosa (2000MS).

As it is proposed that bulk composition of the Izu-Oshima lavas reflects accumulation of phenocrysts mostly of plagioclase, it is important to discuss magma evolution only using groundmass (melt) composition. Slime was washed and sieved into fine grains (1 mm to 0.25 mm). Groundmass was separated using isodynamic magnetic separator and handpicked. Presently lava flow samples whose formation was determined mainly by logging data were only investigated. To compare groundmass compositions for the Senzu Group, the whole-rock compositions of aphyric rocks (less than 10 vol% phenocryst) from the Older and Younger Oshima Groups were used.

Otsuka (1998MS) argued that magma mixing of the parental and evolved magmas poor in H2O and K2O before the middle age of the Older Oshima Group (8 ka). Mixing of the parental and evolved magmas rich in H2O and K2O after 8 ka. He suggested that magma plumbing system of Izu-Oshima changed around 8 ka. Moreover, Santosa (2000MS) proposed mixing of K2O-rich and K2O-poor magmas.

The present chemical data using the drilling cores and slime do not support the result of Kawanabe (1991). That is, Mg/Mg+Fe hardly changed with depth. However, chemical trends of the three groups show temporal increase in Fe, Mg, K, Ni, Ca, V, and Ba. Since each chemical trend can be explained by fractional crystallization or/and internal mixing, it is likely that the time variation of the chemical trends can be considered as that of the parent magmas.