

## Magma mixing mechanism of Fujiyama lava dome in Takahara volcano, northeast Japan

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We carried out petrological and petrochemical studies on Fujiyama lava dome in northern part of Takahara volcano which is a Quaternary stratovolcano located on volcanic front in the southern part of northeast Japan arc. Fujiyama is mainly composed of dacites. Takahara volcano was presumed to have finished its volcanic activity ca. 100 ka (Inoue et al., 1994), but Fujiyama was assumed to have been formed at 6.5 ka (Okuno et al., 1997; Takashima, 1999).

Magma mixing is accepted as one of the important processes leading to the formation of mafic inclusions (e.g., Eichelberger, 1975; Koyaguchi, 1986). The presence of mafic inclusions was already reported in Fujiyama (Ikeshima and Aoki, 1962). However, there are no investigations for the mafic inclusions in Fujiyama, and their petrogenesis is not yet understood. Therefore, we tried to study to intend to understand genetic processes of these mafic inclusions and magma mixing mechanism in Fujiyama lava dome.

The mafic inclusions in Fujiyama dacites ( $\text{SiO}_2=67.4-70.4$  wt.%) have andesitic composition ( $\text{SiO}_2=60.7$  wt.%). They are dark in color and most inclusions have spherical to oblate in shape. In the boundary between host rock and inclusion, a few phenocrysts straddle the boundary. All inclusions have abundant vesicles. These features are similar to mafic inclusions reported from other volcanoes, and indicate that the inclusions were liquid when they were entrained by the silicic magma (e.g., Heiken and Eichelberger, 1980; Bacon, 1986). The host rocks (dacite) contain phenocrysts of plagioclase, quartz, orthopyroxene, hornblende, Fe-Ti oxides and rarely augite. The inclusions contain phenocrysts of plagioclase, orthopyroxene, augite, Fe-Ti oxides and rarely include hornblende and quartz.

Whole-rock major and trace element composition of the inclusions are plotted between host dacites and basalts erupted during the earliest activity in Takahara volcano. In general, chemical compositions have linear data trend which may be evidence of magma mixing between dacitic and basaltic magma. Plagioclase and orthopyroxene phenocryst cores in the host rocks and inclusions have a large variation in composition. Both rocks contain Ab-rich plagioclase, An-rich plagioclase, Fe-rich orthopyroxene and Mg-rich orthopyroxene. Most of Ab-rich plagioclase and Fe-rich orthopyroxene in the inclusions show reverse zoning. Sr isotopic ratio ( $^{87}\text{Sr}/^{86}\text{Sr}$ ) of the inclusion is slightly lower than that of the host dacite.

From these results, it is presumed that magma mixing occurred between silicic magma and mafic magma in Fujiyama. Silicic end-member might have been close to in composition to the host Fujiyama dacitic magma, and mafic end-member might have been basaltic magma having similar composition to the products erupted during the earliest stage in activity of Takahara volcano. Therefore, it is suggested that the mafic inclusions were formed from resultant andesitic magma by the magma mixing.