

The relation between microlite textures and discharge rates for the 1990-1995 eruptions at Unzen, Japan

Satoshi Noguchi[1]; Atsushi Toramaru[2]; Setsuya Nakada[3]

[1] Earth Planet Sci., Kyushu Univ.; [2] Earth and Planet. Sci, Kyushu Univ.; [3] ERI, Univ. Tokyo

The dacite eruptions during 1990-1995 at Unzen, Japan consist of series of development of lava domes and the subsequent collapse generating pyroclastic flows (block-and-ash flow). Although the petrological aspects at Mt. Unzen have been studied well (e.g., Nakada and Shimizu, 1995; Nakamura 1995; Sato et al., 1999; Nakada and Motomura, 1999), several aspects of magma ascending processes such as the dynamics of H₂O exsolution and microlite crystallization processes, and their relation to conduit flow are still poorly understood.

In the present study, we carried out the quantitative textural analysis of volcanic products in order to clarify the relation between the temporal change in discharge rate (exit velocity) and the variation of microlite textures for the 1990-1995 eruptions. Results show that the temporal variation of microlite number density (MND) has the positive correlation with discharge rate. MND is controlled by effective undercooling rate (dT/dt) which is proportional to exsolution rate of H₂O from melt (dCH_2O/dt). Assuming the equilibrium H₂O exsolution, the temporal variation of MND corresponds to the change in decompression rate of magma at microlite nucleation depth (Z_n). The coincidence between decompression rates and discharge rates at the surface implies that the magma ascended as a spatially uniform flow.