

Groundmass texture of B-fall deposit from the Ten-nin eruption, Asama volcano, Japan

HONGO, Yuko¹ ; NAKAMURA, Michihiko¹ ; OKUMURA, Satoshi^{1*} ; MUJIN, Mayumi¹

¹Department of Earth Science, Graduate School of Science, Tohoku University

Volcanic eruptions often show the transition from explosive to non-explosive activities and the change in the explosivity during explosive activity. A controlling factor of the explosivity is the magma ascent velocity in volcanic conduits (e.g. Jaupart and Allegre, 1991). When the velocity of magma ascent is high, magma does not experience gas loss, which results in explosive activity. On the other hand, non-explosive eruption is caused if magma ascent velocity is low and efficient outgassing occurs. In this study, we investigated crystal size distribution (CSD) of plagioclase microlite because it reflects magma decompression rate. We measured the CSD in fallout pumices from the Ten-nin eruption of Asama volcano and compared the CSD with those of other eruptions. The fallout deposit of the Ten-nin eruption is divided into eight subunit layers from B-1 to B-8. Four layers (B-2, B-4, B-6 and B-8) are composed of gray and brown pumices, while other layers, i.e., B-1 and B-5, and B-3 and B-7, are formed by volcanic ash and dense lithic fragment, respectively. The B-4, B-6 and B-8 also contain dense lithic fragment. All the samples investigated in this study have a common bulk chemical composition (Hongo et al., Volcanological Society of Japan, 2013). We analyzed bulk density and CSD for the pumices from B-4, B-6 and B-8. To obtain the CSD, we corrected the effect of microlite shape using CSD Slice5 software (Morgan and Jerram, 2006) and CSD corrections software (Higgins, 2000) after measurement of the length and number of the microlites on backscattered electron images with 800 magnifications. The vesicularities and crystallinities of B-4 and B-6 were smaller than those of B-8. The CSD slope was slightly steeper than those of B-4 and B-6. We compared the CSD obtained in this study with those of explosive to non-explosive eruptions reported by previous studies. The CSD data show that the slopes of the explosive eruptions are generally steeper than those of the non-explosive ones. This result implies that the CSD slope reflects magma ascent velocity and eruption style, but we need more data to clarify the relationship between CSD and eruption style, since no clear difference was found in some CSDs of sub-Plinian and lava dome eruptions (e.g. Castro and Gardner, 2008).

Keywords: crystal size distribution, microlite, pumice, sub-Plinian eruption, Asama volcano