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Time-series analysis of volcanic ash from vulcanian eruptions at Showa-crater of Sakurajima volcano, Japan

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We study a temporal variation of texture of volcanic ash emitted by vulcanian eruptions at Showa-crater of Sakurajima volcano. We collected 34 ash samples during 14th-17th, January 2010. The collected ashes were examined from view point of variation of ash texture 1) through single eruption and 2) before and after big eruption emitting pumice clast. Ashes were classified on the basis of particle morphology and component. The classification of volcanic ash was performed on stereoscopic microscope. Volcanic ash is divided into 15 types of particle, K (black ash ash), B (brown color ash), W (white to colorless ash), Pumiceous particle (ash with extremely high vesicularity), N (ash with non-smooth surface), A (altered), Pl (plagioclase), Cpx (clinopyroxene) and Opx (orthopyroxene). Moreover, K is subdivided into three types of particle, K-B (shows blocky morphology), K-F (shows fluidal surface) and K-V (shows vesicular morphology). Also B is subdivided into B-B, B-F and B-V as well as K particle. W type ash is subdivided into W-B-T (shows blocky morphology with transparency), W-B-NT (shows blocky morphology with non-transparency) and W-V (shows vesicular morphology). The examination on polarized microscope indicates that groundmass crystallinities of B, W-B-T, W-V and pumiceous particles are lower than that of K and W-B-NT particles. The classification and time-series analysis of the ash reveals that 1) the number fraction of ash with low crystallinity (B, W-B-T, W-V and pumice) and 2) vesicular morphology (K-V, B-V, W-V and pumiceous particle) in later phase is larger than that in initial phase in single eruption, and 3) the number fraction of ash with low crystallinity increases approximately 1 day before big eruption (emitting pumice clast) and decreases after the eruption. These results imply temporal variation of volcanic ash texture is possible to be an indicator of progress of eruptive activity.

Keywords: Volcanic ash, Texture, Time-series, Progress of eruptive activity