A correlation between microlite crystallinity and local groundmass compositions in volcanic ash from Sakurajima vulcanian eruption

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The aim of this study is to understand a mechanism of vulcanian eruption in Sakurajima volcano. The samples of this study are collected by many researchers who have committed in SVOC (Sakurajima volcano research center). They consist of volcanic ash, volcanic bomb, pumice and lapilli.

To classify type of particle in volcanic ash, thin sections of volcanic ash was made for 6 explosion events. The classification of volcanic ash was performed on polarized microscope. Volcanic ash is divided into 6 types of particle, Ph (phenocryst), Ag (ash aggregate), Ba (brown color ash) and Wa (white color ash). Moreover, Ba is subdivided into two types of particle, Ba-S (shows vesicles with smooth interface between vesicle and matrix, and lower crystallinity) and Ba-R (shows vesicles with roughly interface between vesicle and matrix, and higher crystalliniy).

Local groundmass bulk compositions (LGBC: groundmass glass and microlite) of Ba-S and Ba-R (4 and 3 clasts, respectively) ashes erupted at 1982/8/21/6:46 was analyzed using SEM-EDS. LGBC (area: 50∗50 and 37∗37 square micrometers) were analyzed for 3-4 areas for each clasts, and a crystal textual analysis was carried out for this area. The crystal textual analysis was performed on plagioclase, pyroxene and oxide. Then, a correlation between chemical variation and microlite crystallinity was found. The correlation is that plagioclase microlite crystallinity increases (about 0.1-0.4) with decreasing SiO2 wt.% (about 62-68wt.%) and increasing CaO wt.% (about 4-7wt.%) and Al2O3 wt.% (about 15-20wt.%), and pyroxene microlite crystallinity increases (about 0.05-0.17) with increasing MgO wt.% (about 0.6-1.8wt.%). In Ba-S, there are two possibilities to explain this correlation. 1) Addition or reduction of microlites by migration movement of microlite. 2) Small-scale chemical heterogeneity intrinsic in magma.