

Structural state of plagioclases within volcanic ash from Sakurajima volcano: Preliminary investigation of monitoring volcanic activity by constituent mineral

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Sakurajima volcano, one of the most active volcanoes in Japan, has seen an increase in the magnitude and frequency of activity over the past decade. This activity has been studied by many geophysicists, with most focusing on seismic waves and crustal movement that occurred nearby. Many geochemists have approached igneous activity from the viewpoint of whole-rock chemical analysis and mineral composition analysis of direct products, such as volcanic ash and lapilli, but few studies have applied crystallography in analysis. The goals of this study are to obtain basic data for understanding magmatism just under the Sakurajima volcano and to construct a new and efficient method for investigating and monitoring volcanic activity, focusing on the crystal structure of constituent minerals within the volcanic ash. Toward this second goal, the structural state of plagioclases within volcanic ash erupted from Sakurajima volcano was preliminarily investigated. Samples were collected for about 27 months starting in May 2013 at Higashi-Sakurajima Junior High School, which is located about 4 km southwest of Minami-dake crater. It is known that $B(2\theta_{(1-11)} - 2\theta_{(-201)})$ versus $\Gamma(2\theta_{(131)} + 2\theta_{(220)} - 4\theta_{(1-31)})$ for plagioclases, as determined from X-ray powder diffraction data, distinguishes among structural states and gives a rough estimate of plagioclase composition. The B/Γ plot measured for the plagioclases in the volcanic ash suggests a gradual change in degree of order in the crystal structure during this period. Further results from long-term analysis of volcanic ash are expected to clarify aspects of the volcanic activity of Sakurajima volcano.

Keywords: Sakurajima, volcanic ash, plagioclase, X-ray powder diffraction, structural state