

Separate quantification of volcanic gas fluxes from showa and minamidake craters at sakurajima volcano, japan

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Measurements of volcanic gas emission are crucial for monitoring of volcanic activities. Volcanic gas emission data reflect the amount of degassed magma within the volcano and conditions of the conduit. At a volcano with multiple craters, a separate estimate of the gas fluxes from different craters is needed. However, it is difficult to measure volcanic gas emissions from multiple craters separately by means of conventional observational methods. When observing volcanic gas emission from the leeward, the volcanic plume observed is mixture of emissions from multiple sources. In this study, we present separate quantification of volcanic gas emissions using a UV camera observation system.

We conducted volcanic SO₂ measurements from 2007 to 2010 at Sakurajima volcano, Japan. The UV camera observation system was used to visualize SO₂ in the volcanic plume (e.g., Mori and Burton, 2006). By analyzing UV images obtained by the UV camera system, we succeeded separate quantification of SO₂ fluxes from two craters of the volcano: Showa crater and Minamidake crater. Sulfur dioxide flux from Showa crater showed a variety from a few hundred to several thousand ton per day. In contrast, that of 100-500 ton per day from Minamidake crater remained at a lower level. Within the observation period, the amount of degassed magma beneath Showa crater should have varied corresponding to the intensity of volcanic activities and number of eruptions. On one hand, degassing conditions of Minamidake crater have kept stable in this period.

Conventional volcanic SO₂ observations using a UV spectrometer have been conducted after 2003 (e.g., Mori et al. 2008). The sum of SO₂ fluxes from both craters has been collected by means of the conventional methodology. The result showed a diversity of SO₂ emission in 2007-2010. Since SO₂ flux from Minamidake crater have remained stable, this variation of SO₂ emission in 2007-2010 was controlled mainly by degassing activities of Showa crater, not by those of Minamidake crater.