

Temporal variation of HCl/SO₂ ratios in the volcanic plumes of Showa and Minamidake craters, Sakurajima volcano

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After the reactivation of Showa crater at Sakurajima volcano in June 2006, the volcano has been emitting volcanic gas from two craters, Minamidake and Showa craters. Due to the difficulty of volcanic gas sampling at this volcano, remote measurement is effective for monitoring volcanic gas composition. Notsu and Mori (2010) reported that HCl/SO₂ ratio of the volcanic plume of Minamidake crater was 0.24-0.48 between 1999 and 2001. This presentation will report the temporal variation of HCl/SO₂ ratios of volcanic plumes of the two craters observed using remote FT-IR measurements.

The observations were carried out using a FT-IR spectrometer of Air Monitoring System (MIDAC Inc.). This FT-IR spectrometer equipped with a liquid Nitrogen cooled InSb detector has spectral resolution of 0.5 cm⁻¹. A movable mirror installed in front of the entrance window was adjusted to introduce the sunlight into the spectrometer. For the measurements, solar occultation method (Francis *et al.*, 1998) using the sun as an infrared light source was used due to the lack of infrared source on the flank of the volcano.

Since the plumes from the two craters mix as they flow, it is impossible to separately measure the HCl/SO₂ ratios for the respective craters by measuring the plume a few km away from the volcano. In order to separately measure the ratios, plume just above one of the craters was aimed using the sun going down behind the crater.

The FT-IR observations revealed that two craters have different HCl/SO₂ ratios. The HCl/SO₂ ratio of Showa crater is relatively stable ranging 0.1-0.18 for the last three years. In contrast, the ratio of Minamidake crater varied between 0.13 and >0.3 and is usually higher than that of Showa crater except for the end of 2010. There is no noticeable correlation between the ratios and the SO₂ flux of the volcano. In two of the observations, we were able to separately measure the ratios of two vents in Minamidake crater (A and B craters) and found that they also have different ratios (the ratio of A crater is higher than the ratio of B crater). Some part of the large variation of Minamidake's ratio may be explained by changes in relative degassing strength of the two vents.

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