

Automatic continuous observations of SO₂ flux at Suwanose-jima volcano, Southwest Japan

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Suwanose-jima is a remote volcanic island (about 27 km² in area) located about 200 km southwest of Kyushu island, Japan. It is an andesitic volcano and, since 1950s, there has been intermittent Strombolian and Vulcanian eruptions. It is still one of the most active volcanoes in Japan that emits volcanic gas continuously. Sulfur dioxide flux data of this volcano is rare because measurements have only been carried out once every few years for the last 10 years. Previous studies revealed that the average SO₂ flux of the volcano was 500–1000 ton/day with typical daily variations ranging from 100 to 2000 ton/day [Mori et al., 2004; Oikawa et al., 2004].

Existing scanning DOAS systems have an outer cylinder with a window and a mirror/prism both rotating with a stepper motor [Edmonds et al., 2003; Galle et al., 2010]. In this study, we made a small DOAS scanner replacing the outer cylinder with a cylindrical quartz glass window. The advantage of this scanner is that it reduces power consumption by using a relatively small stepper motor that only rotates the mirror.

The new device with a USB2000+ spectrometer (Ocean Optics, Inc.) was set about 4 km south-southwest of the volcano on 20th January, 2013. It was powered by a solar panel and observed data were transmitted via cellular phone networks. The measurements were carried out from 8 am to 5 pm everyday and each scan took about 10 to 15 minutes. An integrated SO₂ column amount of each scan was multiplied by a wind velocity value from weather GPV data by Japan Meteorological Agency. Preliminary results showed that average SO₂ emission rates were about 500–1000 ton/day with the maximum of 2000 ton/day. These values were comparable to those of other recent observations. Acquired time-series data of SO₂ flux will be discussed with volcanic activities of the volcano.

References

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