

## Sulfur dioxide discharge rate monitoring of Mt. Asama 2004 eruption

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On 1st September 2004, a moderate-sized explosive eruption took place at Mt. Asama. It was the first full-scale explosive eruption in 21 years. We started SO<sub>2</sub> flux measurements campaign from 2nd September. The eruptive activity continued, and in mid September, Mt. Asama had repeated minor ash eruptions for a few days. Eventually, the volcano had 4 moderate-sized explosive eruptions and many minor eruptions, and there is no eruptive activity since 9th December 2004.

The SO<sub>2</sub> flux measurements were carried out using a portable SO<sub>2</sub> monitoring system. The system uses a compact ultraviolet spectrometer (about 200g). Since the total weight of the system is less than a few kilograms, the system offered maneuverability for sudden eruption on 1st September. In the measurements, we fixed the system to the car and carried out traverse method for measuring SO<sub>2</sub> amount on the profile of the volcanic plume. The SO<sub>2</sub> flux from the volcano was obtained by multiplying the SO<sub>2</sub> profile amount and the plume speed. We also applied scanning method for flux measurements for other occasions. For estimation of the plume speed, we used volcanic plume images taken by digital or video cameras.

Daily average SO<sub>2</sub> flux from Mt. Asama soon after the eruption was a thousand and a several hundreds ton/day. The flux rose above 3000 ton/day during the continuous ash eruptions on 15th and 16th September. The day after the moderate-sized eruption on 23rd September, the flux recorded maximum of 4500 ton/day and it suddenly dropped to 2000 ton/day on the following day. In October, the SO<sub>2</sub> discharge rate subsequently remained at relatively lower level of less than 2000 ton/day. At the end of October, the flux jumped up above 2500 ton/day and went over 3000 ton/day around the moderate-sized explosive eruption on 14th November. The SO<sub>2</sub> flux slightly decreased since then but still continues to emit more than 2000 ton/day as of February 2005.

At Mt. Asama, the SO<sub>2</sub> discharge rate has been observed since 1972 using COSPEC. The flux shows 100-200 ton/day during dormant periods, whereas it increases up to 1000 ton/day during active periods. During the recent 2002-2003 active period, the SO<sub>2</sub> flux ranged between 400 and 1000 ton/day. However, it decreased down to about 150 ton/day in December 2003. The SO<sub>2</sub> flux observed during the 2004 eruption were generally over 2000 ton/day and is much higher than the reported values in the past. During the 2004 eruption, a lava dome was observed at the bottom of the crater in mid September, and volcanic glows have been observed many times. High SO<sub>2</sub> flux values observed is probably corresponding to the magma at shallow depth from the crater bottom. Furthermore, the continuing high SO<sub>2</sub> flux in February 2005 suggests that the magma is still actively degassing at the shallower level.