

Causes leading to enhancements in sulfur dioxide concentration observed by MAX-DOAS in Kyusyu

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We performed continuous observations of sulfur dioxide (SO₂) using the Multi-Axis Differential Optical Absorption Spectroscopy (MAX-DOAS) at Kasuga in Kyushu, Japan. Spectra measured at 310-320 nm were analyzed with the DOAS method to retrieve mean SO₂ concentrations for a 0-1 km layer with a horizontal scale of about 10 km. This spatial scale is expected to provide useful inputs for data assimilation. This study focuses on continuous data acquired in July-August 2014. In the period, seven days were identified as the SO₂ level was high (>5 ppbv). Back trajectory analysis indicates that there were two categories; the one from a volcanic origin and the other from a continental origin. A high SO₂ plume observed on July 8 was found to originate from Sakurajima volcano. Plumes with SO₂ higher than 10 ppbv observed on July 30 and August 7 and 13 were from the Aso volcano. High SO₂ observed on August 14 could be affected by both volcanoes. On the other hand, high SO₂ plumes observed on July 12 did not pass over volcanoes but over China for about 1 day. Very high SO₂ of 20 ppbv was observed on July 21. This is suggested to be due to a rapid transport of high SO₂ plumes from South Korea.

Keywords: SO₂, MAX-DOAS, volcano