



## **Volcanic SO<sub>2</sub> measurements by UV-TIR satellite retrievals: validation by using the ground-based FLAME network at Mt. Etna**

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Monitoring active volcanoes is crucial for social, environment and economic aspects, especially in a densely populated area as Mt. Etna in Italy. Since the '80s surveillance approach has displayed an intense and rapid growth also thanks to fast technological advances. Thought, satellite-based observation nowadays still lie beyond ground-method, in the next decade this technique is a potential candidate to overcome and/or integrate ground-observation. This thanks to its potential ability to record multi-parameter data and to the flexibility for large-scale tracking volcanic SO<sub>2</sub> cloud at high temporal and spatial resolution. The European Space Agency project 'Study on an End-to-End system for volcanic ash plume monitoring and prediction' (SMASH and SACS2) explore the ability of polar-orbiting satellite instruments for retrieving quantitative measurement of volcanic SO<sub>2</sub> and ash clouds parameters. Here, we present the Mt. Etna SO<sub>2</sub> measurements retrieved by MODIS, IASI, GOME-2 and OMI and their comparison with the ground-based DOAS monitoring network (FLAME). Case-studies were selected in the range of the 18 lava fountains episodes occurred at Mt. Etna in 2011. Due to the short timing of the paroxysmal episodes a selection has been performed in order to have contemporaneous detection of the SO<sub>2</sub> cloud both from satellite sensors and ground network. Results has been obtained in terms of the different measurements of SO<sub>2</sub> mass in the volcanic clouds and their respective uncertainty. The agreement between the satellite and the ground measurements has been investigated. For all the sensors retrievals the comparison has been considered a validation when the two measurements are within the respective errors. Results of this study suggest that satellite retrieval is a promising volcano monitoring tool for SO<sub>2</sub> volcanic cloud observation providing day-night integration in the day-light ground-based SO<sub>2</sub> measurements records.