Geophysical Research Abstracts
Vol. 21, EGU2019-5253, 2019
EGU General Assembly 2019

SO_2 fluxes from Mt Etna (Italy) measured with TROPOMI validated with ground-based measurements

Manuel Queißer, Mike Burton, Nicolas Theys, Federica Pardini, Giuseppe Salerno, Tommaso Caltabiano, Matthew Varnam, Benjamin Esse, and Ryunosuke Kazahaya

University of Manchester, SEAS, Manchester, United Kingdom (manuelqueisser@web.de)

The newly launched imaging spectrometer TROPOMI onboard the Sentinel-5 Precursor satellite provides atmospheric column measurements of sulfur dioxide (SO_2) and other gases with a pixel resolution down to 3.5 $\times$ 7 km2. This permits mapping emission plumes from a vast number of natural and anthropogenic emitters with unprecedented sensitivity and spatial resolution. Volcanic SO_2 emission time series reflect magma dynamics, are used for risk assessment and calculation of global volcanic CO_2 gas flux. TROPOMI enables unprecedented insights into these fields. To test TROPOMI's potential we retrieved SO_2 flux times series from TROPOMI satellite images with high temporal resolution (30 min) using HYSPLIT backtrajetory modeling. To validate the flux time series they are compared against fluxes retrieved from ground based instrumentation. Mt. Etna (Italy) emits SO_2 with fluxes ranging typically between 500 and 5000 t/day, measured automatically by the largest network of scanning UV spectrometers in the world, providing the ideal test-bed for this validation. A comparison of three SO_2 flux datasets, TROPOMI (one month), ground-network (one month), and ground-traverse (two days) shows acceptable to excellent agreement for most days. The result demonstrates that reliable, nearly real-time, high temporal resolution SO_2 flux time series from TROPOMI measurements are possible for Etna and, by extension, other volcanic and anthropogenic sources globally. This suggests that the potential of TROPOMI data can be realized, offering a transformation in our ability to monitor and study volcanoes and volcanic processes world-wide.