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The 24-30 December 2018 Etna eruption: ash and SO_2 volcanic cloud monitoring using satellite data

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Mt. Etna (Sicily, Italy) is one of the most active volcano of the world. Since 2011 it showed an intense explosive activity consisting on a sequence of 53 short-lived, but powerful lava fountains episodes. On the morning of 24th of December 2018, the explosive activity at the summit craters of Mt. Etna suddenly increased and an eruptive fracture opened at the base of the South East crater. The eruption produces an ash and gases column that reach about 9 km a.s.l. and dispersed south-eastwards of the volcano. The explosive regime decreased in the late afternoon of the 24th but a significant SO_2 and ash emission continues until 30th December.
In this work the measurements of several geostationary and polar satellite instruments as MSG-SEVIRI, NASA-Terra/Aqua-MODIS, Sentinel-5P TROPOMI and MetOp-IASI, have been used for the monitoring of Mt. Etna ash and SO_2 volcanic emissions.
The products obtained remotely by satellite were inter-compared and validated using ground based networks. In particular, SO_2 flux inverted by satellite-based data was compared with that flux obtained from the ground-based ultraviolet scanning spectrometer FLAME-Etna network installed on the flanks of Mt. Etna.
The results obtained by this comprehensive method highlight the ability of satellite-based systems to fully follow eruptive events in near real time, offering a powerful tool to mitigate the volcanic risk on airspace.