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Eruption of Mt. Etna: GOME-2 sensor tracks plume from Europe to Asia

19 May 2008

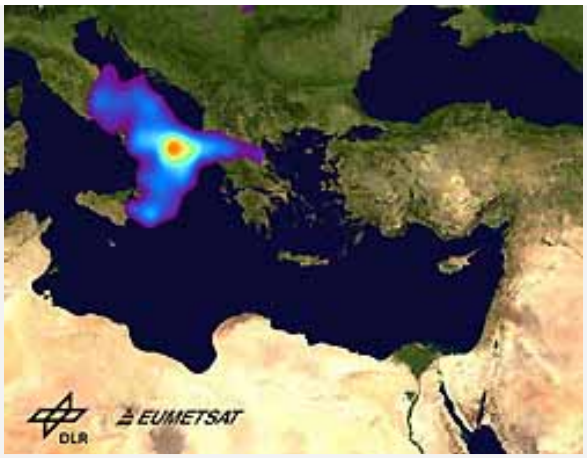
SO2 plume

Mount Etna is a stratovolcano located on the Italian island of Sicily. Being Europe’s highest and most active volcano, it is one of the best monitored volcanoes worldwide and has the world's longest documented records of volcanism starting 1500 BC. Two typical eruptive styles occur at Etna, persistent explosive eruptions, sometimes with minor lava emissions and less frequently flank vents, typically with higher effusion rates.

The latest eruptions of Etna started on 10 May 2008 around 16:00 CEST. The first eruption lasted for about 4 hours and was dominated by heavy activity of the south-eastern crater. High amounts of lava have been emitted, a lava fountain could be seen at the crater and several lava flows travelling down into the eastern flank of the volcano into the Valle del Bove depression were visible on one of the webcams installed to monitor the volcano. Cloudy conditions and poor visibility obstructed the monitoring of the eruption activity, but it seems that this is one of the heaviest eruptions of the south-eastern crater since 2001. A second eruption occurred on the evening of 13 May from a fissure that opened NE of the SE crater, about 800m long. Catania airport had to be closed because of ash emission from Etna.

Detection of SO2 with GOME-2

Apart from the emission of lava, the eruption at Etna emitted large amounts of sulphur dioxide (SO2), a colourless and toxic trace gas, into the atmosphere. The SO2 was measured the day after the eruption, 11 May, by the atmospheric sensor GOME-2 (Global Ozone Monitoring Experiment) on the EUMETSAT satellite, MetOp-A. The SO2 plume had been transported eastwards and could be traced over Greece, with sulphur dioxide amounts of more than 20 DU (The amount of sulphur dioxide is measured in Dobson Units (DU), the number of molecules in a square centimetre of the atmosphere). Trajectory analysis revealed that the sulphur dioxide was injected into the atmosphere by Etna up to a height of 12 km.. The path of the volcanic cloud could be tracked for two more days as it moved further eastwards. On the third day after the eruption the sulphur dioxide cloud moved over Iran and the next day it could still be detected over Turkmenistan.



SO2 plume on 14 May 2008

On the evening of 13 May, a second eruption occurred at Etna that continued throughout the next day, emitting again large amounts of sulphur dioxide that were detected by GOME-2 the next morning NE of the volcano, over Italy.

Sulphur dioxide is emitted into the atmosphere not only by volcanic eruptions, but also by anthropogenic activity such as the combustion of fossil fuels. In some regions it contributes significantly to air quality issues. Sulphur dioxide acts as an acid. Inhalation results in laboured breathing, coughing, sore throat and may cause permanent pulmonary damage. It further plays an important role in climate change, if it finds itself in high atmospheric regions by volcanic eruptions, where it can lead to temporary cooling.

Analysis of GOME-2 data at DLR

The Global Ozone Monitoring Experiment-2 (GOME-2) is one of the new-generation European instruments carried on board of MetOp, which has been jointly established by ESA and EUMETSAT. GOME-2 will continue the long-term monitoring of atmospheric ozone and trace gases, such as sulphur dioxide (SO2), started in 1995 by GOME on ERS-2 and since 2002 by SCIAMACHY on Envisat.

The operational processing and routine analysis of GOME-2 data are performed in DLR Oberpfaffenhofen at the Remote Sensing Technology Institute (IMF) and German Remote Sensing Data Centre (DFD). GOME-2 SO2 images are available in near-real time at the World Data Centre for Remote Sensing of the Atmosphere hosted by DLR.

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