

Volcanic Ash Cloud Altitude retrievals from passive satellite sensors: the 03-09 December 2015 Etna eruption.

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The volcanic ash cloud altitude is one of the most important parameter needed for the volcanic ash cloud estimations (mass, effective radius and optical depth). It is essential by modelers to initialize the ash cloud transportation models, and by volcanologists to give insights into eruption dynamics. Moreover, it is extremely important in order to reduce the disruption to flights as a result of volcanic activity whilst still ensuring safe travel. In this work, the volcanic ash cloud altitude is computed from remote sensing passive satellite data (SEVIRI, MODIS, IASI and MISR) by using the most of the existing retrieval techniques. A novel approach, based on the CO₂ slicing procedure, is also shown. The comparisons among different techniques are presented and advantages and drawbacks emphasized. As test cases Etna eruptions in the period between 03 and 09 December 2015 are considered. During this time four lava fountain events occurred at the Voragine crater, forming eruption columns higher than 12 km asl and producing copious tephra fallout on volcano flanks. These events, among the biggest of the last 20 years, produced emissions that reached the stratosphere and produced a circum-global transport throughout the northern hemisphere.