Geophysical Research Abstracts
Vol. 17, EGU2015-6777, 2015
EGU General Assembly 2015

Sensitivity analysis and uncertainty estimation in ash concentration simulations and tephra deposit daily forecasted at Mt. Etna, in Italy

Michele Prestifilippo (1), Simona Scollo (1), and Stefano Tarantola (2)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Etneo, Sezione di Catania, Italy, (2) Joint Research Centre of the European Commission, Ispra, Italy

The uncertainty in volcanic ash forecasts may depend on our knowledge of the model input parameters and our capability to represent the dynamic of an incoming eruption. Forecasts help governments to reduce risks associated with volcanic eruptions and for this reason different kinds of analysis that help to understand the effect that each input parameter has on model outputs are necessary. We present an iterative approach based on the sequential combination of sensitivity analysis, parameter estimation procedure and Monte Carlo-based uncertainty analysis, applied to the lagrangian volcanic ash dispersal model PUFF. We modify the main input parameters as the total mass, the total grain-size distribution, the plume thickness, the shape of the eruption column, the sedimentation models and the diffusion coefficient, perform thousands of simulations and analyze the results. The study is carried out on two different Etna scenarios: the sub-plinian eruption of 22 July 1998 that formed an eruption column rising 12 km above sea level and lasted some minutes and the lava fountain eruption having features similar to the 2011-2013 events that produced eruption column high up to several kilometers above sea level and lasted some hours. Sensitivity analyses and uncertainty estimation results help us to address the measurements that volcanologists should perform during volcanic crisis to reduce the model uncertainty.