Geophysical Research Abstracts
Vol. 16, EGU2014-6383, 2014
EGU General Assembly 2014

Combining observations and model simulations to reduce the hazard of Etna volcanic ash plumes

Simona Scollo (1), Antonella Boselli (2,3), Mauro Coltelli (1), Giuseppe Leto (4), Gianluca Pisani (3,5), Michele Prestifilippo (1), Nicola Spinelli (3,5), Xuan Wang (3,6), and Ricardo Zanmar Sanchez (4)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Etneo, Sezione di Catania, Catania, Italy (simona.scollo@ct.ingv.it), (2) CNR-IMAA, Potenza, Italy, (3) China-Italy Laser Remote Sensing Joint Research Center - CNISM, Napoli, Italy, (4) INAF-Osservatorio Astrofisico di Catania, Catania, Italy, (5) Dipartimento di Fisica, Università di Napoli "Federico II", Napoli, Italy, (6) CNR-SPIN, Napoli, Italy

Etna is one of the most active volcanoes in the world with a recent activity characterized by powerful lava fountains that produce several kilometres high eruption columns and disperse volcanic ash in the atmosphere. It is well known that, to improve the volcanic ash dispersal forecast of an ongoing explosive eruption, input parameters used by volcanic ash dispersal models should be measured during the eruption. In this work, in order to better quantify the volcanic ash dispersal, we use data from the video-surveillance system of Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Etneo, and from the lidar system together with a volcanic ash dispersal model. In detail, the visible camera installed in Catania, 27 km from the vent is able to evaluate the evolution of column height with time. The Lidar, installed at the "M.G. Fracastoro" astrophysical observatory (14.97° E, 37.69° N) of the Istituto Nazionale di Astrofisica in Catania, located at a distance of 7 km from the Etna summit craters, uses a frequency doubled Nd:YAG laser source operating at a 532-nm wavelength, with a repetition rate of 1 kHz. Backscattering and depolarization values measured by the Lidar system can give, with a certain degree of uncertainty, an estimation of volcanic ash concentration in atmosphere. The 12 August 2011 activity is considered a perfect test case because volcanic plume was retrieved by both camera and Lidar. We evaluated the mass eruption rate from the column height and used best fit procedures comparing simulated volcanic ash concentrations with those extracted by the Lidar data. During this event, powerful lava fountains were well visible at about 08:30 GMT and a sustained eruption column was produced since about 08:55 GMT. Ash emission completely ceased around 11:30 GMT. The proposed approach is an attempt to produce more robust ash dispersal forecasts reducing the hazard to air traffic during Etna volcanic crisis.