Geophysical Research Abstracts
Vol. 15, EGU2013-8145, 2013
EGU General Assembly 2013

What a tephra deposit cannot tell us

Antonio Spanu (1,2), Sara Barsotti (2), and Mattia de' Michieli Vitturi (2)
(1) Scuola Normale Superiore di Pisa, Pisa, Italy, (2) Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Pisa, Pisa, Italy

In order to deepen our knowledge on the mechanisms triggering a volcanic explosion, the column evolution, the ash cloud dynamics and, finally, to mitigate its impact on the surroundings, one key objective of the entire volcanological community is to quantify and to measure the magnitude and the intensity of an eruption. Tephra deposits are often the only available information on past volcanic eruptions that can be used to characterize their eruptive styles and quantify their intensities and historically the integration of discrete sampling of thickness values (or mass loading values) has been used to quantify the erupted volume (or mass) and, in this way, to define the size of the eruption. One key aspect to consider when performing these evaluations is that the information we can obtain by the tephra deposit is just a part of the whole one emitted by the source and thus the deposit represents only a partial description of what really happened and was erupted during an eruption. This consideration should be kept in mind all the times an eruptive magnitude is established on the base of deposited material. Furthermore, volcanological conditions (TGSD and erupted mass) reconstructed on the base of such field studies are generally used to initialize tephra dispersal codes. Here we wanted to demonstrate, by using a numerical approach, how the information provided by ground deposit is representative of only a part of the total emitted mass and we quantified this portion with the use of a dispersal model. In particular we produced, for two hypothetical explosive events at Mt. Etna for which the intensities, the durations and, consequently, the erupted masses have been fixed a–priori, synthetic "real" deposits using the dispersal code VOL-CALPUFF, which simulates the volcanic ash transport and deposition in a transient and 3D atmosphere. At the end of the simulations we compared the cumulative deposit on the ground and the percentages related to each specific simulated grain-sizes with the initial released values. From this comparison we estimated how much of the original information is still present on the ground and we quantified the lost one.