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Automatized near-real-time short-term Probabilistic Volcanic Hazard Assessment of tephra dispersion before and during eruptions: BET_VHst for Mt. Etna

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Tephra dispersal, even in small amounts, may heavily affect public health and critical infrastructures, such as airports, train and road networks, and electric power supply systems. Probabilistic Volcanic Hazard Assessment (PVHA) represents the most complete scientific contribution for planning rational strategies aimed at managing and mitigating the risk posed by activity during volcanic crises and during eruptions. Short-term PVHA (over time intervals in the order of hours to few days) must account for rapidly changing information coming from the monitoring system, as well as, updated wind forecast, and they must be accomplished in near-real-time. In addition, while during unrest the primary goal is to forecast potential eruptions, during eruptions it is also fundamental to correctly account for the real-time status of the eruption and of tephra dispersal, as well as its potential evolution in the short-term.

Here, we present a preliminary application of BET_VHst model (Selva et al. 2014) for Mt. Etna. The model has its roots into present state deterministic procedure, and it deals with the large uncertainty that such procedures typically ignore, like uncertainty on the potential position of the vent and eruptive size, on the possible evolution of volcanological input during ongoing eruptions, as well as, on wind field. Uncertainty is treated by making use of Bayesian inference, alternative modeling procedures for tephra dispersal, and statistical mixing of long- and short-term analyses.

References

Selva J., Costa A., Sandri L., Macedonio G., Marzocchi W. (2014) Probabilistic short-term volcanic hazard in phases of unrest: a case study for tephra fallout, J. Geophys. Res., 119, doi: 10.1002/2014JB011252