

Probabilistic Volcano Hazard Analysis

PROBABILISTIC VOLCANO HAZARD ANALYSIS

Sponsoring Commissions: Volcanic Hazards and Risk; Statistics in Volcanology

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Topics: Scenario development; Hazard+risk models; Simulation and optimization; Uncertainty estimation; Expert elicitation; Dependencies and extreme events; Mapping

Abstract While Probabilistic Seismic Hazard Analysis (PSHA) has been around for quite a while, the volcanic equivalent is still in its infancy. One difficulty is that while PSHA can concentrate on a scalar variable (peak ground acceleration) resulting from an earthquake, volcanic hazard is inherently multidimensional, with pyroclastic flow, tephra, lava, lahars, etc. each characterised by their own separate metrics. Furthermore, some volcanically-induced hazards are not necessarily temporally associated with eruption onsets, like lahars, seismic swarms, etc. Analysis of volcanic hazards must take into account both the type(s) of impact, and the likelihood of an impact of a given scale within a given time window (exposure time). Where is the lahar likely to go, and at what height and speed; what area will the lava flow inundate; what is the runout distance of a pyroclastic flow; what is (for airspace management especially), the duration of the eruption? These questions are the basis of decision-making around high-risk volcanic centres, and can only be answered via probabilistic hazard analysis. Often such analysis is undertaken for individual hazards, but the overall goal of integration of a suite of possible hazards is still highly problematic. A further issue is that current methodologies allow some hazards (e.g. tephra fall) to be better characterised, probabilistically, than others (e.g. lahars/debris flows). In order to advance probabilistic volcanic hazard analysis, it is clear that attention has to be focused on the weakest aspects of the current procedures. We seek papers that quantify, in a probabilistic fashion, the mid-to long-term hazards from a volcano (exposure times in the order of years to tens of years). The focus should be on providing information for the authorities for both hazard management and land-use planning purposes. Topics of interest include the probabilistic assessment of hazard exposure and probabilistic hazard maps, the design of scenarios for civil defence exercises, simulations, uncertainty estimation, expert elicitation, and quantification of dependencies between hazards. Papers that incorporate the impact on decision making, vulnerability and risk analyses, and other aspects of risk management are particularly welcome.

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