

Exchange of probabilistic volcanic hazard information between scientists and civil authorities: insights into the influence of communication format

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Until recently, most volcanic hazard assessments were constructed using largely qualitative schemes, built on expressions such as “low,” “medium,” and “high” that characterized broad classes of hazard magnitude. New probabilistic approaches to analyzing volcanic hazard have introduced ways to build more robust, high-resolution quantitative assessments and maps. Probabilistic hazard calculations based on traceable and customizable numerical variables and measures of uncertainty offer many advantages in modern high-stakes social and economic risk environments. However, it is unclear how this complex probabilistic volcanic hazard data translates and integrates into civil authorities’ decision-making practices.

A quantitative volcanic hazard analysis requires a multi-level assimilation of many different types of hazard information and a rational design of data output, processes typically performed by users in the geosciences. Yet recent eruptions have highlighted that the critical decisions that directly benefit from the outputs of probabilistic hazard analyses, such as those concerning evacuation timing, land use planning, and risk reduction measures, are most often made by end-users in civil defence and emergency management organizations. This study investigates the critical communication pathway involving the exchange of probabilistic hazard data between scientists and these civil authorities.

Probabilistic volcanic hazard information created with data generated by the long-term hazard analysis tool BET_VH (*Bayesian Event Tree for Volcanic Hazards*) is presented in various communication formats to civil authority stakeholders. Mixed social science methods are used to measure the civil authorities’ interpretation of the information and the uncertainties associated with it. The study provides insight into ways scientists can optimize communication of probabilistic volcanic hazard data in dialogue with civil authorities and other stakeholders for effective integration into decision-making and risk reduction practices.