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Principles of Volcano Risk Metrics: theory and the case study of Mt. Vesuvius and Campi Flegrei.

W. Marzocchi (1) and G. Woo (2)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Roma, (2) Risk Management Solutions, London

Despite volcanic risk having been defined quantitatively more than thirty years ago, it has been always managed without being effectively measured. Yet, the recent substantial progress in quantifying eruption probability paves the way for a new era of rational science-based volcano risk management, that we name Volcanic Risk Metrics (VRM). In this talk, we propose some principles of VRM, based on two main components: a probabilistic volcanic hazard assessment and eruption forecasting, and a cost/benefit analysis. In a nutshell, the method assists managers in decision-making under uncertainty, weighing appropriately the cost and benefit of actions to mitigate the effects of a threat having a specific probability of occurrence. The strategy has the potential to rationalize decision-making across a broad spectrum of volcanological questions: what areas should be covered by emergency plan? What early preparations should be made for a volcano crisis? When should the call for evacuation be made? The strategy has the paramount advantage of providing a set of quantitative and transparent 'rules' that can be established before a crisis, optimizing and clarifying decision-making procedures. It places volcanologists at the centre of decision-making, applying all their scientific knowledge and observational information to assist authorities in quantifying the positive and negative risk implications of any decision.