Quantitative modelling of disaster risk at La Soufriere, Guadeloupe

Susanna Jenkins[1], Peter Baxter[2], Robin Spence[3], Jean-Christophe Komorowski[4], Sara Barsotti[5], Tomaso Esposti-Ongaro[5], Augusto Neri[5]

[1]University of Bristol, UK, [2]University of Cambridge, UK, [3]Cambridge Architectural Research, UK, [4]Institut de Physique du Globe de Paris, France, [5]Istituto Nazionale di Geofisica e Vulcanologia, Italy

E-mail: susanna.jenkins@bristol.ac.uk

As part of the CASAVA project, potential consequences of an eruption at La Soufriere volcano, Guadeloupe, have been quantified for the local population and infrastructure through development of an impact model. For a given eruption scenario, and on a 250m grid, the model incorporates hazard information about areas potentially affected by ash fall (vertical loading) and/or pyroclastic density currents (peak dynamic pressure, temperature and duration) sourced from numerical modelling able to describe the transient and 3D features of the phenomena. This is combined with vulnerability information derived from engineering and medical analyses of the exposure and response of humans and buildings to these hazards. Model outputs include maps of the numbers and severity of human casualties and building damage for each given scenario. The impact model is further coupled with a dynamic casualty management model that then tracks the rescue, transport and treatment of casualties to estimate the impact of the eruption on the emergency services and on casualty numbers with time following the eruption. This allows dynamic mapping of human survival in space and time following the eruption scenario and can be combined in GIS with emergency management data to support public officials responsible for planning for a crisis. To identify suitable actions that could be taken to reduce the loss of lives and infrastructure, the consequences from different disaster risk scenarios are tested by varying the crisis conditions for each model run. For example, by incorporating short- and long-term mitigation activities (e.g. partial evacuation, construction of additional road capacity), differing emergency management (e.g. the location of triage centres) or simulating alternative disaster conditions (e.g. reduced rescuing capacity because of ashy conditions). The models are deliberately generic in nature and could be applied to any volcano, providing input hazard scenarios and appropriate exposure and vulnerability data are available.