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Combining the effects of volcanic hazards on buildings: A modelling approach to synthesising the impact under different eruption scenarios.

G. Zuccaro (1), S. Petrazzuoli (1), R. Spence (2, 3), I. Kelman (3), E. Calogero (3).

(1) Università degli Studi di Napoli, Laboratorio di Urbanistica e Pianificazione Territoriale, Napoli, Italia (2) Cambridge University Centre for Risk in the Built Environment, University of Cambridge, U.K., (3) Cambridge Architectural Research, Ltd., U.K..

(zuccaro@unina.it / Fax-Phone: +39 081 5519437)

This research represents the first attempt to assess the impact of a range of different volcanic hazards on the built environment. The ones considered here for this multi-hazard approach are limited to the following: earthquakes, pyroclastic flows and ash fall. Approaches to this work must take a hybrid form of stochastic and deterministic analyses, taking into account written histories of volcanic eruptions and expertise from field geologists to build up a semi-deterministic model of the possible combinations of the above hazards that are situated both in time and space. Once a range of possible scenarios has been determined, a stochastic method can be applied to find a sub-set of permutations and combinations of possible combinations of effects. At this point, numerous analyses need to be carried out in order to determine the potential impact on the building stock. These analyses have been carried out in the following ways: numerical modelling, test loading and *probability distributions*. Once such a matrix of impacts due to each individual hazard has been created, a dampening or multiplying factor can be applied in the case of prior exposure to hazard. The results show that some hazard combinations increase and others mitigate building vulnerability to subsequent eruptive phenomena.