Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04024, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04024
EGU General Assembly 2008

Lava flows hazard zonation of large areas using Cellular Automata

M.V. Avolio (1), B. Behncke (2), G.M. Crisci (1), D. D'Ambrosio (3), S. Di Gregorio (3), V. Lupiano (1), M. Neri (2), R. Rongo (1), W. Spataro (3)

(1) University of Calabria - Dept. of Earth Sciences, (2) I.N.G.V. Catania, (3) University of Calabria - Dept. of Mathematics (rongo@unical.it)

Evaluating the hazards posed by geological phenomena constitutes, within the broader framework of ''prediction'', one of the most significant challenges of modern scientific research. Nevertheless, modeling and simulation techniques represent a valuable tool for researchers involved in risk assessment and mitigation of the phenomena. The objective of this work is the application of a new technique for the definition of lava flows hazard maps to the SE flank of Mt Etna (Italy), one of the most dangerous areas in Europe in terms of volcanic hazard. The technique relies on a "virtual laboratory", namely the lava flows simulation model SCIARA based on the Cellular Automata computational paradigm which, when adequately calibrated and validated, permits to forecast the paths of new hypothetical events on present morphological data. The methodology here proposed consists in the generation of an elevated number of simulations, each with different eruptive characteristics, which "cover" the area of interest. In particular, the SE flank of Mt Etna was subdivided in different areas, each one characterized by a different probability of activation of eruptive vents, and their union "covered" by a regular grid of vents. From each vent, different simulations were executed, each one with a particular effusion rate and duration. A "weight" was assigned to each point in the DEM of the considered area interested by the lava flow, which was set greater for those simulations having the source point located in areas characterized by a high probability of vents activation, and a highly probable emission rate. The final hazard map, characterized by an elevated degree of detail, was therefore compiled by considering each cell of the Etnean flank DEM and, for each of them, by

adding the weights of all the simulations that interested it.