



Computer Simulations for Hazard Evaluation of Lava Flows at Mt Etna

A. Vicari (1), A. Ciraudò, (1,2), C. Del Negro (1), A. Herault (3)

(1) Istituto Nazionale di Geofisica e Vulcanologia - Sezione di Catania, Italy, (2) Dipartimento di Matematica e Informatica - Università di Catania, Italy, (3) Laboratoire de Science de l'Information, Université de Marne La Vallée, Paris XIII, France (vicari@ct.ingv.it)

Lava flows are the most common of the direct volcanic hazards at Mt Etna. Although there are other potential hazards on Etna, the principal threat to the population that lives on the volcano is inundation by lava flows which are the main products of eruptions that occur every few years. Numerical simulations are a good tool to explore various eruption scenarios and these can be used to estimate the extent of the inundation area, the time required for the flow to reach a particular point and resulting morphological changes. We evaluated the lava flow hazard on Mt Etna by means of the MAGFLOW cellular automata model. This model was developed for simulating lava flow paths and the temporal evolution of lava emplacement. The effects of rheology and cooling are included in the model. The MAGFLOW cellular automata model represents the central part of an extensive methodology for the compilation of hazard maps related to lava invasion at Mt Etna. Hazard map was realized by simulating a number of lava flows from a set of initial data (a record of past eruptions) and with different parameters of the volcanic system in a meaningful range of variation. We assumed a preliminary zonation for identifying possible emission regions with the highest probability of opening. After that, a set of reference values for the parameters of the simulation model based on the knowledge of past eruptions was estimated. MAGFLOW was used to determine for each emission region the area that can be invaded by lava flows originated from sample points located in that region. Last step was to assign the probability of lava invasions to interested region, calculated on the basis of the simulated lava flows. By applying the model to the simulation of an adequate

number of possible events, a preliminary hazard map was obtained for the Mt Etna.