



Quantitative hazard assessment at Vulcano (Aeolian islands): integration of geology, event statistics and physical modelling

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The analysis of stratigraphy and of pyroclastic deposits particle features allowed the reconstruction of the volcanic history of La Fossa di Vulcano. An eruptive scenario driven by superficial phreatomagmatic explosions emerged. A statistical analysis of the pyroclastic Successions led to define a repetitive sequence of dilute pyroclastic density currents as the most probable events at short term, followed by fallout of dense ballistic blocks. The scale of such events is related to the amount of magma involved in each explosion. Events involving a million of cubic meters of magma are probable in view of what happened in the most recent eruptions. They led to the formation of hundreds of meters thick dilute pyroclastic density currents, moving down the volcano slope at velocities exceeding 50 m/sec. The dispersion of density currents affected the whole Vulcano Porto area, the Vulcanello area and also overrode the Fossa Caldera's rim, spreading over the Piano area. Similarly, older pyroclastic deposits erupted at different times (Piano Grotte dei Rossi formation, ~20-7.7 ka) from vents within La Fossa Caldera and before La Fossa Cone formation. They also were phreatomagmatic in origin and fed dilute pyroclastic density currents (PDC). They represent the eruptions with the highest magnitude on the Island. Therefore, for the aim of hazard assessment, these deposits from La Fossa Cone and La Fossa Caldera were used to depict eruptive scenarios at short term and at long term. On the base of physical models that make use of pyroclastic deposits particle features, the impact parameters for each scenario have been calculated. They are dynamic pressure and particle volumetric concentration of density currents, and impact energy of ballistic blocks. On this base, a quantitative hazard map is presented, which could be of direct use for territory planning and for the calculation of the expected damage.