



Simulation of a lava flow emitted during the 2001 Etna eruption by means of LavaSIM code

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Lava flow computer simulation is an useful method to asses the hazard connected to an effusive eruption. This work describes LavaSIM simulation code which solves, in 3D, the Navier-Stokes and the energy conservation equations and takes into account: the natural convection mechanisms for mass transportation; the heat transfer between the lava and: ground, air, water and crust and the formation of a solid and stationary crust (Hidaka et al, 2005). LavaSIM was applied to the Etna lava flow erupted in July-August 2001, from a vent located at 2100 m a.s.l.

Input data of LavaSIM are the pre-eruption topography, lava chemical composition, mass rate trend and some physical parameters. Output data are lava thickness and the 3D distribution of temperature, velocity and lava state (liquid or solid).

Different values of lava viscosity, solidification fraction of liquidity loss, eruptive enthalpy and lava emissivity were utilized in the first simulations in order to check their influence on the lava distribution and cooling. In particular viscosity values were set, as constant, according to models for Etna’s lavas, by considering the 2001 composition or viscosity-temperature dependence was defined by using the Goto’s law, implemented in LavaSIM.