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Dynamics of lava flow emplacement

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A computational 2-D model based on the conservation of mass, momentum and energy was applied for studying lava flow dynamics in terms of depth averaged variables (thickness, velocity and enthalpy). This approximation is valid when the undisturbed fluid height is smaller than the characteristic wave length in the flow direction (the so-called “shallow-layer” limit). This represents a good compromise between the full 3-D description and the need to decrease the computational time. In particular, we investigated the effect on lava emplacemente of both the thermal exchange with the atmosphere and the heat generated by viscous dissipation. Two different computations algorithms were used. The former is based on the Roe scheme, whereas the latter is based on the central differencing scheme for hyperbolic conservation equations with relaxation term. The model was applied to simulate few episodes of the 1991-1993 and the 2001 lava flows at Etna.