Geophysical Research Abstracts
Vol. 19, EGU2017-5538-4, 2017
EGU General Assembly 2017

Lava flow modelling in long and short-term hazard assessment

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Lava flows constitute the commonest volcano hazard resulting from a non-explosive eruption, especially in basaltic systems. These flows come in many shapes and sizes and have a wide range of surface morphology (pahoehoe, aa, blocky, etc.) whose differences are mainly controlled by variations in magma viscosity and supply rates at the time of the eruption. The principal constraint on lava emplacement is topography and so flows will tend to invade the lowest-lying areas. Modelling such complex non-Newtonian flows is not an easy task, as many of the parameters required to precisely define flow behaviour are not known. This is one of the reasons, in addition to the required high computing cost, for which deterministic models are not preferred when conducting long and short term hazard assessment. On the contrary, probabilistic models, despite being much less precise, offer a rapid approach to lava flow invasion and fulfil the main needs required in lava flow hazard analysis, with a much less computational demand and, consequently, offering a much wider applicability. In this contribution we analyse the main problems that exist in lava flow modelling, compare between deterministic and probabilistic models, and show the application of probabilistic models in long and short-term hazard assessment.

This contribution is part of the EC ECHO SI2.695524:VeTOOLS and EPOS-IP AMD-676564-42 Grants