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Lava flow modelling at El Hierro (Canary Islands): the case of Montaña Aguarijo volcano

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Lava flow simulations are valuable tools for forecasting and assessing the areas that may be potentially affected by new eruptions, but also for interpreting past volcanic events and understanding the controls on lava flow behaviour. The plugin Q-LavHA v3.0 (Mossoux et al., 2016), integrated into QGIS, allows simulating the inundation probability of an a'a lava flow from one or more eruptive vents spatially distributed in a Digital Elevation Model (DEM). Q-LavHA allows running probabilistic and deterministic methods to calculate the spatial propagation and the maximum length of lava flows, considering a number of morphometric and/or thermo-rheological parameters.

El Hierro is the smallest and westernmost island of the Canary Archipelago where basaltic lava flows infer the major volcanic hazard. However, no lava flow emplacement modelling has been carried out yet on the island. Here we present Montaña Aguarijo's lava flow simulation, a monogenetic volcano located on the NW rift of El Hierro. Detailed geological fieldwork and current topographic-bathymetric data were used to reconstruct the pre-eruption (before the eruption modifies the relief) and post-eruption (at the end of the eruption, prior to erosive processes) DEMs. The obtained morphometric parameters of the lava flow (2,268m long; 5m medium thickness; 422,560m^3) were used to run probabilistic (Maximum Length) and deterministic (FLOWGO) models. The latter also considers a set of thermo-rheological properties of the lava flow such as initial viscosity, phenocryst content, or vesicle proportion.

Results obtained show a high degree of overlap between the real and simulated lava flows. Therefore, the thermo-rheological parameters considered in the deterministic approach are close to the real ones that constrained Montaña Aguarijo lava flow propagation. Moreover, this work evidence the effectiveness of Q-LavHA plugin when simulating complex lava flows such as Montaña Aguarijo's lava which runs through a coastal platform, a typical morphology of oceanic

volcanic islands.

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References

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