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# A morphological approach to the emplacement of felsic lava flows on Terceira Island, Azores

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Lava flows exhibit a broad spectrum of shapes and sizes that can be associated to different emplacement regimes. In turn, the emplacement dynamics of lava flows are governed by key factors, such as the rheological properties of the lava, the effusion rate and the characteristics of the local environment.

A model was developed to estimate the length of lava flows from eruptive parameters such as the flow rate, the apparent viscosity of the lava and the topographic slope.

The model considers that the lava discharge rate at the vent follows an exponential decrease with time, as expected from a pressurized magma chamber. In order to relate the morphology of the lava to the flow parameters, it was assumed that the volume of lava was related to the flow width, length and thickness by a shape factor. Based on experimental studies, it was considered that, for lavas with similar initial viscosity, the width of the lava flow was a function of the initial flow rate and the underlying slope. The model also accounts for the variation of the apparent viscosity of the lava with distance and time. Viscosity data from the 1988-1990 Lonquimay eruption (Chile) was fitted by a power-law and the relationship was calibrated to a different value of the initial viscosity. The Jeffery's equation was applied to combine the influence of the physical properties of the lava and the effect of the underlying slope.

The present model provides the relationship between flow morphology and eruptive parameters. This relation may be expressed as the length range of the flows as function of the total volume extruded.

The model was applied to felsic lava flows on Terceira Island (Azores) and the results

show a good agreement between the length range predicted by the model and the measured lengths of the actual lava flows.

This approach proved to be a simple and efficient way to estimate felsic lava flows morphology from easily obtained eruptive parameters.