

## **What drives the lateral vs vertical propagation of dikes? Insights from analogue models.**

Stefano Urbani (1), Valerio Acocella (1), and Eleonora Rivalta (2)

(1) University of "Roma Tre", Department of Sciences, Rome, Italy (stefano.urbani@uniroma3.it), (2) Deutsches GeoForschungsZentrum GFZ, Potsdam, Germany

As nearly all eruptions are triggered by dikes, understanding dike propagation and emplacement is crucial to define how magma is transferred and extruded. Geological and geophysical data highlight both lateral and vertical dike propagation, at both the volcano and regional scale. Previous modeling studies pointed out that many factors may control dike propagation, including buoyancy, crustal layering and topography. Nevertheless, the relative weight of these factors in affecting the vertical and lateral propagation of the dikes is still unclear/poorly understood. In order to define a hierarchy between the various factors, we have conducted analogue modeling, injecting water within gelatin. Here we present preliminary results of 24 experiments, investigating the effect of crustal layering (both rigidity and density layering), topography, dike pressure, and the location of the injection of the dike (from the bottom or the side). While most experimental dikes tend to ascend vertically, at times with some elongation, some factors facilitate lateral propagation. Comparing the results from the performed experiments allows proposing a preliminary hierarchy between the investigated factors controlling vertical versus lateral propagation. These factors are, in order of importance, rigidity layering, topography, dike pressure, density layering and buoyancy. More experiments are being carried out to complete and test the proposed hierarchy.