

Structural and petrogenetical insights of the crustal plumbing system on Santorini Volcano, Greece

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Magma plumbing systems represent the magma transport and storage from the source in the mantle, through the crust, to the surface in a volcanic eruption. Characterising the different aspects of shallow crustal magma storage, the associated magma-crust interaction as well as the arrangement and chemistry of dykes and eruptive units are of key importance to help constrain the behaviour of individual volcanoes.

Santorini is an active volcano that hosts a crustal magma plumbing system which has been disturbed by several caldera collapse episodes. To study this system, we have undertaken a field campaign at the northern part of the island. We have mapped, in detail, sections of the northern caldera wall with a specific interest in the dyke swarm, associated lavas and eruptive units which are partially cut by a series of historic caldera collapses.

Preliminary results show that most of the studied dykes strike mostly N-S except 4 dykes which strike NW-SE. In contrast, the caldera strikes E-W in the northernmost section of Santorini. Dyke thickness ranges between 20 cm - 8m but the average thickness is 0.8 m. Most of the dykes studied are vertical to sub-vertical, only 5 dykes dip at angles less than 60 degrees. Compositionally the dykes range from basaltic to rhyolitic and their textures are glomeroporphyric to aphanitic.

By coupling the field and geochemical data with numerical and analytical models we aim to 1) understand the distribution of stresses within the edifices, 2) to define and address the variables that contribute to dyke initiation, propagation and lead to a volcanic eruption, 3) group the different populations of dykes based on their composition, thickness and orientation, 4) find the different populations of eruptive units based on their lithology and composition and 5) discover the relationship (cross-cutting) between eruptive units and dykes, which help to constrain the timing of dyke propagation and the relative ages of the dykes.