

EGU2020-12116

<https://doi.org/10.5194/egusphere-egu2020-12116>

EGU General Assembly 2020

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## Field analysis Vs boat-based photogrammetry derived data in volcanotectonics: an example from the Santorini dyke swarm

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Field studies are vital for mapping and understanding active geological processes on Earth. Such studies commonly inform analogue and numerical modelling setups and provide insights over a variety of scales. However, geological field studies have several limitations as they are sensitive both to field-based conditions (e.g. weather conditions, geomorphology, weathering, erosion and access) and the experience of the researchers conducting the work. All of these limitations can add significant error or uncertainty to geological measurements. At the same time, new geological measurement techniques (e.g. photogrammetry) are easy to access, fast and friendly to use, but also often depend on ground truthing parameters.

In this study, we compared two different methods for mapping and surveying volcanotectonic processes related to dyking events: classical field analysis and boat-based photogrammetry. We tested the two approaches on dykes located within a section of a steep cliff face that makes up part of the Santorini caldera. The caldera wall is accessible by land only in the upper most parts and so most measurements require access by boat or by abseiling down the cliff faces. The latter is very dangerous and not recommended.

The core of the work is to carefully compare field data with the equivalents collected on photogrammetry-derived 3D model, focusing on the sea level area in order to compare reliable dataset. Data comparison is focused on dyke attitudes, thicknesses, petrological descriptions, along the 4-km length profile of the northern caldera wall of Santorini volcano.

We collected a series of high-resolution images, around 800 pictures in total, aimed at 3D modelling the dyke swarm using photogrammetry methods. They have been collected using a 20 MPX hand-held camera equipped with commercial GPS from a boat, moving parallel and to a constant distance from to the caldera wall.

Comparison of both datasets allowed insights into 1) the completeness and, 2) the limitations of each technique. Here we assess the various advantages to design a novel multidimensional methodology that allows fast, accurate and low-cost data generation in difficult working conditions, such as at steep cliff faces and flooded terrains.