

EGU2020-3948

<https://doi.org/10.5194/egusphere-egu2020-3948>

EGU General Assembly 2020

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## Using “Selfie drones” for 3D mapping of volcano-tectonic features in Santorini, Greece

**Varvara Antoniou**, Paraskevi Nomikou, and Othonas Vlasopoulos

National and Kapodistrian University of Athens, Geology and Geoenvironment, Markopoulo, Greece

(vantoniou@geol.uoa.gr)

Generally, key geological outcrops are inaccessible for classical mapping due to the hard-logistic conditions of their location in remote or dangerous areas like active volcanoes or fault zones. The UAV-based photogrammetry is a helpful technique to overcome such difficulties in site investigation. It allows a very high-detailed 3D model reconstruction of relevant outcrops, providing also the possibility to cover wider areas.

In this study, we tested the use of a “Selfie drone” aimed at outcrops reconstruction for 3D mapping of volcano-tectonic features. Two different sites in Santorini volcanic complex with different characteristics have been chosen: i) the Vlychada Beach, located in the southern part of the island, characterized by vertical cliffs that offer great exposure of the pumice layers from the well-known Late Bronze Age (LBA) (Minoan) eruption and ii) a historical volcanic crater located in the northern part of Nea Kameni island, related to the 1570 A.D. eruption, with a diameter of about 85 m, which is mostly inaccessible within its internal part and cannot be studied by classical field methods.

The “Selfie drone” which was used for the photo collection, is a 0.300-kg quadcopter equipped with a 12 Megapixel camera, EXIF information (Exchangeable Image File Format) and GPS coordinates. This drone has a flight time of approximately 16 minutes. A total of about 1900 photos has been collected, considering both sites, that have been reconstructed using photogrammetry techniques.

The resulting 3D models are characterized by a sub-centimetric texture resolution, allowing detailed mapping of the Minoan pumice layers, fractures, crater geometry, and related volcanic deposits, proving the usefulness of “Selfie drones” for geological – tectonic mapping.