

# Digital Surface Model of the Tajogaite cone (Cumbre Vieja volcano, La Palma, Spain) - July 2024

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Project Name: Tajogaite cone (La Palma, Spain) SfM DSM – July 2024

Summary: Digital surface model (DSM) of the Tajogaite new volcano edifice (2021 eruption of the Cumbre Vieja volcano, La Palma, Spain) as of July 2024, produced from UAS-derived aerial photographs using the Structure-from-Motion (SfM) method. The 2021 eruption of Cumbre Vieja volcano is the largest eruptive event in recorded history for La Palma Island (Canary Island, Spain). Over almost 3 months (September 19 - December 13, 2021), the volcano produced profound morphological changes in the landscape affecting both the natural and the anthropic environment over an area of tens of km<sup>2</sup>.

## Personnel

- PIs: Riccardo Civico, Víctor Ortega-Ramos, Tullio Ricci

Dates of Collection: July 18, 2024

## Site Information

- Site description: Tajogaite cone, Cumbre Vieja volcano, La Palma, Spain.
- Site objective: the objective was to document at high resolution the morphological evolution of the Tajogaite cone following the 2021 eruption.
- Site location: 28.613636, -17.866550
- Site conditions: mostly sunny. Wind varied between light to strong breeze.

### UAS Equipment and Data Collection Methods

- Equipment used: DJI Matrice 300 RTK with DJI Zenmuse P1.
- GPS solutions: data on camera position were collected using GNSS-RTK information embedded in the image metadata, with differential corrections sent in real-time by a local RTK network.
- Errors: camera location total error estimate is approximately 36 cm.

Processing: We processed the photographs collected by the UAS into point cloud and DSM using Agisoft Metashape®. We set the processing parameters in Agisoft Metashape® to high for photo alignment accuracy and high quality and aggressive depth filtering for dense point cloud generation. We aligned the point cloud to the January 2022 survey (<https://doi.org/10.5069/G96971S8> - designated as the reference dataset and georeferenced with ground control points) using evenly distributed virtual ground control points derived from natural features in unchanged areas of the cone's surroundings.

Products: We generated a 0.2 m/pixel DSM. The dataset was processed and exported in the REGCAN95/UTM zone 28N [EPSG:4083] Coordinate System. The transformation from ellipsoidal to orthometric heights has been performed using the Geoid model EGM08-REDNAP Canarias (<https://datos-geodesia.ign.es/geoide/>).

For more details, please refer to: “Morphological evolution of the 2021 Tajogaite cone (Cumbre Vieja, La Palma, Spain) between January 2022 and July 2024: a quantitative UAS study” by R. Civico et al., submitted to Bulletin of Volcanology.