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Preeruptive deformation at Anak Krakatoa

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Preeruptive processes at volcanoes can be observed by various different methods, e.g. tiltmeters, strain meters, or by photogrammetric methods (i.e. imagebased methods to determine shape and position of an object). Here we apply photogrammetric methods to video sequences of eruptions at Anak Krakatoa (Indonesia) from October 2018 to investigate preeruptive deformation processes
in the crater area. Seven eruptions of Anak Krakatoa were filmed in October 2018 using a Mavic Pro drone. The video sequences examined here show the active crater area prior to the December 22 sector collapse. However, only two of the recorded eruptions are usable for a photogrammetric analysis due to unfavorable perspectives or strong preeruptive degassing. In these two sequences the growth of a lava dome can be observed prior to both studied eruptions.

A free research software called EMT (environmental motion tracking) is used for data evaluation. It provides a work flow for the analysis of image sequences including motion tracking, camera motion correction as well as scaling and georeferencing of measured trajectories. I.e., EMT yields displacement values for so-called object points defined within the dynamic area of interest. In case a digital elevation model (DEM) of the studied object is available, it is possible to georeference the tracked object points (i.e. assign them to a position in space) and scale the measured displacement values to metric units.

For one of the eruptions investigated here, a maximum displacement of 4.03m is found, consisting of vertical movement in the major part. Maximum velocity yields to 0.71m/s, while maximum acceleration derives to 5.93m/s^2, respectively. The presentation will focus on the details of the work flow as well as the strong textproblems encountered during the processing.

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