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Monitoring of Santorini (Greece) volcano during post-unrest period (2014-2016) with Interferometric Time series of Sentinel-1A

Ground deformation monitoring is one of the main geoindicators that should be considered to assess volcanic hazard. Satellite earth observation data and Synthetic Aperture Radar (SAR) interferometry have been used continuously since 1992 to measure or study the temporal evolution of surface deformation in volcanic areas in conjunction with ground-based geodetic measurements.

Such methods were applied to monitor the current state of Santorini Volcanic Complex (Greece). During the period 1992-2010 the volcano was characterized by the gradual deflation of the volcanic island Nea Kameni. However, at the beginning of 2011 the volcano displayed signs of unrest with increased microseismic activity and significant ground uplift. A gradual decrease of inflation rates within the first quarter of 2012 was confirmed from subsequent observations and thus indicating that the volcano entered a post-unrest period.

The ongoing post-unrest period, was examined using 89 Sentinel-1A satellite scenes covering the period October 2014 to June 2016. Exploiting the capabilities of DInSAR techniques like the Interferometric Stacking (IS) and the Singular Value Decomposition(SVD) algorithm, several deformation maps and time series graphs were produced to illustrate the status of the volcano. Interferometric results show that the volcano displays a relative uniform surface deformation with low uplifting rates, horizontal velocities and interesting alterations in the deformation pattern through time, with the decrease of microseismicity in the area.

Keywords: Physical Geography and Ecosystem analysis, Volcanic Hazard, SAR Interferometry, Earth Observation, Santorini Volcanic Complex, Sentinel-1A

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