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The Santorini inflation episode: from start to finish

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Recent studies have indicated that, for the first time since 1950, intense geophysical activity is occurring at the Santorini volcano. Extensive monitoring of the volcano with remote sensing techniques and extended geodetic measurements have quantified a period of unrest of the volcano which began in January 2011 and is shown to have diminished around the end of February 2012. The surface deformation associated with this activity is measured with the use of two well-established Interferometric Synthetic Aperture Radar techniques, namely Persistent Scatterer Interferometry and Small BAseline Subset, producing dense line-of-sight (LOS) ground deformation maps depicting uplift with a radially decaying pattern in amplitude and velocity from the center of deformation. Maximum inflation of $\sim$150 mm/yr, an unprecedent magnitude for Santorini since quantitative monitoring of the area began, is observed at Nea Kameni (a resurgent dome within the caldera), and in Imerovigli and Fira in Thera island (northeast of Nea Kameni). The displacement field was compared with GPS observations from ten continuous sites installed on Santorini, highlighting the same radial pattern outward from the center of the caldera. We model the deformation inferred from GPS and InSAR using a Mogi source located north of the Nea Kameni island, at a depth between 3.3 km and 6.3 km and with a volume change rate in the range of 12 million m3 to 24 million m3 per year.
The latest seismic and GPS data, spanning up to December 2012, suggest that the rapid inflation episode ceased since the end of February 2012. The observed displacement has declined significantly, reaching more than 80mm/yr of velocity change in certain sites. These observations are possibly signaling a new phase of relative stability and reducing the probability of an imminent volcanic eruption, following empirical knowledge from calderas that experienced similar inflation episodes in the past.

Reference:
Papoutsis, I., X. Papanikolaou, M. Floyd, K. H. Ji, C. Kontoes, D. Paradissis, and V. Zacharis (2012), Mapping inflation at Santorini volcano, Greece, using GPS and InSAR, Geophys. Res. Lett., doi:10.1029/2012GL054137, in press.