

## Recent uplift of Iwo-yama volcano, Kirishima Volcanic Complex, southwest Japan, derived from ALOS-2 images

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Phreatic eruptions are usually smaller than magmatic eruptions, but they are sometimes a source of major hazards if infrastructures are close by. Here we report on rapid ground uplift in Iwo-yama volcano, one of vents in Kirishima Volcanic Complex, southwest Japan, potentially leading to a phreatic eruption.

Kirishima Volcanic Complex is a collection of volcanic vents striking northwest-southeast. Shinmoe-dake, one of the vents in the volcanic complex, had sub-Plinian and Vulcanian eruptions in early 2011. Iwo-yama is located about 6 km to the northwest of Shinmoe-dake. In Iwo-yama, elevated surface temperature has been observed since December 2015 and volcanic earthquakes and tremors have been observed in January and February 2016. With this background, we investigated the temporal evolution of the deformation in Iwo-yama volcano inferred from Synthetic Aperture Radar images taken from the ALOS-2 satellite.

We first generated interferograms all possible pairs of SAR images. Then we applied a time-series analysis to extract the temporal evolution of deformation of volcanic origin by removing errors due to the uncertainty of Digital Elevation Model and atmospheric disturbance. The time-series analysis reveals an uplift of a region with a diameter of about 500 meters. We found that the uplift started in late 2015 and amounts up to approximately 60 mm as of June 2016. The deformation pattern looks like almost a mirror of the subsidence observed in 1990s by JERS-1 images. These observations by JERS-1 and ALOS-2 suggest a depressurization in 1990s and a recent pressurization of the same aquifer located a few hundred meters beneath the surface. Electromagnetic observations also endorse the existence of the shallow acquire at the same depth level as we suggest. We need to note that the recent uplift continues even after a cessation of the volcanic earthquakes and tremors in late February 2016. This indicates that the observation of ground deformation adds insights into the current activity of a hydrothermal system that could lead to a phreatic eruption.

Keywords: Synthetic Aperture Radar, Volcano deformation, Phreatic eruption