

Reactivation of volcanic activity on May 2019 at Azumayama –Importance of precise ground deformation monitoring near the crater

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The volcanic disasters of Ontake eruption in 2014 casted volcanologists an assignment on understanding and predicting phreatic eruption. Since phreatic eruption can be very local phenomena due to the expansion of water into steam at very shallow depth (several hundred meters to 1 km beneath ground), it is very important to have precise ground deformation measurements close to the vent area in order to detect possible eruption precursors. Japan Meteorological Agency (JMA) operates a borehole tiltmeter (100 m in depth) and three GNSS stations within 1 km from Oana crater, where the last phreatic eruption was taken place in 1977 at Azumayama. The 2018-2019 volcanic unrest activity was geophysically well monitored. Okada *et al.* (2019) reported some geophysical similarities between the 2018-2019 and the 2014-2015 activities based on the dataset till April 2019. The volcano reactivated afterwards and “Near-crater Warning” was released on 9 May. This study examines the available dataset by expanding the period of analysis up to the present and discusses about the sequence and the cause of the reactivation episode.

The start of the reactivation can be recognized around 1 May by the occurrence of minor seismicity and the corresponding tilt change recorded at Jododaira, 750 m ESE of Oana crater. Observed tilt changes indicate a ground inflation near Oana crater. The number of earthquakes (mainly high frequency type) increases after 5 May and the tilting rate rises drastically at around 17:30 on 9 May. The inflation signals of the tilt suddenly turns into a deflation at around 19:50 on the same day. A rapid deflation coincides with a sharp drop of high-frequency earthquakes occurs after this deformation reversal. Combining the detrended GNSS data with the tilt data, the volcanic activity on May 2019 can be explained by a single pressure source at very shallow depth, but the deeper sources are not necessarily demanded whereas they are requested by Okada *et al.* (2019) during the main period of the 2018-2019 activity. Our results indicate the reactivation on May 2019 may be a part of the 2018-2019 activity and not accompanied with the new injection of hot volcanic fluids from the depth. This supports that the ratio of SO₂/H₂S of volcanic gases does not show any changes but decreases consistently during the corresponding period. Finally, we also report that the repeated EDM measurements at Jododaira capture a possible deflation of Oana crater during June-September 2019. The existence of this deflation may indicate a relaxation process of the heated ground/aquifers and mark the ending of the 2018-2019 volcanic crisis at Azumayama even though the geothermal activity near the crater remains high. Precise ground deformation measurements such as tilt, GNSS and EDM close to the vent area give an important constrain on understanding the shallow hydrothermal systems, a potential hotbed for phreatic eruptions.

Reference:

Okada *et al.* (2019) Ground deformation associated with the 2014-2015 and the 2018-2019 volcanic activities at Azumayama. SVC38-P02, Japan Geoscience Union Meeting 2019

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