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Crustal deformation associated with the unrest of Zao Volcano

MIURA, Satoshi[1*] ; NISHIMURA, Takeshi[1] ; OHTA, Yusaku[1] ; YAMAMOTO, Mare[1] ; DEMACHI, Tomotsugu[1] ; TACHIBANA, Kenji[1] ; OHMI, Katsuya[2] ; SHINOHARA, Eiichiro[2]

[1]Graduate School of Science, Tohoku University, [2]Sendai District Meteorological Observatory

Mt. Zao (1,841 m) is an active volcano located in northeastern Japan and having histories of phreatic or phreato-magmatic eruptions in the last 2 ka. Unrest of Zao volcano started in January, 2013 with a volcanic tremor (JMA, 2013) followed by activated seismicity mainly in the lower crust and very ?long-period seisimic events (VLP) up to today. Since the number of volcanological observatories within a distance of 10 kilometers from the volcano was limited at the time of beginning of the unrest; two continuous GPS sites and two sites equipped with borehole seismometers and tiltmeters, Tohoku University has built up 4 sites with broadband seismometers, 5 sites with continuous GPS, 1 site with shallow borehole tiltmeter, and 2 sites with a Proton magnetometer.

Using the new broadband network, we detected some VLPs with dominant period of about 10 sec, and revealed the source of the VLPs is located at a depth range of 2?4 km beneath the crater lake, from where the recent eruptions occurred since ˜600 years ago. There were, however, no significant surface phenomena such as steam explosion, ash effusion, and so on associated with the VLPs, except for precursory tilt signals about 5 minutes preceding a few major events.

We deployed dual-frequency GPS receivers at 5 new stations and the data are transmitted to the university using cellphone network for continuous observation (Demachi et al., 2011). The data are processed using the precise point positioning strategy (Zumberge et al., 1997) of GIPSY-OASIS II ver. 6.1.2 with IGS08 precise ephemerides and GMF mapping functions (GMF, Boehm et al., 2006). Since the wide area of northeastern Japan still suffers the long lasting postseismic deformation following the 2011 Tohoku-oki earthquake (M9.0), we try to extract volcanic deformation related to the unrest of the volcano using spatial and temporal filtering. Even though no distinct deformation has been recognized in the continuous GPS and tiltmeters at present, we may detect cm level variation of the shape of the mountain.

Reference

Boehm et al. (2006), GRL, 33, L07304, doi:10.1029/2005GL025546.
Demachi et al. (2011), Abstract for JpGU2011.
Japan Meteorological Agency (2013), http://www.seisvol.kishou.go.jp/tokyo/STOCK/kaisetsu/CCPVE/shiryo/127/127_no06_2.pdf
Zumberge et al. (1997), JGR, 102, 5005-5017.

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