Repeat observations of the total magnetic intensity in 2014-2017, at Zao volcano

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Zao volcano lies on the border between Yamagata and Miyagi prefectures. After the 2011 off the Pacific coast of Tohoku Earthquake, deep low frequency earthquakes have increased below 20 km depth beneath Zao since 2012. Volcanic tremors and very long-period earthquakes have been observed since 2013. To monitor subsurface geothermal activity beneath Zao volcano, we have been repeating the total magnetic intensity observation once a year since 2014. This study presents the total magnetic intensity variation from 2014 to 2017, and analyzes the demagnetized region using the 4 years' variation.
The 14 benchmarks are settled in 2 x 2 km2 area around the crater lake, Okama, for the repeating observation. Each observation acquires total magnetic intensity during 2 minutes with 10 second sampling at 1.88 or 2.00 m height from the ground. So far, the observation was carried out on June 20, October 16, 2014, August 6, 2015, August 4, 2016 and June 20, 2017. To eliminate external magnetic field variations, reference geomagnetic field variations were recorded at about 5.3 km away to the east from Okama. As a result, the spatial distribution of total magnetic intensity variation represents demagnetized substratum between 2014 and 2017. The maximum amplitude of the variation in 4 years is about 6 nT.
Using the total magnetic intensity variation data, we model a demagnetized region with grid search. Here we assume demagnetized region to be ellipsoidal shape and 5 A/m demagnetization. The grid search seeks the location, axes' length, and attitude of ellipsoid. Ichiki et al. (2016) modeled a demagnetized ellipsoid using the 4 month total magnetic intensity variation data in 2014. The center located at 700 m NE from the center of Okama, and 350 m depth, the long, middle, and short axis length is 500, 475, and 190 m, and strike, plunge and yaw angle is almost EW, 0 and 0, respectively. The grid search is going on in this study, and we will present the result, resolution of model and discussion of implication for future eruption.

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