

Magnetic variation of total intensity associated with volcanic activity observed around Owakudani, Hakone Volcano

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Volcanic event of Hakone in 2015 began in late March by slight extension of baseline length observed by GNSS network, and in late April the volcanic seismicity increased including many felt earthquakes as well as fumarole of Owakudani became more active. InSAR analysis revealed that a local uplift was take place in a part of Owakudani from May to June. After these, on June 30, eruption occurred at the nearest neighbor of the locally uplifted area in Owakudani. Though the eruption was tiny, a group of vents was created. Since July the activities were going down, the extension of the GNSS baseline was stopped and the seismicity decreased.

Associated with phreatic eruption, the type of eruption expected at Owakudani, hydrothermal activity often causes thermal demagnetization of underground rock in rather shallow place and results in magnetic change on the surface. For Kusatsu-Shiranesan and Meakandake where phreatic eruption occurred in recent years, observed magnetic variation of total intensity is one of indices used for assessment of the volcanic activity. For Owakudani, the magnetic intensity is also thought to be a hopeful data for the volcanic monitoring, we carried out repeat observation of magnetic intensity around Owakudani from May to November in 2015.

It was revealed from the observation that the magnetic intensity decreased by about 1nT from July to September, after the eruption, at the stations in the northern part of Owakudani. In the same period, a slight increase of the intensity was possibly occurred at a station in the southern part. These kind of magnetic variation is expected when underground rock get magnetized, and it will be possible by cooling of heated rock. Beneath Owakudani, the rock temperature seemed decreased from July to September. It might be happened by the creation of the vents in the eruption at the end of June and they made the cooling more effective. Assuming the temperature decrease was occurred beneath the locally uplifted area in Owakudani before the eruption, and the depth was 500m from the surface, the obtained magnetic moment was estimated as $2-3 \times 10^6 \text{Am}^2$.

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