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Aeromagnetic survey at Shinmoedake volcano by using unmanned helicopter in 2014

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1. Introduction

Shinmoedake volcano is one of the most active volcano in Japan, and had some sub-Plinian eruptions at the beginning of 2011. Now the eruptions cease and any apparent activity cannot be seen, but seismic activity and geodetic change are still observed near Shinmoedake volcano. It is important to monitor the volcanic activity for a long term by using various geoscientific measurements.

We have conducted surveys continually at Shinmoedake volcano by using unmanned helicopter since May 2011, after the eruptions. And very recently, our forth aeromagnetic survey was performed on 21st Oct. 2014.

2. Aeromagnetic survey

The aeromagnetic survey was conducted by using the unmanned helicopter YAMAHA RMAX G1. The magnetometer sensor of the total intensity was installed 4 m apart down from the helicopter in order to avoid the effect of the helicopter magnetism itself. The helicopter flied in the area of 3 km by 4 km which is western part of the Shinmoedake. The measurement line intervals were almost kept as 100 m, and also the flight altitudes above the ground were kept as about 100 m. The total measurement length is about 63 km.

3. Result

Obtained data of the magnetic total intensity shows the geomagnetic anomaly as large as about 1000 nT, which is almost the same as the previous surveys in general. Comparison of the data with the first survey data of May 2011 shows the notable anomaly around the crater of Shinmoedake volcano. The anomaly shows the dipole-like pattern which are the positive anomaly in the south and the negative one in the north. It indicates the magnetization occurs in the crater and the cooling down of the lava accumulating in the crater at the 2011 eruptions was inferred. The average magnetization intensity of the lava is estimated about 4.0 A/m, which is larger than the previous results.

Changes of the average magnetization follow a square root of an elapsing time, and thus the cooling of lava may be gradually done by the thermal diffusion, and is still going so far.

Keywords: repeated aeromagnetic survey, unmanned helicopter, Shinmoedake