

Repeated aeromagnetic survey of Shinmoe-dake, Kirishima volcano, Japan, after the 2011 eruption using unmanned autonomo

Takao Koyama^{1*}, Takayuki Kaneko¹, Takao Ohminato¹, Takatoshi Yanagisawa², Atsushi Watanabe¹, Minoru Takeo¹

¹Earthquake Reserach Institute, Univ. Tokyo, ²Institute for Research on Earth Evolution, Japan Agency for Marine-Earth Science and Technology

We conducted the highly resolved aeromagnetic surveys around Shinmoe-dake, Kirishima volcano twice by using the unmanned autonomous helicopter, when it was after the magmatic sub-plinian eruptions.

First survey was carried out in the end of May covering 3 by 3 km area of western Shinmoe-dake. The flight altitude is as low as about 100 m above the ground and spacing of flight lines are as close as almost 100 m. Total flight distance is about 85 km. The cesium optically-pumping magnetometer was installed by hanging below the helicopter to measure the geomagnetic total intensity. Due to this survey, we detected a large geomagnetic total intensity anomaly as 1000 nT. Using these data, the horizontal map of magnetization intensity was obtained beneath the survey area. We found the followings;

- 1) The average value of the magnetization is as low as 1.5 A/m;
- 2) Northwestern Shinmoe-dake has lower magnetization than average;
- 3) Strong magnetization appears the area corresponding the lava at the foot of Karakuni-dake.

Second survey was carried out about 5 months later than the first survey, in the end of October to the beginning of November, in order to detect temporal change of geomagnetic total intensity. By comparing both data, we could detected a dipole-like change as large as about ± 100 nT around the crater of Shinmoe-dake. This change can explain by magnetization enhancement with 2.3×10^7 Am² in the crater. In the 2011 eruptions of Shinmoe-dake, a large pancake-like lava was found in crater with 1.5×10^7 m³ (Nakada et al., submitted), and the cooling of this lava probably causes this magnetization enhancement.

Keywords: repeated aeromagnetic survey, unmanned autonomous helicopter, Shinmoedake