

Repeated droneborne magnetic survey in Iwoyama, Kirishima volcano

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In Mt. Iwoyama, Kirishima, volcanic tremors have occurred since the end of 2013, and then some fumaroles are observed. A small phreatic eruption has occurred in the south of the edifice on 19th April 2018, in which the last eruption has occurred about 250 years ago. According to geodetic deformation measurements, inflation of the edifice was detected. The pressure source location is inferred at about 1 km below the surface. Also, according to MT surveys, a clay layer is detected in the shallow area due to hydrothermal alteration. Therefore, the phreatic explosion may have happened due to vaporization of volcanic fluid through cracks of the clay layer (Tsukamoto et al., 2018). It is important to observe thermal change and gas emission at such a crack prior to explosions in order to understand the process of the phreatic explosion.

We have conducted high-resolution aeromagnetic survey by drone in Iwoyama in last May. In our survey, the DJI Matrice 600 Pro multicopter is used and Geometrics G-858 cesium optical pumping magnetometer is installed on it. The magnetic sensor is hung down at 5m from the drone. A GNSS receiver with barometric altimeter is also installed in order to correct the time and measure the position. It totally flew more than 15 km by 10 flights in a half of days. The flight courses were programmed prior to flights, and thus they can be reused again in the future surveys, and retrieve geomagnetic data along the same course.

We have carried out flights in 50 m and 100 m above the surface. In the west of survey area, geomagnetic total intensity anomaly by 750 nT at 50 m above and 500 nT at 100 m above were found. In the east, which is just above the Mt. Iwoyama, the anomalies are 400 nT at 50 m above and 100 m above. It indicates that demagnetization is occurred beneath the Mt. Iwoyama as inferred.

We conducted survey again in last December on the same flight courses which are programmed in a drone, in order to detect the temporal variation of magnetic intensity of the edifice. It, however, does not show significant changes, and it indicates that thermal condition beneath Iwoyama is not activated recently.

Droneborne survey has a potential to be a powerful tool to monitor a thermal condition beneath the volcano.

Keywords: aeromagnetic survey, drone, Iwoyama, Kirishima volcano