

## The initial report of aeromagnetic studies for Nishinoshima

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An aeromagnetic survey is a method to measure the total magnetic field or three component magnetic field by a sensor mounted on an airborne vehicle and is useful for monitoring volcanic activities. Recent technical development yields more popular use of drones instead of helicopters or airplanes for aeromagnetic surveys because of low cost and easy operation.

Nishinoshima is an oceanic island arc volcano constituting Izu-Ogasawara (Bonin) island arc, which locates about 1000 km south of Honshu island in Japan. The eruption since 2013 produced huge amount of andesite lava. In order to understand a magnetization structure and distribution of rocks beneath Nishinoshima, we measured the total magnetic intensity by using a drone.

We used the drone, DJI Matrice 600, with a potassium magnetic sensor, which was modified by TIERRA TECNICA Ltd. We measured the total magnetic intensity, latitude, longitude, height, and altitude at 20 Hz. The position of the drone was measured by GPS, and the altitude above the ground was measured by using a laser altimeter. Each flight time was set to be within 17 minutes because of the capacity of the drone's batteries. Flight speed was between 2 and 8 m/s.

The drone took off and landed on the deck of an ocean weather ship "Keifumaru" belonging to Japan Meteorological Agency in both September 2018 (KS18-07) and June 2019 (KS19-05). The drone was operated by HEXaMedia Inc.. In KS18-07, we conducted two flights (one N-S direction and one E-W direction), which was the first trial of applying aeromagnetic survey using drone to an oceanic island. Flight altitude was fixed at approximately 100 m above sea level. In KS19-05, we conducted 17 flights, 16 N-S directions and one E-W direction. Two flights of them were at the same location and altitude as the two flights in KS18-07. Flight altitude of the other 15 flights was fixed at approximately 80 m above the ground. The total observed area is about 3 km by 3 km.

We estimated the magnetization structure of the shallow part of Nishinoshima by using the 3-D inversion (Utsugi, 2019). The main calculation area is 4 km by 4 km and 2 km deep, and the area is surrounded by 1000 km grids. The mesh size in the main calculation area is 50 m by 50 m by 50 m. We used the topography data of 50 m by 50 m grid around Nishinoshima provided by Japan Coast Guard.

In this presentation, we will introduce our observations and discuss a magnetization structure of the shallow part of Nishinoshima.

Keywords: Nishinoshima, magnetization structure, aeromagnetic survey, drone