



3 Dimensional Magnetization Distribution obtained using Vector Magnetic Anomalies for Volcanic Structure of Aogashima Island

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AVI (Aogashima Volcanic Island) is one of the active volcanoes located 362km south of Tokyo. The bottom of AVI is considered to be located at 900m-1200m below the sea level. Topographic major axis of AVI is in the direction from northwest to southeast. The length of the major axis is approximately 20km and the length of the minor axis (perpendicular to the major axis) is about 10km. The seaside of AVI is surrounded by the steep cliff which is approximately 200m high. The highest peak of AVI is 423m above sea level.

AVI also has double calderas. One is the Ikenosawa caldera, which occupies the south area of AVI and whose diameter is about 1.5km. Another caldera and a volcanic cone (Maruyama) are located in the center of the Ikenosawa caldera, which was generated by the latest volcanic activity, the Tenmei eruption in 1870-1890. There have been still many active volcanic fumaroles especially in Ikenosawa caldera. To understand the volcanic internal structures, three component aero geomagnetic surveys were carried out in 2006 and 2009. Especially in 2009, the detailed surveys over Maruyama were conducted.

We analyzed the obtained magnetic anomaly vectors by the damped least square method in order to understand the 3D3C (three dimensional spaced three component) magnetization of AVI. We tried five-layer model which consists of aggregated prisms with horizontal width of 200m, and the depths of five layers are 200m, 400m, 600m, 800m and 1000 m, respectively. The uppermost surface of Layer 1 approximates the topography. The total number of the prisms is 4,375 (875 blocks/layer x 5 layers). Thus, the total number of unknowns becomes 13,125 (4,375 x 3 components).

We used 30,696 three components of magnetic anomalies, including 2,172 ones of Maruyama area. And one data set is the observed 3D3C magnetic fields (H_x , H_y , H_z), their position (x , y , z) measured by GPS, and the attitude of the three component magnetometer sensors measured by a fiber optic gyrocompass.

As the result, the following characteristic features are found. At first, the Japan Coast Guard have often found discolored water in several areas, which may be due to volcanic fumaroles on the seafloor such as Kurosaki, west of Saigou, Sanpou port, Kita Ura and Otiyo port and so on. We consider that the low magnetization (less than 4A/m) areas of the 1st layer are in harmony with those areas and relate with the volcanic activity of AVI. And the second finding is the low magnetization area crossing the Maruyama caldera from south-west to north-east at 1200m depth. Incidentally, the discolored water sometimes occurred on the same date at different locations. This observation suggests that such volcanic activities could be caused by an extensive source. There could be consistency with the low magnetization areas which are extended from shallow to deep layers.