論　説

火山 第52巻 (2007)
第4号 211–220頁

諏訪之瀬島の地磁気異常と3次元磁気構造

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（2006年12月14日受付，2007年7月4日受理）

Aeromagnetic Anomalies and a 3D magnetic structure of Suwanose-jima Island

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Airborne magnetic surveys of Suwanose-jima Island were conducted on August, 24 and 25, 1999 at the altitude of 1066 m by a proton magnetometer installed on a craft of YS-11. Magnetic anomalies of total force are calculated by subtracting IGRF-10. The negative peak (−326 nT) is observed over the north to northeastern coastal zone and a positive peak (242 nT) is over the southeastern slope. Another positive peak is also recognized over the southern tip of Island. The volcanic edifice is approximated by the assemblage of the prismatic bodies for the 3D magnetic analyses. A 3D model analysis based on an uniform magnetization assumption shows the magnetization intensity of 3.14 A/m corresponding to a magnetization direction polarized in the direction defined by declination of 0° and inclination of 42.5°. A 3D non-uniform magnetization analysis, where each block is magnetized in the same direction as in the uniform model with a variable magnetization intensity, is conducted to derive an internal magnetic structure of the edifice. This result makes it apparent that the volume weighted mean magnetization intensity is ranging from 2.87 to 3.12 A/m, and a non-uniformity of magnetization from 40% to 14%, by taking into consideration of the base layer underlain by the volcanic edifice. Besides, the following features are also made apparent. (1) Relatively low magnetization zones (−0.5 〜−1.5 A/m) are recognized in the southwest of Mt Ontake. This low magnetization zone extends to the base layer between 0m and 700m below sea level. This zone is thought to be linked with the conduit of Suwanose-jima Volcano. (2) Relatively strong magnetization zones (0.5〜1.5 A/m) are recognized in the southeast of the summit area and they further extend northeastward to the east offing of Suwanose-jima Island. (3) The base layer between 0 m and 700 m b.s.l. is generally small in magnetization intensity (−0.5〜−1.5 A/m) except the high magnetization zone denoted in 2). The above features may imply that the base layer is composed of more siliceous rocks than pyroxene andesites forming the present volcanic edifice.

Key words: Suwanose-jima, magnetic anomalies, 3D magnetic analysis, active volcano, Ryukyu-Islands (Nansei-Shoto), airborne geophysics

1. はじめに

諏訪之瀬島は桜島の南西約200 kmに位置する活火山で (Fig. 1)，現在でも度々ストロンボリ式噴火やブルカノ式噴火を繰り返している．山体は主に4つの火山が集積してできた複合火山で，安山岩質の溶岩と火山砕屑物から形成されている（平沢・松本，1983；松本，1964；Tiba, 1989）．山体の最高峰は御岳の南壁で799 mの標高を有する．周辺の海底地形を参照すると諏訪之瀬島の基底は水深700 m付近にあり，標高0 m付近は海面下の地形を考慮すると，ほぼ5合目に相当する．

諏訪之瀬島についての地磁気に関連した調査は，陸上での地磁気観測結果とその解析結果が村内 (1954) により報告されている．それによれば，山体の平均磁化強度として約8.0 A/mの値が報告されている．しかし，この結果は陸上での限られた観測結果による推定値であるため，正確な磁化強度の推定のためには海域を含めた火山地形をカバーする航空磁気測量データが必要である．

一般に磁気異常の原因となる磁性鉱物はキューリー点温度以上に達すると磁性を失うが，諏訪之瀬島のような安山岩質で構成される火山でも磁性鉱物が含まれてお

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