IODP EXP352で掘削された小笠原前弧の前弧玄武岩とボニナイトの弾性と磁性

Magnetic and elastic properties of forearc basalt and boninite in the Ogasawara(Bonin) forearc recovered by IODP Expedition 352

本多 睦美[2]、*道林 克禎[1,2,7]、藤井 昌和[4]、山本 由弦[5]、針金 由美子[6]、柵山 徹也[3]
Mutsumi Honda[2], *Katsuyoshi Michibayashi[1,2,7], Masakazu Fujii[4], Yuzuru Yamamoto[5], Yumiko Harigane[6], Tetsuya Sakuyama[3]

1. 静岡大学理学部地球科学科、2. 静岡大学大学院総合科学技術大学院、3. 大阪市立大学、4. 国立極地研究所／総合研究大学院大学、5. 海洋研究開発機構、6. 産業技術総合研究所、7. 名古屋大学理学部地球惑星科学科
1. Institute of Geosciences, Shizuoka University, 2. Graduate School of Geosciences, Shizuoka University, 3. Osaka City University, 4. National Institute of Polar Research and SOKENDAI, 5. JAMSTEC, 6. AIST/GSJ, 7. Department of Earth and Planetary Sciences, Nagoya University

The Izu-Bonin-Mariana (IBM) arc, which is located to the southeast from Japan, is a typical intraoceanic arc system and is the type locality for subduction initiation. IBM project, which is a part of International Ocean Discovery Program (IODP) expeditions, is aimed to understand subduction initiation, arc evolution, and continental crust formation. Expedition 352 is one of the IBM projects and that has drilled four sites at the IBM fore-arc in the period from 30th of July to 29th of September, 2014. Expedition 352 has successfully recovered fore-arc basalts and boninites related to seafloor spreading during the subduction initiation as well as the earliest arc development. The fore-arc basalts were recovered from two sites (U1440 and U1441) at the deeper trench slope to the east, whereas the boninites were recovered from two sites (U1439 and U1442) at the shallower slope to the west. In this study, relationships between seismic velocity and density in comparison with magnetic susceptibility of these volcanic rocks were investigated in order to understand the large variation of seismic velocity in Layer 2 among seismic velocity structures. As a result, the densities are in a range between 2 g/cm^3 and 3 g/cm^3. The porosities are in a range between 5 % and 40 %. The P-wave velocities are in a wide range from ~3 km/s to ~5.5 km/s and have a positive correlation to the densities. Variation of P-wave velocity along with bulk density show two trends depending on magnetic susceptibility values. Magnetic susceptibility shows bimodal distribution of 27 to 116 (×10^{-5} SI) and 794 to 5153 (×10^{-5} SI). Higher magnetic susceptibility samples consisting of volcanic rocks such as fore-arc basalt and high Mg andesite show that there is an inflection point in the trend where the P wave velocity and bulk density are 4.8 km/s and 2.8 g/cm^3, respectively. Thermomagnetic curves and magnetic hysteresis suggest that these samples are composed of single-domain, puedo-single-domain and multi-domain titanomagnetite particles with little titanium content. Lower magnetic susceptibility samples consisting of boninite such as high Si boninite show a linear trend in the relationship between P-wave velocity and bulk density as well as linier thermomagnetic curves and low coercivity. They have not experienced high-temperature oxidation. It suggests that the two trends of the relationship between P-wave velocity and bulk density depend on magnetic susceptibility value resulting from the amount of titanomagnetites. In addition, these trends have also been found in the physical properties measured on board during Expedition 351.

キーワード：IODP、前弧玄武岩、ボニナイト、物性（密度，弾性波速度，磁性）
Keywords: IODP, Forearc basalt, Boninite, Physical properties (Density, P-wave velocity, magnetism)

