Near-seafloor magnetic mapping for understanding off-axis volcanism hosting the Kairei hydrothermal field in the Central Indian Ridge

*Masakazu Fujii[1], Kyoko Okino[2]

1. National Institute of Polar Research and SOKENDAI, 2. AORI, UTokyo

We report the case study of near-seafloor magnetic mapping of the off-axis volcanic knoll, namely the Hakuho knoll, located in the Central Indian Ridge. The Kairei hydrothermal field known as the system related to mafic as well as ultramafic host rocks is distributed on top of the Hakuho knoll [e.g., *Nakamura et al.*, 2009]. Three dive surveys were conducted during the R/V Yokosuka cruises of YK05-16_leg1, YK09-13_leg2, and YK13-03. A three-axes fluxgate-type magnetometer "*Shinkai Miniko*" developed by the AORI, UTokyo, was attached to the submersible *Shinkai 6500* and vector magnetic fields were successfully measured during dives of 6K#918, 6K#1171, and 6K#1332. Submersible tracks cover the Hakuho knoll especially in the western slope at 2,200–3,000 m depth, northern slope at 2,700–3,200 m depth, and the foot of eastern slope at 2,900–3,200 m depth.

The observed data were first corrected for the effects of induced and permanent magnetizations of the submersible to obtain regional magnetic anomalies after subtraction of the International Geomagnetic Reference Field (IGRF) [*Isezaki*, 1986]. Then, two-dimensional forward modeling and inversion technique were applied to estimate absolute and equivalent magnetization under consideration of topography and altitude variation [*Honsho et al.*, 2009; *Fujii et al.*, 2015].

The variation pattern of observed magnetic anomalies above lava flows in the western slope of the Hakuho knoll is in phase with that of synthetic magnetic anomalies calculated for simple assumption with magnetization direction parallel to the IGRF and infinite source layer. This result suggests that these lava flows preserve normal magnetic polarity corresponding to the Brunhes Chron. Estimated absolute magnetization intensity shows up to 20 A/m in this area, which is comparable to crustal magnetization demonstrating the recent volcanic activity [*Honsho et al.*, 2009]. These signatures were certainly observed in both vertical and horizontal components of magnetic anomalies. The Kairei hydrothermal field is characterized by low coherence between observed and modeled anomalies, and low values of magnetization, suggesting that magnetic minerals within basaltic basement were altered into non-magnetic minerals and/or clay minerals due to the oxidative reaction with hydrothermal fluids.

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