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Deepsea Magnetics on Tarama and Irabu Hydrothermal Fields

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Magnetic signatures of oceanic lithosphere is changed by hydrothermal alteration, therefore magnetization contrast derived from magnetic anomaly provide us information about spatial extent of hydrothermal alteration zones. Previous studies reported both reduced and enhanced magnetization at different hydrothermal fields, suggesting the destruction and production of magnetic minerals are controlled by geological and tectonic background. In order to characterize magnetic response of arc/backarc hydrothermal systems, we investigated two hydrothermal fields of the southern Okinawa Trough. The Irabu knoll is located on the axial area of backarc rift and consists of basaltic lavas. The Tarama knoll is located between backarc and arc sides along with dacite to rhyolite. Previous surveys reported hydrothermal venting on both knolls. During the cruise YK14-16, we conducted near-seafloor magnetic measurements using autonomous underwater vehicle (AUV) URASHIMA. The vector geomagnetic field was measured by fluxgate-type magnetometer at an altitude of ˜100 m with the whole area of the Irabu and Tarama knolls. The correction of vehicle magnetization was successfully done using data obtained during 8-figure rotation loops. The amplitude variation of observed magnetic anomaly is up to 12000 nT at the Irabu knoll and 1000 nT at the Tarama knoll. Sea-surface anomaly also shows larger amplitude variation at the Irabu knoll (760 nT) than Tarama knoll (460 nT). These observations suggest the difference of hosted rock type, i.e. the Tarama knoll is hosted by basaltic rock with large amount of titanomagnetites. In addition to the magnetic signature of the Tarama and Irabu knolls, we will discuss relationship between magnetization distribution and locations of confirmed hydrothermal vent fields.

Keywords: near-seafloor magnetic anomaly, seafloor hydrothermal system, Okinawa Trough, AUV URASHIMA