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Near-seafloor magnetic field observations at the Mariana Trough back-arc spreading center

Toshiya Fujiwara (1), Miho Asada (1), Susumu Umino (2), Yuki Koike (3), and Toshiya Kanamatsu (1)

(1) Institute for Research on Earth Evolution, Japan Agency for Marine-Earth Science and Technology, Yokosuka, Japan (toshi@jamstec.go.jp, +81-46-867-9315), (2) School of Natural System, Kanazawa University, (3) Department of Natural Environmental Science, Kochi University

We surveyed the Mariana Trough back-arc basin in the western Pacific with the Japanese submersible *Shinkai 6500* to understand detailed crustal formation process at the 17˚N segment [*Fujiwara et al.*, 2008]. The 17˚N segment is suggested to be in vigorous magmatic stage. Sheet lava flows, suggesting a high rate of eruption, occupy the seafloor of the segment even the slow spreading with a full-rate of ∼3 cm/yr [*Deschamps et al.*, 2005; *Asada et al.*, 2007].

The objective of magnetic field measurements is to investigate magnetization of lava flows at the seafloor. Near-seafloor observations provide us high-resolution magnetic anomaly that is valuable for the studies of the detailed magnetization structure of ocean crust and paleointensity recorded in the ocean crust. Magnetization intensities relate to age of lava, therefore deep-sea magnetic data may provide geophysical evidence for discussion of relative age differences of the lava flows.

Three submersible dives were made in the axial valley situated in the spreading center. One of the dives traversed the axial valley a distance of ∼2 km from the center of the valley toward off-axis, roughly parallel to the spreading direction. We observed magnetic anomalies with large-amplitude (up to 5000 nT) and short-wavelength (several tens of meters). We evaluated fine-scale across-axis magnetic structure along the dive path from the anomalies. High magnetization intensity (up to 50 A/m) was estimated at the center of the axial valley, and therefore the lava flows in the area was likely young in age. The magnetization intensity decreased toward the off-axis. The result suggests the seafloor age increases toward the off-axis.

However the detailed variation of the magnetization distribution does not show simple seafloor age increment in proportion to distance from the spreading center. It implies the complexity of the crustal formation process. There is no clear correlation between the distribution of magnetization intensity along the dive path, that is the spreading direction, and a compiled dataset of paleointensity variation [e.g. Sint-800: *Guyodo and Valet*, 1999].

A possible explanation is that eruption of lava flows at the segment was not focused on the fixed volcanic axis, but was dispersed rather broad volcanic zone because of enhanced magmatic activity. And/or new sheet lava flows traveled a long distance and overlapped old lava flows, and the lavas overprinted the seafloor magnetization. As the result, the sequential records of the paleointensity variation in the ocean crust of the slow spreading rate were disrupted.