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海底熱水循環系を伴う背弧拡大軸の磁化構造：南部マリアナトラフの例
Magnetic Structure of Back-arc Spreading Axis with Hydrothermal Vents; the Southern Mariana Trough

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Geological and geophysical characterization of seafloor hydrothermal system is important in investigating the mineral deposits, habitat of microbial communities and heat and chemical fluxes, and especially near-bottom geophysical mapping is an useful technique for the investigatioin. To reveal the high-resolution magnetic structure of oceanic crust with hydrothermal alteration zones, I constructed a new technique of three-dimensional forward modeling using three component of magnetic anomaly. I applied this technique to the near-bottom data acquired by submersible Shinkai 6500 at an altitude of 1 -100 m above seafloor in five hydrothermal vent sites near the Southern Mariana Trough (SMT), backarc spreading axis. In addition, I compared the results with NRM measurements of basalt samples and with magnetic signatures obserbed by AUV with higher altitude. Important results are detailed below.

The distribution of esitimated absolute magnetization well corresponds to the seafloor geological characters such as hydrothermal deposits and fresh pillow lava. The value of absolute magnetization is almost equal to measured NRM of collected samples, demonstrationg the reliability of new processing technique. The result is also consistent with the equivalent magnetization deduced from the previous AUV survey and shows more detailed structure.

My results reveal that hydrothermal alteration zones are accompanied with distinct low magnetization as some previous studies reported in mid-ocean ridges. It is considered that this low magenetization is caused by demagnetization of high temperature hydrothermal circularion exceending Curie temperature or alteration of magnetic minerals in stockwork pipe.

The horizontal scale of low magnetization zones around the off-axis vent sites is almost 10 times larger than those around the on-axis sites. I consider that the longer duration time of hydrothermal circulation in off-axis sites makes the alteration zone larger.

We obtain extremely high magnetization just on neo volcanic zone (NVZ) and relatively low magnetization away from the NVZ, suggesting a very rapid decrease of magnetization by low-temperature oxidization. My results shows higher decay rate than suggested by previous study.

キーワード: 3 成分地磁気異常, 南部マリアナトラフ, 海洋性地殻, 熱水循環系, 背弧拡大軸部, 磁化
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