沖縄トラフ海底熱水鉱床試料の岩石磁気測定

加藤 千恵 [1]; 大野 正夫 [1]; 畠山 唯達 [2]; 石橋 純一郎 [3]; 戸塚 修平 [3]; 島田 和彦 [3]
[1] 九大・比文・地球変動講座; [2] 岡山理大・情報処理セ; [3] 九大・理・地球惑星

Rock-magnetic studies on seafloor hydrothermal deposits in the Okinawa Trough

Chie Kato[1]; Masao Ohno[1]; Tadahiro Hatakeyama[2]; Jun-ichiro Ishibashi[3]; Shuhei Totsuka[3]; Kazuhiko Shimada[3]
[1] Division of Earth Sciences, SCS, Kyushu Univ.; [2] IPC, Okayama University of Science; [3] EPS, Kyushu Univ.

Investigation of the mineral assemblage of seafloor hydrothermal deposits are crucial for understanding its formation environment and process. Rock-magnetic measurements of the deposits are quick and effective to detect accessory magnetic minerals which are sensitive to the environment. We report our preliminary results of rock-magnetic measurements conducted on seafloor rock samples of a sulfide chimney in the Noho Site, Iheya Small Ridge and drilled core samples from Sites C9025 and C9026 in the Izena Hole, Okinawa Trough. We selected four samples from 74.7 to 82.9 m in depth of core C9025 and five samples from 65.2 to 84.1 m in depths of core C9026, where pyrrhotite was identified by the on-board X-ray diffraction analysis. Low-temperature magnetic measurements such as field cooled (FC) remanence and zero-field cooled (ZFC) remanence and low temperature cycle of room-temperature isothermal remanent magnetization (IRM) were conducted using a Magnetic Property Measurement System (MPMS). IRM acquisition experiments was performed up to 1 T by an Alternating Gradient Magnetometer, and up to 5 T on selected samples using the MPMS.

Chimney sample from Iheya Small Ridge showed decrease of FC and ZFC remanences near 100 K during zero-field warming. Considering the X-ray diffraction patterns, it could be attributed to a Cu-Fe-S phase with sphalerite-type structure reported by Wintenberger et al. (1994). However, the chemical composition analyzed by FE-EPMA was close to that of $CuFe_2S_3$ isocubanite rather than the reported composition $CuFe_3S_4$. Pyrrhotite was also recognized by low-temperature magnetometry, XRD and chemical analysis.

In the core samples from Izena Hole, FC remanence was 2-3 times larger than the ZFC remanence, and an extremely hard component which does not saturate even at 5 T was shown in the IRM acquisition curve. These features indicate the contribution of goethite (Liu et al. 2006), which might have been formed by alternation in laboratory. Signals of Cu-Fe-S phase and pyrrhotite were also distinguished in some of the core samples. In addition, a sharp decrease of room-temperature IRM at 50 to 70 K was observed during the low-temperature cycle. These features could not be explained by any of the magnetic minerals noted above, and therefore suggest the presence of other magnetic component(s).