

## The detection of greigite with thermal demagnetization of two-axis isothermal remanent magnetization imparted at 0.3T and 0.07T

# Noriko Kawamura[1]; Atsuhito Ennyu[2]; Naoto Ishikawa[3]; Kiichiro Kawamura[4]; Masayuki Torii[5]; IODP Exp. 303 IODP Expedition 303 Shipboard Scientific Party[6]

[1] Kyoto Univ.; [2] ITOCHU Oil Exploration; [3] Graduate School of Human and Environmental Studies, Kyoto Univ.; [4] FGI; [5] Dept. Biosphere-Geosphere, Okayama Univ. Sci.; [6] -

<http://www.gaia.h.kyoto-u.ac.jp/~kwmr>

Greigite (Fe<sub>3</sub>S<sub>4</sub>) is an authigenic mineral that acquires chemical remanent magnetization in association with early diagenesis. The chemical remanence in aquatic sediments by such diagenetic magnetic minerals obscures the original magnetization, thereby masking primary paleomagnetic and paleoenvironmental signals. However, no conventional method to identify low concentration of greigite in the sediments has not been established. In this study, we developed a method to detect small quantity of greigite in the sediments by thermally demagnetizing two-axis isothermal remanent magnetizations (IRMs) imparted at various levels of direct current magnetic fields. Sediment samples used in this experiment were Plio-Pleistocene in age collected from Erhjen-chi (EJ) section, southwestern Taiwan. Previous XRD analysis indicates presence of magnetite and greigite in the magnetically separated EJ samples (Horng et al., 1998). We applied combinations of three individual magnetic field on two-axis of the EJ samples; 2.5 T to saturate the samples, 0.3 T to magnetize magnetites, and 0.07 T as a typical remanent coercivity of greigite. Our experiment showed unblocking temperatures of ~350 C (i.e., greigite) and 580 C (i.e., magnetite) clearly with a combination of thermally demagnetized IRMs at 0.3 T and 0.07 T. This suggests that greigite in sediments can be detected effectively with the paired 0.3 T and 0.07 T two-axis IRMs. We then applied this method to the Neogene-Quaternary sediments from IODP Site U1307 in the Labrador Sea. Our preliminary results showed distinct unblocking temperatures of ~350 C and 580 C in the sediment samples from selected horizons at Site U1307, indicating presence of greigite. Depths of those samples containing detectable amount of greigite are generally below the depth at which sulfate concentration reaches the minimum downhole. This implies that authigenic greigite precipitates in reduced sedimentary environment.

### Reference

Horng, C. -S., Torii, M., Shea, K.-S., and Kao, S.-J. Inconsistent magnetic polarities between greigite- and pyrrhotite-magnetite-bearing marine sediments from the Tsailiao-chi section, southwestern Taiwan, *EPSL*, 164, 467-481, 1998.