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Rock magnetic property of the marine sediment cores recovered from IODP Site U1403 in the Northwest Atlantic

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Marine sediment is an important recorder of the past environmental changes. It can provide important information to investigate the environmental change continuously back in time, once a high-resolution age model is constructed by multiple techniques. Integrated Ocean Drilling Program (IODP) Expedition 342 recovered marine sediment cores from the Northwest Atlantic, off Newfoundland, to investigate the environmental change from the Paleocene to the Eocene. Our objective is to estimate relative paleointnsity variation for that period. In order to achieve this, we need to find out relatively homogeneous intervals in rock magnetic properties. In this study, we conduct preliminary rock magnetic measurements on the 88 discrete samples taken from Hole A in Site U1403 at every ˜1.5 m interval (25-160 mcd: meter composite depth).

Low temperature magnetometry failed to detect, the Verwey transition except some horizons. We therefore, think that Ti-poor titanomagnetite is not much included in the present samples. Below about 117 mcd, the samples showed a distinct phase transition at about 25 K. It is probably due to an existence of rhodochrosite.

In the thermomagnet experiments, slight increase in magnetization at about 400 ℃ and Curie temperatures at about 580 ℃ and/or about 670 ℃ were recognized throughout the studied interval. Because the Verwey transition was not detected except some horizons ,the Curie temperature at about 580 ℃ is probably originated from a breakdown of titano-maghemite upon heating. These results indicate that the present samples contain titano-maghemite and titano-hematite.

Anhysteretic remanent magnetization (ARM) was imparted by a DC field of 100

μT and AF of 80 mT. The samples from the 50-90 mcd interval showed a relatively constant high ARM intensity of 3-5X10^{-4} (A/m). Except this interval, the ARM intensity varied a lot, as low as 1X10^{-6} (A/m). Isothermal remanent magnetization (IRM) imparted by a DC field of 2.5 T exhibited a similar tendency. The samples from the 50-90 mcd interval showed a relatively constant high IRM intensity of 1-3X10^{-3} (A/m). Except this interval, the IRM intensity varied a lot, as low as 1X10^{-5} (A/m).

Ratios of ARM to IRM (ARM/IRM), which are often used as parameters of magnetic grain size and/or degree of magnetostatic interaction, resulted in either about 0.15 or 0.05 for the studied interval. The interval of 50-90 mcd showed a constant ratio of 0.15. S-ratio (-0.1T and, -0.3T) which stands for a remanence fraction according to a coercivity resulted in constant values of 0.97 (-0.1T) and, 0.98 (-0.3T) for the 50-90 mcd interval.

In summary, the 50-90 mcd interval is considered to be little affected by a diagenesis and have relatively homogeneous rock magnetic property, because of the relatively strong ARM and IRM intensities and constant values of several rock magnetic parameters. We think that, this interval is suitable for an estimate of relatively paleointensity variation.

Keywords: geomagnetic field, paleointensity, marine sediments