Paleomagnetic study on a deep-sea sediment core obtained from Central Wilkes Land Margin, East Antarctica

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Paleomagnetic study was made on a deep-sea sediment core obtained from Central Wilkes Land Margin. Long-term secular variation of the geomagnetic field during the last 1 Ma recorded in the core. The natural remanent magnetization (NRM) direction after thorough stepwise AF demagnetization revealed that the core contains at least 3 polarity intervals. Rockmagnetic parameters, such as saturation magnetization (Js), saturation remanence (Jr), magnetic susceptibility, anhysteretic remanent magnetization, coercivity (Hc), and remanent coercivity force (Hcr) were measured. They revealed the characteristic magnetic properties of the sediments. Many samples have high coercivities of 30+/-5 mT and exhibited a linear change in AF demagnetization experiments. We also performed thermomagnetic analysis (applied fields: 1.0 T) in vacuum. Many samples from upper and lower of the core showed characteristic irreversible changes in the heating-cooling cycle. The conspicuous depressions between 200 and 220 degree in Js-T, Jr-T, Hc-T and Hrc-T curves, and humps between 220 and 350 degree in Hc-T and Hrc-T were detected. The values of Js and Jr after cooling are three times higher than before heating. In the second heating-cooling cycles in vacuum, the thermomagnetic curves became reversible. For further study, X-ray analysis and observations of magnetic minerals with SEM, TEM, AFM and MFM were carried out. Homogeniety of magnetic mineralogy and magnetic grain size were examined using the ratio of anhysteretic susceptibility to susceptibility. The relative paleointensity was obtained from NRM intensities remaining after demagnetization at 30mT (NRM30mT) normalized by ARM intensity at 30 mT demagnetization (ARM30mT). The appropriateness of the normalization was checked by absence of correlation between the normalized intensity (NRM30mT / ARM30mT) and the normalizer (ARM30mT). The normalized intensity variation shows no correlation with rock-magnetic parameters. It suggests that the obtained variation is independent of the rock-magnetic parameters, thus the obtained relative paleointensity may possibly reflect the geomagnetic field variation in the Antarctic region.