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Magnetostratigraphy and Environmental Magnetism of Eltanin Core 27-21, Ross Sea Sector (Antarctica)

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We have undertaken new paleomagnetic and rock magnetic studies of old cores from the Ross Sea sector of Antarctica. Here we present the magnetostratigraphic and environmental magnetic record of Eltanin core 27-21. This piston core is 18 meters long and represents the first systematic piston coring of the Southern Ocean, which was conducted in 1968 by the USNS Eltanin as part of Operation Deep Freeze. After removal of a low-coercivity overprint, which probably originates from drilling, handling, and/or storage, most samples have a strong remanent magnetization that is stable between about 25-50 mT. We have used the stable characteristic remanent component to define a high-resolution magnetostratigraphy and a relative paleointensity record, which permitted us to construct a solid age model for this sediment core. We recognized clearly all polarity intervals from the Brunhes Chron down to the Reunion Subchron. In addition, environmental magnetic data provide new insights about geologic processes, such as weathering, erosion, transport and deposition. Orbitally induced cycles occur in the magnetic susceptibility, ARM, IRM, ARM/IRM@0.9T and HIRM, which can then be used as climatic proxies. The cyclicity allows us to analyze the astronomical tuning on the core back to about 2.3 Ma. Our environmental magnetic data, coupled with the chronostratigraphic observations, provide new constraints on the timing and nature of paleoclimate events in this region of the Ross Sea, especially those that affect the availability of sediment and its transport into the basin. In addition, the astronomical forcing of the environmental magnetic parameters shows, that astronomical cyclicity is present in Plio-Pleistocenic sediments from Antarctica.