Evidences of delayed acquisition of paleomagnetic record in the marine sediment inferred from offset Be-10 flux anomaly

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Fluxes of meteoric cosmogenic radionuclide, Be-10, is thought to be varied due to changes of incoming comic-ray flux modulated by geomagnetic field intensity variation. Enhanced production rate of the nuclides during a geomagnetic polarity transition period is expected as a result of the low dipole field strength. We therefore reconstruct Be-10 flux changes in deep-sea sediments including the Brunhes-Matuyama geomagnetic polarity transition to discuss the detailed structures of the geomagnetic field behavior. Piston cores, MD982187 and P340, were taken from the western equatorial Pacific Ocean. Measurement of Be-10 was conducted using the accelerator mass spectrometry (AMS) of the University of Tokyo, Japan.

The results show significant increases of Be-10 flux during the polarity transition in both cores, indicating that the geomagnetic field intensity was low during this interval. In detail, well-defined double highs of Be-10 flux are recognized. These highs are thought to correspond to the B-M polarity boundary and the precursor event, 15 kyr before the B-M boundary (e.g., Hartl and Tauxe, 1996; Singer et al., 2005), respectively. These features are very similar to the relative paleointensity records of both cores and other published records of the B-M geomagnetic polarity transition, indicating that Be-10 flux of deep-sea sedimentary sequence well records the variation of the geomagnetic field intensity. Approximately 16cm of clear depth offset was observed in each core between the Be-10 flux and the relative paleointensity variation, which were measured on the same sedimentary sequence. This indicates that the relative paleointensity records are offset by ca. 16 cm below the actual level of the polarity transition, which is thought to be the paleomagnetic lock-in depth effect.