

High-resolution magnetostratigraphy across the Matuyama-Brunhes polarity transition from the Chiba Section

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An oriented 54-m core was collected from the Kokumoto Formation of the Kazusa Group, near the Chiba Section, a candidate for the GSSP of the Early-Middle Pleistocene boundary. The core spans in stratigraphy from a thick sand layer below a mud clast layer up to just below the Ku-2B tuff. A detailed Matuyama-Brunhes (MB) geomagnetic reversal record was obtained, using u-channel samples of 1 m long cut out from 1-m core section. Magnetization components were separated by stepwise alternating field demagnetization (AFD). Low field magnetic susceptibility and anhysteretic remanent magnetization show the core consists of magnetically homogeneous sediments. Magnetizations of discrete samples of 2.2cm x 2.2cm x 2.2cm were also measured, being subjected to progressive thermal demagnetizations (THD) and AFD. The declinations of characteristic remanent magnetization (ChRM) well agree across the boundary of 1m-sections, indicating that orientation of each 1m-core section was successful. Magnetic hysteresis measurements show magnetic grains are of PSD size. THD shows that hematite is included besides magnetite, a main magnetic carrier. Thermomagnetic measurements and THD suggest that the sediments include greigite, ferrimagnetic iron sulfide, which may cause a false reversal due to self-reversal of magnetic minerals. The paleomagnetic results show that the upper boundary of the MB transition lies above the Byakubi volcanic ash layer, which is much higher than the previous result. Our data show normal polarity continues from a depth of about 1m below the Byakubi, but several polarity swings exist above it. From about 70cm above the Byakubi to the top of the core, normal polarity continues. Relative paleointensity data show the lower end of the MB transition lies below the base of the core. The relative paleointensity keeps low values in the lower part below the Byakubi, and gradually increases upward above it, reaching a maximum value at about 39 m above the Byakubi. This linear increase feature is similar to the post-MB reversal intensity pattern observed in the paleointensity stack Sint-2000 (Valet et al., 2005). The low paleointensity kept throughout the basal part suggests the beginning of the MB transition lies much below the base of the core.

Keywords: Matuyama-Brunhes boundary, magnetostratigraphy, Chiba section, oriented core