A high resolution paleomagnetic record across the Matuyama-Brunhes polarity transition from the Chiba composite section, a candidate for the L-M Pleistocene boundary GSSP

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We report a high-resolution paleomagnetic direction and relative paleointensity records from a continuous marine succession , consisting of 55 meters in thickness, exposed on the Chiba composite section of the Kokumoto Formation, Kazusa Group, Japan. The Chiba composite section is a candidate for the Lower-Middle Pleistocene boundary GSSP. Our records provide detailed behaviors of the virtual geomagnetic poles (VGPs) and relative paleointensity changes during the Matuyama-Brunhes (M-B) polarity transition. The resultant relative paleointensity and VGP records show a significant paleointensity minimum near the M-B boundary, which is accompanied by a clear “polarity switch” like change in terms of the paleomagnetic direction. The relative paleointensity seems to keep in a low level for more than 10 thousand years associated with an unstable normal polarity. A high-resolution oxygen isotope chronology for the Chiba composite section indicates that the M-B boundary is located in the middle of Marine Isotope Stage (MIS) 19 and yields an age of 771.7 ka for the boundary. This age is consistent with those based on the latest astronomically tuned marine and ice core records and with the recalculated age of 770.9 ±7.3 ka deduced from the U-Pb zircon age of the Byk-E tephra. Moreover, our relative paleointensity record exhibits a consistent variation with other paleointensity records including Be10 derived intensity proxy from deep sea and ice cores. Our paleomagnetic data especially for the relative paleointensity represent one of the most detailed records on this geomagnetic field reversal so far obtained from marine sediments and will therefore be key for understanding the dynamics of the geomagnetic dynamo and for calibrating the geological time scale.

Keywords: Matuyama-Brunhes boundary, geomagnetic reversal, L-M Pleistocene boundary

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