

Application of a new geomagnetochronology using polarity transition features to hominid-bearing beds in Sangiran, Java, Indonesia

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Magnetostratigraphy was investigated on the hominid fossil bearing formations in Sangiran, central Java, Indonesia, where there has been a hot debate on chronology. Preliminary paleomagnetic analyses at 3-10 m depth intervals of a stratigraphic sequence about 90 m thick revealed a clear reverse-to-normal polarity boundary around the Upper Tuff of the Bapang Formation. The polarity boundary is well correlated in stratigraphy with the Matuyama-Brunhes polarity boundary (MBB) in the previous study (Hyodo et al., 1993; Hyodo et al., 2002), but disagrees with the hornblende Ar/Ar date of 1.02±0.06 Ma for the Upper Tuff (Larick et al., 2001). In order to examine whether it should be correlated to the MBB, we investigated detailed polarity transition features to compare with the recently published data. Samples were collected at 10cm depth intervals from a sequence about 7 m thick across the Upper Tuff from two sections; one is the type Bapang Formation and the other is that about 200 m separated from it. The results of detailed paleomagnetic analyses show: (1) The main polarity boundary lies 120 cm above the Upper Tuff. (2) The transition accompanies three short reversal episodes; two below the main polarity boundary and one above it. (3) Very few transitional (excursion) paleomagnetic fields occur throughout the transition, except four fields having VGPs with southern latitudes lower than 45 degrees just below the main polarity boundary. (4) Relative paleointensity represents a broad low between the lower two short reversal episodes before the main polarity boundary. It gradually increases with a peak above the second short episode, followed by a gradual decrease across the main polarity boundary. Another low occurs around the third episode, and subsequently a rapid intensity recovery occurs. Here we take notice of the multiple occurrences of short reversal episode, the paleointensity variation pattern and its timing with short episode occurrences, and few occurrences of excursion directions. These features are consistent with millennial to centennial scale features of the Matuyama-Brunhes transition from the high accumulation rate (50-60cm/kyr) Osaka Bay sediments. At present, with respect to the lower Jaramillo and Olduvai reverse-to-normal polarity transitions, there is no observation of such features, and rather absence of multiple short reversals was confirmed by detailed paleomagnetic analyses for the latter. Therefore, the polarity transition around the Upper Tuff in the Bapang Formation is certainly correlated to the MBB. The stratigraphic level of the MBB is consistent with the tektite horizon observed at two separated sites, between the Upper and Middle Tuffs. The MBB constrains the younger limit for the uppermost level of *Homo erectus* fossil occurrence in Sangiran. The present study is the first case that polarity transition features are used to characterize a polarity boundary in magnetostratigraphy.