

Multiple rapid polarity swings during the Matuyama-Brunhes transition from two high-resolution loess-paleosol records

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Two high-resolution magnetic records of the Matuyama-Brunhes (M-B) transition have been obtained from Xifeng and Baoji loess-paleosol sequences in the Chinese Loess Plateau (CLP). The results of stepwise thermal and alternating field (AF) demagnetizations confirm that both treatments are effective to isolate characteristic remanent magnetization (ChRM) from specimens of loess-paleosol sediments which suffer weak pedogenesis, and that AF demagnetization undoubtedly fails to isolate ChRM from specimens of paleosol sediments which suffer strong pedogenesis. Based on virtual geomagnetic pole (VGP) latitudes crossing the virtual geomagnetic equator, the M-B transition accompanies at least 15 rapid polarity swings. Rock magnetic experiments and anisotropy of low-field magnetic susceptibility show that high-frequency polarity swings during the M-B transition cannot be attributed to rock-magnetic and/or sedimentary causes. Extrapolating a constant accumulation rate between the Jaramillo-Matuyama (J-M) and M-B boundary ages, the whole M-B transition at both Xifeng and Baoji sections is estimated to span a duration more than 10 ka. Durations of each short polarity episode are estimated to range from about 0.3 ka to 5.6 ka. Our new results, combined with previous paleomagnetic observations from lavas and marine sediments, support that multiple rapid polarity swings occur during the M-B transition, and that the M-B transition may have taken considerably longer times to complete.