

## Multiple rapid polarity flips within the Gauss-Matuyama geomagnetic transition record from central Loess Plateau, China

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Multiple rapid polarity swings within the Gauss-Matuyama geomagnetic transition were recently reported from deep sea sediment and Chinese loess. A paleomagnetic study in Baoji loess/paleosol section, southern Chinese Loess Plateau, has identified 29 rapid polarity flips during the Gauss-Matuyama transition. However, other paleomagnetic studies of the Gauss-Matuyama transition in Loess Plateau have failed to clarify detailed feature of the reversal because of long sampling intervals. In order to test the high frequency polarity flips in the Gauss-Matuyama geomagnetic reversal records reported from Baoji, we performed detailed paleomagnetic analyses at a sampling intervals of 2.5cm throughout L33 loess layer of Lingtai loess/paleosol section, located 60 km north of Baoji.

Low-field magnetic susceptibility and anhysteretic remanent magnetization (ARM) within L33 is relatively low and constant except for some minor peaks, suggesting low and uniform degree of pedogenesis throughout L33. Dominant magnetic carriers were identified to be magnetite with slight oxidization and hematite, and did not significantly vary within L33, according to thermomagnetic analyses and thermal demagnetization of low-temperature magnetization.

Stepwise thermal demagnetization revealed a high temperature ChRM up to 680 deg. C with normal, reverse and transitional polarities, after removal of a low temperature viscous overprint below 200-300 deg. C. The polarity of the high temperature component within L33 changed from normal to reverse through a transition zone ranging 2.58 m. A notable feature of the transition zone is that it consisted of 22 short episodes transited by 23 rapid paleomagnetic polarity flips. The transition lasted for 9.5 kyrs estimated based on the astronomically tuned loess-paleosol chronology with the constant accumulation rate within L33 loess.

The duration and frequency of polarity flips discovered in Gauss-Matuyama reversal record from Lingtai were comparable to those from Baoji, although each polarity flips did not correspond one by one. Moreover, all millennial-scale features of Gauss-Matuyama reversal record from Baoji, summarized as follows, can be recognized in that from Lingtai: (1) short reversed episode GM28, (2) stable normal episode GM27, (3) frequent polarity flips between GM26 and GM18, (4) stable normal episode GM17, (5) few polarity flips between GM16 and GM13, (6) dominance in reversal polarity between GM12 and GM8, (7) dominance in normal polarity between GM7 and GM3, (8) reversal episode GM2 and (9) normal episode GM1. These agreements confirmed that a geomagnetic transition, which included more than 20 polarity reversals, had actually occurred in central to southern Loess Plateau.