

Decadal-centennial scale features of the Matuyama-Brunhes magnetic reversal

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The Matuyama-Brunhes magnetic reversal is the youngest and most investigated reversal on record, and this has greatly furthered our understanding of the geodynamo by providing detailed records of a highly dynamic change of the earth's magnetic field. Recent paleomagnetic observations in various localities reveal many centennial-scale changes during the reversal. However, we have never observed sub-centennial scale features. Here, we report a 10-yr resolution record of the Matuyama-Brunhes transition (MBT) from a marine sequence from the Chiba Section, central Japan. The record is based on paleomagnetism mainly carried by greigite and an astronomical age model. The transition spans about 9000 yr in total, consisting of two precursory events, the main transition, and rebound. There are two precursory events characterized by multiple polarity swings. The first event occurred in the earliest marine isotope stage (MIS) 19 and spans ca. 1100 yr; the second occurred just after highstand MIS 19.3 and spans ca. 100 yr. The main MBT spanning ca. 2000 yr has nine large directional swings in both inclination (> 50 deg.) and declination (> 100 deg.). The main MBT is postdated by three steep inclination events persisting for 40–70 yr within about 300 yr, regarded as rebounds. Besides these features, there is an interval characterized by large declination fluctuations persisting for about 1200 yr around highstand MIS 19.3. Some of these centennial scale features can be seen in previous high-resolution MBT records from other locations around the world.

キーワード：マツヤマーブリュンヌ極性トランジション、地磁気逆転、千葉セクション、堆積残留磁化、堆積化学残留磁化

Keywords: Matuyama-Brunhes polarity transition, Geomagnetic reversal, Chiba Section, depositional detrital remanent magnetization, depositonal chemical remanent magnetization