中国レスの磁気・粒度分析に基づく海洋同位体ステージ19の東アジアモンスーン変動

East Asian Monsoon variations in marine isotope stage 19 by magnetic and grain size data of Chinese loess deposits

*上野 友輔[1]、兵頭 政幸[1,2]、楊 天水[3]
*Yuusuke Ueno[1], Masayuki Hyodo[1,2], Tianshui Yang[3]

1.神戸大学大学院惑星学専攻、2.神戸大学内海域環境教育研究センター、3.中国地質大学
1.Department of planetology, Kobe University, 2.Research Center for Inland Seas, Kobe University, 3.State Key Laboratory of Biogeology and Environmental Geology, China University of Geosciences

Marine isotope stage (MIS) 19 is an important target of study, because of its similarity with the Holocene in term to orbital element, and occurrences of the last geomagnetic polarity reversal and cooling event. Loess-paleosol deposits in the Chinese Loess Plateau (CLP) are a good archive of the climate changes of glacial-interglacial cycles and paleomagnetic variations. Thus, loess-paleosol deposits provide a good opportunity to study the climate of MIS 19 and the Matuyama-Brunhes transition (MBT).
We analyzed magnetic susceptibility (MS), frequency dependence (FD) and grain size (GS) of loess-paleosol deposits from two sections in the CLP, to restore detailed monsoon variation in MIS 19. In paleoclimate studies in the CLP, MS is regarded as a proxy of summer monsoon intensity, and GS as that of winter monsoon intensity. The sections are about 7 and 8 m thick, which are from Xifeng in Central CLP and Lingtai about 100 km south of Xifeng, respectively. Specimens were collected at about 2.5 –30 cm intervals. Detailed paleomagnetic analyses, which have been already carried out, reveal the Matuyama-Brunhes transition (MBT) with multiple polarity swings in both sections.
In both sections, MS and FD show similar variations well correlated with the glacial sea-level or ice volume changes indicated by marine oxygen isotope data, having two peaks correlated to highstands MISs19.3 and 19.1, respectively, and a minimum to lowstand MIS19.2. Only the Lingtai section has low MS and FD interval correlated to MIS 20.2. Median GS and the percentage of coarse grains (CG) (Xifeng: φ>16 μm, Lingtai: φ>20 μm) show grains become coarse as MS decreases or summer monsoon intensity weakens at MISs 20.2 and 19.2. These results suggest that both of summer and winter monsoon intensities are essentially controlled by orbital forcing, especially by the precessional component. Therefore, weak winter monsoon is expected to occur during a warm period correlated to highstand. However, coarsening occurs many times in the strong summer monsoon interval correlated to MIS 19.3. In Lingtai, the maximum mean GS almost reaches to that of the glacial period (MIS 20.2). We define the anomalous interval as intensified winter monsoon zone (IWMZ). The uppermost part of the IWMZ is overlapped with the MBT. Many marine core data show the MBT is preceded by a long interval of low paleointensity that starts from around highstand MIS 19.3. The temporary winter monsoon strengthening during the summer monsoon peak may be related to the MB reversal, especially to the low paleointensity.

キーワード：冬季モンスーン、マツヤマーブリュンヌ境界、中国黄土高原、海洋酸素同位体ステージ19、帯磁率、粒径
Keywords: winter monsoon, Matuyama-Brunhes boundary, Chinese Loess Plateau, MIS 19, magnetic susceptibility, grain size

