A preliminary result of paleowind variations in Hungary during MIS 19 from loess-paleosol deposits

*Yusuke Ueno[1], Balazs Bradak[2], Masayuki Hyodo[2], Erzsebet Horvath[3], Tamas Vegh[3], Diana Csonka[3], Jozsef Szeberenyi[4]

1. Department of planetology, Kobe University, 2. Research Center for Inland Seas, Kobe University, 3. Department of Physical Geography, Eotvos Lorand University, Budapest, H-1117, Hungary, 4. Geographical Institute, Research Centre for Astronomy and Earth Sciences (HAS), 45 Budaorsi St., H-1112 Budapest, Hungary

Marine Isotope Stage (MIS) 19 is a unique interglacial that occurs around the minimum amplitude insolation variation of eccentricity component at 65 deg N, and thus has been a target for a number of paleoclimate studies. In East Asia, numerous studies revealed detailed paleomonsoon variations for MIS 19 using loess-paleosol deposits in Chinese Loess Plateau (CLP), and discussed continental climate changes. Despite the well-studied CLP, the detailed paleoclimate reconstruction of MIS19 is missing in Europe. The similarities and differences between the characteristic of the East Asian monsoon and the European paleoclimate have not been revealed yet. We analyzed loess-paleosol deposits in the European Loess Belt (ELB) in order to reconstruct detailed inland climate changes in Europe during MIS 19, to evaluate its relation to the global paleoclimate.

Quasi-continuous sampling was elaborated at Paks brickyard, about 150-km south of Budapest (Hungary), where about 60-m thick loess paleosol sequence lies on the right bank of River Danube. The studied sequence is dated back to Early to Late Pleistocene. The Matuyama-Brunhes magnetic polarity transition was reported in various stratigraphic positions around the PD_1 and PD_2 paleosol complex. Oriented samples were collected at 2.5-cm depth intervals from an about 380 cm thick section, ranging from paleosol PD_1 to PD_2. We conducted magnetic and grain size analyses of the samples. Low field magnetic susceptibility (kLF) and frequency dependence of magnetic susceptibility (kFD) show consistent variations, having a large peak in each of paleosol PD_1 and PD_2, and a minimum at the loess horizon between them. We tentatively correlate the lower peak with MIS 19.3, the upper with MIS 19.1, and the minimum with MIS 19.2. The kLF gradually decreases upward from the lower peak, and has a temporal stagnation of decrease on the way at 208~256 cm in depth, that probably lies between MIS 19.3 and 19.2. The result of grain size analyses shows that the median size inversely correlates well with kLF and kFD, namely large kLF and kFD samples have small grain sizes, and vice versa. The relation is the same with the loess-paleosol deposits in CLP. However, we find that the content of fine grains ($< 8\ \mu m$) shows no vertical changes, namely almost constant, while coarse grains ($> 8\ \mu m$) show variations, consistent with median size. We interpret the results as surface winds, carrying coarse grain over short distances, weakened in the warm-moist periods, and strengthened in the cool-dry period, whereas, compare to that winds, the intensity of high altitude winds, carrying fine grain over long distances, such as the Westerlies, has no large variation.

The paleoclimate records from Hungary were compared to those from Lingtai in the CLP during MIS 19. The kLF and kFD of both sites show quite consistent variations. In addition, the characteristic temporal stagnant of kLF decrease observed in Paks is also confirmed in the Lingtai record. The grain size records of both sites show consistent changes that the grain size decreases in the pedogenic zones, and increases in the less pedogenic zone. This record reveals the similarities between the influence of various wind system in the ELB and in CLP: the surface wind (winter monsoon), probably weakened in the warm-moist periods, and strengthened in the cool-dry period. The similarities between the paleoenvironment in ELB and CLP reveal a possible link between Europa and East Asian inland climates during MIS 19.

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