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Reconstruction of the Pleistocene climate change in the Middle Dnieper area on the basis of rock magnetic, palaeopedological and pollen studies of two reference loess-palaeosol sequences

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Palaeoclimatic reconstructions including rock magnetic, magnetostratigraphic, palaeopedological and pollen studies were performed on two reference Ukrainian loess-palaeosol sequences at Stari Kaydaky and Vyazivok, located within the Middle Dnieper River Basin. The results have shown that rock magnetic palaeoenvironmental proxies, primarily magnetic susceptibility (MS), are clearly correlated with the marine isotope record (MIS), being enhanced in the palaeosols compared to the loesses. The background susceptibilities of the Stari Kaydaky and Vyazivok sections are both in the range of 7×10^{-8} to $10 \times 10^{-8} \text{ m}^3 \text{ kg}^{-1}$, which is a half of those at the Danube Basin loess sites. The good correspondence of the MS curve with changes in the marine $\delta^{18}\text{O}$ signal, provides a strong evidence for correlating the Pryluky/Kaydaky (S1) pedocomplex at Stari Kaydaky and Vyazivok to MIS 5, and the welded Zavadiivka (S3/S4) pedocomplex to MIS 9–11. In the Upper Pleistocene deposits, the well developed Luvisol of the Kaydaky unit has a pollen succession of the last interglacial, with high percentages of broadleaf trees' pollen indicating the early and late temperate phases of the interglacial. Relatively high pollen percentages of broadleaf trees are observed in the Greyzem of Lower Pryluky subunit (the correlative of MIS 5c) and indicate the south-boreal, transitional to temperate, climate. The Upper Pryluky Cambisols and Chernozems (MIS 5a) formed under boreal forest-steppe and steppe, as well as the Vytachiv soils (L1S1, MIS 3). Pollen assemblages from the Uday (L1L2) and Bug (L1L1) loesses reflect tundrasteppes in the north of the studied area and dry periglacial steppe in its southern part. The Late Middle Pleistocene is represented by three interglacial pedocomplexes (correlatives of MIS 11, 9 and 7), with the larger proportions of broad-leaved trees' pollen in the lower forest soils. Judging from these indices, the climates were warmer than during the last interglacial. Only the upper soils of the MIS 7 formed in the cooler climate. Indicative *Pterocarya* pollen occur in the MIS 11 soil. During the Early Middle Pleistocene, the temperate climate was typical for the pedocomplex correlated with MIS 13, whereas the older red-brown and dark-brown clayey soils formed in warm-temperate climate (their palynospectra include pollen of thermophilic Neogene relics). At Vyazivok, the Matuyama/Brunhes (M/B) boundary has been detected in the lower part of the Shyrokyne (S7?) soil unit, providing an ultimate chronological benchmark of 780 ka. The Kryzhanivka pedocomplex, located below the M/B boundary, formed in subtropical climate. Preliminary investigations at Stari

Kaydaky did not detect the M/B boundary within the studied upper part of the Shyrokyne unit. Pseudo-single-domain/multi-domain magnetite and hematite particles are the main magnetic carriers of the loess and palaeosol ChRMs. The reconstructions demonstrate a correspondence between the pollen and soil sequences and other palaeoenvironmental records including rock magnetic data.

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