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Multi-proxy analytical characterisation and palaeoclimatic interpretation of the Crvenca loess-palaeosol sequence, Serbia

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Over the past years there has been increasing fossil charcoal and malacological evidence from loess-palaeosol sequences in the Carpathian (Pannonian) Basin that call into question the traditional paradigm of treeless full glacial palaeoenvironments. In order to contribute to this discussion we recently analysed plant-derived n-alkanes and evaluated their potential to serve as biomarkers for the reconstruction of the vegetation history during the last glacial cycles (Zech et al., 2009, Eiszeitalter und Gegenwart – Quaternary Science Journal, submitted). Accordingly, trees contributed significantly to the soil organic matter formed during loess accumulation under full glacial conditions (Marine Oxygen Isotope Stages (MIS) 4 and 2). On the contrary, grass steppe palaeoenvironments should have prevailed during the last interglacial and interstadial (MIS 5 and 3).

Here we aim at putting our biomarker results in a closer context with results from other methodological approaches. We will present first results from elemental, isotopic, grain size, magnetic and luminescence analyses and palaeoclimatic and palaeoenvironmental proxies that can be derived from these data. For instance, organic carbon, nitrogen, delta13C and delta15N allow to characterize the soil organic matter, its turnover and to draw palaeoclimatic implications. Inorganic element ratios and indices allow to quantify the mineral weathering and to study the provenance of the eolian sediments. The grain size distributions are evaluated in terms of wind-strength dependent variations of the silt fraction and in terms of pedogenetic clay mineral formation. The latter can be confirmed by the magnetic susceptibility.

All proxies reveal clearly marked changes of the palaeoclimatic and palaeoenvironmental conditions at the transitions from glacial to interglacial periods and vice versa. On the contrary, the differences between the glacial and the interstadial periods are less pronounced. This is in agreement with the typical Late Pleistocene loess-palaeosol stratigraphy of the Vojvodina region and allows the application of the regional stratigraphic nomenclature proposed by Marković et al. (2008, Journal of Quaternary Science 23, pp. 73-84).