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Humid glacials, arid interglacials? Results from a multiproxy study of the loess-paleosol sequence Crvenka, Serbia

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The loess-paleosol sequences in the Carpathian Basin, southeast Europe, are up to tens of meters thick and provide valuable archives for paleoenvironmental and –climate change over several glacial-interglacial cycles. The Crvenka section spans the full last glacial cycle and is used in this multi-proxy study to reconstruct past climate conditions. Crvenka features the characteristic pattern in terms of grain size and weathering intensity, i.e. finer grain sizes and more intensive weathering in the paleosols compared to the glacial loess units. The analysis of plant-derived long-chain n-alkanes as molecular biomarkers for past vegetation indicates the presence of trees during glacials, which is consistent with other e.g. macrofossil findings and the notion that parts of southeast Europe served as tree-refugia. However, virtually tree-less grass steppes are reconstructed for the Eemian, the last interglacial. More humid conditions during glacials and more arid conditions during interglacials would be in good agreement with lake-level reconstructions from the Dead Sea, but they seem to be at odds with traditional interpretations of pollen and stable isotope records for the Mediterranean region.
In order to further contribute to this issue, we performed compound-specific D/H analyses on the most abundant alkanes C29 and C31, which should mainly record past changes in the isotopic composition of precipitation. The absence of a clear signal towards more depleted values during glacials shows that the temperature-effect is not dominant and probably offset by a strong source-effect, namely the enrichment of the Mediterranean sea water during glacials. This very same source effect may generally need to be taken into account when interpreting terrestrial isotope records in the Mediterranean, which implies that more positive values during glacials may not necessarily indicate an amount-effect and more arid conditions.