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Geochemical evidence of a specific atmospheric circulation on Balkan during last glaciation

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Isotopic organic geochemistry (δ^{13}Corg) study has been applied to the Surduk loess-paleosol sequence in Serbia in parallel with other proxy studies like grain size, pedology, paleomagnetism, stratigraphy... The studied record covers the last climate cycle from the last interglacial through the present interglaciation with sedimentation rates as high as 0.6 mm.yr^{-1} at the onset of the Pleniglacial.

The Serbian sequence provides a high temporal resolution isotopic record that characterizes paleoclimate rapid events of the last glaciation in the Middle Danube Valley. Furthermore, it has been shown that, due to the specific sedimentation conditions (high accumulation, cold and arid meteorological conditions) and if adequate chemical treatment is applied to sediment, typical loess δ^{13}Corg nicely reflects the original vegetation isotopic composition. Conversely paleosol δ^{13}Corg can only be interpreted in terms of qualitative paleoenvironmental variations because of pedogenesis impacts on the original vegetation isotopic signature. Organic geochemistry investigations allow also the characterization in terms of environmental parameters (e.g. precipitation annual distribution) of short events recorded concomitantly by all investigated proxies.

Here we highlight here the cornerstone location of the Middle Danube Valley in the past atmospheric circulation pattern. By showing the first definitive punctual occurrence of C4 plants for at least 4 episodes while other loess sequences in western European loess sequences showed presence of the solely C3 plants along the last glaciation, the Surduk δ^{13}Corg record underlines quite different atmospheric influences that leaded for drastic aridity during these episodes.

By gathering our record with other continental and Eastern Mediterranean Sea records, we propose a schema of atmospheric circulation that prevailed during these C4 episodes.