

Stable isotopes in loess-paleosol-sequences from the Carpathian Basin – methodological challenges and paleoenvironmental implications

S. Pötter¹, A. Schmitz¹, P. Schulte¹, A. Lücke², H. Wissel², M. Zech³, I. Obreht⁴,
S. B. Marković⁵, F. Lehmkuhl¹

¹*Department of Geography, RWTH Aachen University, Aachen, Germany;* ²*Institute of Bio- and Geosciences, Agrosphere (IBG-3), Forschungszentrum Jülich GmbH, Germany;* ³*Institute of Geography, Technical University of Dresden, Germany;* ⁴*Organic Geochemistry Group, MARUM-Center for Marine Environmental Sciences and Department of Geosciences, University of Bremen, Germany;* ⁵*Chair of Physical Geography, University of Novi Sad, Serbia*

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The loess-paleosol-sequences of the Carpathian basin play a crucial role in understanding the palaeoclimatic evolution of this complex landscape. Among other proxies, stable organic carbon and bulk nitrogen isotopes can be used to interpret past vegetation patterns and qualities of ecosystems, respectively. Here, we present these proxies for two loess-paleosol-sequences from the southern Carpathian Basin, in order to reconstruct the paleoclimatic commonalities and differences between the two sites. To ensure the reliability of our results, we conducted methodological tests concerning the complete decalcification of the samples prior to stable isotope analyses. Since residual carbonate distorts the carbon stable isotope signal of a sample towards enriched values, complete carbonate removal is crucial to obtain the “true” organic carbon stable isotope composition. We tested two different decalcification methods, direct treatment in pre-weighted tin boats and wet chemical acidification, as well as different treatment times for the latter method. Additionally, we performed a reproducibility test on selected samples with low TOC content to estimate the uncertainty of measured organic carbon stable isotope values of those samples. We suggest methodological tests prior to stable isotope studies, in order to obtain reliable results. Besides the methodological advances of our study, the stable carbon isotopes show no indicators for C₄-vegetation in the southern Carpathian Basin. Striking conformities in the development of the stable nitrogen isotope records between the investigated sites bear potential for further, more detailed studies.