

## Reconstructing paleoenvironmental conditions at the Gravettian settlement site Krems-Wachtberg, Lower Austria, using *n*-alkane biomarkers

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Loess-paleosol sequences (LPS) are prominent terrestrial paleoenvironmental archives, containing information about ecological and climatic changes throughout the Quaternary. Moreover, last glacial LPS in Central Europe provide important information on the landscape dynamics during the first arrival of anatomically modern humans. However, changes in dust accumulation rates over time can complicate interpretations of many pedological and geochemical proxies (Zech et al. 2013). There is an obvious need to further develop new quantitative methods.

The Gravettian settlement site Krems-Wachtberg comprises a ~8 m thick well-resolved LPS which formed between ~40 – 20 ka and is famous for its archeological findings. Various pedological, sedimentological and geochemical investigations have revealed millennial-scale paleoenvironmental fluctuations during the marine isotope stage (MIS) 3 to MIS 2 transition (Terhorst et al. 2013). This study aims at complementing these reconstructions through high-resolution analysis of leaf-wax derived long-chain *n*-alkanes. Alkanes can be preserved in LPS and serve as molecular fossils (biomarkers) for past changes in vegetation.

At the site of Krems-Wachtberg the complementary profiles that comprise the whole LPS were sampled equidistantly in 10 cm intervals. The free lipids then were separated via solvent extraction (Dionex ASE 200) and quantified on a GC-FID (gas chromatography-flame ionization detector).

Our results show that *n*-alkanes occur in relatively high concentrations at Krems-Wachtberg (ranging from 0,34 to 1,79 µg/g sediment). The odd over even predominance (OEP) ranges between 7,32 and 19,44 and indicates the good preservation of *n*-alkanes at this site. The abundance of long chains (C<sub>31</sub>, C<sub>33</sub>) suggests a dominant contribution of *n*-alkanes derived from grasses and herbs throughout the whole profile, while deciduous trees and shrubs (represented by C<sub>27</sub>, C<sub>29</sub>) probably contributed much less (Zech et al. 2009, Zech et al. 2013).

Ongoing work aims at (i) corroborating and quantifying these findings using also leaf-wax derived long-chain fatty acids, (ii) complementing the paleoclimate

reconstructions using compound-specific stable isotope analyses ( $\delta\text{D}$  and  $\delta^{13}\text{C}$ ), and (iii) compound-specific radiocarbon measurements.

## Zitate

- Terhorst B, Kühn P, Damm B, Hambach U, Meyer-Heintze S, Sedov S. 2013: Paleoenvironmental fluctuations as recorded in the loess-paleosol sequence of the Upper Paleolithic site Krems-Wachtberg. *Quaternary International*: in press.
- Zech M, Bugge B, Leiber K, Marcović S, Glaser B, Hambach U, Huwe B, Stevens T, Sümegi P, Wiesenberg G, Zöller, L. 2009: Reconstructing Quaternary vegetation history in the Carpathian basin, SE Europe, using n-alkane biomarkers as molecular fossils – Problems and possible solutions, potential and limitations. *E & G Quaternary Science Journal* 58, 2: 148 – 155.
- Zech R, Zech M, Marković S, Hambach U, Huang Y. 2013: Humid glacials, arid interglacials? Critical thoughts on pedogenesis and paleoclimate based on multi-proxy analyses of the loess-paleosol sequence Crvenka, Northern Serbia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 387: 165 – 175.