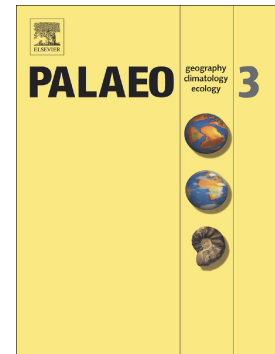


Accepted Manuscript

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PII: S0031-0182(17)30121-9
DOI: doi: [10.1016/j.palaeo.2017.09.010](https://doi.org/10.1016/j.palaeo.2017.09.010)
Reference: PALAEO 8441

To appear in: *Palaeogeography, Palaeoclimatology, Palaeoecology*

Received date: 6 February 2017
Revised date: 8 September 2017
Accepted date: 11 September 2017

Please cite this article as: Anna Potůčková, Petra Hájková, Pavla Žáčková, Libor Petr, Tomáš Matys Grygar, Martin Weiser, Spatiotemporal heterogeneity of the palaeoecological record in a large temperate lake Šúr (SW Slovakia): Comparison of pollen, macrofossil and geochemical data, *Palaeogeography, Palaeoclimatology, Palaeoecology* (2017), doi: [10.1016/j.palaeo.2017.09.010](https://doi.org/10.1016/j.palaeo.2017.09.010)

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Spatiotemporal heterogeneity of the palaeoecological record in a large temperate lake Šúr (SW Slovakia): comparison of pollen, macrofossil and geochemical data

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Abstract

Aquatic macrophytes living within shallow lakes are particularly sensitive to climate change and fluctuations in water depth. In the Dabubian Lowland of southwestern Slovakia, sediments from the large, shallow, palaeolake Šúr provide a unique opportunity to reconstruct changes in water depth to analyze succession within local aquatic and terrestrial vegetation. Here, we used a multi-core, multi-proxy approach (macrofossils, pollen, and geochemistry) in order to reconstruct water depth changes and its influence on aquatic and terrestrial vegetation succession during the Holocene. Additionally, we also consider how heterogeneity in proxy data varied across time and space. Using particular macrophyte taxa found in the macrofossil assemblage, which have specific water depth requirements, our results demonstrate changes in water depth created a long-term mosaic of vegetation succession. In the Early Holocene, aquatic macrophytes suggest the water column was high (>100 cm). During the Middle Holocene, water depths decreased creating mosaics of aquatic succession. By ca 4200 cal yr B.P., terrestrialization had occurred in palaeolake Šúr. Regional vegetation succession was likely more influenced by the presence of fluvial sands and/or by low precipitation and high evaporation rates, which delayed the expansion of temperate trees and favoured *Pinus* until 8850 cal yr B.P. Macrofossils exhibit the lowest temporal variation among all proxies, which suggests a rather stable macrophyte community when water depth was high. Pollen data show very low spatial variation given by the size of the accumulation basin, which reflects regional pollen rain. Higher spatial variation was observed in the geochemistry and macrofossil data compared to the pollen data, which could be the result of different mosaics of aquatic plants, local dispersion of propagules, or changes in sediment types. We conclude that changes in water depth were not homogenous, but rather heterogeneous in space and time.

Keywords

Palaeorecord heterogeneity; Multi-proxy; Palaeohydrology; Lake ecosystem; Lake ontogeny; Pannonian Basin

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