Using testate amoebae to infer Holocene palaeohydrological history in the Northern Carpathians, Romania

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As natural and anthropogenic ecosystems are entirely dependent on the local water availability, understanding past changes in hydro-climate is a priority in research concerning past climate variability. For this purpose, ombrotrophic bogs are most suitable for hydro-climate reconstructions as they are entirely dependent on water from precipitations.

We used radiocarbon dating, testate amoebae (TA) and pollen analysis of a peat profile extracted from an ombrotrophic bog (Tăul Muced) located in the Rodna National Park, Romania, to identify major changes in the wet-dry ecological gradient over the last 8000 years. We performed a quantitative reconstruction of the local depth to water table (DWT) and pH variation using the transfer function developed on a Polish modern testate amoebae data set and compared our reconstruction with other palaeohydrological studies in this region. The pollen record was used to determine regional vegetation dynamics as well as the potential impact of humans on peatland dynamics.

Based on the changes in TA assemblages over tine we identified six main wet-dry stages in the mire surface conditions. Wet mire surface conditions with a pH between 2 and 4.5 were recorded between 4600-2750 and 1300-400 cal. yr BP by the occurrence of *Archerella flavum*, *Amphitrema wrightianum* and *Hyalosphenia papilio*. Dry mire surface conditions and pH between 2.5 and 5 were inferred by the dominance of *Nebela militaris*, *Difflugia pulex* and *Phryganella acropodia* between 7550-4600, 2750-1300 and 0-50 cal. yr BP. In the period between 400 and -50 cal. yr BP, the surface of the bog is characterized by a rapid shift from dry to wet conditions. The surrounding landscapes were forested (primary *Picea abies)* throughout the entire period. A distinct decline in the forest extent, in particular of *P. abies* started at 1000 cal yr. BP and intensified over the past 100 years, coinciding to an increase in pollen types associated with human impact. This suggests that at least until 100 years ago, human activities likely have not significantly affected the water table of this bog.

Our reconstruction, one of the few in the CE Europe, shows contrasting conditions to others records from NW Europe. However, it remains in relatively good agreement with palaeohydrological studies from the Central Eastern Europe. One of the most important aspects of our study is that it provides valuable information on changes in local hydrology. These puts an accent on the need of spanning TA based hydro-climate studies to a larger scale and to determine whether a regional modern data set for transfer function isn't more suited for our local climate reconstructions.