



## **Functional traits of testate amoebae and multi-proxy data unveil exceptional Baltic bog ecohydrology, autogenic succession and climate change during the last 2000 years in CE Europe**

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We studied two peat cores from the Baltic raised bog (Mechacz Wielki in NE Poland). We aimed to separate signal of extrinsic and intrinsic forcing of the raised bog development using multi-proxy high-resolution approach. Using testate amoebae transfer function, we found that the bog revealed exceptionally stable hydrological conditions during the last 2k with a relatively high water table and lack of local fire events that allowed for rapid peat accumulation (2.75 mm/year) in the bog. Furthermore, the strong correlation between pH and community-weighted mean of testate amoeba traits suggests that other variables than water-table depth play a role in driving microbial properties under stable hydrological conditions. There is a difference in hydrological dynamics in bogs between NW and NE Poland until ca CE 1500, after which the water table reconstructions possess more similarities. Our data suggest a common regional climatic forcing in Mechacz Wielki, Gązwa and Kontolanrahka. Though it may still be too early to attempt a regional summary of wetness change in the southern Baltic region, this study is a next step to better understand the long-term peatland palaeohydrology in NE Europe. We suggest that extrinsic factors (climate) played an important role as a driver in mire development during the bog stage (AD 500–2012). Our results also show how various functional traits relate to different environmental variables in a range of trophic and hydrological scenarios on long time scales.