TESTATE AMOEBAE AS THE PALAEOHYDROLOGICAL INDICATORS IN PEATLAND ARCHIVES - POLISH EXPERIENCE

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We present testate amoebae analysis as a reliable tool for paleohydrological reconstruction as well as for the monitoring of natural and human-impacted mires – e.g. Polish Baltic bogs.
Testate amoebae are unicellular organisms that produce a test (shell), which protects their cytoplasm. These protists represent a valuable tool in palaeohydrological studies in Sphagnum mires. In peatlands, testate amoebae live in mosses and the upper, oxygenated part of the peat. They are very sensitive to water table changes and, to a lesser extend also to pH: Some species occur in moist, slightly acidic hollows and others in dry very acidic Sphagnum hummocks. During the vegetation season testate amoebae produce many generations. When conditions become less favorable, (e.g. winter or temporary desiccation in summer), they encyst or die. After they die, empty tests are preserved in peat together with the remains of plants and some other organisms and become part of peat archive. Peat sediments provide a unique opportunity to reconstruct past hydrological changes in mires on the basis of testate amoebae.
To reconstruct water table changes quantitatively a good modern data set is required. For Poland such a data set was recently created from surface samples from Tuchola Pine Forest. The gathered data allowed us to model the response of species (optimum and tolerance) to environmental variables. Subsequently, this training set was used for inference of past hydrological conditions from Sphagnum mires in northern Poland, Tuchola and Jelenia Wyspa, located on Tuchola sandur area were analyzed. We reconstructed the past water table change from testate amoebae. In addition, plant macrofossils and palynological analyses were used to reconstruct changes in the local and regional vegetation and the history of human impact. AMS radiocarbon dates were obtained from the peat to provide a time scale. In Tuchola mire we obtained records of water table change for nearly the entire Holocene while the data for Jelenia Wyspa mire covered the last 2000 years. We observed correlations between the testate amoebae inferred hydrology and climate changes and human activities (e.g deforestations).