



How do climate and human impact affect Sphagnum peatlands under oceanic-continental climatic conditions? 2000 years of fire and hydrological history of a bog in Northern Poland

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Climate change affects many natural processes and the same applies to human impact. For instance, climate change and anthropogenic activities may cause increased fire activity or change peatland dynamics. Currently, it is still unknown how Sphagnum peatlands in the oceanic-continental transition zone of Poland may respond to combined effects of heat waves, drought, and fire. The aim of the study was to reconstruct the last 2000 years of palaeohydrology and fire history at Linje bog in Northern Poland. The main task was to determine the drivers of fire episodes, particularly to identify climatic and anthropogenic forcing. A two-meter peat core was extracted and subsampled with a high resolution. Micro- and macroscopic charcoal analyses were applied to determine past fire activity, and the results compared with palaeohydrological reconstructions based on testate amoeba analysis. Palynological human indicators were used to reconstruct human activity. A depth-age model including 20 ¹⁴C dates was constructed to calculate peat accumulation rates and charcoal influx. We hypothesised that: 1) fire frequency in Northern Poland was determined by climatic conditions (combination of low precipitation and heat waves), as reflected in peatland water table, and that 2) past fire episodes in the last millennium were intensified by human activity. Furthermore, climate may have influenced human activity over harvest success and the carrying capacity. Our study shows that fire was important for the studied ecosystem, however, its frequency has increased in the last millennium in concomitance with land use activities. Landscape humanization and vegetation opening were followed by a peatland drying during the Little Ice Age (from ca. AD 1380). Similarly to other palaeoecological studies from Poland, Linje peatland possessed an unstable hydrology during the Little Ice Age. Increased fire episodes appeared shortly before the Little Ice Age, and most severe fires were present in the time when recorded water table was the lowest.

We acknowledge the support of RE-FIRE SCIEX project 12.286 and grant PSPB-013/2010 from Switzerland through the Swiss Contribution to the enlarged European Union.