



Unveiling the impact of fire on Sphagnum-dominated peatlands located along the oceanic-continental climatic gradient – a 5700 year-long history

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The area of Poland is not considered to be fire-prone, both currently and historically. For this reason, studies on the past fire activity in Poland are not extensive and limited to only a few single case studies. Fire activity is predicted to increase in many areas of the world due to progressing climate change, as predicted by various climatic models, also in the areas that currently are not experiencing frequent fires. Therefore, deepening the knowledge about past fire activity is especially important for nature conservation and management. Here we present results of the high-resolution study of past fire activity and hydrological changes in N Poland. We analysed microscopic charcoal from three Sphagnum peatlands located on the south of the Baltic Sea, on the oceanic-continental (west-east) climatic gradient, and reconstructed fire history over the last 5700 years. We hypothesized that air circulation patterns are highly important for local fire activity, and that fire activity has been more intensive in peatlands influenced by continental air masses. The study revealed that forest fires have been occurring regularly in the past millennia and were linked to climatic conditions and fuel availability, but the fire activity patterns were different between the sites. Fire activity was significantly higher in sites dominated by the continental climate (NE Poland) than in the site located under oceanic conditions (NW Poland). We recorded that microscopic charcoal influx was 13.3 times higher in the study site located on the eastern end of the gradient, compared to the site located in the west. Moreover, most of the recorded charcoal peaks occurred during high water tables. Last 400 years shown rising human pressure that caused droughts and water table instability, and the substantial increase in fire activity.

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