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Through fire and water – testing the synchronicity hypothesis of droughts and fires in northern Poland using peatland archives

Katarzyna Kajukało (1), Katarzyna Marcisz (1), Piotr Kołaczek (2), Dmitri Mauquoy (3), Michał Słowiński (4), and Mariusz Lamentowicz (1)

(1) Laboratory of Wetland Ecology and Monitoring, Department of Biogeography and Palaeoecology, Adam Mickiewicz University, Krygowskiego 10, 61-680 Poznań, Poland, (2) Department of Biogeography and Palaeoecology, Adam Mickiewicz University, Krygowskiego 10, 61-680 Poznań, Poland, (3) School of Geosciences, University of Aberdeen, Elphinstone Road, Aberdeen AB24 3UF, United Kingdom, (4) Department of Environmental Resources and Geohazards, Institute of Geography and Spatial Organization, Polish Academy of Sciences

We present the first results of a project which seeks to explore the synchronicity of droughts and fires along a continentality gradient during the last 5000 years. The research is based upon high-resolution, multi-proxy analyses of peat deposits in northern Poland. The aims of the project are to understand how long-term changes in climate and human impact influence the development of Polish peatlands on centennial and millennial timescales.

Here we present results from the Głęboczek peatland (Pomorskie voivodship) where we reconstructed long-term hydrological variability (based upon testate amoebae analysis) along with the past occurrence of fire using charcoal particles accumulated in peat (macro- and microscopic charcoal). The results are combined with pollen, plant macrofossil analyses and carbon accumulation rates changes to better understand the long-term ecosystem dynamics. An extensive radiocarbon chronology allows us to precisely reconstruct the disturbance frequency.

In the analyzed period, we detected rapid hydrological shifts and the occurrence of lake stages during the development of the peatland. We also recorded increased fire activity during the last millennium which could be linked with human activities. This multi-proxy approach is essential in order to disentangle human impacts from long-term climatic changes and to quantify anthropogenic disturbances in the environment.