



Lake ecosystem response to rapid lateglacial climate changes in lake sediments from northern Poland

Michał Słowiński (1,2), Izabela Zawiska (3), Florian Ott (1), Agnieszka M. Noryśkiewicz (4), Karina Apolinarska (5), Monika Lutyńska (6), Danuta J. Michczyńska (7), Achim Brauer (1), Sabine Wulf (1), Piotr Skubała (8), and Mirosław Błaszczewicz (2)

(1) GFZ German Research Centre for Geosciences, Section 5.2 – Climate Dynamics and Landscape Evolution, Telegrafenberg C, D-14473 Potsdam, Germany (michal@geopan.torun.pl), (2) Institute of Geography, Polish Academy of Sciences, Department of Environmental Resources and Geohazards, Toruń, Poland, (3) Department of Geoecology and Climatology, Institute of Geography and Spatial Organization, Polish Academy of Sciences, Warszawa, Poland, (4) Institute of Archaeology, Nicholas Copernicus University, Toruń, Poland, (5) Institute of Geology, Adam Mickiewicz University, Poznań, Poland, (6) Department of Geology and Quaternary Paleogeography, Adam Mickiewicz University, Poznań, Poland, (7) GADAM Centre of Excellence, Department of Radioisotopes Institute of Physics – CSE Silesian University of Technology, Gliwice, Poland, (8) Department of Ecology, University of Silesia, Katowice, Poland

During the Late Glacial Period environment changes were triggered by climatic oscillations which in turn controlled processes like, for example, permafrost thawing, vegetation development and ground water circulation. These environmental changes are ideally recorded in lake sediments and thus can be reconstructed applying a multi-proxy approach. Here, we present the results from the Trzechowskie paleolake, located in the northern Polish lowlands (eastern part of the Pomeranian Lakeland). The site is situated on the outwash plain of the Wda River, which was formed during the Pomeranian phase of the Vistulian glaciation ca 16,000 14C yrs BP. The depression of the Trzechowskie lake basin formed after melting of a buried ice block during the Allerød (13903±170 cal yrs BP).

We reconstructed environmental changes in the Trzechowskie paleolake and its catchment using biotic proxies (macrofossils, pollen, cladocera, diatoms, oribatidae mite) and geochemical proxies ($\delta^{18}\text{O}$, $\delta^{13}\text{C}$, loss-on-ignition (LOI), CaCO_3 content). In addition, we carried out $\mu\text{-XRF}$ element core scanning. The chronology has been established by means of biostratigraphyAMS14C dating on plant macro remains, varve counting in laminated intervals and the late Allerød Laacher See Tephra isochrone.

Our results showed that biogenic accumulation in the lake started during the Bølling. Development of coniferous forest during the Allerød with dominance of *Pinus sylvestris* lead to leaching of carbonates in the catchment due to low pH increasing the flux of Ca ions into the lake. In consequence calcite precipitating in the lake increased as evidences by increasing CaCO_3 contents. Both biotic and physical proxies clearly reflect the rapid decrease in productivity at the onset of the Younger Dryas.

We compare the data from the Trzechowskie paleolake with the Meerfelder Maar and Rehwiese lake records based on tephrochronological synchronization using the Laacher See Tephra.

This study is a contribution to the Virtual Institute ICLEA (Integrated Climate and Landscape Evolution Analysis) funded by the Helmholtz Association.