Geophysical Research Abstracts
Vol. 20, EGU2018-978-2, 2018
EGU General Assembly 2018

Leads and lags in sedimentation response to Younger Dryas climate change in a three lake cascade in northern Poland

Christin Lindemann (1), Florian Ott (1,2), Michał Słowiński (3), Rik Tjallingii (1), Birgit Plessen (1), Agnieszka M. Noryśkiewicz (4), Markus J. Schwab (1), Milena Obremska (5), Sabine Wulf (1), Mirosław Błaszkiewicz (3), and Achim Brauer (1)

(1) GFZ German Research Centre for Geosciences , 5.2 Climate Dynamics and Landscape Evolution , Germany (christin.lindemann@gfz-potsdam.de), (2) now at: Max Planck Institute for the Science of Human History, Department of Archaeology, Jena, Germany, (3) Polish Academy of Sciences Institute of Geography and Spatial Organization, Toruń, Poland, (4) Nicolaus Copernicus University, Faculty of History, Institute of Archaeology, Toruń, Poland, (5) Polish Academy of Sciences, Institute of Geological Science, Warsaw, Poland

Lake sedimentation responses to climate change are partly controlled by local catchment morphology and lake basin bathymetry. However, not much is known about the influences of these controlling factors on lake sedimentation and in particular geochemical proxies. Here, we compare high-resolution sedimentological and geochemical proxies (XRF element scanning, stable isotopes, bulk carbon and varve micro-facies) of three partly varved sediment records for their responses to Younger Dryas (YD) climate change. The YD is an ideal time window to study proxy signals in more detail because it represents the latest major and abrupt climate change.

Lake Głęboczek (JG), palaeolake Trzechowskie (TRZ) and Lake Czechowskie (JC) were formed by glacial hydrodynamic processes and are located within one catchment composed of mainly outwash plain deposits. The lakes form a cascade-chain. The close proximity of these three lakes ensures that the climate signal was the same for these lakes.
We investigate the interval of 13,100 to 11,200 years BP (from the Allerød up to the early Holocene). The lake records are synchronized through well-defined biostratigraphic boundaries (Allerød/YD and YD/ Preboreal) as well as the early Holocene Askja-S Tephra.

Varve formation was interrupted during most of the YD in all three lakes, but our results shows that cessation of varve preservation in JG is lagging by approximately 170 years at the onset of the YD in comparison to TRZ and JC. The beginning of varve preservation occurs about 70 years earlier than in JC around the end of YD whereas varves did not appear again in the early Holocene in TRZ. Detailed XRF scanning records indicate a general higher detrital input during the Younger Dryas in all three lakes. However, asynchronous changes in the XRF element records and stable isotope data around the main climatic shifts in these three lakes demonstrate the influence of local lake and catchment morphology on sedimentation.

This study is a contribution to the BaltRap project "WP2: Holocene annually laminated lake records", foundet by the Leibniz Association.
This is a contribution to the Helmholtz Association climate initiative REKLIM Topic 8

References:
Słowiński, M., Zawiska, I., Ott, F., Noryśkiewicz, A. M., Plessen, B., Apolinarska, K.,Brauer, A. (2017). Differential proxy responses to late Allerød and early Younger Dryas climatic change recorded in varved sediments of the Trzechowskie palaeolake in Northern Poland. Quaternary Science Reviews, 158, 94–106.

Ott, F., Kramkowski, M., Wulf, S., Plessen, B., Serb, J., Tjallingii, R.,Brauer, A. (2017). Site-specific sediment responses to climate change during the last 140 years in three varved lakes in Northern Poland. The Holocene, 1-14.