

Early- to Mid-Holocene environmental and climate changes in the southern Baltic lowland using XRF scanning data

Rik Tjallingii (1), Florian Ott (1), Nadine Dräger (1), Mateusz Kramkowski (1,2), Michal Slowinski (2), and Achim Brauer (1)

(1) GFZ-Potsdam, Section 5.2 Climate Dynamics and Landscape Evolution, Germany, Germany (tjalling@gfz-potsdam.de),
(2) Polish Academy of Sciences, Department of Environmental Resources and Geohazard, Institute of Geography, Toruń, Poland

The ICLEA project includes several annually laminated (varved) lake records from the southern Baltic lowlands for detailed climatic and environmental reconstructions. Continuous geochemical records have been obtained by XRF scanning and reveal the dominant depositional processes of the German lake Tiefer See and the Polish lakes Głęboczek, Czechowskie and Jelonek. Each lake record has been independently dated by means of varve counting, AMS ¹⁴C dating and tephrochronology. The unprecedented age control allows accurate age correlation of individual lake records even over large distances. The detailed stratigraphy is used in combination with micro-XRF core scanning records to link depositional variability with past environmental and climatic changes. However, in each lake the major sedimentological transitions are reflected by different geochemical elements due to the different depositional conditions. Here we present a statistical concept for XRF core scanning data to evaluate the timing and frequency of the most prominent sedimentological transitions of the Early to Mid Holocene. Preliminary results reveal that depositional conditions prevail over relatively long periods (102-103 yrs) between the Younger Dryas and ~6000 yrs. The sedimentological transitions during this period are associated to regional climatic changes in the southern Baltic lowlands during this period. After ~6000 yrs BP, depositional conditions vary at a much higher frequency (10-102 yrs), which are associated with a stronger local and lake internal environmental variability. Ongoing research focuses on a multi-proxy approach to further constrain possible links between depositional changes recorded in these varved lacustrine sediments with Early- to Mid-Holocene climatic and environmental variations.

This study is a contribution to the Virtual Institute of Integrated Climate and Landscape Evolution Analysis – ICLEA – of the Helmholtz Association.