

Let's think about the Masurian Lake District, what would we see? Probably beautiful lakes surrounded by grasslands and forests. But who knows that a similar lake district functioned in eastern Poland, about 400,000 years ago? So we have to go back in time for about 400,000 years to the Holsteinian Interglacial. However, you can ask: why the Holsteinian Interglacial? Well, nowadays this is a very important matter - the climate change. The increasing impact of anthropogenic factors affecting current and future climate change led researchers to better understand the climate changes that have occurred in past interglacials. On the basis of similarities of the Earth's orbital parameters Holsteinian Interglacial correlated with Marine Isotope Stage 11c (MIS 11c), appears to be one of the closest palaeoclimatic analogues for the present interglacial. In this context, high-resolution palaeoclimate records, particularly from past interglacials that, unlike the Holocene, were unaffected by human interference, can make an important contribution towards elucidating natural short-term climate variability and its future evolution during the present interglacial.

The Holsteinian Interglacial lasted about 20,000 years and had one distinct intra-interglacial cooling called Older Holsteinian Oscillation (OHO). There, the OHO is characterized by a marked decline in temperate tree taxa and an increase in pioneer trees and herbs caused by decreasing temperature and moisture availability, and increased continentality.

The aim of this study is to record and trace in detail the succession of climatic conditions at the time of the abrupt cooling event during the Holsteinian Interglacial - the so called Older Holsteinian Oscillation (OHO). The reconstruction of paleoenvironmental conditions will be accomplished by a multi-proxy analysis of lake sediments from two sites located in Eastern Poland - Ortel Królewski II and Ossówka. This will include a high-resolution faunal (ostracods and molluscs), pollen and geochemical analyses including oxygen and carbon stable isotope composition and Mg/Ca ratios of mollusc and ostracod shells. Stable ^{18}O and ^{13}C isotope records will be applied for the first time to the Holsteinian freshwater ostracods.

This project will be the first study carried with a multi-proxy approach in this part of Europe. Traces of the Older Holsteinian Oscillation have been already identified at sites in central and northwestern Europe. However it was revealed mainly by pollen analyses of lake sediments. Because the interval in question was relatively short most of the records from previous studies lack the temporal resolution needed for its identification. Variability in the structure and composition of the ostracod assemblages along with stable oxygen and carbon isotope analysis will enable high-resolution paleoecological reconstruction of the Holsteinian interval in Eastern Poland. Additionally, other applied analyses will further extend and confirm the interpretation. Our results will be compared with other previously studied profiles from around the Europe in order to examine the spatial extent and pattern of the OHO impact across Europe. An understanding of the mechanisms and effects of natural short-term (i.e. decadal scale) climate variability is essential for providing projections of possible climate change for the near future. Therefore, a better representation of such oscillations in climate models may improve simulations of abrupt climate changes.