

Abstract

This study concerns the sediments of Lake Żabińskie, located in the Land of Great Masurian Lakes, northeastern Poland. Investigations of processes responsible for sediment formation and preservation as well as the 1000-yr-long chronology are presented in this dissertation. Next, the potential of the sediments, based on the reconstruction of the erosion intensity in the Lake Żabińskie catchment, is shown.

Based on a two-year observation period, the seasonal model of sediment deposition at the lake bottom was established. Moreover, four different scenarios of thermal-oxygen conditions that occur within the lake, depending on the meteorological conditions, were recognized. Microscopic investigations confirmed that Lake Żabińskie sediments are annually laminated (varved) along the sediment profile and varves can be used for the estimation of the sediment age.

The sediment age model was constructed based on multiple varve counting and measurements of the concentration of radiocarbon in terrestrial macrofossils preserved in the sediments. In the topmost part of the sediment profile, the chronology was validated using measurements of ^{210}Pb and ^{137}Cs activity concentrations. Additionally, cryptotephra from the eruption of Askja volcano in AD 1875 was recognized in the sediments. Moreover, palynological and historical data were used to validate and improve chronology in the lower part of the sediment profile. All the applied methods indicated that chronology of Lake Żabińskie sediment is precise and reliable.

In the next step, a combination of sedimentological, geochemical, historical and palynological data as well as the microfacies analysis enabled the identification of four different phases of erosion intensity in the Lake Żabińskie catchment. The changes were mainly related to the human-induced transformations in the land-cover, deforestations and the development of agricultural activity.