DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

The discussion on global climate change and the corresponding response of the natural environment, mainly carried out in the context of forecasts, requires substantive knowledge on climate and environmental changes occurring on the Earth in the past. For this reason, the scientific world is looking up for long records of these changes in all kinds of series of sediments of the greatest, the best annual, resolution. A special place among those deposits is occupied by annually laminated lake sediments, where each year is recorded in a separate pair of laminas, a lighter spring-summer, usually calcite-diatomaceous lamina and a darker autumn lamina of organic matter. Together they form the so-called annual biochemical varve. In this way, at the bottom of the lakes during their operation a "sedimentary layer cake" accumulates which is the book of records of environmental changes in its surroundings. Conducting detailed analyses of the composition of living organisms, as well as chemical composition in the vertical profile of the sediment we obtain information about past environments, and knowing the climatic preferences of individual species, also about climate change. By counting individual varves we can relate these changes to a virtually yearly calendar scale. Although the laminated lake sediments typically do not include such long records of changes in the past as ocean sediments or ice cores, they are extremely valuable in paleogeographical reconstructions because of their prevalence in human living space. Due to the specificity of the lamination formation and the necessity of special conditions in lakes conducive to the lamination preservation only a few sites covering more than 10,000 years are known in Europe.

An extremely important place among them is occupied by laminated sediments of Lake Gościąż, discovered by Dr. Kazimierz Więckowski of IGiPZ in 1985. These sediments were the subject of an interdisciplinary research conducted in the late eighties and early nineties of the twentieth century. The published results of these studies have become an important component of our understanding of climate and environmental change over the last 13,000 years. However, due to lamination discontinuity in the upper part of the profile and the difficulty of correlation of sediments at its bottom, the constructed varve chronology, which was based on the then applicable laminas count based on black-and-white photographs, is floating, that is, in the absence of the absolute stratigraphic marker it is not embedded in the calendar time scale.

In recent years, studies of laminated lacustrine sediments have made great progress, mainly due to the use of microlithofacial analyses of thin sections, non-invasive µXRF scanning and microtephrochronological analyses, allowing for detecting absolute stratigraphic markers, which are e.g. microtephra traces of known volcanic eruptions. The application of these research techniques by the applicants in the case of laminated sediments in Lake Czechowskie, East Pomerania, has led to documenting e.g. microtephra coming from the eruption of Laacher See in the Eifel region as well as Askja – AD 1875, Askja-S and Hasseldalen from Iceland. They are a particularly important tool to synchronise - with an annual resolution - distant sites located in different morphoclimatic zones. Synchronisation is necessary for creating transects of paleoclimatic and paleoenvironmental changes, taking into account varying degrees of climate continentalism.

The main objective of the authors of this project is the use of modern research techniques, including microlithofacial analysis, µXRF scanning and microtephrochronological analyses for studying laminated sediments in Lake Gościąż and integrating them into a currently created European transect of climate and environmental change over the last 15,000 years with an annual resolution, starting from Meerfeldmaar (Eifel Massif) through Rehwiese (near Berlin), Tiefer See (northern Germany) and Lake Czechowskie (eastern Pomerania) to Lake Gościąż with the possibility of its extension to the east. At the same time we are planning to analyse the factors determining the course of modern sedimentation in Lake Gościąż; such studies are also conducted in the case of other objects along the transect line. This research approach is very helpful to define the feedbacks that occur between climatic, environmental and anthropogenic factors and to conduct correct interpretation of the record of climate and environmental change on the basis of laminated lacustrine sediments.