

Newly found sites of fossil lakes from the Eemian interglacial (dated to 115-128 thousand years before present) in the Garwolin Plain (Central Poland) can help to recognize the vegetation history and climate changes during this warm period preceding the Holocene. In the ongoing contemporary discussion on the observed climate changes the researchers focus, among other things, on the causes of natural climate variability. In this respect the Eemian interglacial is of particular interest. The aim of the research undertaken in the project is a detailed palaeoecological and palaeoclimatic study of the Eemian interglacial registered in the newly discovered fossil lakes. The study area is located on the southern edge of the fossil lakeland, which has not been recognized yet. During the fieldwork for the Detailed Geological Map of Poland (scale 1: 50 000) there were discovered more than 20 sites with Eemian lacustrine deposits. In terms of the number of palaeolakes found, the area is unique in the country. The thickness of biogenic deposits in them is varied (from 1.5 m to 12 m). For the aims of the research the sites with the greatest thickness of sediments were selected. These are the sites in the vicinity of Puznówka, Wola Starogrodzka, Żabieniec, Kozłów, Parysów and valley stream - Struga. The sites are located in two geomorphological situations: in depressions without outflow and within the valleys of small streams. Profiles of organogenic sediments, taken from selected fossil lakes will be examined using multidisciplinary methods. Origin of the fossil lakes and their evolution will also be recognized. The results will help not only to reconstruct the history of vegetation and climate changes but the recognition of the functioning of the lakes or their disappearance during the intra-Eemian climate oscillation, as well. A digital model of terrain using GIS techniques will be made, which will allow for the palaeogeographic and palaeogeomorphologic reconstruction of the Garwolin Plain. The study area was functioning as the Eemian lakeland in the vicinity of a large (several kilometers) Vistula river valley. Reconstruction of the climate parameters will be based on the software in international collaboration with the specialist in this field. Particular emphasis will be to reconstruct the climatic conditions during the intra-Eemian oscillation in the so called hornbeam phase.

The main research method is the analysis of pollen and spores of plants (palynological method), which is an essential tool among the palaeoecological methods aiming at climate reconstruction. Complementary analyses are: stable isotopes of carbon and oxygen, macroscopic plant remains, fossil Cladocera and diatoms, which together will allow reconstruction of the conditions in the lake and its evolution. Furthermore, sedimentological analysis will be carried out during the sampling of the cores and during field research. In the subsurface series of deposits excavations will be made in order to perform lithofacial analysis. Mineral deposits, underlying biogenic series will be dated by the OSL method (optically stimulated luminescence). Results of palynological analyses will be entered into a computer program used for the quantitative reconstruction of climate conditions. The following climate variables can be reconstructed: mean annual temperature, mean temperature of the warmest and the coldest month and annual rainfall. The program uses modern pollen analogues from areas of Europe and Asia, which are assigned to the climatic parameters.

The best recognized are climate oscillation within the Holocene, which are known as Bond events. Oscillations occurred also in the Eemian Interglacial. They took place in different phases of this interglacial. A cooling at the end of the interglacial is best known. The results of many authors indicate, however, that also in the middle period of the Eemian warming, there was a drying phase and / or a cooling (ie. during the hornbeam phase). This intra-Eemian climate oscillation is much worse documented and does not appear in all profiles. Research undertaken under the project, should bring an answer to the question of what climate features had this intra-Eemian oscillation and whether it was associated only with the rapid drying, or also was accompanied by temperature drops. The results can help to identify the predominance of this oscillation over regional or supra-regional scale and to recognize the extent to which intra-Eemian climate oscillation may resemble cool events known from the Holocene.