

Description for the general public “Morphogenetic processes as determinants of vegetation patterns under impact of the Younger Dryas global climatic changes”

The transition from the cold climate conditions of the last glaciation to the moderate climate of the Holocene progressed in a non-linear fashion. The relatively brief (to ca 1000 years) alternating periods of warming and cooling left significant traces in the geologic structures and the relief. In Central Poland, the periods of warming, the Bölling and Alleröd, were marked by thermal conditions similar to those typical of moderate climate. The flora was reborn and the intensity of landform processes increased. During the cooling periods, known respectively as the Oldest Dryas, Older Dryas, and Younger Dryas, the climate became much harsher. Dynamic processes that transformed the surface were activated, while the vegetation density was diminished. Low-temperature tolerant species gained hold. The Younger Dryas was particularly interesting as the final, globally recorded climate fluctuation before the Holocene (12 850 – 11 650 BP). This sudden climatic breakdown contributed to the activation of slope processes, aeolian processes resulting in the remodelling of the existing dune landforms, as well as an increase in fluvial processes manifesting themselves in increased accumulation. In many cases it also led to changes in channel patterns from meandering to braiding or multichanneled. The transformation of the vegetation was visible in the appearance of plant communities typical of subarctic or even polar conditions. Fossil basins of biogenic sedimentation are the archives where the signs of the environmental changes were recorded. Despite the general regularities of the palynological record of the cooling period of the Younger Dryas, the plant succession in different sites of Central Poland is varied. The Łódź Region, which was characterised by homogeneous climate conditions in the Younger Dryas, shall be the training ground for the scientific study of the question of the local determinants of diversity in plant communities.

The objective of the research is to describe the significance and the mechanisms of action of the abiotic elements of the environment such as geological structures, relief or hydrological conditions on the changes in vegetation or the survival of plant communities in an unaltered form through the Younger Dryas cooling. The fulfillment of this goal will contribute to a better understanding of the processes acting between the biotic and abiotic sphere during drastic climate changes. The creation of palaeogeographic reconstructions will be based on the principle of actualism; hence the formulated conclusions will possess a universal character with possible applications in the prediction of interactions between specific components of the environment.

The study will be carried out with the use of an array of research methods utilised by specialists in various fields of study for the purpose of a complex assessment of the parameters of the palaeoenvironment. The means of implementation will include fieldwork and laboratory analyses. The fieldwork will be focused on a detailed geological and geomorphological mapping of the immediate vicinity of the sites containing palynological records of the Younger Dryas. The purpose is to determine the abiotic environmental conditions that generated the records. The laboratory analysis will include: a pollen analysis, an analysis of the macroscopic plant remains, geochemical study and geochronometric analyses. Geostatistical studies will be conducted on the correlation of the sequences of the results of the palynological analysis and the geologic data. The final stage will be the formulation of models of interactions between the biotic and abiotic sphere in the presence of sudden global climatic changes.

The results of the study will allow for participation in the discussion about the sensitive components of the environment in an age of global climate change. They may prove useful for researchers of other aspects of geography such as biogeography, or other fields of knowledge, such as botany – in research into habitat preferences of plant species.