

The aim of project titled “Younger Dryas glaciation in the Western Carpathians” is dating and reconstruction of the Younger Dryas (YD) glaciation in the highest parts of glaciated massifs in Western Carpathians, especially in the High Tatra Mountains and Low Tatra Mountains. An additional aim is YD climate conditions reconstruction on the basis of relations between climate, glaciation and their geomorphological record as a moraines and relict rock glaciers.

In the Last Glacial Maximum (LGM) culmination around 20 thousand years ago, glaciers in most European massifs reached its greatest volumes. During the gradual warming at the end of the last glaciation (called Lateglacial), glaciers have been retreating successively, with several interrupting transgression phases as a response to severe climate downturn. Such transgressions are recorded in moraine sequences representing a geomorphological record which can be found in many mountain valleys. The Younger Dryas (11,7-12,9 thousand years ago) is the last return of cold and severe climate conditions, whose termination is simultaneous with the end of the last glaciation (Pleistocene) and the onset of current interglacial (Holocene). In many mountain areas in Europe, such as the Highlands of Scotland or the Alps, glaciers advanced significantly in response to that cold climatic event. This left pronounced glacial forms (eg. Loch Lomond, Egesen stage), which are distinguishable from the geomorphological record of older glaciation stages. Given the empirical relations between glaciation and climate conditions, study of geomorphologic record such in case of this extremely “fresh” stage of glaciation, was often the base to reconstruct the climate conditions prevalent during the YD. It is crucial for the climate system understanding in regional and global scale, particularly within the glacial mode. Therefore, the Younger Dryas, the last climatic stage of the Pleistocene, is very intensively studied in this regard. In comparison to Scottish Highlands or the Alps, recognition degree of the YD glaciation in the Western Carpathians, as well as throughout the Carpatho-Balkan region is very low. None of the regional-scale climate implications drawn from existing research can be reliable. Even in the High Tatra Mts., which is the best-studied massif in terms of glacial chronology, the existing information on this phase of glaciation is patchy and often inconsistent. A comprehensive picture of the Younger Dryas glaciation in this entire massif have never been presented.



Field works in Western Carpathians, High Tatra Mountains (fot. E. Opyrchał)

For better understanding of specificity and variability of globally widespread geomorphological record of the Younger Dryas glaciation, a team of scientists from Cracow universities in international cooperation with specialists from Switzerland proposed comprehensive research plan for Western Carpathians. This multiproxy approach is focused on detailed recognition and precise dating of glacial forms and relict rock glaciers on the base of their morphological development and position in recessional sequence. Such forms are expected to be Younger Dryas in age. Implementation of the proposed research, which is glacial forms dating over such a large area, will be possible through, not used so far in this area, the combination of absolute and relative dating. The results of this study may shed new light on the climatic conditions and glacial systems in the final stages of mountain glaciation, where the marginal-type of glaciation has dominated at that time.

This project will be conducted in international cooperation, with five, mostly young scientists however, having considerable experience in fieldwork in the area of both the Alps and the Carpathians. Cooperation with world-class specialists in the field of cosmogenic isotope dating from the ETH in Zurich will enable young researchers to gain invaluable experience, will also strengthen the importance of Polish research institutions on the international arena and to take further research challenges.