

## **Description for the general public**

Do you know that Poland has polar station in Spitsbergen? The Polish Polar Station in Hornsund is the most northerly Polish scientific institution. If you are wondering why for many years our country supports research of Polish scientists in the polar regions and what relationship they have with the surrounding reality in the Central Europe, my project will be explanation for you.

At present in Spitsbergen there are climatic conditions, similar to those 10 00 years ago in Poland. The temperature rarely exceeds a few degrees above zero. Winters are cold and snowy. In the mountains in the south of our country, there are still glaciers, which will be a recession soon and disappear with the advent of global warming in the Holocene. Whereas mountain glaciers shaping a landform of the High Tatra Mountain leave the multitude of landforms. This landforms for a long time will resemble, for the modern tourist, the youngest geological history of Poland. In accordance with the principle of uniformitarianism formulated by James Hutton in the XVIII century, present is the key to the past. This is one of the reasons for the studies of Spitsbergen area.

My project consists precisely in understanding the mechanisms and factors responsible for the formation of landforms, which commonly occur in the Arctic region and cover an area of nearly 30% of the total area of Spitsbergen. These landforms are also very popular in Poland, where are developing for a long time. You can observe them in the most of the Tatra valleys. Landforms, which accompany glaciers from the beginning, are the slopes. The fastest they form during the recession of glaciers and the exposing of an area where the glaciers were. At present in Spitsbergen it is possible to do researches in areas of intense activity of glaciers and in areas covered by relatively recent glaciation. We can say, that Spitsbergen is a testing ground for researches, who want to understand the changes taking place in Poland. Finally, the key to the past is the present.

The main objective of the project is answering to question, how are formed the slopes in the polar regions. Describing all stages of the development of the slopes is possible by comparing with each other the slopes differing by age. It is the starting point for the analysis taking into account other factors such as geology of the area and the type of rock in which this type of formations form, high above sea level, exposure, different climatic conditions and distance from the sea coast. The way to explain this problem is use of modern geophysical methods: method of electrical resistivity tomography (ERT) and method of ground penetrating radar (GPR). Obtained in this way the data are characterized by a high resolution, which allows detailed recognition of the internal structures in the slopes. The interpretation of geophysical data is completed by information from the geological and geomorphological mapping, dating (dendrochronology, lichenometry, radiocarbon  $C^{14}$ ), and with meteorological sensors located in various parts of the glaciated area. The combination of the information about subsurface structures with reference to natural conditions is the basis for the description of the evolution models for the slopes in southern Spitsbergen.

The leader of project is a geologist with experience in conducting research in the polar regions. He took part in the polar expeditions on Spitsbergen in 2012 and 2015. He perfectly knows the environment of the slopes in southern Spitsbergen, because he realized a master's thesis on "The mechanisms of contemporary transport of the material on the talus cones in Svalbard". Now he continues the works aimed at the detailed exploration of the slopes formation and find in them answers to research questions, which geomorphology and Quaternary geology are still waiting for. With the increasing popularity of the geophysical methods in the geomorphological study, there have been many areas of unusual research potential. The slopes in Spitsbergen are just such a facility. Their recognizing will allow us to better understand the processes which shaping the periglacial environment zones not only in the Arctic region, but also in Poland during a few thousand years ago.