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COLDSPOTS – low temperatures of ground in the Sudetes

The project concerns temperatures of ground in the Sudetes, which depend on specific climatic and topographic conditions, such as altitude above sea level, exposure to the Sun or geological settings. On the basis of pilot studies conducted in the highest parts of the Karkonosze Mountains, within coarse-grained sediments (blockfields), low air temperatures were observed throughout the year. This situation is similar to research conducted in mountain areas in other regions of the world. In the Sudetes, similar situations are also known for deep rock clefts in the Stołowe Mountains and some caves, such as the Naděje cave in the Lusatian Mountains, where there are years when snow or ice persists until summer months or even until snow falls in the autumn. These premises lead to the conclusion that the soil temperatures in these areas may persist as a low or the ground may be constantly frozen. The occurrence of this phenomenon may also be demonstrated by the results of geophysical research obtained in recent years. An unequivocal confirmation of this type of information would give grounds for the verification of claims about the occurence of contemporary permafrost (frozen ground) in Europe and the existence of its relict forms. At the same time, the project would provide temperature data that may be useful for other fields of science studying the mountain environment – soil science, botany, ecology. So far, this type of data has not been collected in the Sudetes.

The implementation of the project is planned to drill boreholes in which soil temperature measurements will be carried out automatically. The deepest borehole of this type is to be located at altitude of about 1350 m a.s.l. on the ridge of the Karkonosze Mountains. Ground temperature measurements in shallow boreholes will also be carried out within the blockfields in the Karkonosze Mts and the Śnieżnik Massif. Information about the temperature of the ground in places with a specific microclimate will also be collected by sensors inserted into rock fissures in the Stołowe Mountains and in the cave in the Lusatian Mountains. The research will also apply geophysical methods that can indirectly indicate the ground being frozen. These methods include geoelectric techniques. The dependence will be used that the frozen rocks lose the ability to conduct an electric current.

The effect of the work will be a temperature database for the soil in places with a specific, raw microclimate. It will significantly expand the information collected in a standard way by meteorological stations. This will allow to determine and modelling the soil temperatures in the highest parts of the Sudetes, mainly in the Karkonosze Mountains. It will be possible to determine the depth of soil to which seasonal and annual variations in the temperature of the atmospheric air reach. Finally, the problem will be settled whether in the face of current climate changes, anywhere in the Sudetes it is possible to survive temperature of the ground less than 0 ° C throughout the year.