Landslides are one of the largest geohazards for modern society. There are particularly dangerous in mountainous areas, where progressing urbanization necessitates the transformation of potentially endangered areas for housing and public use. It is also a fact that progressing climate change and global warming manifested by a shortened winter period, increased rainfall and general hydrogeological changes are not without impact on landslides.

An important climatic factor, not previously widely studied in the field of landslides, is the impact of climate change on human activity. A good example of such an impact is the situation observed on ski lifts. Because steep, often overgrown slopes seem to be ideal terrain for this type of objects, and the natural slow landslide activity is almost invisible, the threat cannot be properly recognized. Due to climate change, and ensuring the profitability of this type of investment, it is necessary to use artificial snow production. This, much heavier than natural snow, causes an additional and significant load on the slope. In addition, the high water content in this type of snow is an important factor conditioning the hydrogeological conditions during the melting period. This significant human impact due to climate change should be further explored. Since the situation observed at ski stations can be regarded as a natural laboratory, where the development of landslides is faster and can be observed distinguishing the main initiating factors, the data collected in this way can be directly correlated with other such type structures.

The proposed project involves the use of geophysical methods to observe and explain this process. Optimal in this case is the combination of passive seismic methods, along with high-resolution active geophysical surveys. The methods of passive seismological observation will allow capturing micro-shocks arising in the structure of the landslide and during its melting. Active methods, consisting of seismic, electrical and magnetic methods made in two measurement series are designed to capture structural changes occurring inside the landslide. The measurement series will be held every year so that it is possible to distinguish even subtle but having a big impact on the geology changes. This will allow a better understanding and visualization of the evolution of this type of structures, along with an assessment of the impact of climate-induced anthropogenic factors affecting the landslide

The survey will be carried out in Cisiec, Silesian voivodeship region, Żywiecki district, where a seasonally active landslide on a ski slope was identified during pilot studies carried out previously.

Different research methods will be jointly interpreted in a previously developed system using uncertainty analysis. This will allow getting more accurate and well-connected results, with an estimated uncertainty. The data processing itself will be performed on world-class software used in geoengineering, climate researches and seismological monitoring.

The expected result of the project is a dataset containing both high-resolution images of the geological structure of the landslide and seismological data with interpreted main microseismic events and their occurrence time. The combination of these results will allow determining when the main triggering factors conditioning the development of a landslide occur, along with their impact on the evolution of its structure. This combination will allow you to understand the impact of climate and human on this geohazard.