Project acronym: ThermoRock

Project title: Thermal influences on rock slope dynamic in High Arctic permafrost areas

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Discipline: Earth Sciences & Environment: Other - Earth Sciences

Station(s): Polish Polar Station, Hornsund (Svalbard/Poland)

The project will be conducted at Polish Polar Station, Hornsund (Svalbard/Poland). The objective of this project is twofold (i) to download and analyse existing crackmeter monitoring network data of unstable rock slopes features in the area of Hornsund fjord and (ii) to obtain short term spatio-temporal data about rock slope surficial zone thermal behaviour. Long term joint behavior data will be provided by 3D dilatometer and induction crackmeter network at Hornsund fjord. These data will be later analysed in relation with long term climatic data from in situ weather station. Short term data will be gained by newly placed induction dilatometers in combination with remote thermal camera sensing and newly places surface and subsurface temperature probes. Newly instrumented rock slopes will be structurally characterized using direct methods (geological compass, schmidthammer) and indirect methods based on UAV photogrammetry produced point clouds and digital elevation models. A combination of these approaches will bring improvement of knowledge on the influence of deglaciation-linked thermal cycles/changes of rock slope temporal evolution and mass movements activity.

The reason why to conduct this research in the surroundings of the Polish Polar Station in Hornsund fjord is mainly due to its high-energy alpine type of relief combined with rapid deglaciation in the last years. Moreover, some background geological and geomorphological studies were performed in the area in the past, so there is basic geological and geomorphological knowledge as well as maps available.

In the long term, this study can also significantly contribute to hazard and risk studies dealing with post-glacial rock slope development and its stability.