



Establishing a permafrost monitoring network in the Bernese Alps: geophysical characterisation of potential monitoring sites and validation of permafrost distribution models

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Permafrost monitoring has a long tradition in Switzerland and is operational since 2000 within the PERMOS network (www.permos.ch). Distribution of monitoring sites is however not homogeneous with an increased concentration of sites towards the Valais Alps in the West and the Grisons in the East, while the Bernese and Central Alps are underrepresented. The canton of Berne therefore recently initiated the establishment of a long-term permafrost monitoring network within the Bernese Alps, with the main goal to detect and map permafrost occurrences, monitor their long-term evolution and evaluate the probability of natural hazards related to degrading permafrost.

As a first step, potential monitoring sites are selected based on the modelled permafrost distribution (Alpine permafrost index map by Boeckli et al. 2012, and Map of potential permafrost distribution by BAFU 2005), and promising sites are investigated by means of geophysical measurements (Electrical Resistivity Tomography/Refraction Seismic Tomography), ground surface temperature measurements as well as geomorphological interpretation. From the joint analysis of all data, propositions for new boreholes are made.

In this contribution we will present a data set of more than 20 geophysical profiles from more than 10 new locations (without previous information). As many of the sites of interest are located close to the lower boundary of potential permafrost distribution (~2500 m asl), this extensive geophysical data set can further be used for the validation of existing permafrost distribution models for this region. We here present a comparative analysis of geophysical-based characterisation of the permafrost distribution and the modelled permafrost probability for the respective locations. The results confirm that geophysical surveying presents a cost-effective approach to detect permafrost over larger areas and evaluate permafrost distribution models with an independent data set.

References

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