DC RESISTIVITY AND REFRACTION TOMOGRAPHY TO DETECT MOUNTAIN PERMAFROST

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In the high mountain areas of Europe the occurrence of permafrost may cause severe hazards for civilization. This is largely because of possible risks arising from increased frequency of slope instability, due to global warming. Therefore, efforts are being made to find suitable methods to detect and characterise permafrost in high mountain areas in order to assess the potential of future natural hazards. Here, we present first results from DC resistivity and seismic measurements performed in the framework of the EU-project PACE (Permafrost and Climate in Europe). Because of the strong heterogeneity in the depth range of interest (5-30m) the commonly employed 1D-soundings proved to be inadequate and a 2D-tomographic approach had to be considered. Furthermore, joint analysis of DC and seismic data is expected to reduce potential ambiguities of the individual data sets significantly. DC resistivity measurements were performed with a multi-electrode system and the data were inverted with the RES2DINV software package. The seismic data were recorded with a 24 channel seismograph and a sledgehammer source. Tomographic inversions of the travel times were performed with a non-linear tomographic refraction scheme that allows both damping and smoothing constraints. In the tomograms a number of important features such as ice lenses and rock glaciers can be delineated.