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Research and monitoring activities on rock glaciers and permafrost in Trentino (eastern Italian Alps): the contribution to the Alpine Space PermaNET project

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In the next years, research and monitoring activities on rock glacier and permafrost in Trentino (eastern Italian Alps) will receive a significant increase by the recent approval of the Alpine Space PermaNET project. In order to describe the permafrost presence and condition in the territory, a number of investigations have been put in place since many years, providing an extensive dataset of information that will form the basis for new studies.
In particular, a GIS-based inventory of permafrost evidences (i.e. rock glaciers) has been carried out in two mountain groups (Adamello Presanella and selected areas of Cevedale). The inventory is based on aerial photo interpretation and field observations, and describes the activity status, geometry and geomorphological characteristics of rock glaciers. Part of these rock glaciers were selected as test sites for further investigations like: a) surface velocity measurements using terrestrial topographic surveys (total station and RTK-GPS); b) BTS measurements on an active landform and on nearby slopes; c) near-surface continuous ground temperature measurements using MTDs (miniature temperature dataloggers) in the area of four active rock glaciers and on nearby slopes; d) characterization of several rock glacier springs by water thermal regime measurements during summer and all year round, EC - Electrical Conductivity measurements and water chemical analysis.
In the framework of the PermaNET project, new investigations have recently started: a) instrumentation with a thermistor chain of two 20 m deep boreholes drilled for inclinometer measurements near the "Ai Caduti dell'Adamello" alpine hut (3030 m a.s.l., Adamello Group); this area will therefore become a key-monitoring site for high altitude infrastructures and related permafrost-degradation problems; b) preliminary evaluation of two areas potentially suitable for drilling a borehole in bedrock; the assessment will be mainly based on geomorphological investigations, ground surface thermal monitoring using MTDs and extensive BTS measurements. These activities will eventually provide the ground temperature validation data set, upon which the statistical model of permafrost distribution in Trentino will be based.
The aim of this contribution is: (i) to give an overview on the investigations of permafrost occurrence in Trentino, (ii) to summarize the main results of the monitoring activities on rock glaciers obtained so far, and (iii) to describe the procedure chosen to identify possible test sites for borehole drillings in high altitude alpine mountains.