Electro and Electro-magnetic geophysical surveys for the characterization of periglacial environment: case studies in the Alps

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The characterization of permafrost in alpine environment is crucial for several reasons, from the consequences on potential slope instability to the monitoring of the climate change effects in the periglagical environments. Permafrost is the well-known ground layer with a temperature remaining at or below 0°C for at least two consecutive years. Permafrost interests one quarter of the Northern Hemisphere and 17% of the entire Earth (Biskaborn et al 2019), and is intensively studied from decades in the polar regions and in the high mountain environments (Phillips et al 2009). Geophysical prospecting can usefully help to extend the characterization of high mountains areas, increasing the characterization of the permafrost zones (Hauck 2001; Scott et al. 1990) and the study of rock glacier environment. The PhD project regards in particular the use of electrical resistivity tomography (ERT) , Frequency Domain Electro-magnetic techniques (FDEM) and radar (GPR) in several sites of the Alps already monitored with different techniques (PERMANET project). The aim is to test limit and applicability of the methods and in particular test the use of contactless geophysics to characterize the permafrost active layer (in terms of layer thickness and lateral continuity) and the rock glacier structures. The work will involve national and international collaboration with the WSL - SLF institute of Davos and the University of Fribourg (Switzerland), the Free University of Bolzano (Italy), the Province of Bolzano (Italy) and ARPAV (Italy).

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