

MULTIDISCIPLINARY APPROACH TO EVALUATE CONNECTION BETWEEN PERMAFROST DEGRADATION AND DEEP SEATED GRAVITATIONAL SLIDE DEFORMATION ACTIVITY: A CASE STUDY FROM SCHNALSTAL, SOUTH TYROLEAN ALPS, ITALY

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During the 20th century, Alpine permafrost has warmed by about 0.6°C due the global warming (Harris and Haeberli, 2003; Harris et al., 2003). Moreover, its degradation is playing an increasing influence in determining slope instabilities in high mountain areas (Smith, 1988; Zimmermann and Haeberli, 1989; Barsch, 1993; Rebetz et al., 1997), representing a major issue for landscape management (Agrawala, 2007; Lopez-Moreno et al., 2008). In this context, the Italy-Swiss “SloMove” Interreg Project promoted an experimental composite monitoring in the Italian Alps. This monitoring aimed to reconstruct the geomorphological processes, their state of activity and the role of permafrost in landslide activity. In this study, a multidisciplinary approach that integrates field survey, GPS measurements, time series analysis of PSInSAR data and GIS techniques has been adopted.

The investigated area extends just north of the touristic site of Maso Corto/Kurzras, (South Tyrol, Italy) and is located within the Oetztal-Stubai Crystalline Complex (OSCC).

Data elaborations show that an area of 2km² is affected by a Deep Seated Gravitational Slide (DSGSD) that involves the OSCC rocks throughout most part of the slope. Movement is east-southeastward and extremely slow but not laterally homogenous so that we identified zones with different activity rate: full activity, exhaustion phase and incipient phase. Rock glaciers in the study area do not appear to be linked to the DSGSD and can be considered as active with very low activity rate.

Main conclusions of this work are:

- Reconstruction of the DSGSD main predisposing factors.
- Reconstruction of the DSGSD activity rate and of the role of permafrost in its evolution.
- Reconstruction of the state of permafrost in the study area on the base of rock glaciers activity rate.
- Reconstruction of the correlation among the occurrence of rock glaciers, blocky slope deposits and DSGSD.

We consider that this method can be used to reconstruct the local permafrost conditions and to support the risk zonation in populated sites, in other mountain areas.