

# Explorative investigation of interannual and seasonal kinematic pattern of landslides in the Valais Alps, Switzerland, by means of DInSAR based time series

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Differential synthetic aperture radar interferometry (DInSAR) allows the detection of slope movements and their investigation over time. For the Valais Alps different DInSAR based slope movement inventories have been established. Also, understanding mass movements and their kinematic evolution is of increasing interest in the Valais Alps regarding natural hazards.

In this context, the presented master thesis exploratively investigates DInSAR derived kinematic information of landslides for interannual and seasonal kinematic pattern which are potentially affected by permafrost.

Based on existing DInSAR derived inventories, a regional compilation of slope movements which are potentially affected by permafrost in the Valais Alps is established.

Hereof, the six sites Grabengufer, Breithorn, Cabane de la Tsa, Genevois and Almagellerhorn, Almagellerhorn-Kanziljoch are qualitatively investigated for kinematic pattern. The hereto required kinematic information is gained of DInSAR derived time series between 1991 and 2019 which were established by manual interpretation of DInSAR interferograms. For the Breithorn and the Grabengufer landslide, the DInSAR derived time series have been validated by in-situ GPS measurements.

Different interannual and seasonal kinematic pattern are identified. Most of the interannual kinematic pattern show increasing velocities for the past 20 years, which is comparable to the observations made in in-situ monitoring campaigns. The seasonal kinematic pattern identified in some sections of the six sites are characterised by an acceleration between June and October with maximum velocities in autumn. For other sections, the gradual summer acceleration is intermitted by lower velocities in July and August or no acceleration is discernible.

The qualitative analysis of the identified kinematic pattern indicates that permafrost is probably affecting the kinematics in five of the six investigated sites. Also, all sites are characterised by kinematic elements showing different kinematic pattern.

When further, more quantitative analyses of the data confirm the presented results and conclusions, the approach of analysing time series for the influence of permafrost on mass movement's kinematics has potential to facilitate research and monitoring related permafrost kinematics as in-situ measurements are challenging to obtain on interannual scales.

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