



Snow slope stability index derived from terrestrial laser scanning data

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The evolution of snow slope stability over the winter is investigated using a simple algorithm to calculate the shear strength of a buried layer and the shear stress. While shear strength depends on the density of the particular layer, the shear stress is estimated by the overburden snow mass and the slope angle. Settlement is taken into account. The snow slope stability index is defined as the ratio of the shear strength of each layer to shear stress.

An automatic weather station (AWS) in the middle of a slope measures continuously the local snow depth (ultra sonic sensor). The snow depth distribution on the slope is provided by a terrestrial laser scanner (TLS), which is one measurement device of the European Research Project GALAHAD (Advanced Remote Monitoring Techniques for Glaciers, Avalanches and Landslides Hazard Mitigation). The scan field covers the area of the weather station. Laser scans are available before as well as after snowfall and snow drift events. Because TLS requires optimum weather conditions, this leads to a temporal irregular time series.

The snow slope stability index is calculated using both, the continuous snow depth data from the AWS and the sporadic snow depth data from the TLS at the site of the AWS. The differences arising are shown and the consequences are discussed. The data from the TLS provides the possibility to calculate the slope stability index spatially.