

Investigations on Snow Hardness as a Measure to Determine Shear Strength

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The shear strength plays an important role in avalanche formation. However, investigations on shear strength in the field are time-consuming, in particular these measurements require experienced avalanche professionals.

Main objective of this study was to estimate shear strength by using indirect methods which are more user-friendly than the traditional tests.

We assumed that hardness and density of snow must be the two most appropriate parameters. Three different methods were implemented to determine snow hardness: the conventional hand hardness test, measurements with the Swiss Rammsonde, and a method with a digital force gauge where we measured hardness in horizontal direction (to find out hardness ranges in the different layers of the snowpack). The snow density was measured with the common standard cylinder and the shear strength was determined with a shear frame.

The results indicate a encouraging relationship between snow hardness and shear strength; however, the strong scattering of the data requires further investigations to specify these relations.