



An experimental method to determine snow fracture toughness in mode II

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Before a dry snow slab avalanche is released a shear failure along a weak layer or an interface has to take place. This shear failure disconnects the overlaying slab from the weak layer. A better understanding of this fracture mechanical process which is a key process in slab avalanche release is essential for more accurate snow slope stability models. The purpose of this work was to design and to test an experimental method for snow fracture toughness measurements in mode II (shear) for layered snow samples and to compare the results to the ones of a previously made study on fracture toughness in mode I (tension). Beam-shaped specimens were cut out of the layered snow cover, so that the snow specimens consisted out of homogeneous snow layers separated by a well defined interface. On an aluminium plate, the specimens were tilted with angles between 30 and 90 degrees. A cut was made along the interface until the overlaying part broke off under its own weight and slipped down the interface. Experiments were performed in the cold laboratory and the field. First tests showed that the method can easily be applied in the field at modest expense. Experiments in the cold laboratory had the additional advantage that it was possible to ice the specimens to the aluminium plate and thus higher tilting angles were reached. This resulted in an increase of the shear stresses acting at the crack tip and made it possible to test also low density specimen.