



Measurement of Fracture Mechanical Properties of Snow and Application to Dry Snow Slab Avalanche Release

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Snow slab avalanche release involves an interfacial failure in a weak layer spreading out slope parallel along the weak layer followed by a fracture in tension which releases the slab. For a better understanding of the involved fracture processes well founded experimental data is essential. The aim of this study was to measure relevant fracture mechanical parameters of snow, assess the applicability of different fracture mechanical theories and adapt results to the slope scale. The fracture mechanical experiments were made in the laboratory with samples of naturally deposited snow and can be divided in two categories: Homogeneous snow samples of different sizes were loaded in mode I, and layered snow samples including a weak layer were loaded in mode II. The laboratory experiments were complemented with a few field tests. Material parameters like the fracture toughness in mode I turned out to depend on the specimen size and emphasized that the applicability of linear elastic fracture mechanics to snow is limited. The size effect could be quantified and corrected successfully. The corrected fracture toughness data were related to snow density. In mode II, the critical energy release rate of a weak layer could be determined for the first time. First attempts were made to relate the laboratory data to the slope scale. Thereby, the field experiments build an important link between laboratory and slope.