



Field studies of collapse propagation in weak snow layers

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Instabilities in snow slopes generally originate in the progressive delamination of the stratification along weak snowpack layers. A theory which has been proposed is that the fracture energy is delivered by a self-sustained collapse wave (solitary wave). In order to study this fracture process in natural weak layers, a long beam specimen is isolated from the surrounding snow slope. The fracture is triggered by saw-cutting into the weak layer. The subsequent deformation of the overlying slab and the collapse amplitude of the weak layer are recorded with high speed photography. In order to eliminate boundary effects and initial conditions due to artificial triggering, the images are recorded away from both the notch and from the opposed edge of the specimen. Important properties of the snow stratification regarding the nucleation and propagation phases are derived. These are: (i) the fracture energy of the weak layer, (ii) collapse amplitude of the stratification during fracture, and (iii) propagation velocity of the crack.