Geophysical Research Abstracts
Vol. 13, EGU2011-13929, 2011
EGU General Assembly 2011

The effect of surface warming on snow slab stiffness and fracture propagation propensity in avalanche snowpacks

Benjamin Reuter and Jürg Schweizer
WSL Institute for Snow and Avalanche Research SLF, Davos, Switzerland

Surface warming is among the most complex contributory factors that need to be considered in forecasting of dry-snow avalanches. The aim of the present study is to quantify surface warming with respect to the contributing meteorological processes and to investigate in situ the fracture propagation propensity under conditions of surface warming. The relevant energy fluxes at the snow surface, partly measured and partly modelled with the snow cover model SNOWPACK, were used to determine the energy input into the snowpack. Stiffness of the near-surface layers and its changes with day-time warming were derived from penetration resistance measurements with the SnowMicroPen and related to the energy input. Changes in fracture behaviour were assessed with the propagation saw test (PST). A reduction in stiffness by a factor of 2 was observed in near-surface snow layers when the energy input at the surface exceeded 300 kJ m-2. Weak layer properties did not change. Critical cut lengths tended to decrease with decreasing slab stiffness – suggesting that surface warming increases fracture propagation propensity. However, the effect is subtle. Therefore, the effect of surface warming on instability seems only prominent if a sub-critical weakness already exists in the snowpack.