Geophysical Research Abstracts, Vol. 9, 10287, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10287

Significance of new snow properties for snow-cover development

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Thorough knowledge regarding the properties of new snow is crucial in avalanche forecasting. The input of reliable boundary conditions (e.g. density of new snow) are essential for accurate snow-cover modelling. However, the grain and bulk properties of deposited new snow have never been systematically investigated. In this contribution we present data used for verification of the snow-cover model SNOWPACK. The model, developed at SLF Snow and Avalanche Research, simulates the evolution of the snow cover based on meteorological input data. Its strength lies in the accurate description of crucial layers and interfaces such as surface hoar, depth hoar and melt-freeze crusts based on snow microstructure physics. The data for verification were obtained during the winter season 2005/2006 on the SLF study plot located at Weissfluhjoch, 2540 m a.s.l. near Davos, Switzerland. During snowfall events, new snow densities were measured on a half hourly to hourly basis, depending on the intensity of the snowfall. The snow crystals were characterised using various techniques such as macro photography and image processing. Specially designed sensors were placed before and during snow storms to measure the settling and temperature of different new snow layers in the snow cover. The first few days after snow storms, detailed snow profiles were taken. The fresh snow layers were then characterised with the help of high-resolution resistance measurements (SnowMicropen), snow grain characterisation, stability tests and density profiles. Based on these measurements we derived a new parameterisation for new snow density and show how this may improve snow-cover simulations. The new parameterisation improves the total snow water equivalent predictions for different seasons as well as the modelled snow-cover layering. With the corrected initial conditions, the settling of 60 cm of new snow in March 2006 was rea-

sonably well modelled. Nevertheless, a better understanding of new snow viscosity is needed to further improve the modelled settling curves and possible causes of errors are qualitatively analysed.