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Guest Editorial

Snow avalanches cause human and economic losses every year all over the world. They affect settlements, roads and infrastructures and constitute a major problem increased by the recent population growth in mountainous areas. Despite significant research efforts over the last decades, little is known about the physics of the phenomenon. Moreover, the existing methods for forecasting and risk assessment include substantial uncertainties.

On 25 April 2005, at the occasion of the General Assembly of the European Geosciences Union (EGU) in Vienna (Austria), we organised a session on snow avalanche formation and dynamics. This special issue of Cold Regions Science and Technology contains nine of the 36 contributions presented at the conference.

Fyffe et al. study slab avalanche release in the presence of random shear strength fluctuations within the snowpack using a lattice automaton technique. The model allows stress redistribution between weak and strong regions of the snowpack. It includes inertia and allows for rupture of the slab to occur when the tension reaches a critical value. The authors highlight the predominant role of basal shear failure in avalanche release. Platzer et al. present basal and normal force measurements of dry and wet snow avalanches. This paper highlights the variation of the effective friction coefficient with snow quality and slope deviation. The paper by Vilajosana et al. focuses on the development of an algorithm to estimate the speed of an avalanche, by applying cross correlation and time frequency analysis techniques to avalanche seismic data obtained in a Norwegian test site (Ryggfonn). Gauer et al. report on avalanche measurements carried out at the Ryggfonn test site, Norway, during several winter seasons. The data are analyzed with emphasis on recognizing different flow regimes and estimating flow densities, flow speeds and impact pressures. Calculated accelerations indicate that the effective friction parameter has a wide range of variability and depends strongly on the flow regime of the snow mass. The paper by Faug et al. deals with an experimental investigation examining the run-up distance reached by a dense snow avalanche on a deflector. The correlation between the incident Froude number and the deflecting angle has been investigated. The observed flow features are identical to those observed using granular material and water. The paper by Hauksson et al. reports and analyses the experimental results concerning the impact forces of supercritical granular flows against mast-like obstacles. The paper by Cierco et al. investigates the use of a commercial sensor based on acoustic technology (Flowcapt) which allows *in situ* measurements of the snow drift mass flux. The limits of the sensor, in terms of calibration and accuracy, are highlighted and a new calibration is proposed. The paper by Eckert et al. proposes a statistical–topographical method for estimating the runout distance of extreme events. Bayesian modelling is used to predict the statistical distribution of extreme avalanche runout distances.

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