Physikalisches Kolloquium

Universität Konstanz

Di 15.11.16
15:15 Uhr
14:45 Uhr, Kaffee/Tee
R 513

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für Schnee- und Lawinenforschung
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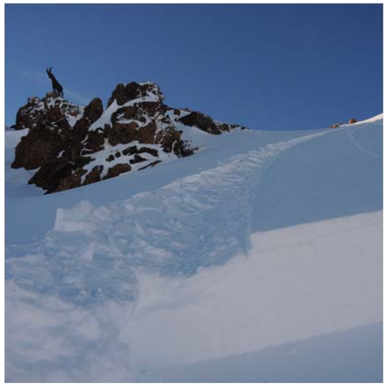

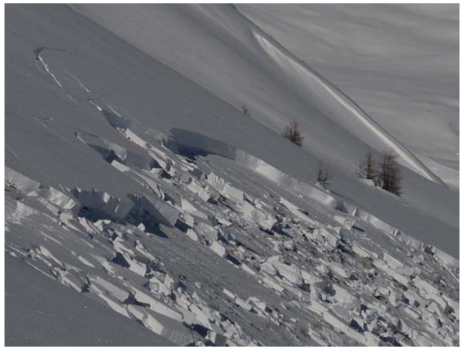

Avalanches – from cloud to cloud

During winter, snow avalanches are among the most disastrous alpine hazards. Those rapid, gravity forced mass movements are commonly listed as meteorological hazards, but actually snow research overlaps with different scientific fields. Understanding snow properties and the formation of avalanches touches fields of physics and meteorology.

Assessing snow instability involves understanding the interplay of the mechanical properties of the various snow layers forming the snowpack. Snow as a heterogeneous foam of ice has a complex structure exhibiting anisotropic material properties challenging measurement and modelling approaches. Finding answers to the crucial question of how fragile a multilayer material such as the snowpack is, requires a fracture mechanics based modelling approach.

Furthermore, in order to eventually estimate avalanche danger within a region the variations of snow properties need to be interpreted at scales beyond the snowpack scale. Understanding the driving agents which cause spatial variations of snow properties can be envisaged with a meteorological modelling approach, comprising environmental processes such as preferential deposition of precipitation or the radiation balance in complex terrain.

In contrast to debris flow or rockfall events, providing a probability of occurrence is feasible for snow avalanches, at least within a region. However, predicting the exact time and location of a snow avalanche still seems to be hindered by the complex microstructure of snow and the inherently variable nature of the seasonal snow cover. This presentation sheds some light on the touching points between physics, meteorology and the formation of snow avalanches.

Introducing some of the general properties of snow, a fracture mechanical framework will be presented to interpret snow properties in view of snow instability. Measurement techniques to obtain such measures in the field, but also modelling approaches will be discussed. An application of this framework to real cases will reveal the driving agents shaping the mountain snow cover and influencing snow instability under real, observed meteorological conditions. Assessing the influence of those driving agents is the key to future numerical avalanche forecasting approaches.