

A high resolution approach to defining spatial snow height distribution in avalanche release zones for dynamic avalanche modeling

Alexander Prokop; Christina Delaney

Institute of Mountain Risk Engineering, BOKU- University, Vienna, Austria

Over the last 80 years, avalanche-dynamics models have increasingly been used for land-use planning and to design protection measures. One of the important input parameters for such models is the mass of snow that is released within the avalanche starting zone. The variability of snow pack height in mountainous terrain and a lack of snow height measurements at the time extreme avalanche events occur make it difficult to define the mass of releasing snow. We present a high resolution approach consisting of wind field modeling, spatial snow height measurements and extreme value statistics to approximate the volume of the slab released. Wind field modeling was conducted using ARPS (Advanced Regional Prediction System) with a horizontal resolution of 5 m. A higher horizontal resolution of 0.5 m was obtained by spatial snow height measurements using terrestrial laser scanning. Measured snow heights were then extrapolated according to extreme value statistics. The presented methodology was applied to case studies such as a safety concept for the Thomaseck-avalanche, which is a potential danger for a railway track. Due to the high resolution analysis of the avalanche starting zone and subsequent dynamic avalanche modeling, it was possible to offer detailed instructions for safety measures to authorities. The newly developed methodology is presented and the results are discussed.