



## Evaluation of snow-glide risk by modelling and on-site assessment

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Abandonment of agricultural practices on alpine grasslands lead to increasing snow-glide intensities due to lower surface roughness of the vegetation. Beneath the danger of snow-glide avalanches snow gliding leads to soil erosion and damaging of young trees at afforested sites. Especially in high altitudes afforestation is important to protect settlements and infrastructure against snow-gliding and glide avalanches. Snow-glide damages are therefore of particular danger for these afforestation sites. In the light of future climate change and warmer winter periods, studies already state increasing snow-glide risk and the occurrence of glide avalanches. This study presents an approach to evaluate snow-glide risk by combining the refined Spatial Snow Glide Model (SSGM) first published by Leitinger et al. (2008) and the Guidelines to Identify Snow-Glide Areas (GISGA) proposed by Höller (2012), an on-site risk analyses approach. First, GISGA was validated on the basis of corresponding snow-glide measurements. Second, a potential snow-glide map for an area in the Eastern Alps covering 20000 km<sup>2</sup> was modelled. The results revealed considerable areas of high snow-glide risk. Using the average amount of winter precipitation between 1990 and 2010 in the SSGM shows higher vulnerability for the northern part of the study area (Tyrol, Austria) than in the southern part (South Tyrol, Italy) because of lower winter precipitation. However, running the SSGM based on the highest winter precipitation registered in the study area between 1801 and 2003 exhibits the possibility of very high snow-glide risk for most parts of the study area with significant increasing risk in the southern part. Given the very probable future climate during winter periods with increasing temperatures but uncertain development of precipitation patterns, snow-glide activity and linked glide avalanches might further increase at least in areas and altitudes with solid precipitation. In combination with the modelled potential snow-glide map of the SSGM as basis, GISGA is a very useful and time-efficient approach for practitioners to plan suitable measures to reduce snow-glide risk and related consequences.

### References:

- Höller P. 2012. On the identification of snow gliding areas and planning of control measures to protect high-altitude afforestations. *Allg Forst Jagdztg*, 183: 94-100.
- Leitinger G, Holler P, Tasser E, Walde J, Tappeiner U. 2008. Development and validation of a spatial snow-glide model. *Ecol Model*, 211: 363-374. DOI: DOI 10.1016/j.ecolmodel.2007.09.015.