



## **Formation of Surface Hoar in Alpine Terrain and its Roughness Properties**

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The formation of surface hoar, which takes predominantly place during cold and clear nights over snow covered surfaces, is particularly important for avalanche formation since a buried surface hoar layer forms very often a significant weak layer. We present measurements and simulations of surface hoar formation at an Alpine study plot in the Swiss Alps. It is first shown, that surface hoar formation is quantitatively explained by measured latent heat fluxes. The heat fluxes are successfully modelled with the snow cover model SNOWPACK, which describes surface fluxes with a bulk approximation of Monin-Obukhov similarity theory. Using the model, it is then shown that larger wind speeds typically stop surface hoar formation because of increased sensible heat flux to the surface, which prevents significant latent heat flux to the surface. This corresponds to observations and offers an explanation different from the often cited mechanical destruction of surface hoar at higher winds.

In a second part, the surface roughness created by surface hoar formation is compared to the roughness generated by snow deposition, which has particular scaling properties and can be explained by a simple ballistic deposition model.