

Forecasting of wet snow avalanche activity: Proof of concept and operational implementation

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State-of-the-art tools for the operational assessment of avalanche danger include field observations, recordings from automatic weather stations, meteorological analyses and forecasts, and recently also indices derived from snowpack models. In particular, an index for identifying the onset of wet-snow avalanche cycles (LWC_{index}), has been demonstrated to be useful. However, its value for operational avalanche forecasting is currently limited, since detailed, physically based snowpack models are usually driven by meteorological data from automatic weather stations only and have therefore no prognostic ability. Since avalanche risk management heavily relies on timely information and early warnings, many avalanche services in Europe nowadays start issuing forecasts for the following days, instead of the traditional assessment of the current avalanche danger. In this context, the prognostic operation of detailed snowpack models has recently been objective of extensive research.

In this study a new, observationally constrained setup for forecasting the onset of wet-snow avalanche cycles with the detailed snow cover model SNOWPACK is presented and evaluated. Based on data from weather stations and different numerical weather prediction models, we demonstrate that forecasts of the LWC_{index} as indicator for wet-snow avalanche cycles can be useful for operational warning services, but is so far not reliable enough to be used as single warning tool without considering other factors.

Therefore, further development currently focuses on the improvement of the forecasts by applying ensemble techniques and suitable post processing approaches to the output of numerical weather prediction models. In parallel, the prognostic meteo-snow model chain is operationally used by two regional avalanche warning services in Austria since winter 2016/2017 for the first time. Experiences from the first operational season and first results from current model developments will be reported.