Abstract
The Krkonoše Mts., with the highest peak at 1602 m, are the highest mountains in the Czech Republic. This middle-mountain range covers an area of 454 km² and includes 53 permanent avalanche paths. Despite its low altitude Krkonoše experience considerably high avalanche activity, even causing fatalities. Unfortunately, and so far, the local authorities do not have a professional tool for avalanche forecasting available. Within the framework of a project devoted to preparation of a tool for snow avalanche hazard forecasting an analysis of historical datasets was performed including weather and snow condition data covering more than 1100 avalanche events in the last 50 years.

HR-DEM from airborne LiDAR was used to get accurate slope and terrain characteristics, which were used for calculation of a release susceptibility map using decision tree method. Afterwards and regional runout susceptibility was calculated employing Flow-R code (http://www.flow-r.org) and information from the analysis of avalanche runout length. This “static” information about avalanche hazard is then being coupled with snow distribution and stability models in order to assess the snow-avalanche hazard in near-real time. For the snow distribution modelling are being tested two models – Alpine 3D and newly developed spatial distributed HBV-ETH model.

It is planned that the forecasting system will be employed as a public avalanche alert system for the Krkonoše Mts. and consequently will be extended for the whole Czechia under the patronage of the Mountain Rescue Service, an organization responsible for the public snow-avalanche hazard forecasting. The system will use forecasted ALADIN weather data.

Runout model
Snow avalanche runout model was calculated using Flow-R code (Horton et al. 2013), using Perla et al. (1980) friction model. It shows the avalanche potential runout, when the protective function of the forest is not taken into account. For a more detailed modelling RAMMS code is applied.

Susceptibility model
Snow avalanche susceptibility model was calculated with Decision Tree method using C4.5 Algorithm (Quinlan 1993). Applied method discriminates very well the snow avalanche release paths and the success rate curve reaches 96.96%, which is an exceptional result. On less than 5% of the area is located more than 96% of the modelled avalanche paths.

Snow distribution and stability
Snow distribution using Energy balance model for 1.2. 2012 (left) and 1.5. 2012 (right) calculated after Walter et al. (2005).

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• Horton et al. (2013): Flow-R, a model for susceptibility mapping of debris flows and other gravitational hazards at a regional scale. NHESS, 13, 869-885.

Concluding remarks
Snow avalanche hazard model is being developed joining available historical information with state-of-art models. „Static“ hazard part consisting of snow avalanche susceptibility and runout potential is joined with the „dynamic“ hazard part consisting of snow distribution and stability models. While both hazard components show considerably good results, their joining for a proper hazard prediction still remains an issue to be solved.