



## **Hydrological response of mountain catchments during rain-on-snow events**

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Rain-on-snow events (ROS) caused severe floodings in the past. Prediction and modelling of this specific flood type are challenging because the role of snow during rain is not fully understood yet. Snowpack has an ambiguous effect on the hydrological response. Rainwater can be fully or partially stored inside the snowpack. In this case, less amount of rainwater can appear in the runoff. On the contrary, warm rainwater can cause additional snowmelt, which can significantly increase the runoff volume. The runoff response is mostly related to the snowpack properties and rain intensity. However, detailed snowpack properties and their distribution are usually not known for the entire catchment.

This study presents the results of more than 110 ROS events analysis carried out for 15 mountain catchments (6.5–181.5 km<sup>2</sup>) in the Czech Republic. The analysis was based on hourly data covering an 11-year time period between 2004–2014. ROS events were categorised into two main groups: 1) ROS events which can cause runoff increase and 2) ROS events with no hydrological response. The main objective of the study was to better understand the meteorological and hydrological conditions causing both types of hydrological response. The crucial task of this study was to analyse how fast the runoff can reach the maximum peak flow and how large the runoff volume caused by ROS is. The preliminary results show that approximately 28% of the ROS events caused no hydrological response, 61% caused an intermediate increase in the runoff and 11% caused a substantial increase in the runoff. The exact number of ROS events depends on the ROS event definition. We have tested several definitions according to input rain volume and critical temperature governing the liquid precipitation.