

Abstract

Rain-on-snow events (ROS) are natural phenomena that have the potential to cause serious floods, wet avalanches and slushflows. Due to climate change the spatial distribution and intensity of ROS events is changing. Accordingly, ROS events become more frequent in high-elevation areas as well as in high latitudes, whereas their occurrence at low-elevation and low latitudes is less common. The behaviour of a snow cover during rainfall and mechanisms of rainwater propagation through the snowpack are still poorly understood. A frequency and correlation analysis of ROS events in the Ptačí potok basin in the Šumava Mts. was conducted. The selected characteristics of the events were calculated from measured climate and streamflow data (2015-2019) and then analysed to examine the influence of individual characteristics on the development of ROS events. Results indicate a significant correlation between the amount of precipitation and the resulting outflow, as well as the influence of other snow and rain characteristics was shown. The time lag of outflow was mainly influenced by snow density. In order to evaluate the impact of climate change on ROS events, climate time series were analysed for the period 1961-2017 and a significant increasing trend in winter air temperature and decreasing trend in snow depth were found. The effects of climate change impacted the spatial distribution of ROS events in the study area.

Key words: rain-on-snow, floods, snowmelt, snowmelt runoff, energy budget