

Abstract

The precipitation falling as rain or snow has different impact on regional water resources and their annual distribution. Shift from solid to liquid form of precipitation following the increase of the surface air temperatures could be important because such change could influence the timing of spring runoff and cause water scarcity in summer. In this study, the spatial and temporal variations of ratio of snowfall to total precipitation (S_f), mean air temperature, day of year of melt-out and winter and spring runoff is analysed. Data were examined for 11 meteorological and 6 hydrological stations in the mountains catchment in Czechia for November-April 1965-2014. Data were analyzed using the Mann-Kendall trend test. Major results show that S_f has been decreasing strongly throughout the whole examined area, with the strongest decrease in the foothill area of the northern mountains of Czechia. Stronger decrease is observed in lower elevations, at the stations with meant air temperature close to melt temperature. Strongest decrease was observed in March and the weakest decrease was observed in December and April, The significant decreases in S_f are associated with large increase in mean winter air temperatures. Due to the increasing mean air temperature in the cold season, the total rainfall is increasing and total snowfall decreasing. This work has shown a strong increasing trend in mean air temperature for all stations at least in one month and a very strong negative trend in day of year of melt-out, which occurs several days earlier. The increasing trend in winter runoff in all studied catchments was confirmed, mainly in March, when the most intense snowmelt occurred.

Keywords: precipitation phase, snow cover, snowfall fraction (S_f), snowmelt, seasonal runoff, Mann-Kendall test