EGU2020-20264
https://doi.org/10.5194/egusphere-egu2020-20264
EGU General Assembly 2020

Understanding runoff formation in a basin with Peat Bog and Podzol hillslopes

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This research deals with the hydrological function of Peat Bog in a catchment where Peat Bog (formed by Histosol or other hydromorphic soils) covers a part of the area (40-60%). In this study, two soil types, creating two main hillslopes of the experimental catchment, form the dominant soil types (Podzol and Histosol) in the Šumava Mountains, Czechia. A modified HBV model was used for the estimation of the contribution of each soil type to common outflow and for the estimation of the water balance. According to previous research and field observations, dominant hydrological processes were described for each hillslope (soil). The model confirmed previous results concerning dominant preferential flows at Peat Bog hillslope and Podzol hillslope; moreover, it quantified a ratio between fast and slow flow in soils. At Peat Bog hillslope, the majority of outflow (67%) was formed from the upper soil layer (Acrotelm). In the mineral soil hillslope, a larger portion of runoff was generated from the lower soil layers or bedrock interface (61%). Peat Bog contributes to a stream mainly during rainfall events; however, the model showed also significant deep percolation at the Peat Bog hillslope and considerable contribution to baseflow during a year. Generally, more precipitation water was turned into runoff at the Peat Bog hillslope by the model, which was indicated by a lower rate of actual evapotranspiration (21% of precipitation), compared to 29% in the case of Podzol hillslope. If we consider land use changes in this locality in terms of expanding or reducing peat areas (draining, drains damming, droughts, etc.), this model could sufficiently estimate hydrological behaviour of local streams and thus, can be potentially used in hydrological planning by local authorities.