EGU2020-22315
https://doi.org/10.5194/egusphere-egu2020-22315
EGU General Assembly 2020

The importance of an accurate estimation of the radiation balance and interception loss for the evaluation of evapotranspiration

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The accurate estimation of the potential evapotranspiration (PET) is one of the key processes for water balance research and for determination of actual evapotranspiration (AET). The rate of PET is primarily affected by the amount of available water, climate conditions and surface characteristics. One of the main controlling factors is the radiation balance. Both shortwave and longwave radiations significantly influence the rate of PET. Since the longwave radiation is rarely measured, it has been computed. The computing approaches include several coefficients connected to specific climate conditions. The accuracy of original set of coefficients is questionable when applied in different sites. Here we present potential systematic error in estimating PET while using modelled longwave radiation. In our study, the use of original coefficient values in calculated longwave radiation resulted in differences from 20 to 80 mm of PET in the growing season. It decreased to less than 20 mm per season after parameter calibration.

Interception describes the amount of water captured by vegetation. Captured water often evaporates back to the atmosphere, thus it doesn't participate in surface runoff or infiltration of water to the soil. Therefore the rate of interception loss hasn't an impact only on evaporation but also on other components of water balance. As the interception is often neglected, we decided to compare observed and modelled values of interception loss. Five different modelling approaches were selected and discussed against measured values. Resulting interception loss differences were in range from 1 to 60 mm per growing season. The differences in the rate of interception led to overall variations in predictions of discharge, groundwater height and soil moisture content modelled by HBV model.