



Actual transpiration at a forested site estimated assuming constant whole-plant hydraulic capacitance

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Evaluation of the hydrological system function under changing climatic conditions requires insight into internal hydrological processes governing the soil water regime, such as infiltration, soil water retention, water uptake by plant roots etc. Deriving a macroscopic description of the soil-plant-atmosphere interface applicable in hydrological models continues to be a research challenge.

Mountainous headwater catchments provide unique opportunity for studying water regime at detailed temporal scales. Uhlirska catchment is located in the north-west of the Czech Republic in Jizera Mts. (altitude: 820 m, mean annual temperature: 4.6°C, mean annual precipitation: 1400 mm). The site is undergoing reforestation with spruce trees (a uniform tree stand is 22 years old). The site is instrumented for monitoring of the relevant meteorological and hydrological variables, as well as the soil moisture and the tree sap fluxes.

A dual-continuum soil water transport model (S1D) coupled with water-potential-gradient based root water uptake model and simple transient plant water storage approximation is applied. Diurnal and seasonal variations of the actual transpiration rates are simulated for a forested site under temperate climate. Results are compared with observed soil water pressure/content as well as tree sap flow.

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