



Evaluation of water fluxes in the spruce tree SPA system using sap flow measurement

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An adequate and physically sound description of the local scale soil-plant-atmosphere (SPA) processes and their spatiotemporal variability is essential for our ability to predict the impact of possible future changes of governing system parameters. In this contribution we focus on the role of the various components of the SPA system and their impact on the temporal variations of sap flow through a spruce tree. Experimental station, located in a forested mountainous area, is instrumented with devices for monitoring basic meteorological and hydrological variables. Automated tensiometers and soil moisture sensors have provided full picture about water flow dynamics in the soil profile. Sap flow measurement by heat field deformation method has been carried out on several full-grown spruce tree specimens (stems and roots) for last two years. The sap flow dynamics of a single spruce tree was compared with the tensiometric data and the transpiration intensities resulting from the analysis of the observed meteorological data. In addition, detailed numerical modeling of transient soil water movement in the spruce root zone was performed using a two-dimensional model based on the Richards' equation. The model results were compared with the tensiometric and soil water content data. Relatively good agreement was achieved.

The work was supported by the Grant Agency of the Czech Republic project No. 205/08/1174.