Geophysical Research Abstracts
Vol. 17, EGU2015-9456-2, 2015
EGU General Assembly 2015


# Quantifying the feedback of evaporation and transpiration rates to soil moisture dynamics and meteorological condition changes by a numerical model

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Evapotranspiration drives the hydrological process through energy-driven water-phase changes between systems of soil-vegetation-atmosphere. Evapotranspiration performs a rather complex process attributable to the spatial and temporal variation of soil-vegetation-atmosphere system. For vegetation-covered land surfaces, the transpiration process is governed by the stomatal behavior and water uptake from the root zone, and evaporation is related with the interception of rainfall and radiation on the canopy and soil surface.

This study is emphasized on describing the hydrological process and energy cycle in a basic hydrological response unit, a hillslope. The experimental hillslope is located in an experimental catchment of the Bohemian Forest Mountains' headwaters in the Czech Republic, where is mostly covered by dead Norway spruce forest (Picea abies) stands caused by balk beetle outbreak. High-frequency monitoring network of the hydro-climatic data, soil pore water pressure and soil temperature has been launched since 2012. To conceptualize the land-surface energy and water fluxes in a complex hillslope, a soil-vegetation-atmosphere transport (SVAT) model, coupled with a multi-phase soil physics process (i.e. the water, vapor and heat flow transport) is used. We selected an 8-week basis dataset from 2013 as a pilot for partitioning the evapotranspiration into three interactive components: transpiration (Et), canopy interception evaporation (Ei), and soil evaporation (Es), by using this numerical model. Within such model framework, the sensitive feedback of evapotranspiration rates to rainfall intensity, soil moisture, and solar radiation will be examined by conducting numerical experiments to better understand the mechanism of evapotranspiration process under various influencing factors. Such application study and followed numerical simulations provide a new path for quantifying the behaviors of the soil-vegetation-atmosphere system.