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The significance of the interception in a Thornthwaite-type monthly step water balance model in context of the climate change

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The hydrological impacts of the climate change can be dramatic. Our main purpose is the methodical improvement of a previously established Thornthwaite-type monthly step water balance model, which takes the interception item into account, and compare the results of the evapotranspiration and the soil moisture projections for the 21st century of the original and the upgraded models. Both of the models will be calibrated and validated (using remote-sensed actual evapotranspiration data, called CREMAP) and requires only temperature and precipitation time series as inputs. The projections based on 4 bias-corrected regional climate models databases (FORESEE), and the 3 investigation periods are: 2015–2045, 2045–2075, and 2070–2100. The key parameter is the water storage capacity of the soil, which can be also calibrated using the actual evapotranspiration data. The maximal rooting depth is determinable if the physical properties of the soil are available. The interception can be ranges from 5–40% of gross precipitation, which rate are differing in the various plant communities. Generally, the forests canopy intercepts considerable amounts of rainfall and evaporates back into the atmosphere during and after precipitation event. Leaf area index (LAI) is one of the most significant factor, which determine the canopies storage capacity. Here, MODIS sensor based LAI time series are applied to estimate the storage capacity. A forest covered experimental catchment is utilized for testing the models near to Sopron, Hungary. The projections will expected to demonstrate increasing actual evapotranspiration values, but decreasing trends for the 10 percentile minimum soil moisture values at the end of the 21st century in both model runs. The seasonal periodicity of evapotranspiration may demonstrates the maximums in June or July, while in case of the soil moisture it may shows minimum values in autumn. With the comparison of the two model runs, we expect lower soil water storage capacity ($SOIL_{MAX}$) values for the upgraded model and for that very reason lower soil moisture reservoir as well. Consequently, we will possess a more reliable model, which represents a closer approximation of the reality. The water stress analysis (relative extractable water and soil water deficit) may indicate that more significant water stress assumed to occur in case of the upgraded model run during the 21st century.

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