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A monthly water balance model for climate change analysis in Hungary

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The currently ongoing climate changing progress can be typified with a global temperature rising. The most significant effect of the climate change will impact for the water cycle. The analysis of the effects of vegetation on the hydrological cycle in a climate change context is especially important. In Hungary the impact of vegetation on water balance was analyzed in the frame of small catchment research as well as paired plot analysis.

The aim of this paper was to a model develop based on Thorntwaite-type monthly water balance estimations. The main goals were to calibrate the model parameters, using remote sensing based ET dataset. The calibrated model was used for prediction using 4 climate model datasets. The 3 main periods of prediction were: 2010-2040, 2040-2070, and 2070-2100. The advantage of this model is its robust build-up. It can be applied if temperature and precipitation time series are available. The parameter of the calibration is the water storage capacity of the soil ($SOIL_{max}$), which can be calibrated using the available actual evapotranspiration data. If the soils physical properties are known, the maximal rooting depth is also predictable. The model can primarily be used at the catchment level or for areas without additional water amounts from below.

For testing the model, a dataset of a corn field next to Mosonmagyaróvár, and a dataset of a small forest covered catchment next to Sopron was successfully used. The latter can be used for water balance validation too.

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