



Monthly water balance model for climate change analysis in agriculture with R

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For Hungary regional climate models projections suggest a warmer climate and some changes in annual precipitation distribution. These changes force the whole agrarian sector to consider the traditional cropping technologies. This situation is more serious in forestry because some forest populations are on their xeric distributional limits (Gálos et. al, 2014). Additionally, a decision has an impact sometimes longer than one hundred years.

To support the stakeholder there is a project which develops a GIS (Geographic Information System) based decision support system. Hydrology plays significant role in this system because water is often one of the most important limiting factor in Hungary.

A modified Thorntwaite-type monthly water balance model was chosen to produce hydrological estimations for the GIS modules. This model is calibrated with the available data between 2000 and 2008. Beside other meteorological data we used mainly an actual evapotranspiration map in the calibration phase, which was derived with the Complementary-relationship-based evapotranspiration mapping (CREMAP; Szilágyi and Kovács, 2011) technique.

The calibration process is pixel based and it has several stochastic steps. We try to find a flexible solution for the model implementation which easy to automatize and can be integrate in GIS systems. The open source R programming language was selected which well satisfied these demands. The result of this development is summarized as an R package.

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References

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