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Spatially distributed evapotranspiration and recharge estimation for sand regions of Hungary in the context of climate change

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Water balance of sand regions of Hungary was analysed using remote-sensing based evapotranspiration (ET) maps (1*1 km spatial resolution) by CREMAP model over the 2000-2008 period. The mean annual (2000-2008) net groundwater recharge (R) estimated as the difference in mean annual precipitation (P) and ET, taking advantage that for sand regions the surface runoff is commonly negligible.
For the examined nine-year period (2000-2008) the ET and R were about 90 percent and 10 percent of the P. The mean annual ET and R were analysed in the context of land cover types.
A Budyko-model was used in spatially-distributed mode for the climate change impact analysis. The parameters of the Budyko-model (α) was calculated for pixels without surplus water. For the extra-water affected pixels a linear model with β-parameters (actual evapotranspiration / pan-evapotranspiration) was used. These parameter maps can be used for evaluating future ET and R in spatially-distributed mode (1*1 km resolution).
By using the two parameter maps (α and β) and data of regional climate models (mean annual temperature and precipitation) evapotranspiration and net groundwater recharge projections have been done for three future periods (2011-2040, 2041-2070, 2071-2100). The expected ET and R changes have been determined relative to a reference period (1981-2010).
According to the projections, by the end of the 21th century, ET may increase while in case of R a heavy decrease can be detected for the sand regions of Hungary.
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Keywords: evapotranspiration, net groundwater recharge, climate change, Budyko-model