



Future trends and geographical distribution of potential evapotranspiration in Germany throughout the 21st century

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Recent climate projections for the 21st century (e.g. ECHAM5-MPIOM) show strong changes of the global climate. Forests in Germany are exposed to these changes, which include increase of temperature, changes of seasonal precipitation patterns and possibly the increase of frequency of extreme meteorological events as droughts, rain and wind storms. Present study focuses on the characterization of possible future developments of potential evapotranspiration (PET) throughout the 21st Century under conditions of SRES scenarios A1B and B1. The FAO-56-Penman-Monteith (ALLEN et al., 1998) was implemented. Climate scenario data were downscaled by the regional climate model Climate Local Model (CLM) to the spatial resolution of about $0.2^{\circ} \times 0.2^{\circ}$ and used to calculate PET for Germany. The spatial and temporal variability of PET in Germany during the 21st century is examined and causes of variation discussed. Areas within Germany with particularly stronger – hot spots – and weaker – cold spots - changes in PET are identified and analyzed in detail. Two hot spots, the Saarland and the Black Forest, and a cold spot, East Brandenburg, were identified. The deviating development of the hot/cold spots are traced back to the stronger or weaker development of the energy balance, which is higher in the hot spots and lower in the cold spot. The spatially differential development of PET could be traced back to the regionally different development of the meteorological variables. The contributions of various meteorological variables to the temporal trend detected in the PET are then determined. Clear trends in the annual sums or means could be described for several component variables of PET. Some variables do not show any noteworthy trend in annual mean but changes in their seasonal variability. The annual PET sums do not increase so much as expected when seen in relation to the temperature increase predicted for the 21st century, particularly in SRES A1B. PET in B1 does not evolve as substantially as in A1B.

ALLEN, R. G., L. S. PEREIRA, D. RAES and M. SMITH. (1998). "Crop evapotranspiration – Guidelines for computing crop water requirements - FAO Irrigation and drainage paper 56." FAO Irrigation and drainage paper from <http://www.fao.org/docrep/X0490E/x0490e07.htm#TopOfPage>.