Hydro-pedotransfer functions to predict annual capillary rise and actual evapotranspiration for grassland

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New hydro-pedotransfer functions (HPTF) for flat grassland sites are presented to estimate both the annual capillary rise from the groundwater into the root zone, and the annual actual evapotranspiration on a regional scale. The HPTFs only need easily available site information such as soil texture class, groundwater depth, summer rainfall and potential evapotranspiration (ET0) according to the FAO guideline.

The basic idea is to evaluate the increase of actual evapotranspiration (=gain, G) caused by capillary rise from groundwater compared to identical site conditions, but without groundwater influence. This gain (G) represents an effective parameter to express both, the soil and climate dependent effective capillary rise for a given site with grassland use.

To develop HPTFs expressing the effective annual capillary rise, we firstly used the numerical simulation model SWAP in order to calculate water balances for a broad spectrum of soils, groundwater depths, and climate conditions. Secondly we analyzed this data statistically in order to obtain simple equations for predicting gain without using a numerical model. The new hydro-pedotransfer functions were developed and tested for several regions in Germany.