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Evaluating the importance of climate input and calculation approach for estimating global scale potential evaporation

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The concept of potential evapotranspiration (PET) is used widely in hydrological modeling to assess the maximum water demand of the atmosphere from the soil-plant continuum for the subsequent estimation of actual evapotranspiration. The calculation is based on meteorological data like radiation, temperature and wind speed, and there are a large number of proposed equations for the computation of PET. The uncertainty of estimated spatially distributed PET at the global scale is high due to the uncertain climate input and the PET calculation approach. Therefore, we evaluated an ensemble of simulated PET estimates that was derived by combining four state-of-the-art radiation (plus other climate) data sets as well as four calculation approaches that are applicable for modeling impacts of climate change at the global scale. This presentation i) identifies optimal radiation input estimates by comparison to BSRN and GEBA stations, ii) identifies an optimal combination of climate input and PET model by comparison to pan evaporation data, and determines iii) where on the global land surface which type of uncertainty dominates total uncertainty of the PET ensemble – either climate input uncertainty or PET calculation approach uncertainty. The global water availability and use model WaterGAP is used for the analysis.