



Towards reliable evapotranspiration estimates over the Iberian Peninsula.

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Current research indicated the potential for improving evapotranspiration (ET) estimates in state-of-the-art hydrologic models such as the mesoscale Hydrological Model (mHM, www.ufz.de/mhm). Most models exhibit deficiencies to estimate the ET flux in semi-arid regions. Possible reasons for poor performance may be related to the low resolution of the forcings, the estimation of the PET, which is in most cases based on temperature only, the joint estimation of the transpiration and evaporation through the Feddes equation, poor process parameterizations, among others.

In this study, we aim at sequential hypothesis-based experiments to uncover the main reasons of these deficiencies over the Iberian Peninsula basin. We plan the following experiments:

- 1) Use the high resolution meteorological forcing (P and T) provided by local authorities to estimate its effects on ET and streamflow.
- 2) Use local ET measurements at eddy covariance stations to estimate evaporation related parameters.
- 3) Test the influence of the PET formulations (Hargreaves-Samani, Priestley-Taylor, Penman-Montheith, corrected Montheith-Unsworth proposed by Schymanski and Or, 2017).
- 4) Estimate evaporation and transpiration separately based on equations proposed by Pasquato et al. (2015).
- 5) Incorporate local soil moisture measurements to re-estimate ET and soil moisture related parameters.

We set-up mHM for 30 sub-basins based on three meteorological model inputs (E-OBS, SPAIN02, downscaled E-OBS) distributed over the Iberian Peninsula. Likewise mHM was set up for eddy-covariance sites at the local scale ($500 \times 500 \text{ m}^2$). This resolution was chosen because it is representative for the footprint of the latent heat estimation at the eddy-covariance station.

In the second experiment, for example, a parameter set is to be found as a compromised solution between ET measured at local stations and the streamflow observations at sub-basins. Preliminary results indicate that higher model performance regarding streamflow can be achieved using local high resolution meteorology. ET performance is, however, still deficient. On the contrary, using ET site calibrations alone increase performance in ET but yields in poor performance in streamflow. Results suggest the need of multivariable, simultaneous calibration schemes to reliably estimate ET and streamflow over the Iberian Peninsula. Penman-Montheith based PET approaches appear to be the best performing. Experiments 4 and 5 should reveal the benefits of separating evaporation from bare soil and transpiration in semiarid regions using mHM. Further research in this direction is foreseen by incorporating neutron counts from Cosmic Ray Neutron Sensing technology in the calibration/validation procedure of mHM.