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# Applicability of remote sensing evapotranspiration products in reducing uncertainty and equifinality in hydrological model calibration of Oued El Abid watershed.

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Typically, hydrological models are calibrated using observed streamflow at the outlet of the watershed. This approach may fail to mimic landscape characteristics, which significantly impact runoff generation because the streamflow incorporates contributions from several hydrological components. However, remotely sensed evapotranspiration (AET) products are commonly used as additional data with streamflow to better constrain model parameters. Several researchers demonstrated the efficacy of AET products in reducing the degree of equifinality and predictive uncertainty, resulting in a significant enhancement in hydrological modelling. Due to the variety of publicly available AET datasets, which vary in their methods, parameterization, and spatiotemporal resolution, selecting an appropriate AET for hydrological modelling is of great importance. The purpose of this study is to investigate the difference in simulated hydrologic responses resulting from the inclusion of different remotely sensed AET products in a single and multi-objective calibration with observed streamflow data. The GLEAM_3.6a, GLEAM_3.6b, MOD16A2, GLDAS, PML_V2, TerraClimate, FLDAS, and SSEBop datasets were downloaded and incorporated into the calibration of the SWAT hydrological model. The findings indicate that the incorporation of remotely sensed AET data in multi-objective calibration tends to improve model performance and decrease predictive uncertainty, as well as significantly improves parameter identification. Furthermore, AET single-variable calibration results show that the model would have performed well in simulating streamflow even without streamflow data. Moreover, each dataset included in this investigation responded differently. GLEAM_3.6b and GLEAM_3.6a performed the best, followed by FLDAS and PML_V2, while MOD16A2 was the least performing dataset. Thus, this research supports the use of remotely sensed AET in the calibration of hydrological models as a best practice.