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Precipitation uncertainty propagation in hydrologic simulations: evaluation over the Iberian Peninsula.

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Precipitation is arguably one of the most important forcing variables that drive terrestrial water cycle processes. The process of precipitation exhibits significant variability in space and time, is associated with different water phases (liquid or solid) and depends on several other factors (aerosols, orography etc), which make estimation and modeling of this process a particularly challenging task. As such, precipitation information from different sensors/products is associated with uncertainty. Propagation of this uncertainty into hydrologic simulations can have a considerable impact on the accuracy of the simulated hydrologic variables. Therefore, to make hydrologic predictions more useful, it is important to investigate and assess the impact of precipitation uncertainty in hydrologic simulations in order to be able to quantify it and identify ways to minimize it. In this work we investigate the impact of precipitation uncertainty in hydrologic simulations using land surface models (e.g. ORCHIDEE) and global hydrologic models (e.g. WaterGAP3) for the simulation of several hydrologic variables (soil moisture, ET, runoff) over the Iberian Peninsula. Uncertainty in precipitation is assessed by utilizing various sources of precipitation input that include one reference precipitation dataset (SAFRAN), three widely-used satellite precipitation products (TRMM 3B42v7, CMORPH, PERSIANN) and a state-of-the-art reanalysis product (WFDEI) based on the ECMWF ERA-Interim reanalysis. Comparative analysis is based on using the SAFRAN-simulations as reference and it is carried out at different space (0.5deg or regional average) and time (daily or seasonal) scales. Furthermore, as an independent verification, simulated discharge is compared against available discharge observations for selected major rivers of Iberian region. Results allow us to draw conclusions regarding the impact of precipitation uncertainty with respect to i) hydrologic variable of interest, ii) spatiotemporal scale and iii) modeling structure. Moreover, the independent verification of simulated hydrographs provides additional indications on the accuracy of different precipitation products.