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Evaluation of the Seamless Parameter Estimation Technique across Contiguous United States

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This study aims at in-depth understanding of the differences in implementation of seamless parameter estimation technique on streamflow simulations and water balance components. This large-sample hydrologic modeling study is evaluated over 500 small to medium-sized unimpaired basins over the contiguous United States. Three hydrologic/land-surface models with varying level of model complexity and process representations are used. Namely, the VIC model using the MPR-flex framework (*Mizukami et al., 2017*) is used as a benchmark and compared with the mHM-MPR framework (*Samaniego et al., 2010, Kumar et al., 2013*) and the Noah-MP-MPR model (*Niu et al., 2011*). The model simulations are based on the same underlying soil, land cover, and meteorological datasets, which allows to attribute differences in model simulations to differences in model structures. Although the differences between all models are marginal in terms of the annual major water cycle components, the differences among model become significant at monthly and sub-monthly scale. This effect can be mostly related to the used evaporation scheme and is closely related to the degree of soil saturation. Detailed examples are presented/discussed and compared against independent gridded reanalysis products.

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