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Joint estimation of improved model parameters for the global hydrology model WGHM from different satellite data

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In this contribution we focus on consistent combination of different satellite data to improve model parameters for the WaterGAP Global Hydrology Model (WGHM). One of the most sensitive parameters of WGHM, alpha-coefficient of the potential evapotranspiration module is represented regionally on a 0.5 degree grid by two-dimensional B-spline expansions. According to the Priestley-Taylor equation, alpha relates the net radiation to the reference crop evaporation. In the standard approach, alpha is set to 1.26 and 1.74 in humid and arid climates, respectively. We performed a Monte Carlo simulation with stratified sampling of alpha from a truncated normal distribution with a mean of 1.5 and a standard deviation of 0.3. Since the relation between the observations and alpha is non-linear, linearization via Taylor expansion and thus an iterative method are applied. Based on the sensitivities of WGHM simulation outputs actual evapotranspiration and total water storage deviation with respect to alpha, the corresponding unknown B-spline coefficients can be estimated from the combination of MODIS-based actual evapotranspiration and GRACE total water storage. Therefore, systematic errors and the stochastic behavior between different observation techniques have to be considered due to a joint adjustment.