

## ***Interactive comment on “A framework to regionalize conceptual model parameters for global hydrological modeling” by Wenyan Qi et al.***

**Anonymous Referee #1**

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This manuscript examines a variety of regionalization approaches applied to regionalize parameters of four catchment-scale conceptual models to global grid cells. The performance of standard regionalization techniques based on spatial proximity, physical similarity and the combination of both is examined for several thousand catchments world-wide and is compared to the performance with at-site calibrated parameters. The combination of best-performing regionalization approaches are used to interpolate parameters from gauged locations to the grid cells world-wide and global water balance components are estimated using four different conceptual hydrological models. The comparison of regionalization methods for global scale hydrological modeling has an immense importance for reliable estimation of global water resources. However, it is not clear how the framework proposed in this study advances the fidelity of

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global hydrological models. The components of the proposed framework are not clear defined making it rather difficult to understand the novelty and the advantages of this work compared with previous studies. Little insights and discussion is provided on the effect of parameter uncertainty on the estimates of global water balance components. Moreover, the introduction of more recent works on model parameter regionalization, especially the work tackling parameter discontinuity for regional and global studies is missing. Some critical assumptions (e.g., on independence among catchment descriptors or that catchments with similar catchment descriptors have similar model parameters) were neither tested nor critically discussed. The reported differences in performance of different regionalization methods and models is minimal. Finally, several missing methodological aspects regarding distance calculation between the catchments, unclear distinction between calibration and evaluation catchments and interpolation to the global grid cells makes it difficult to evaluate the credibility of this study. Therefore, I think a substantial revision of the manuscript is required. Please find my detailed comments attached.

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2020-127/hess-2020-127-RC1-supplement.pdf>

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