

***Interactive comment on* “Global catchment modelling using World-Wide HYPE (WWH), open data and stepwise parameter estimation” by Berit Arheimer et al.**

Anonymous Referee #1

Received and published: 9 May 2019

The discussion paper represents a very impressive body of research that is well-summarized given the amount of information to be documented for the global application of a catchment model. The use of this global model to then gain insights into global water availability is an additional important contribution only achievable through the thoughtful and comprehensive modeling work presented here.

I also want to make note of the well-referenced datasets used in this modeling effort that are nicely documented in the form of several tables and will provide an excellent reference for readers that have an interest in catchment modeling at the global domain. Lastly, I commend the the authors on their candid discussions regarding the model

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performance, parameter estimation, data challenges, and limitations, which will serve to identify the critical research paths moving forward to improve catchments modeling at the global domain.

My comments for improvement mainly lie in providing additional detail on the methods and justification for choices in the modeling process. In some places, the language is feels rushed and I hope my comments also address this point.

Line 95-96: Define what is meant by a “multi-catchment approach for a large domain”

Line 199: Consider emphasizing here the difference and advantages of catchment-scale modeling and other types of models so the importance and significance of catchment based models at the global domain is fully understood.

It might be more logical to the flow of the paper to make Section 3.2 into Section 2, meaning to introduce the model first and then discuss the data and methods used to develop and evaluate the model.

Lines 136-143: How did resolve any spatial differences with the areas not covered by the higher resolution dataset

Line 148-150: How did you identify these flood risk areas?

Change the title of Section 2.2 to “Climate Data” and Section to 2.3 to “Hydrologic Data”

Table 3: Are all time series available at a daily time step?

Lines 202-203: Are versions 1.0 and 1.2 published and citable?

Lines 210-211: How many catchments fell into the category of needing a longer initialization? Was it 10% (100% minus the 90% mentioned in line 209)? This is not clear. How was the screening done to pick these catchments needing a longer initialization?

Line 221: Is the WHIST also new to this paper or should there be a reference here?

Line 271: Change “percolating” to “percolated”

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Lines 275-276: Change to read: “encompassess a large number of sinks due to climate and topography and there existed a national. . .”

Lines 284-288: How were these steps 1-3 done? More detail needs to be provided here.

Line 294-298: Can you offer some specific justification for this assignment was done for soil depth?

Line 318 could read “fluxes well relate to vegetation...conditions rather than soil. . .”

Line 324: Should read “while a gladter routine accounts for”

Line 326: Start new paragraph at the word “There”

Section 3.3 and Figure 3: Could you add more detail about how the process used to group catchments?

Line 367: Why was the DEMC preferred over other approaches?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-111>, 2019.

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