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Comment on hess-2021-109

Anonymous Referee #1

Referee comment on "Inundation prediction in tropical wetlands from JULES-CaMa-Flood global land surface simulations" by Toby Richard Marthews et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-109-RC1, 2021

Toby Marthews et al., conducted a global simulation of inundation areas with CaMa-Flood hydrodynamic model and was driven by JULES land surface model's runoff outputs at 0.25 by 0.25 degree resolution. They compared the simulated inundation areas against Global Inundation Extent from Multi- Satellites database version 2.0 (GIEMS2) dataset over several major inundated regions across the globe. They also tried to bias-correct the model simulated inundation area with simple transformations. Below are my specific comments.

- The major contribution of this analysis is better understanding of CaMa-Flood model biases, and the value of this work is so limited to the CaMa-Flood model/JULES model themselves. Little insights could be gained to better understand the mechanisms/processes underlying the regional hydrological cycle and water balance.
- Furthermore, the understanding of CaMa-Flood model bias was also limited to how it is biased but little was known about why CaMa-Flood has such bias. Which specific process is responsible for the bias?
- In the methodology section, it is clear that JULES provided runoff outputs. However, it is not clear how accurate JULES runoff was. Although JULES runoff evaluation was published before, as the major driving variable of CaMa-Flood model, it's still worthwhile to e.g., add a full paragraph to summarize JULES' runoff at a global and regional scale (particularly the major inundated regions used in this study).
- Also, it will be great to have a full paragraph in the discussion section to discuss the contribution of runoff bias to the CaMa-Flood simulated inundation area bias.
- Again a more detailed explanation of the CaMa-Flood model (inputs, outputs, major equations, hypotheses, advantages, disadvantages) is needed in the methodology section, although CaMa-Flood model description paper was published before.
- The results section needs a big refinement and explains more in detail (quantitatively). The current version (five short paragraphs) only scratches the surface of CaMa-Flood model results. Need more quantitative details about the analysis of e.g., seasonality, interannual variability, spatial distribution, maximal inundation extent, functional relationships between inundation and environmental factors, and so on.
- Discussion section, the bias in the inundation area needs to be mechanistically attributed to multiple relevant factors (e.g., precipitation, runoff) first before the bias-

corrections so that one could learn why CaMa-Flood was biased and provide insights into how to bias correct the model through improving model structure, input data, parameterization scheme and so on in the future.

- Discussion section, the bias correction (based on alpha min, alpha max, and beta) was empirical and may not be valid if the bias was nonlinearly related to the space, time, and magnitude of the inundated area. In order to better justify the bias correction function, an analysis of the bias structure (across time and space) could be helpful.
- Abstract, the second half of the abstract needs more quantitative results and deep implications. The last sentence is not convincing, since this study did not provide data, it was a model-data comparison study.