

Comments in plain text, response to comments in *blue italics*.

Editor

Dear authors,

The edits to your paper have been re-reviewed, and the referee found that you satisfactorily addressed the major review comments. Thank you for your thorough response to these comments. Please address the remaining minor queries regarding your manuscript. Kind regards,
Hilary

We have revised the manuscript to address the minor comments outlined by the referee and feel that our paper is now suitable for publication in HESS.

Anonymous Referee #1

The revision has addressed most of my previous comments. I like the addition of the comparison with observed data (Appendix A3). I am also happy seeing that the authors looked at the hydrologic response at the watershed scale versus at the grid scale. This definitely enriched the findings of this paper.

We thank the referee for their comments. We have addressed all their minor comments; see below.

However, I'm not quite satisfied with the authors' response to the impacts of gridded forcing resolution on non-grid-based hydrologic models. I would like to point out that non-gridded hydrologic models can be physics-based and can provide distributed hydrologic variables. For example, the hydrologic response unit (HRU) based hydrologic models: the cold regions hydrological model (CRHM) (Pomeroy et al., 2007) and the structure for unifying multiple modeling alternatives (SUMMA) (Clark et al., 2015a, 2015b). Therefore, the grid size of hydrologic models can be taken in a more flexible way. It actually refers to the size of the basic hydrologic modeling unit. In this research, the authors take the grid-based hydrologic model as an example and conclude that the resolution of meteorological data is better to be close to the grid size of hydrologic models. This conclusion may be valid to non-grid-based hydrologic models, too, and could be a research avenue.

We agree with the referee that the findings of this study might be limited to the grid-based integrated hydrologic models, which is also the main purpose of our work. Nonetheless, we have attempted to provide guidance by studying the aggregated hydrologic response at the watershed scale. However, as

suggested, future works could assess the impacts of the spatial distributions of forcing on HRU based hydrologic models and could compare the sensitivity of the two types of models to the spatial distributions of meteorological forcings. We have added a sentence regarding this future research venue in our conclusion, please refer to lines 671-673.

Below are some specific comments.

1. Line 91. Change "...and meant..." to "are meant".

Changed

2. Line 110. Add "are" to the sentence "..., and periods of intense precipitation mainly caused by atmospheric rivers".

We have removed the comma; the sentence does not need an "are"

3. Figure 3 and Figure 5, y-axis tick labels need to be corrected. For example, -5.10^3 means $-0.5 \cdot 10^3$, is it right?

The y-axis labels are correct. As explained in the manuscript (section 4.2.), these values are large due to the small values of ET

4. Line 257. Please specify Appendix A. I think it's "in Appendix A2".

Changed

5. Line 336. Please rephrase the sentence "thus small changes in ET are relatively large".

Changed

6. Line 379. Please specify Appendix A here. 1, 2, or 3?

We refer to Appendix A2, we specified it in the manuscript.

7. Line 442. Please rephrase the sentence "As shown in Figure 9 illustrating the spatial distributions of the absolute error of surface pressure-head, ...".

We have changed the sentence, now to read: "As shown in Figure 9 illustrating the spatial distributions of the absolute error of surface pressure-head (AE Ψ s), the percent error of the total surface water storage at the watershed scale is small because some regions in the domain over-estimate the pressure-head while others under-estimate the pressure-head"

References:

Pomeroy, J. W., et al. "The cold regions hydrological model: a platform for basing process representation and model structure on physical evidence." *Hydrological Processes: An International Journal* 21.19 (2007): 2650-2667.

Clark, Martyn P., et al. "A unified approach for process - based hydrologic modeling: 1. Modeling concept." *Water Resources Research* 51.4 (2015): 2498-2514.

Clark, Martyn P., et al. "A unified approach for process - based hydrologic modeling: 2. Model implementation and case studies." *Water Resources Research* 51.4 (2015): 2515-2542.