The second round of revision on the manuscript

"NMH-CS 3.0: a C# Programming Language and Windows System based

Ecohydrological Model Derived from Noah-MP"

Dear referees and editors,

Thank you for identifying the issues in the manuscript. We have made modifications based on your feedback.

The following paragraph presents the point-to-point response to your comments.

Yonghe Liu

Overall, I think the authors have done a great job revising this manuscript. I am satisfied with the responses to my previous comments. I have some other (mostly small) suggestions below. Once these comments are addressed, I think the manuscript will be suitable for publication. I would be happy to review the revised manuscript again.
Reply: Thank you for recognizing our work.

Lines 32-33: Citations missing.
Reply: I have not made clear which citation is missing. Only citations (Niu et al., 2011; Yang et al., 2011) are here, which are listed in the references.

Line 35: FORTRAN is misspelled.
Reply: Corrected.

Line 56: 'Analyse' should be analysing.
Reply: Corrected.

Line 89: Remove 'are'.
Reply: Corrected.

Line 141: Change 'simulating' to 'simulate'.
Reply: Corrected.

Lines 153-154: Here, n and n+1 are used to refer to diUerent time steps, while in Eq. 2, t and t+1 are used.
Reply: Corrected. All the 'n' are replaced by 't'

Line 207: Citations missing.
Reply: Added now: (David et al., 2015; Mizukami et al., 2016), in the reference list.

Line 212: Citation missing.
Reply: Added now, same literature to the above.

Line 248: Remove 'of'.
Reply: Removed.

Line 261: Citation missing, and parentheses need to be fixed.
Reply: Added now: (David et al., 2013) in the reference list.

Line 362: Can the authors comment on possible factors that could be contributing to these sporadic differences in high-latitude areas? Is this related to the discussion of Fig. 7?
Reply: We cannot certify whether the factors contributing to these differences are identical to those discussed in relation to Fig. 7. However, this is highly probable. Now, I added a sentence to the discussion of Fig.7 in Line 404: "This explanation may account for the inconsistencies observed in the time series in Fig. 7 and the sporadically distributed discrepancies in high-latitude regions depicted in Fig. 4."

Fig. 4 & 5: Can these figures be plotted on a latitude-longitude grid? Just to provide a geographic reference in terms of where the larger differences are occurring. The same goes for similar figures in the supplementary info.
Reply: The data is in a Lambert projection coordinate system, so it is difficult in plotting the maps in a latitude-longitude due to the lack of powerful tools. Now I have added the latitude-longitude network on the maps.

Fig 4: Can the authors comment further on the region of higher relative difference in underground runoff shown by the red in the lower right figure?
Reply: We cannot make clear what is the reason of such differences in the current study. Although this relative difference is significant in the map, actually it is actually in very smalls because the annual total underground runoff in the corresponding region is below 50 mm. We think this may be a floating-point error. We added one sentence in line 359: "These regions with large relative differences of underground runoff actually are in small absolute differences, primarily because the annual total groundwater runoff in these areas is inherently low (<50 mm). This discrepancy is likely attributable to floating-point arithmetic errors. "

Line 375: Should the "Noah-MP" in the caption here be omitted?
Reply: Noah-MP is omitted now.

Fig 9: Can the authors plot these figures using the same y-axis scale for all plots? This will aid in comparison between plots.
Reply: I have redrawn the curves now using the similar y-axis scale. It is difficult to present all the curves in one single plot (see following attached plot). Actually, the comparison between different subplots is also unnecessary and irrelevant to the topic under discussion here. When the If readers want to compare the different performances of option combinations, they can see

the Taylor diagrams in the manuscript.
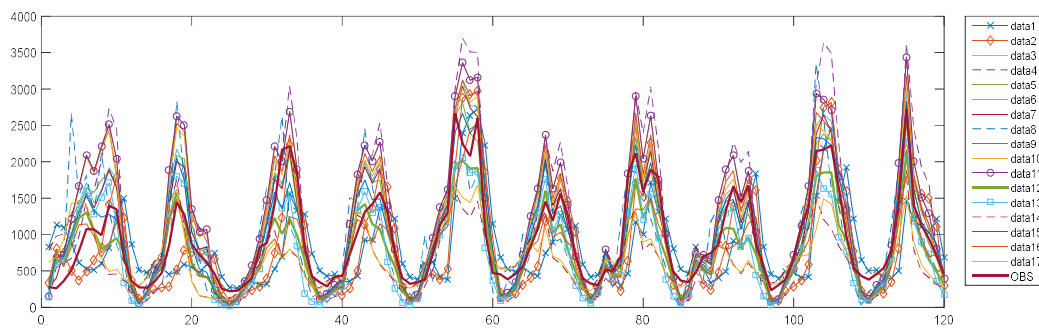
An attached plot for all the curves together

Line 551: 6 km is the simulation resolution, not the total size of the simulation domain. Please clarify this.
Reply: It is a wrong description. Now it is corrected. 6 km refers to the resolution.

Line 556: Remove 'on river network' to make this sentence clearer.
Reply: Removed.

Line 563: Remove 'happened'.
Reply: Removed.

Lines 562-565: It's not necessary to refer to WRF-Hydro twice in the sentence, and I recommend re-wording it for clarity.
Reply: The sentences are rewritten: "Overall, while there are occasional disparities between the models' outputs, it reproduces highly consistent spatiotemporal distribution of multiple variables."

References

David, C.H., Famiglietti, J.S., Yang, Z. and Eijkhout, V.: Enhanced fixed-size parallel speedup with the Muskingum method using a trans-boundary approach and a large subbasins approximation, Water Resour. Res., 51(9), 7547-7571, https://doi.org/10.1002/2014WR016650, 2015.

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Niu, G., Yang, Z., Mitchell, K.E., Chen, F., Ek, M.B., Barlage, M., Kumar, A., Manning, K., Niyogi, D., Rosero, E., Tewari, M. and Xia, Y.: The community Noah land surface model with

multiparameterization options (Noah-MP): 1. Model description and evaluation with local-scale measurements, J. Geophys. Res.-Atmos., 116(D12109), https://doi.org/10.1029/2010JD015139, 2011.

Yang, Z., Niu, G., Mitchell, K.E., Chen, F., Ek, M.B., Barlage, M., Longuevergne, L., Manning, K., Niyogi, D., Tewari, M. and Xia, Y.: The community Noah land surface model with multiparameterization options (Noah-MP): 2. Evaluation over global river basins, J. Geophys. Res.-Atmos., 116(D12110), https://doi.org/10.1029/2010JD015140, 2011.