Review Comments (egusphere-2023-3132)

Oloruntoba et al. analysed how various soil data and forcings impact CLM5 water-related variable simulations across Africa. This work could be valuable in guiding future simulations. However, the paper is not well-written. Below, I list some of my comments for improvement.

1. The title is confusing. What do you mean by "temporal model resolution"? It needs to be modified. It does not reflect the important points mentioned in your abstract about different soil textures and forcing sources, which are crucial to your paper.

   The title will be changed to “High Resolution Land Surface Modelling over Africa: the role of uncertain soil properties in combination with forcing temporal resolution” in the revised version.

2. The abstract is not well organized. From your summary of your experiments (4 soil textures and 3 forcings), readers might expect results on how soil impacts the simulations and how different forcings affect the simulations. However, the abstract does not mention how different forcings affect your simulations, i.e., the IV point in your conclusion section. Thus, I think the abstract is not well organized.

   We wanted to focus the abstract on the main novel results, which in our opinion are more related to the combination of simulations with different soil input data and the temporal resolution of the atmospheric forcing input. We still think that this needs to be the focus, but will dedicate an additional line to the impact of different atmospheric forcings as well.

3. The introduction should be reorganized or rewritten. Many paragraphs in the introduction belong in the method section. For example, paragraphs 4 through 6, about specific soil data, forcing, and experiment design, respectively, should be mentioned in the methodology section. Therefore, the introduction should be more thoughtful and include more logical content with citations. As you have written the method in the introduction section, it makes some information in the method section somewhat fragmented; for example, L275 mentions “The four (4) soil texture maps”, which originally comes from L81 of the introduction.

   Thank you for this recommendation. We will move some of the material of the introduction section to the methodology section to better explain the experimental details and ensure consistency throughout the manuscript. Also, we will modify the references in the methodology to avoid any fragmented or recurring information and to ascertain that all technical details are clearly introduced and appropriately cited.

4. In L265, please clarify if one year of spin-up is enough. Running the entire domain for a long time may be challenging, but you need to check if one year is sufficient. I suggest picking several typical grid cells with typical plant functional types and/or soil textures, to test if the one-year spin-up is enough for your analysed variables (ET, runoff) to become stable enough

to show the difference between your 12 different experiments. That is to say, can your conclusion made here represent results if run the simulations for 30 years?

Earlier works over the Southern Africa region including (Crétat et al., 2012), (Ratna et al., 2014) and (Zhang et al., 2023) have employed 6 months or less spin-up times (but they used different land surface models). For the validation runs performed in this work, spin up was also increased to two years. Nevertheless, we will perform tests with a longer spinup to study the impact on the results and in case larger impacts are found, redo the simulations.

5. For the different soil texture upscale data, is it common in our community to "randomly select a single SoilGrid cell"? If so, please provide some references; if not, why do you want to test it here if few uses it in the community?

Although, the "Random upscaling" method has not been documented, it is a novelty of this paper. Unlike other upscaling methods, the random upscaling method, creates an opportunity for outliers to be the effective soil parameter. This is because the Dominant upscaling method introduces bias towards the prevalent soil types and the Averaging method presents a conservative estimate that misses extremes. Although the random upscaling method selects for certain grid cells outlier, overall it samples correctly the pdf of texture values, which is not guaranteed by the other methods mentioned before. Since this work hinges on detecting uncertainties in soil texture information, using an un-biased upscaling method is therefore sacrosanct. Hence the consideration of the random upscaling method.

6. L274. Is the metric termed "average margin" developed by you? If not, you need to add proper citations.

Yes, it was initiated here.

7. Figure 2 could be moved to the supplementary because it is not part of your main story but an explanation for your main story.

We will consider this suggestion in the revised version.

8. It is better to use some quantitative metrics to quantify the differences in model simulations between different experiments, instead of a qualitative way, to distinguish which factors (e.g., different soil, different forcing) are the most important.

We will reformulate the text to take this comment into account and provide information on the statistical significance of differences in simulation results (ET, surface runoff) between different scenarios if possible.

9. The analysis would be better if further compared with benchmark datasets.

A comparison has been made with GLDAS dataset and will be featured in the revised manuscript.

10. L52. Correct the typo of the degree symbol from “0.5o”, and check for other similar errors throughout the document.

    In Line 52, “0.5o” will be changed to “0.5º”. We will check the manuscript thoroughly for similar typographical errors and correct them.

11. In the Data Availability section, it would be better to include where (URL or platform) you specifically obtained the data, e.g., SoilGrids, different forcings, etc.

    The Specific URL where Soil Grids and other ancillary data is downloaded will be specified in the revised manuscript.

12. The discussion section includes numerous analyses which, although sufficient, feel oddly placed. If there are so many analyses based on new tables, why not include them in the results section (e.g., Tables and new figures)? Additionally, the discussion does not provide a broad scope that shows how your study could further connect with or guide future research.

    Yes, we agree that some of the tables and figures presented in the discussion could be more relevant in the result section. The findings and their corresponding tables will be moved to the results section. Also, we will expand on how our findings connect with existing literature and outline potential directions for future research.

References

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