

Point-by-point response to editor

We thank the editor for the comments. We have made point-by-point responses and/or revisions according to your suggestions and instructions. We recall the comments of the editor in black, followed by our reply in blue. Please note that the line numbers in our responses refer to the new line numbers.

Comments to the Author:

Dear authors,

Many thanks for your quick reply. Below my comments on your submitted version:

- Line 46: Such changes have...

Response: Corrected as suggested.

- Line 134, 179, 180, labels in the Y-axis in Figure S10, etc.: a blank space between numerals and units is mandatory (e.g., 25 cm)

Response: Corrected as suggested.

Spaces between number and unit are also added in line 124, 126, 218, 243, 244, 245, 290, 294, 348, 349, 356, 357, 383, 406, 407, and labels in the Y-axis in Figure 3.

Besides, a space between degree sign and direction of coordinates are added in line 118 and 571.

- According to our journal guidelines, it is necessary that you publish the code of your modified version of Noah-MP with the paper. You can do it as supplementary material to your paper or publishing it in a Zenodo repository.

Response: Thanks very much for your professional comment. We have uploaded the modified Noah-MP in the Zenodo repository (<http://doi.org/10.5281/zenodo.4555449>).

And the Code availability and Data availability section has revised as following:

“*Code availability.* The original source code of the offline 1D Noah-MP LSM v1.1 is available at

<https://ral.ucar.edu/solutions/products/noah-multiparameterization-land-surface-model-noah-mp-lsm> (last access: 23 February 2021). The modified Noah-MP with the consideration of vertical heterogeneity in soil profile, snow sublimation from wind and the combination of roughness length for heat and under-canopy aerodynamic resistance can be downloaded at <http://doi.org/10.5281/zenodo.4555449>.”

“*Data availability.* The 1-hourly forcing data, daily soil temperature and liquid water content data at the TGL and BLH sites are available at <https://doi.org/10.17632/h7hbd69nnr.2>. Soil texture data can be obtained at <https://doi.org/10.1016/j.catena.2017.04.011> (Hu et al., 2017). The AVHRR LAI data can be downloaded from <https://www.ncei.noaa.gov/data/> (Claverie et al., 2016).”

- Line 620: It is GNU/Linux, not Linux. You have used the full system, not just the kernel. And please clarify what kind of distribution and version you have used (Debian, RedHat, CentOS...)

Response: Thanks very much for your professional comment. We have revised the sentence as “JC helped to compile the model in a GNU/Linux (CentOS 7.0) environment.” in line 621.

It is extraordinary to add authors to the manuscript at this stage, after an almost completed review process. Since the last version, you have not conducted new experiments, and therefore no additional compilation of the model or additional simulations seem to have been necessary. I have to say that I need a better explanation of what has happened and why you forgot to add them to the previous versions. And I want to make clear that although there is nothing that a priori can prevent, this does not grant that we accept such change at this stage without a good reason.

Response: Thanks very much for your comments. We apologize for the author changes.

In fact, Dr. Sizhong Yang and Mr. Guohui Zhao have been involved in this work since the Major Revision round. In a webinar, Dr. Sizhong Yang, a recent colleague of our group, suggested to illustrate the results and discussions of the two newly-added physical processes in separate paragraphs, i.e., Section 3.3 and Section 4.1. He also suggested to remove the optimal combination part to sharpen the focus of the manuscript. His suggestions directly responded to the reviewer's concerns and made the structure of the manuscript clearer. Mr. Guohui Zhao, engineer of the data center, provided convenience in the application, allocation and management of computation resources in the supercomputing system, which enabled our subsequent deployment and simulation work to be carried out as soon as possible.

We believe they made intellectual contribution to this work. However, we did not include Dr. Sizhong Yang because he was moving to a new institute, and there were some problems in the human resource department. Therefore, we did not know how to do with this. Until recently, Dr. Sizhong Yang solved this problem, and thus we hope we could include him. When compiling and running the model, we directly approached Dr. Jie Chen. He got a lot of support in terms of applying for computing nodes from Mr. Guohui Zhao. We would like to reflect his contribution in this work.

However, we agree with you that we should not do this at this stage. Therefore, we would like to thank their contributions in the Acknowledgment. Sorry for the inconvenience.

List of changes

1. Uploaded the modified Noah-MP in Zenodo.
2. Removal of Dr. Sizhong Yang and Mr. Guohui Zhao in the co-authors list, and thank them in the Acknowledgement section.
3. Added blank spaces between numbers and units.
4. Deleted reference that is not cited in the text, and checked the format of References and In-text citations.
5. Corrected all typos.