

Author's Responses to comments on "Ensemble numerical simulation of permafrost thermal regimes over the Tibetan Plateau from Flexible Permafrost Model: 1950–2023"

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The authors would like to thank the reviewer and editor for their constructive feedback, and the thorough assessment of the manuscript. Below, we provide a point-by-point response to each comment. Reviewer comments are given in black and responses in blue. We have included details of how we addressed these changes in a revised submission. Additionally, we have carefully reviewed the manuscript to correct any technical errors. Specifically, we have standardized the Nomenclature throughout the manuscript for consistency and reordered the appendix sections to align with their order of appearance in the text.

Responses

The manuscript has been substantially improved and is now close to publication quality. Only minor technical issues remain, mainly typos, cross-reference inconsistencies, and a few problems with units and notation. Please see my detailed comments.

Thank you for your careful revision of the manuscript. The paper has improved substantially, and in my view, it is now suitable for publication after a final round of technical corrections.

Please carefully check the manuscript for the following points before final publication:

1. Please correct the remaining typos and wording errors. Examples include "active later thickness" in the second point of the Conclusions section, "equavalent" in line 148, "making FMP a cross-scale platform" in line 402, the spelling of "Priestly-Taylor coefficient" in line 98, and Table 1. There are also several minor grammatical issues throughout the manuscript.

Responses: Revised as below.

"active later thickness" → "active layer thickness";

"equavalent" → "equivalent";

"making FMP a cross-scale platform" → "making FPM a cross-scale platform";

"Priestly-Taylor coefficient" → "Priestley-Taylor coefficient".

2. Please check the consistency of numerical values and units throughout the manuscript. In the Conclusions, permafrost extent is currently written as $1.07 \pm 0.02 \text{ km}^2 \text{ dec}^{-1}$, whereas extent should be reported in km^2 rather than $\text{km}^2 \text{ dec}^{-1}$.

Responses: Revised to $1.07 \pm 0.02 \times 10^6 \text{ km}^2$.

3. Please verify all figure, appendix, and cross-references. For example, in Results 5.1, the text refers to "Fig. D1a and d", but Figure D1 contains panels a–c only.

Responses: Revised as "Fig. D1a".

4. Please harmonize values reported in the text and figures. For example, the text states that the RMSE of the MAGT trend is $0.29 \text{ }^\circ\text{C dec}^{-1}$, whereas Figure 5 shows $\text{RMSE} = 0.22$. In Results 5.3, the comparison with Noah LSM ($1.6 \text{ }^\circ\text{C}$) should also be checked, as the sign or wording may be inconsistent with the surrounding text. I guess a negative sign is missing here.

Responses: The RMSE should be $0.22 \text{ }^\circ\text{C dec}^{-1}$ for MAGT trend. We revised the text. Yes, it should be revised to $-1.6 \text{ }^\circ\text{C}$.

5. Please check the internal consistency of the model setup description and tables. Section 3.1 states that the 150 m soil column is discretized into 172 layers, but Table D1 appears to list only 160 layers, and the layer numbering overlaps at 151. This should be corrected so that the main text and the appendix table are fully consistent.

Responses: For the depth of 50–150 m, the layer should be 152–170, revised.

6. Please make a final check of units and notation. For instance, the unit of R_d appears incorrect; it should be $R_d = 0.287 \text{ kJ kg}^{-1} \text{ K}^{-1}$. In Appendix E, the units are written as $\text{W m}^{-1} \text{ }^\circ\text{K}$ and $\text{J m}^{-3} \text{ }^\circ\text{K}$. Please note that Kelvin should be written as K, not $^\circ\text{K}$. These units should therefore be corrected to $\text{W m}^{-1} \text{ K}^{-1}$ and $\text{J m}^{-3} \text{ K}^{-1}$.

Responses: The unit of R_d is revised to $\text{kJ kg}^{-1} \text{ K}^{-1}$. The typos are revised to $\text{W m}^{-1} \text{ K}^{-1}$ and $\text{J m}^{-3} \text{ K}^{-1}$.

Overall, please go through the manuscript again and recheck the technical errors.

Responses: Done.