Reply to

Interactive comment on "Effects of Stratified Active Layers on the High-Altitude Permafrost Warming: A Case Study on the Qinghai-Tibet Plateau" by X. Pan et al.

Referee #1

We appreciate the reviewer again for the help in language problems. Detailed replies are list as follows.

1. "*P1, L14, 'smaller' should be 'lower'*"

Done.

2. "*P2, L6-7, why is the warming rate given per decade at the first of the sentence and then per year later on? Also, these two presented rates only differ by 0.01 C/yr.*"

Changed them in the same unit ˚C/yr. The difference is due to contrast averaging areas that the former one is for overall Qinghai-Tibet Plateau, whereas the latter one just represent one much smaller mountain permafrost area.

3. "*P2, L9-11, this is an awkward and confusing sentence*"

It is rephrased as "Under the warming of the atmosphere, the high warming rate of the permafrost is even similar to that of air temperature rise, 0.02˚C yr^{-1}. Thereby, we expect a dominating role of subsurface processes in the active layer that amplify the climate warming input.".

4. "*P2, L20, I'd delete 'in addition to the soil thermal properties' as it is not needed in this sentence, and the sentence has iffy structure*"

Done.

5. "*P2, L20-22, as I noted last time, and the authors insufficiently addressed, it is not really appropriate to say that permafrost has diurnal forcing. Permafrost does not freeze and thaw on a daily basis. This sentence is confusing.*"

We delete this sentence.

6. "*P2, L34, change 'highly demanded' to 'required' and 'facilitate' to 'enable' Throughout the manuscript: I'd say 'rapid permafrost warming' not 'quick permafrost warming'*;

Done.

7. "*This is just a comment and the authors do not need to change anything, but I remain skeptical that analytical models (at least in theory) cannot address the seasonal moisture content/thermal conductivity and layering issue that the authors address. As reviewed by Walvoord and Kurylyk (2016), Stefan equation modifications have been proposed to address soil layering, changing moisture content, sensible heat affects, and two-directional heat transfer. These algorithms can often be combined, and thus many of the analytical assumptions can be relaxed.*

Walvoord MA, Kurylyk BL. 2016. Hydrologic impacts of thawing permafrost – A review. Vadose Zone Journal, DOI: 10.2136/vzj2016.01.0010"

Thank you for suggestion. We will take it for consideration in our future work.

8. "*P3, L29, change 'Thereby' to 'Thus'*"

Done.

9. "*P4, L1, delete 'They were' and combine the 2 sentences into 1.*"

Done.

10. "*P4, L23, delete '. They are' and add a colon after 'drilling' (i.e. combine into one sentence)*"
The sentence is rephrased as "The soil profile domain was generated with element size of 10 cm for the shallow soils (0-3.0 m) and reducing to 0.5 m and 1.0 m for the underlying soils. There are 63 elements in total.".

11. "P4, L26 move 'solely' after 'to'"
Done.

12. "*P8, L8, change 'is rarely addressed' to 'has been rarely addressed'*"
Done.

13. "*P8, L31, change 'not well accurate in general' to 'not generally accurate'*"
Done.

14. "*P10, L3, change 'of water's' to 'that of water'*"
Done.

15. "*P10, L3-4, this statement is not true. It assumes a porosity of 1 (and also ignores changes in the heat capacity of ice vs. water). It is not needed, so just delete it.*"
Done.

16. "*P10, L6, insert 'it is' after 'instance'*"
Done.

17. "*P11, L16, change 'sparsely' to 'sparse'*"
Done.

18. "*P11, L18, this is not really the right use of the term 'indispensable'. It should be something like 'instrumental'*"
Done.

19. "*P11, L21, for this point I would insert 'negative' after 'normal' and '(≥ 1)' after 'reversed'. I'd also delete "namely close 1.0 or even higher, given such a weather pattern and soil properties"*"
Done.

20. "*P11, L24, change 'facilitating to raise' to 'raising'*"
Done.