

Response to editor's comments on "Characterizing permafrost soil active layer dynamics and sensitivity to landscape spatial heterogeneity in Alaska"

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Dear Editor,

Thank you for your careful reading and consideration of our manuscript. We have addressed your comments in the manuscript with changes are highlighted.

1) P1 L 15: “~50 m” becomes “~ 50 m resolution”

Response: this was corrected.

2) P1 L26: “permafrost active layer conditions.” AL is by definition above Pf. Also, it would be good to add some text about the framework and future development perspective. Sentence becomes something like “active layer conditions and refinement of the modelling framework across a larger domain.”

Response: We revised the sentence based on your suggestions:

Page 1, Line 26-27: “... will enable more accurate predictions of active layer conditions and refinement of the modeling framework across a larger domain.”

3) P3 L31: After the first sentence in this paragraph, please include a line about the small differences you find between the 8-day and daily time steps. Add Figure R1 to your supplementary materials, and refer to it. The caption for the figure will include a component of your response to Reviewer 1.

Response: We added a sentence explaining why we chose the 8-day time step for the modeling:

Page 4, Line 3-5: “The MODIS LST and SCE data were largely affected by clouds in the study area, and therefore 8-day temporal composite data were used as the model inputs. Our test runs indicated relatively small differences between model simulated soil temperatures at 8-day and daily time steps (Figure S1).”

4) P6 L14: “backscatter measurements acquired” becomes “backscatter measurements (~ 50 m resolution) acquired”

P7 L2: “SM and snow density” becomes “SM, and snow density”

P7 L9: high, baseline and low SOC” becomes “high, baseline, and low SOC”

P8 L30: “~1km” becomes “~ 1 km”

P9 L23 and throughout: Search and replace “in-situ” with “in situ”

P11 L31: “accumulated degree” becomes “accumulated thawing degree”

P11 L3: “MODIS LST degree” becomes “MODIS LST thawing degree”

P12 L8: “MODIS LST degree” becomes “MODIS LST thawing degree”

P13 L18: “indicated” becomes “indicate”

Response: all these were corrected.

5) P14 L11: Please cite Zhang, T.: Influence of the seasonal snow cover on the ground thermal regime: An overview, *Reviews of Geophysics*, 43, RG4002, 2005.

Response: this was cited.

6) P14 L18: “(50-m)” becomes “(~ 50 m)”

Response: this was corrected.

7) P15 L15: “(Due et al. 2015; Bartsch et al. 2016)” becomes “(Due et al., 2015; Bartsch et al., 2016)”

P15 L21: “(Liston and Sturm 1998, Gisnas et al 2016)” becomes “(Liston and Sturm, 1998; Gisnas et al., 2016)”

P15 L27: “(Jorgenson et al 2006, Osterkamp et al 2009, Grosse et al 2011)” becomes “(Jorgenson et al., 2006; Osterkamp et al., 2009; Grosse et al., 2011)”

Response: the citations were corrected.

8) P15 L32: “(~50m resolution)” becomes “(~ 50 m resolution)”

Response: this was corrected.

9) *References: Carefully review and write out all journal titles that have been abbreviated.*

Response: the citations were updated with journal titles spelled out.

10) *Supplementary materials: Please add in references cited beneath Table S1 and in the Caption for Figure S3.*

Response: the references were added.

11) *Throughout the text, tables, figures and captions, both in the main document and the supplementary material: Carefully ensure that units are reported in a similar manner. In many cases units are reported as cm, but in others units are reported correctly in m (Page 13 Lines 18 to 24 are a good example of this). Some figures show units in m, but most report units in cm. I suggest changing cm to m and centimetre to metre throughout, adjusting the reported numerical values accordingly. I recognize that this is tedious, but will make for a better read.*

Response: Since many of the units for ALT simulations were reported in cm with 2 decimal places, we changed the units from “m” to “cm” in order not to lose the accuracy. We now report the ALT results in cm or cm yr⁻¹ (trends) throughout the manuscript, figures, tables and supplement material.

12) *Throughout the text, tables, figures and captions, both the main document and the supplementary material: Thin spaces should be used before and after the following mathematical symbols.*

Throughout the text, tables, and figures, both the main document and the supplementary material: Thin spaces should also the unit symbol from the numerical value, and this applies to the degree Celsius (e.g., “10 °C”). The exception is for degree, minute, and second for plane angle (e.g., “coarse resolution (~ 5°)”). Please carefully review the text, figures, captions, and tables in the main document and the supplementary material and correct as necessary.

Throughout the text, tables, and figures, both the main document and the supplementary material: For consistency, please do not use mixed units. E.g., change 10 m/s to 10 m s⁻¹. This notation change is most often required in figures for such things as axis titles.

Response: All these have been corrected throughout the manuscript, figures, tables and also supplementary material.