

Dear referee 2

Thank you for the comments and for the efforts you have made to improve our manuscript.

Please note that line numbers refer to the clean version.

Main comments:

Table 2:

Why are there unfrozen and frozen values shown for heat capacity and diffusivity for the soil (silt) category? You should only be using one value because your porespace (saturated) is treated separately for temperature and salinity-dependent water/ice fractions. The bulk diffusivity, heat capacity, and thermal conductivity are driven by changes to the water and ice fractions, so specifying unfrozen/frozen values for the mineral fraction is not required. The third row of Table 2 should only be the mineral fraction of the saturated sediment because your equations in (2) weight each component of the sediment (mineral, ice, water) volumetrically. The porespace is also saturated, so air is not considered. This is why you cannot use any "dry soil" value that is derived for a dry soil state with air inside the porespace. It is very important that is cleared up in Table 2 and that there is no confusion. Additional changes to Table 2:

- Please change the title to, "1-D heat transfer model physical parameters of water, ice, and sediment"
- Change "soil (silt)" to "mineral fraction (silt)"
- Show only one value for the mineral fraction's thermal conductivity, heat capacity, and diffusivity

We have corrected table 2 as proposed

Minor comments:

- Line 24: Replace "permafrost aggradation" with "The permafrost aggradation" **corrected (line 23).**
- Line 47: Replace "between atmosphere" with "between the atmosphere" **corrected (line 47).**
- Line 73: Replace "Tavacoli" with "Tavakoli" **corrected (line 72).**
- Line 194: Replace "evolving" with "an evolving" **corrected (line 192).**
- Line 254: Replace "dry sediments" with "the mineral fraction of the sediment", **corrected (line 251).**
- Line 517: Replace "somewhat slowly" with "somewhat more slowly" **corrected (line 499).**
- Figure 8: Typo in panel "stage 3": replace "aggrads" with "aggrades" **corrected, Thanks.**

- Summary and conclusions: This is up to you, but I suggest explaining the seasonality effects when discussing "differences in thermal properties" for your scenarios. If a reader only glances at the abstract and conclusion, a broader explanation here would be helpful.

Thank you, we have added a conclusion concerning that topic, lines 565-567.