

Interactive comment on “Investigating the sensitivity of soil respiration to recent snow cover changes in Alaska using a satellite-based permafrost carbon model” by Yonghong Yi et al.

Anonymous Referee #1

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General comments

This study describes a novel permafrost carbon model, with two distinguishing features: it's largely driven by remote sensing data, and operates at an intermediate spatial scale. The authors describe the model and its parameterizations clearly, test it against a number of eddy covariance and distributed datasets across Alaska, and then use it to predict regional fluxes. This is an important and interesting subject with wide possible implications. The ms is generally well written and interesting; figures are clear; and the introduction does a very nice job of setting up the overall study.

There are some problems. The results are wordy and fairly long; one problem is that

C1

there's a certain amount of discussion material mixed in. I suggest looking for opportunities to condense and cleanly separate different sections' material. I also was quite confused how you're comparing model output R_h with the Natali dataset, which is soil surface (R_a+R_h); there's a general carelessness with terminology in this area, confusing the reader about whether soil surface CO_2 flux (soil respiration) or its heterotrophic component is being referred to. Finally, it's not acceptable, in my view, not to make the model code available at the review stage. For all these see below.

In summary, this is overall a strong, interesting, and well-done study. It would benefit from moderate revisions for clarity and concision in many places, and transparency and reproducibility absolutely need to be improved.

Specific comments

1. Line 30: “soil respiration” or heterotrophic respiration? I assume we're still talking about the latter, but clarify. Similarly line 31 mentions “total soil carbon emissions” – is this the R_a+R_h flux at the surface?
2. L. 71: define soil respiration precisely here
3. L. 107: how are these depths chosen?
4. L. 125: “linear”?
5. L. 129: interesting assumption. What's the rationale? Does litterfall = 100% of NPP in other systems, or at regional research sites?
6. L. 265: “therefore...” this logic is unclear. How the 2001-2016 period related to first part of sentence?
7. L. 301-303: this sentence seems out of place
8. L. 304: perhaps start new paragraph here
9. L. 306-312: seems like discussion, not results

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10. L. 345: I'm confused how you're comparing model output Rh with the Natali dataset, which is soil surface (Ra+Rh)

11. L. 522-531: this seems unnecessary and duplicative of conclusions below

12. L. 560: perhaps start new paragraph for readability

13. L. 606-608: it's really inexcusable, in my view, to promise to upload data and code in the future while not making it available at the review stage

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