

Interactive comment on “Estimating the permafrost-carbon feedback on global warming” by T. Schneider von Deimling et al.

Anonymous Referee #4

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Comments on the manuscript by Schneider von Deimling et al. “Estimating the permafrost-carbon feedback to global warming” submitted to Biogeosciences.

Overall Evaluation

This manuscript represents a very nice study using a reduced complexity coupled carbon-climate modeling framework to examine the potential for permafrost thaw to influence climate change through the release of CO₂ and CH₄ from the large stocks of carbon in thawing permafrost. The paper is very straight forward about this being a first-order analysis, and a reduced complexity modeling framework is ideal for examining uncertainties from a variety of sources. The paper is well written, and the discussion is quite scholarly. The relevant literature has been appropriately cited. I don't have a lot to add that has already been raised by the other reviewers, but here a

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few issues that I'd like to see considered in the revision:

(1) Similar to the comment by Referee 1, I do think it is important to clarify what you mean by “emissions”. For “Cumulative CO₂ emissions”, I'm assuming that you are representing cumulative GPP-RH so that any plant CO₂ uptake (either implicitly or explicitly) in the model is accounted for in the emissions. I'm also assuming that the emissions are from ecosystems in the permafrost region, and not just from the carbon that is currently locked up in permafrost in the top 3 m of soil in the region.

(2) I'm a little fuzzy on the number of soil carbon pools per band. I understand mineral vs. peatland and aerobic vs. anaerobic pools for 4 pools. But, within each band is there a permafrost and a thawed pool, so that you are essentially tracking the dynamics of 8 pools per band (I'm inferring this from the rate of thaw and refreeze parameters in Table 1)? If so, it might be good to be more explicit about this on page 4734. It actually would be helpful to see the state equations for changes in the soil carbon pools explicitly identified in the appendix. This would also help improve the clarity of point number 1 above.

(3) A few grammatical (and other) issues: (a) Page 4729, line 27: Perhaps change “nutrients release” to “the release of plant-available nutrients”. (b) Page 4730, line 2: Perhaps change “around thousand Petagram” to “approximately 1000 Pg (10¹⁵ g)”. (c) Page 4730, lines 6-11: This is a run-on sentence. Please break it up into two or more sentences to improve clarity. (d) Page 4731: There are a couple of references to Meinshausen et al. (2008) on this page, but that publication is not identified in the References section. (e) Page 4737, line 12: Change “ecosystem” to “ecosystems”. (f) Page 4737, line 15: Change “he majority” to “the majority”.

Interactive comment on Biogeosciences Discuss., 8, 4727, 2011.