

Interactive comment on “Soil temperature response to 21st century global warming: the role of and some implications for peat carbon in thawing permafrost soils in North America” by D. Wisser et al.

Anonymous Referee #2

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In this study, the authors utilize the GIPL permafrost model to assess the potential impact of 21st century climate change on permafrost in peatlands and mineral soils. I found this to be a very nicely executed study and the paper was a pleasure to read. It is important in that it is the first study that separately investigates permafrost thaw in peatland and mineral soil domains. Peatland permafrost will not respond to climate change in the same way as mineral soil permafrost due to the unique thermal and hydrologic properties of peat. I appreciated the discussion section. This was a nice summary of the strengths and weaknesses of this modeling system and it highlighted

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the potential sources of error and pointed to ways in which this class of models needs to be improved. In general, the paper also included a very thorough and appropriate literature review. In summary, I find this paper acceptable for publication essentially in its current form. I have the following minor recommendations. Minor points: 1. There is a comment on p. 167 that unfrozen soil water at temps below freezing can improve the transfer of heat in frozen soils. I think you mean that it can improve the simulation of heat transfer in frozen soils. 2. Why did you use the ECHAM5 climate forcing rather than the forcing from another model? I am not criticizing the use of ECHAM5 data. But, if there was a reason for using it, it should be stated. If there wasn't a solid reason then you should simply note that the choice was arbitrary (and that most GCM projections are similar?). 3. Figure 3 is very difficult to read. The symbols are not clearly distinguishable and the 4. In section 3.3, you note that the large increase in P is partly offset by ET increases. I don't think that the method for calculating ET is noted in the text. 5. P. 180. I think that the Lawrence and Slater (2010) study showed that snow changes could explain 50-100% of the changes in soil temperature during the 20th century, not the 21st century. 6. P. 182. I think you mean Brown et al. 2000 for the permafrost classification.

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