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**Climate of the Past Discussions**

# *Interactive comment on* "The importance of Northern Peatlands in global carbon systems during the Holocene" *by* Y. Wang et al.

**Anonymous Referee #2**

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Y. Wang and colleagues used the "Green" McGill Paleoclimate Model to investigate the role of peatland carbon uptake for the evolution of Holocene $CO_2$ concentrations.

In order to determine sources and sinks of carbon during the Holocene, they employ their model in an inverse experiment. They drive the model with prescribed atmospheric $CO_2$ from icecore measurements and use the changes in the carbon pools to diagnose the sources and sinks of carbon. They include peatland growth as an externally prescribed scenario, which appears well researched and seems to cover the relevant range of forcings. Their main conclusion is that the 20 ppm rise in $CO_2$ over the last 8 kyr was primarily caused by carbon release from the ocean.

When I was first asked to review this paper, I was highly excited, since Wang and coauthors to my knowledge are the first, who have tried to explicitly consider the carbon



uptake by peatlands in their analysis of the global carbon cycle. When I had finished reading it, I was rather disappointed, since their main result that the carbon must've come from the ocean isn't exactly exciting. Yes, it is clear from the analysis that it came from the ocean, but where exactly did it come from? How much was released by carbonate compensation, and how much is due to other processes? These questions, unfortunately, the authors don't have answers for. I won't hold it against them, though, since these were questions they just couldn't investigate with their model setup. Lacking a marine carbon cycle, they just weren't able to consider this in a more detailed manner.

Nonetheless, the authors deserve credit for their pioneering effort to include C uptake by peatlands in their analysis. The paper is well-written, and I can't find any fault in their methodology, or in their conclusions.

A few points that should be considered before final acceptance of the paper:

The model description in Section 2.1 is extremely short. In fact, it is so short that the reader is not able to get an idea of the model used without referring to other publications. Since the model is documented elsewhere, the description need not be long, but I am sorely missing two sentences summarising what kind of atmosphere and ocean models are used in the MPM.

In Section 2.3, the authors mention that they reduce NPP in VECODE to compensate for peatland development. Unfortunately it doesn't become clear, what exactly the authors have done here, and how exactly the b and g cases differ. Is the reduction proportional to the area fraction covered by peatlands? Is it based on total NPP, i.e. C mass? This doesn't become clear in the manuscript, and while this issue has no qualitative effect on results, it would improve the manuscript if this were clarified.

In Section 4, page 1240, and Fig. 6, the authors mention the global terrestrial carbon. The order of magnitude makes it clear that this is the sum of biomass and soil carbon, but a sentence clarifying this would again make this clearer for the uninitiated reader.

Interactive comment on Clim. Past Discuss., 5, 1231, 2009.