

## ***Interactive comment on “McGill Wetland Model: evaluation of a peatland carbon simulator developed for global assessments” by et al.***

**A. McGuire**

ffadm@uaf.edu

Received and published: 11 June 2008

Comments on the manuscript by St-Hilaire et al. &#8220;McGill Wetland Model: Evaluation of a peatland carbon simulator developed for global assessments&#8221; (bgd-2008-0023):

### Overall Evaluation

This manuscript presents the description and evaluation of the McGill Wetland Model (MWM), which is a model that has been developed for the purpose of conducting regional and global assessments of the responses of peatlands to global change. The MWM represents important progress towards better representing peatlands in coupled

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



carbon-climate system models. Most of my comments for revision are minor, but I do have two key suggestions for revision.

First, I think it is important to report the results of rank correlations in the Results section in any analyses involving correlations between rows of Table 3.

Second, give the importance of autotrophic respiration (AR) in affecting the sensitivity analyses of NPP and NEP in Table 4, I was really shocked that it didn't receive any attention in the Conclusion section of the manuscript. The effects of AR of AR on NPP and NEP are typical of models with one box for vegetation carbon. Particularly in the shrub, R25 in equation 12 should decrease with increasing shrub biomass to account for the increasing proportion of biomass in wood tissue. Also, vascular plants are good at adjusting their metabolic activity to avoid burning up; I'd suggest that the investigators check to see whether AR increases as a proportion of GPP with increases in temperature. The bottom line of my comments on the AR issue is that it should receive the attention of at least one paragraph in the Conclusions section since AR responses to temperature appear to be more important than the responses of GPP and HR to temperature with respect to effects on NPP and NEP.

#### Other Issues to Consider in Revision

1. Introduction. Bottom of page 1692: While I realize MWM has been defined in the Abstract, I think it would be good to define the acronym MWM before its first use in the Introduction. Line 6 of page 1694: Change 'couple'; to 'coupled';

2. McGill Wetland Model (MWM) I found a number of things in the first paragraph confusing. First is the use of the word 'comprise'. Unless I'm mistaken, the parts comprise the whole and the whole is composed of the parts. Thus, the first five words of the paragraph should read 'The MWM is composed of four C pools'. The second issue of confusion on line 3 and 4 is 'two

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



living matter pools &#8211; vascular plants comprising leaves, sapwood and roots, and moss, &#8230;&#8221;. I think this should be reworded &#8220;two living matter pools &#8211; (1) moss, and (2) vascular plants (which are composed of leaves, sapwood, and roots), &#8230; The third issue is the sentence spanning lines 14 and 15: &#8220;At present the MWM has four plant functional types (PFTs): mosses, sedges, shrubs, and conifer trees.&#8221; The first sentence of the paragraph and the rest of paper suggests that there are only two PFTs: moss and one vascular PFT (either sedge, shrubs, or conifer trees). Maybe the structure of the model does have the capacity for simultaneously considering up to four PFTs. If so, then indicate that the model has four living matter pools, but that in this study only two living matter pools were considered: moss and shrub. Line 20 of page 1695: delete &#8220;8&#8221; at end of &#8220;non-vascular&#8221;? Line 11 on page 1697: subscript &#8220;c&#8221; in &#8220;gc&#8221;? Line 17 on page 1697: Do you mean &#8220;Eq. (13)&#8221; instead of &#8220;Eq. (12)&#8221;? Line 20 on page 1700: Do you mean &#8220;Eqs. (15) and (16)&#8221; instead of &#8220;Eqs. (13) and (14)&#8221;?

3. Site and data sets Lines 15-18 on page 1701: The presentation of the parameterization of the model is presented in one sentence spanning lines 15-18. I felt that the parameterization of the model deserved at least a paragraph.

4. Results and discussion Line 16 on page 1703: Don&#8217;t you mean &#8220;64 g C&#8221; instead of &#8220;59 g C&#8221; to be consistent with Table 2? Line 22, page 1703: Please report correlation (along with n and P value) between observed and simulated annual NEP. Line 24, page 1704: The text &#8220;fraction components that make up total comprise GPP and ER&#8221; needs to be revised. Lines 25-27, page 1704: This sentence about moss and shrub GPP is very confusing. My suggestion is to write about moss GPP in the first half of the sentence and about shrub GPP in the second half of the sentence. Line 16, page 1705: Change &#8220;curve&#8221; to &#8220;curves&#8221;? Line 19, page 1706: Change &#8220;observe&#8221; to &#8220;evaluate&#8221;? Change

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

&#8220;average&#8221; to &#8220;annual&#8221;? Line 23, page 1706: Change &#8220;GPP&#8221; to &#8220;simulated GPP&#8221;? Please report results of Spearman rank correlation for GPP vs. temperature. Line 26, page 1706: Change &#8220;cumulative GPP&#8221; to &#8220;cumulative simulated GPP&#8221;? What is &#8220;Fig. Y-2a&#8221;? By the way, very good job on evaluating the issue memory issue with respect to foliage biomass of shrubs after drought years. Line 24, page 1706: Please report the results of Spearman rank correlation for ER vs. temperature. Line 5, page 1707: Please report the results of Spearman rank correlation for NEP vs. temperature. Line 17, page 1707: Change &#8220;affects&#8221; to &#8220;effects&#8221;. Line 29, page 1708: Change &#8220;Autotrophic respiration&#8221; to &#8220;Moss AR&#8221; Lines 2 and 3, page 1709: I think this sentence has confused the placements of increase and decrease and should read &#8220;An increase (decrease) in temperature corresponds to a decrease (increase) in shrub NPP.&#8221; This is a critical sentence because it is the AR sensitivity of shrubs to temperature that is primarily affecting the sensitivity of NPP and NEP to temperature (see my overall evaluation comments).

5. Conclusions and Prospects for MWM See my overall evaluation comments about adding a paragraph on the importance of the AR sensitivity of shrubs to temperature in primarily affecting the sensitivity of NPP and NEP to temperature. Another issue that could use a couple of sentence is how consideration of nitrogen feedbacks would affect the sensitivity of shrub GPP and NPP to temperature. This issue is mentioned in the Introduction, and it would be good to at least call it out in the conclusion section somewhere.

---

Interactive comment on Biogeosciences Discuss., 5, 1689, 2008.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)