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Biogeosciences Discussions

Interactive comment on "McGill Wetland Model: evaluation of a peatland carbon simulatordeveloped for global assessments" *by* et al.

Anonymous Referee #1

Received and published: 10 June 2008

This manuscript describes and evaluates a parameterization of carbon exchange by northern peatlands, which is being developed for use in global applications. Peatlands are a highly significant component of the global carbon cycle. The uncertainties associated with the carbon exchange by peatlands are large, and constitute one of the several factors limiting our ability to make reliable predictions of future climate change. Because of this, the research topic of this work is highly relevant. Overall this study is well carried out and the manuscript is clearly written. Therefore, I see no reason to uphold publication, except for some minor revisions that will be needed to address the comments and questions that are listed below.

GENERAL COMMENTS

It is difficult to judge the performance of the presented parameterization without comparison with previous work (for example Zhuang et al, 2006). I understand that it is difficult to make a one to one comparison at specific sites (although there could be a comparison with Frolking, 2002). There should, however, be an indication of the level of performance that is to be expected for main output parameters.

Several results are presented in tables. Tables have the advantage over plots that they are much more quantitative. For pointing out the general agreement between model and measurements, however, they are difficult to interpret (I ended up making plots of the data while reviewing). My advice is to use bar graphs to visualize the information in Tables 2 and 4.

It is not quite clear how representative the performance of the model at Mer Bleue for its general capability of simulating ombrotrophic bogs. Among the input parameters listed in Table 1 are several site-specific parameters that presumably come from specific knowledge on the Mer Bleue site. The question is to what extent the performance would degrade when global databases are the only available source of information. Some further discussion in this direction is needed, possibly supported by further sensitivity calculations.

SPECIFIC COMMENTS

page 1695, line 10: It seems Bmaxfoliar should have been Broot.

page 1695, line 20: What is non-vascular8 PFT?

page 1701, line 12: What is meant by a "general" climate model?

page 1703, line 15: "In general, the MWM simulates the magnitudes and interannual trend in annual NEP" From the perspective of large-scale modelling the comparison between the observed and simulated magnitude and interannual variation of annual NEP is highly relevant. Regarding the interannual variation the model performance

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is not very impressive. I derive a spearman's correlation coefficient r of 0.56. For a sample size of 8 this corresponds to a chance of more than 10% that the correspondence between model and measurements is purely coincidental. Right now almost no text is spent on the possible implication of this result. When I read this realizing that the comparison at Mer Bleue may even be more favorable than average (see general comment 3) I start worrying about the performance of a future global application. If this interpretation is wrong then some further discussion is needed.

page 1705, line 4: How is the index of agreement defined?

TECHNICAL CORRECTIONS

page 1695, line 12: "and photosynthesises whenever" some word is missing here.

page 1697, equation 4: some space is missing between the equations for G and beta.

1698, line 8: theta_m should be explained here as it is first introduced.

1700, line 22: "quadratic for PD". The word "equation" is missing.

Table 2 no footnote, no unit.

GPP variability much less than observed. same for RE

page 1704, line 26: remove either "to our knowledge" or "as far as we know".

page 1705, line 26: What is meant by figure Y-2a?

page 1710, line 7: "We also suspect ... experience drought" insert "in the model" somewhere in this sentence.

Table 2, 3: footnotes are missing

Figure 1, 3, 4: the colors in the figures are difficult to see (lines are very thin).

Figure 5, Caption: NEP instead of GPP and ER

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