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Biogeosciences Discussions

Interactive comment on "Using MODIS derived fPAR with ground based flux tower measurements to derive the light use efficiency for two Canadian peatlands" *by* J. Connolly et al.

Anonymous Referee #6

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This paper investigates the productivity of Canadian peat lands and its climatic drivers using a combination of in-situ and remote sensing measurements. Peat lands are a highly significant component of the global carbon cycle. The uncertainties associated with the carbon exchange by peat lands 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. In my opinion, this study could make a very useful contribution, provided, however, that it addresses the comments and questions listed below.

GENERAL COMMENTS

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Discussion Paper

It was surprising to read a scientific paper without a single occurrence of the word "uncertainty". Strictly speaking numbers don't mean anything without an estimate of their associated uncertainties. Because of this the reader cannot judge, for example, if the difference between the reported GPP at Mer Bleue and Western Pearland is significant or not. For several reasons it may not be possible to carry out a rigorous error analysis and provide a formal uncertainty estimate for each number. However, at least there should be a discussion of the uncertainties involved in this method and some indication of its expected overall accuracy.

In my understanding eddy flux measurements yield only NEE. To convert NEE to GPP assumptions are needed for RE. The way to deal with this may be obvious to experts in eddy covariance, which, however, nevertheless needs further explanation. It raises the question, for example, how applicable the assumptions are to the case of wetlands.

The main conclusion of this study is that VPD is not a growth-limiting factor at the investigated sites. This seems inconsistent with the interpretation of the observed interannual variation, which is attributed primarily to variations in water availability. Of course VPD and precipitation are not the same, but there is nevertheless a relation between the two. The question is why there is no relationship between GPP and VPD if there is a relationship between GPP and wet versus dry conditions.

It is not clear how the eddy flux measurements were sampled to derive 8-day composites. In the case of MODIS the sampling is not even, but in fact biased to fair weather conditions. Further information is needed to allow to reader to judge whether or not short-term variations in fPAR may be significant. It is stated somewhere that the procedure leads to a loss of the day-to-day variation. This suggests there is variation, which might become relevant if it introduces a bias.

SPECIFIC COMMENTS

page 1772, line 21: ";The footprint of an EC ... calculate epsilon." What is the evidence that the footprint of the eddy flux tower is ˜1 km2? It is used as an argument that

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MODIS and in-situ measurements can be compared. However, as pointed out in this sentence the signal at the EC tower is in fact mostly representative of the nearest 200m. In that case additional justification is required for comparing satellite and in-situ measurements. There is, for example, no information on the representativeness of the direct vicinity of the EC site for its surroundings. More information is needed.

Page 1773, equation 4: There is no parameter on the left hand site of this equation. It should be reformulated.

Page 1773, line 13: "The MODIS fPAR ... communication, 2005)" I consider information on data formats out of the scope of the study, which makes this sentence redundant.

Page 1773, line 16-21: "The reprocessing .... observation tower" The acronyms in this part should be explained, if they are really needed at all.

Table 1: The meaning of the parameters a, b, c, d should be explained for example in a footnote under the table

Figure 6: The site should be mentioned in the caption.

Figure 7: This figure shows a comparison of the fitted equation 5 and the data, not estimates of the length of the growing season and the peak in epsilon as suggested by the caption.

Figure 8: "predicted epsilon" suggests that some method is used to estimate epsilon independent of the data. What is shown, however, is derived from a fit to the data and is therefore not a prediction.

Interactive comment on Biogeosciences Discuss., 5, 1765, 2008.