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Interactive comment on “Do we miss the hot spots? – The use of very high resolution aerial photographs to quantify carbon fluxes in peatlands” by T. Becker et al.

Anonymous Referee #3

Received and published: 29 May 2008

General comments

This paper describes an approach to upscale point-based flux measurements in peatlands using aerial photographs, and proposes recommendations with regards to resolution of imagery and object sizes.

The upscaling method is interesting and may prove to be a valuable tool in quantifying carbon balances in similar ecosystems. The method is novel and I consider the topic to be appropriate for BG.

However, I believe that from the aspect of scientists not specialized in remote sensing,

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image processing, GIS etc, it would be an advantage if some of the steps are more thoroughly explained. The article is very concise and I would like to see that some sections are expanded (please see specific comments).

While the upscaling method is powerful for specified ecosystems, its appropriateness can be discussed in a context of global greenhouse gas balances. It is obviously not possible to use the proposed technique in all peatlands of the world, whereas satellite imagery can be used. However, the underestimation of the carbon balance using coarser resolution (as satellite imagery) in this study, might also be valid for similar ecosystem, and thus provide important knowledge for modellers using satellite data.

Specific and technical comments

The abstract presents a good summary of the study, except for the last sentence which is long and hard to follow. I suggest punctuating sentence or splitting it up in two.

Introduction:

On P1099 L12-13 it is said that upscaling based on land-cover maps gives the most reliable extrapolation, please elaborate on why this is.

Methods:

Gas flux measurement method is well described, but the modeling procedure to construct time series of CO₂ and CH₄ exchange is unclear. Six predictors were used in a multiple regression analysis to model CO₂ exchange; what about multicollinearity between e.g. air and soil temperature? Were respiration and photosynthesis modeled separately? How good were the models (coefficient of determination, statistical significance etc)? Why was wind speed used as a predictor when closed chambers were used? The same applies for CH₄ model. Please describe more thoroughly.

P1101 L23: Adjust unit

Remote sensing: I am interested in more details regarding the dirigible. Perhaps a

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photo of it could be included? I also think that other research groups that may want to try your method are interested in total cost of the equipment.

How was the accuracy of the derived land-cover map estimated?

P1103 L4: Why was the land cover map vectorized? Since it was created in raster structur, I assume the further preprocessing would decrease its quality? P1103 L9-12: Please describe MSWA in more detail.

Results:

P1103 L16: Flark area fluctuates between 200-300 m², and L19: lawn/hummock between 7000-7700.

P1103 L23: Training area for algorithm is mentioned. Please describe this in methods section.

There are some interpretations of the graphs in this section; e.g. sentences starting with P1103 L21 "The oscillation", P1103 L22 "Furthermore", P1104 L2 "This effect". I suggest moving this to discussion section.

P1104 Last paragraph: Judging from the land-cover map (figure 2), lawns do not seem to constitute isolated polygons, but rather a big area with flarks and also hummocks to some extent as islands in it. How was mean object size in table 3 for lawns calculated? Secondly, based on the mean object sizes, ratio of mean object size to ground resolution was calculated (table 4). Which variables and units were used (e.g. resolution in cm² and object size in cm²)? Please include units in table 4 caption.

Discussion:

P1105 L6: What is "effective greenhouse gases"? If it refers to GWP please include this and also which time horizon was used.

Tables and figures:

P1109: Table 1 is not referred to in text, and contains the same information as figure 3. I suggest to remove it.

P1110: CO₂-C flux for flarks should have a minus sign?

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P1114: Which coordinate system does the numbers on x- and y-axis refer to, and what are units?

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