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Biogeosciences Discussions

Interactive comment on "Towards operational remote sensing of forest carbon balance across Northern Europe" *by* P. Olofsson et al.

Anonymous Referee #2

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The manuscript by Olofsson et al. describes the construction of an empirical carbon flux model for Northern Europe that is based on remotely sensed input data. The paper is well written and certainly worth publishing. However, I have some problems with the conclusion that this study illustrates the potential that remote sensing can be used for assessing the carbon balance of forested areas in Northern Europe. Remote sensing based approaches can tell us a lot about GPP and also NPP but not so much about soil respiration and thus NEE. Since there is currently no solution to the problem of capturing spatially varying base respiration rates from space I would expect a more differentiated statement in the conclusion. I have a few more minor comments that hopefully help to improve the manuscript.

Overall: I would not call GPP, TER, and NEE biophysical parameters but carbon fluxes

Abstract line 11 to 14: not clear which reported correlation coefficients refer to which carbon fluxes

Introduction - p. 3146, line 23: remote sensing does not provide a direct estimate of the carbon balance or carbon fluxes! Better call it data-driven models or diagnostic models

- It is several times mentioned that process-oriented models are primarily limited by accurate input data. I do not agree with it. It is true that process models can generally be tuned to accurately predict fluxes for the site level and small regions but when it comes to the large scale they are much more uncertain. Input data, esp. meteo input have large effects here but uncertainties related to model structure are at least equally important. Otherwise, there would be no difference between models in model-intercomparison studies when all are driven by the same input. I would consider removing this line of argumentation in the paper.

- p. 3146: On LUE models. The determination of LUE is the largest conceptual uncertainty of LUE models. LUE lumps entire vegetation physiology into a single number and modelling this by simple empirical functions with meteo data is probably not adequate. Retrieving LUE from space (e.g. photochemical reflectance index, PRI) does not work yet operationally. Since the LUE approach has limitations (like any other model too) it is worth exploring different approaches like in this manuscript.

- p. 3146, l. 24 to p.3147, l. 6: I find it a strange argumentation. First the authors say that modelling soil respiration from space data is very difficult (I think impossible) then they say it is worth doing it anyway. One does not need a justification if one wants to model NEE given that this is the crucial flux everybody is interested it; and this paper explores an approach using remote sensing data.

- Overall, I would shorten and streamline the introduction section, e.g. mention existing approaches and that all are subject to certain drawbacks and then focus on the objectives of the current manuscript.

BGD

4, S1612–S1614, 2007

Results and Discussion: - p. 3158: it's not very surprising that VI correlate better with GPP and TER than with NEE; TER is correlated with GPP!; NEE is the subtle difference of two large fluxes! I find the interpretation of a lagged effect of TER very speculative.

- would be interesting to see the performance of the model for annual sums of carbon fluxes; the authors should consider to insert a table with site vs. modelled C fluxes for GPP and NEE for all used site years (annual sums).

Typos: p. 3146, line 11 if

p. 3156, line 16 have

p. 3157, line 5 thez

p. 3158, line 20 altter

Interactive comment on Biogeosciences Discuss., 4, 3143, 2007.