Biogeosciences Discuss., 6, C3247–C3253, 2009
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Biogeosciences Discussions

Interactive comment on "Forest floor CO_2 flux measurements with a dark-light chamber" *by* H. J. M. Lankreijer et al.

Anonymous Referee #2

Received and published: 25 November 2009

The manuscript "Forest floor CO2 flux measurements with a dark-light chamber" by Lankreijer et al. shows a new automated method to measure daytime CO2 component fluxes during night and day and by doing that the authors can test the commonly used assumption, that nighttime respiration fluxes are the same as daytime respiration fluxes. When eddy covariance NEE data is divided into Re and GPP, this assumption is generally used. The manuscript contains measurement campaigns from two sites and two different years. The actual flux values and the annual variation is, however, of minor importance, since it has been thoroughly studied by others at the same sites and the duration of the measurement campaigns in were inadequate for such comparison. The scientific value of the present manuscript lies in the new equipment used and the test of the above mentioned assumption.

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Interactive Discussion
Discussion Paper

EVALUATION: Scientific significance: The scope of the manuscript fits well with the scope of the NECC special issue and the scope of BG. It presents new data and illustrates a "new" equipment for estimating GPP that has not been widely used. Rating: Good (3).

Scientific quality: The scientific approach and methods used are valid and mostly discussed in an appropriate way. Rating: Good (3).

Presentation quality: The English language is not acceptable in the manuscript and many sentences are cumbersome and unnecessarily complicated and there are some spelling errors or missing words ⇒ The authors are strongly requested to get a help from a scientifically trained native English speaker to correct the language of their final revised manuscript. Rating: Poor (1).

QUESTIONS: 1. Are substantial conclusions reached?

No, not really. The reviewer feels that the authors do not put enough focus on what are the main goals with the manuscript, not in the abstract, introduction nor discussion. ⇒ They are requested to highlight more what were the main goals of the study and discuss them in more detail in the discussion part.

2. Are the scientific methods and assumptions valid and clearly outlined?

The authors are reporting a new equipment; but they fail to give a proper description of how it really works! A diagram showing it would also be very helpful. ⇒ This needs to be included if the manuscript is to be published.

3. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

See last comment.

4. Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

BGD

6, C3247–C3253, 2009

No, they should give some overview about other automated chamber systems that are available and also allow for measurements by transparent and dark chambers. E.g. the new ADC system (the difference is that they use two different analysers/rings for dark/light measurements). There are ever more automated systems around.

5. Does the title clearly reflect the contents of the paper?

Njaaa; the authors should consider if it would not be better to put the central hypothesis into the title; i.e. the difference between night and day dark respiration. Alternatively it is the new equipment that is central and that should then be reflected in the title.

6. Does the abstract provide a concise and complete summary?

The results it presents is ok, but the sentences are wordy and too many details are included. More focus is needed on the main goals of the study, why they are important and the conclusions reached.

7. Are the number and quality of references appropriate?

There are some mistakes in the reference list. According to the journal guidelines: "Please supply the full author list. . ."; but the authors shorten the author lists for two references by Vesala et al.

Brooks and Farquhar 1985 is missing from the ref list.

Kolari et al. 2005 is missing from the ref list.

Kim and Tanaka 2003 is missing from the ref list

Kulmala et al. 2007 is missing from the ref list (there is however Kulmala et al. 2008 in the list)

There is one reference in the reference list that is not found in the main text ⇒ Rayment et al. 1997.

GENERAL COMMENTS Note: the authors create unnecessary confusion by using

BGD

6, C3247–C3253, 2009

different terminology about the same component fluxes. Most notably they frequently mix the term “assimilation”, “uptake” and “photosynthesis”, even within the same paragraphs. Assimilation can be many things; e.g. nitrogen assimilation, carbon assimilation, etc – and it is not used correctly in the manuscript. The same goes for “uptake” (if it is not termed “carbon uptake”) ⇒ The reviewer requests the author to exchange “assimilation” and “uptake” with “photosynthesis” everywhere in the manuscript, where possible.

Another mix in the terminology are the abbreviations used for net ecosystem exchange (or what more accurately should be termed Net Forest Floor Carbon Exchange; e.g. FNEE = NEE ⇒ always use the same form.

SPECIFIC COMMENTS

P9302 Abstr: gross assimilation ⇒ gross photosynthesis

Line 5. This made it possible to estimate besides total daytime respiration and nighttime respiration also the gross assimilation of the vegetation enclosed in the chamber. ⇒ Cumbersome sentence! Rephrase.

Line 8. Results were compared to estimation of gross assimilation by extrapolation of nighttime respiration and the difference between daytime and nighttime respiration was analyzed. ⇒ Cumbersome sentence! Rephrase.

Line 11. then ⇒ than

And consider the above general comments about the abstract should be rewritten.

P 9306 – line 6-7 Photorespiration (Rp) is taken here as part of the gross assimilation. ⇒ What do the authors really mean with this statement? Do they mean that it is an additive term of the estimated Ag – and should be deducted from Ag??? Since they mention it they need to include it in Eq. (1) in appropriate way and explain how it was estimated in more transparent way.

BGD

6, C3247–C3253, 2009

P9303 – lines 18-20. Explain more clearly how the chambers change from “light” to “dart” conditions. . . A diagram of the system would be helpful here.

9307 – line 12. The authors defined FNEE here as “the net flux”; please be careful to use the same terminology as you did in Eq. 1 (the Net Ecosystem Exchange of the forest floor” ⇒ which should maybe rather be termed: Forest Floor Net Exchange. . .

After a parameter has once been defined (such as FNEE), it is not necessary to both write out the full name and give the abbreviation again and again as the authors do for FNEE!!

P9307 – P9308 – the Measurement site subchapter. The authors start describing Norrunda then turn to Hyytiäla and end by further describing Norrunda. . . ⇒ Rearrange the chapter so you first describe one site and then the other.

P9308 line 13-16. It is not clear if three separate systems were used or one system that was moved during the measurement period.

P9309 0 lines 5-8. The original Lloyd and Taylor reference fitted the function with two unknowns as the authors did, but instead of E0 they fitted one of the reference temperatures. If the authors want to discuss the difference in how they used the formula they should account for this. They should also explain the what the numerical values in Eq. 1 represent!

P9309 line 21-22. This sentence is not understandable! Rephrase! Etc. etc. etc.

Figures: General: Change axis titles to the same terminology used in the text (photosynthesis, gross photosynthesis, Forest floor net carbon exchange, etc.)

P9323 FIG 1. The fact that photosynthesis is shown as a negative number and respiration as a positive needs to be noted in the figure legend. Exchange observation number on the X-asis with dates to better indicate what are night time and daytime fluxes. Also, instead of showing number of observation on the X-asis it would be more helpful to indicate the dates.

BGD

6, C3247–C3253, 2009

P9324 FIG 2. Change label on Y-axis to Total respiration (R) = as defined in Eq. 1.

P9325 . . .taken within a 10 min period ⇒ Does this mean that all these measurements were taken within one 10 min period? . . .as this literally sais. . . ALSO: Here the photosynthesis is shown as positive number, in contrary to what was done in Fig 1. This needs to be commented in the figure legend. You need to add a note why/how you sometimes get Ag < 0 when measured by dark-light chamber, which is biologically impossible per definition (if the paired measurements are really comparable and the difference is only "photosynthesis").

P9326 What do the non-filled points on Fig4b indicate? This needs to be explained in the figure legend.

P9327. Good and illustrative figure! But, the figure legend is not saying WHEN and WHERE the measurements were done – and it is not clear if the residuals are from the same analysis as shown in Fig 4 – is it? ⇒ Add the needed information and link to Fig 4 to the figure legend.

P9327. "Volume" is never measured in % - isn't the correct name for the variable expressed on the X-axis "Volumetric water content"?

P9328. The two graphs should be expressed with the same range on the y-axis. Also the positive photosynthesis should be noted (contrary to what was shown in Figure 1). In stead of saying "estimated assimilation from difference light-dark readings" the measurements should just be termed "gross photosynthesis", which is the conventional term to use. Same applies for the legend on the y-axis. You need to add a note why/how you sometimes get Ag < 0 when measured by dark-light chamber, which is biologically impossible per definition (if the paired measurements are really comparable and the difference is only "photosynthesis").

P9329. The Figure legend does not make any sense! The authors claim there that they are comparing daytime photosynthesis with daytime respiration (if one just reads

BGD

6, C3247–C3253, 2009

the legend and doesn't have background knowledge what they are really doing)!! ⇒ Change the wording so it becomes understandable what you are really comparing... Remember to note that gross photosynthesis is positive and "apparent respiration" is negative in this figure. You need to add a note why/how you sometimes get Ag < 0 when measured by dark-light chamber, which is biologically impossible per definition (if the paired measurements are really comparable and the difference is only "photosynthesis"). For the flux estimates on the y-axis, the large part of the data that then became negative, again makes it difficult to call this gross photosynthesis (or assimilation) – without adding a note what negative numbers really mean.

Interactive comment on Biogeosciences Discuss., 6, 9301, 2009.