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Biogeosciences Discussions

Interactive comment on "Seasonality of ecosystem respiration in a double-cropping paddy field in Bangladesh" *by* M. S. Hossen et al.

Anonymous Referee #2

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General comments:

The paper presents one year of EC measurements of CO2 above a rice field in Bangladesh. From the NEE data, respiration has been obtained using gap-filled and flux partitioned data, after which and the dynamics and controlling factors of the respiration is examined. In my opinion, the main problem of the manuscript is that it is based on gap-filled and partitioned data, not the actual measured data. Therefore, studying the diurnal variation, for example, is not reasonable: it is clear that by using a temperature response model you introduce diurnal variation in the modelled RE, and it's also evident that the RE correlates to the soil temperature. Also, trying to simulate the respiration using a model with a different temperature-response function as compared to that used in the flux-partitioning, is not conceptually correct, I think. In minimum, the

authors should examine the residuals after fitting the temperature-response model on the data and give the corresponding coefficients of determination for different factors.

In general, I wonder if one can say a lot of the carbon balance based on merely total ecosystem respiration; the observation that the RE was higher for Boro does not tell much about the sink-source status of the ecosystem. However, in the introduction (p3 lines 3-14; p4 line 4) the authors partly justify their study with the need to know the C balance. In conclusion, I suggest major revisions for this paper: studying the RE using the actual data, and specifically in connection to GPP and net C balance, would be scientifically much more rewarding. I suggest not presenting the RE in a separate paper, but as part of the annual carbon balance. Finally, I would like to see also figure(s) of the actual, measured data, not only the modelled (daily) values.

Detailed comments:

Even though I am not a native speaker myself, it is difficult to believe that the text was thoroughly read and corrected by a native speaker. Although some parts of the text were well and fluently written, some sentences and expressions were difficult to understand. In Figures, please use the same time unit in x-axis in Figs 1, 2, and 4, to ease the comparison.

Abstract Lines 15-16: What do you mean with this? The net sink of carbon is strongly affected by the amount of harvested biomass. Can you really say based on RE/GPP ratio whether the ecosystem is a sink or source of C?

Introduction P3 line 36: What does carbon cycle change mean? P3 Sentence on lines 36-39 and P4 lines 8-9: Could you provide references?

Methods Ch. 2.1: Could you provide more information on the soil properties, e.g. the C and N content which are tightly linked with soil respiration?

Ch. 2.2: Line 38: remove “an open-path” Line 39: remove “was” Lines 39-40: Could you provide the model of the Gill? P.5 lines 1-6: Did you calibrate the Li-7500 also after

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the study period? P.5 lines 12-15: how was the storage flux calculated?

The authors should comment on the influence of the Li-7500 instrument body heat on the air temperature in the optical path, which would lead to air density fluctuations (Burba et al., 2006; Grelle & Burba, 2007; Halswanter et al., 2009), possibly leading to an overestimate in the annual CO2 uptake. The authors should give an explanation why they did not apply the so-called Burba correction on their data, and estimate how would this correction affect their annual balances?

Ch 2.3: I think the term "micrometeorological" is a bit misleading in this context. Micrometeorology is typically referred to when speaking about different flux measurement methods, including the eddy covariance method. Therefore I would suggest removing "micro" from the chapter title. Also, I suggest replacing the term "miscellanoues" with e.g. biological Line 23: remove "corresponding" The first sentence of the chapter is insane, correct. Lines 38-39: Remove "of the micrometeorological"

P.6 line 1: What are "one meter areas"?

Ch. 2.4 Why did you not apply a friction velocity threshold? Could you show the data?

In general, the authors have not mentioned anything about the data coverage or possible gaps in the data. You tell that applying the quality control tests 42.4% of the NEE data was discarded, but what was the total data coverage? Could you shortly describe what kind of quality control was applied for the measured data?

P.6 lines 26-27: VPD is generally known as "Vapour pressure deficit" P.6 line 34: remove "vegetation" P.6 line 43: which temperature did you use? P. 7 lines 3-4: "...respiration, and T0 and Tref are..." P.7 line 6: was determined P.7 lines 4-6: How was E0 set constant? What was the value of E0, how did you determine that from the set of E0s? P7. line 7 bad English: "... at Tref and was determined for 4-day periods by the regression after the value of E0 was fixed" P.7 line 15 variation (remove plural) P.7 last line: "... (m3 m-3), and Wag is..." P.8 line 3: While we set...? Add comma

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before. P.8 line 4: References to figures should be done in logical order, now the first reference is to Fig 6.

Results and discussion

P. 8 line 25: define Rs P. 9 line 9: The sentence here conflicts with Fig 3 which shows that for Aman, SWC is highest during the vegetative period P.9 line 10: what does “drained days” mean? Could you express this in a different way? P. 9 line 20: rephrase the sentence, e.g. higher peak respiration. . . P.9 On lines 29-30 you say that considerably high RE was observed during the summer fallow period, whereas on line 38 you say that flooded conditions suppressed RE. I think these sentences conflict somehow. Could you compact and shorten the Ch. 3.3?

Ch 3.4 Title: Factors Could you give a short overview, why is the RE,B important, what is the relationship between Re,B and Ts actually telling about, and what is the conclusion of this Chapter and Fig.5? What is the assumption, how should RE,B behave related to Ts? Comparison to earlier studies? The whole chapter is a bit rambling and difficult to follow, I think. P.10 line 7: Could you give error estimates for the seasonal averages; do these means significantly differ from each other? P. 10, lines 24-25 “”. . .was larger and had a higher magnitude. . .” what’s the difference between these? P.11 line3: “. . .RE of the paddy field was controlled by Ts. . .” This is truism. Of course it is controlled by the temperature, since the flux partitioning has been done based on the temperature response. Could you rather use only measured data, or at least make an analysis of residuals after modelling with temperature, and provide the coefficient of determination for SWC and biomass. This would give an indication how big contribution these factors have on the RE variation. P. 11 lines 9-11: I do not understand this sentence. Line 12: “higher temperature period” is bad English. The whole chapter should be thoroughly revised for the language.

Figures

Fig 1. How is it possible that the soil temperature is always above the air temperature?

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Terrestrial heat?

Fig. 4. Please give the definitions of calculated and modelled RE in the figure legend, not inside the figure. Write out WF and SF. Please use same x-axis as in Figs 1&4. You have shown the modelled RE here, but have commented it nowhere in the text?

In Fig. 5, how did you choose the periods? The period of DOY 61-70 I understand, but why did you choose only 10 day for the first flooded period for Boro although this period took about 60 days?

Interactive comment on Biogeosciences Discuss., 8, 8693, 2011.