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Biogeosciences Discussions

Interactive comment on "Estimation of nighttime ecosystem respiration over a paddy field in China" *by* M. S. Hossen et al.

Anonymous Referee #1

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Comments on Estimation of nighttime ecosystem respiration over a paddy field in China
M. S. Hossen, T. Hiyama, H. Tanaka

1. The authors provide an insufficient description of experimental site. More information is needed to determine if site is appropriate for flux and storage calculations, particularly under typical nocturnal conditions.

2. Page 1206 Line 25: Sonic anemometer description appears incorrect

3. The paper does not address the difference in footprint sizes of flux measurements and concentration measurements at different heights.

4. No effort was made to estimate the nocturnal boundary layer depth, or leakage through the nocturnal boundary layer, and the effect this would have on the corre-

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sponding flux estimates.

5. Insufficient information about the eddy covariance data processing. Rotation method, frequency response correction.

6. The authors describe a large suite of met sensors – but are they all used in the paper?

7. Why is soil heat flux measured in grassland and not in the paddy.

8. The scalar budget equation given stated is not the complete equation and already includes simplifying assumptions. You should give the complete equation and state your simplifying assumptions – also there are more "original" reference sources.

9. Page 1209 Lines 1-10: The method of estimation of change in storage is very crude and not acceptable for a paper in which the premise is examination of the veracity of storage calculations for capturing the entire carbon exchange. This method may result in significant underestimations of the storage term because of the CO2 concentration only being measured at the top of the storage layer of interest.

10. Page 1210 Line 4: Need to give reference for soil respiration model.

11. Page 1210 Line 6: Do not define which air temperature was used in soil respiration model. Also authors do not justify why air temperature, instead of soil temperature, is used in respiration model.

12. Page 1210 Line 13: under nighttime conditions it is unlikely that you have unstable conditions. It is more likely that you have near neutral stable conditions.

13. Page 1210 Line 19-20: why were data for high winds and highly turbulent conditions excluded? You do not give a justification for excluding this data

14. Page 1210 Line 23: what is the justification for using 15 umol/m2/s as the upper limit for nocturnal NEE?

BGD

7, C300–C302, 2010

15. Page 1210 section 2.5.3: Figure 2 provides a good basis for the selection criteria and processing description but the text became a bit confusing because of the use of NEEec and NEEsc both referring to NEE. Because many of the selection criteria were applied to NEE it wasn't as clear in the text if the selections were being applied to NEEec, NEEsc, both, or the combined values (i.e. NEE). Additionally, the rational behind applying the selection criteria to NEE (after merging NEEec and NEEsc is not clear. It would make more sense to apply appropriate selection criteria to Ec and Sc separately, because each measurement method has specific issues that may make it non-viable as a method for measuring surface exchange. For example, precipitation may affect NEE measured using Ec but not NEE estimated from surface boundary layer estimates.

16. Page 1213-1214: The respiration model does not include a term for soil moisture. Certainly in a rice paddy ecosystem changes in soil moisture must play a key role in determining the rate of soil respiration.

17. Page 1215 Line 1-2: The authors do not give evidence that the turbulent flux is zero at the upper level of the their tower (32 m). They are making this assumption but show no evidence to support this assumption. This assumption is important to the application of the storage change method of determining the fluxes.

18. The discussion section is primarily an extension of the introduction and more of others' research without saying much about the results obtained in the authors' study. Much more discussion and analysis of the authors' results are needed.

19. The authors do not address the potential for advection affecting the nocturnal boundary layer storage change estimates of NEE. Although the site is flat, it is possible (particularily in regions of anthropogenic sources) that horizontal advection of CO2 may affect the change in storage calculations. The authors must show that this is not the case at their site in order for their NEEsc calculations to be valid.

Interactive comment on Biogeosciences Discuss., 7, 1201, 2010.

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