

## ***Interactive comment on “Variability of annual CO<sub>2</sub> exchange from Dutch Grasslands” by C. M. J. Jacobs et al.***

**Anonymous Referee #1**

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This is a very nice summary paper of CO<sub>2</sub> exchange in Dutch grasslands. The sites have unique biological/management strategies that make them very interesting to study. For example, I have not come across a grassland where LAI is maintained (via grass cutting) through the growing season! Also, as would be expected in Holland, some grasslands are essentially bogs. The net NEE, GPP, and Re data show interesting patterns based primarily on soil respiration being more variable between sites than GPP. This fact is consistent with some work summarizing CO<sub>2</sub> exchange over several European forests.

Some concerns: Four sites are grazed (and two have no mention if they are grazed) but there is no discussion of the removal of this biomass on CO<sub>2</sub> exchange. This is an important component which is not being discussed and will obviously have a big impact

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if the ecosystem is considered as a net source or net sink of carbon. Furthermore, grazing is going to have a significant impact both on GPP and Re, maybe more so than temperature. This issue should be addressed in the paper especially since there is discussion on the net CO<sub>2</sub> balance. I understand the fate of the grazed carbon is difficult to consider but this issue should be mentioned as a component of carbon exchange. For example, in the midwest USA, grasslands are occasionally burned and this management strategy is crucial in the overall CO<sub>2</sub> budget.

There are some other scientific issues I noted;

Pg 1510 - may get better correlation with Ta because there is more diurnal variation with Ta compared to Ts. Do you have an idea of what fraction the night Re comes from vegetation and what comes from the soil? The diurnal variation in above ground Re may be greater than the soil Re so Ta has better correlation because of that also. We have found in our work also, Ta correlates better.

Pg. 1510 No data during precip events - were the CO<sub>2</sub> sensors open-path? It would be interesting to see if there was an increase in soil respiration following rains. Do you have any good quality data to suggest an increase?

Pg 1512 - may want to consider using a conversion between Rin and PAR (photosynthetically active radiation). You should be able to easily establish a conversion (generally  $R_{in} \approx 0.5 \cdot PAR$ ) or use one from the literature so that  $R_{in}$  would be comparable to many other light response studies in grasslands. Perhaps you could simply add a second "y" axis in Fig 4a as  $R_{in}$  and distinguish it from  $R_{in}$  (as  $R_{in}$ ).

There were also some strictly editorial issues: Introduction - don't want to end this section on a negative note (i.e., we know NO<sub>2</sub> and CH<sub>4</sub> exchange is important but we did not measure it). Move this paragraph somewhere else in this section but don't leave it at the end.

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Pg 1511 “to stick to” - this expression is far too colloquial. Use a more formal expression.

Pg 1514 - Line 18 - “these two sites” - it was not clear which two sites the authors are referring to.

Pg 1516 - Line 29 should anti-correlated be negatively correlated?

Pg 1519 - Line 4-6 The text needs to be edited to make sense

Pg 1523 - I did not see the Jacobs et al (2003b) reference in the text

Pg 1530 Should Fig 3 be Re on the y axis and not Ro?

Section 3.3 Annual CO<sub>2</sub> Exchange and Fig. 6 and 7 should be Re instead of Rd?

Fig 1 Locations 5,6, and 7 need to have arrows pointing to the location - they numbers are on top of each other

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Interactive comment on Biogeosciences Discuss., 4, 1499, 2007.

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