

## ***Interactive comment on “CO<sub>2</sub> exchange and Carbon balance in two grassland sites on eutrophic drained peat soils” by E. M. Veenendaal et al.***

### **Anonymous Referee #2**

Received and published: 13 July 2007

The paper addresses the important scientific question: “do land management systems substantially affect the C balance?” The approach of using duplicate eddy covariance systems at the two sites located close to each other is a good one, however I agree with Anonymous referee #1 that the effect of differences in soil compositions should be addressed. Despite significant differences in NEE for short periods of time associated with grass cutting, overall the annual C balance did not differ significantly. The first sentence of the conclusion appears at odds with this finding, which is more clearly stated in the Abstract. I found the conclusion to be unsatisfactory: other than the third sentence, what is the stand-out finding of this study? What makes this study unique of worthy of citation? The final sentence is particularly weak.

The manuscript has a very large number of typographic or minor errors, some of which the previous referees have noted, and I find it frustrating, as a referee, to have to point these out, when a careful editing by the authors prior to submission should have removed most of these. This causes me to ask “if the authors have been so careless in the preparation of their manuscript, what chance is there that they have been just as careless in the analysis and interpretation of their data?”

#### SPECIFIC COMMENTS-SUBSTANTIVE

(Page numbers relate to the version of the manuscript I have, presumably in its original submitted form, which differs from the Discussion version).

Note on figures that rely on colour-I do not think that the use of colour is justified, and causes difficulties when the manuscript is printed in black and white. I suggest revising figures with an appropriate choice of line styles and symbols.

P7 Actually the Webb et al corrections are based on measured sensible and latent heat fluxes as well as other variables such as air pressure.

P11 Energy balance closure appears to be very poor (as pointed out by Anonymous referee #1), which in itself is not unusual, however the implications of this, particularly for the CO<sub>2</sub> flux, need to be carefully considered.

P12 & Fig. 8 The Lloyd and Taylor model does not seem to be a very good fit to the data (other referees have pointed this out), and a residuals plot will show this. This will lead to bias, for example, in Fig. 10 where ecosystem respiration is being predominantly measured at night, but modeled during the day. The effect of this bias should be quantified and discussed.

P14 Paragraph 1: “coinciding with LAI estimates near 6. . .” but Fig. 9 doesn’t indicate any LAI that exceed approx. 4.2.

P16 It appears to be stated that latent and sensible heat fluxes exceed the sum of the net and soil heat fluxes in the afternoon, and this directly contradicts what is stated

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about energy balance closure on pg. 11. I believe that the implication of what is stated on pg. 16 is the reverse: storage of heat energy in water in ditches does not explain the discrepancy.

P16 How does the observed strong correlation support a conclusion that the eddy covariance measurements of NEE are reliable? There could easily be a strong bias, yet the correlation still be excellent!

P18 I could not follow the argument that respiration losses from cows are doubly measured.

#### SPECIFIC COMMENTS-MINOR

Note that this is not an exhaustive list.

Throughout the manuscript the multiplication symbol is missing where exponents are reported.

P3 Hensen et al –is this 1995 or 1998? The two papers listed here do not appear to represent co-workers? From (from New Zealand) Units of C losses listed in the last paragraph are inconsistent, should all include a-1.

P4 Last sentence: delete first two commas. Also, “will lead to cause smaller” is non-sensical.

P5 First paragraph: redundant “). micrometeorological agric ultural “The masts were placed in areas, . . .” (redundant comma) Last sentence: what test was used to determine that “No effects of these features. . .”?

P6 “In the parcels, . . .” (redundant comma) “Csat C3” should be CSAT3

P7 Line 1 is “a diver” the name of an instrument? At the moment it reads as if a person in a wetsuit and a mask snorkel uses pressure transducers. Last line: provide reference for Lloyd-Taylor equation.

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P8 T is not defined in Eqn 8. Parag. 2 March “Biomass samples. . .in life. . .” (. . .into live. . .) “Manure gifts” I do not believe this to be an internationally recognised term, so it would be helpful if it were defined.

P10 First paragraph: “comparable to the average period” should be “comparable to the 30 yr average” “Maximum vapour pressure” (not capitalised) “from a maximum of” (not maximally) “Groundwater. . .” paragraph: insert comma after “were” and “period” “Leaf nutrient. . . time at. . .” (not in) also insert comma after “were” and “sites” “At the beginning. . .” insert comma after “was” and “sites”, add “approximately 180 g” Last line: delete comma after “mown”.

P11 Paragraph 1 replace “a small number (n=20)” with “with 20” “Incoming. . .between a maximum of. . .” (delete maximally) “particularly in wetlands” These cited studies are not all for wetlands Last paragraph “Measured fluxes . . .below  $u^*=0.1$ ” (insert  $u^*$ )

P12 Paragraph 1 replace “quiet” with “calm” or “light winds”. “a filter” i.e. data rejected? “foot peak” should be “footprint peak”

P13 “(P>0.005,  $R^2$ . . .” (redundant “(“ ) “Thus during the growing season LAI. . .” (rearrange) “(P>0.05,  $R^2$ . . .” (redundant “(“ )

P14 “The resulting annual NEE balance showed a divergence. . .” delete “for the measurement period” “from Early May” (early) “Similarly for the Stein site” there is a redundant “also” in this sentence. “. . .was -0.7. . .” (not 0,7) “. . .partitioned into. . .”

P16 “soil and water storage fluxes” (insert “storage”) “In our site during. . .” should be “At our sites. . .”

P18 Top paragraph: . . .July and August were, in 2005, wetter. . .” (commas) “Higher VPD’s are not very common in our. . .” (rearranged) “. . . GEP ((annual. . .” (redundant “(“ ) “. . . source estimate of 10.2 (units?). . .” “non-CO<sub>2</sub>” “. . .methane, also have to be included.” (insert “also”). “. . .30 to 50 cm below. . .” (insert “cm”) “Therefore, C losses. . .in the field are likely to be relatively small. . .” (insert “likely to be”) “. . .be

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loss a loss of 31. . .” (redundant “loss”) “Manure gifts. . .C m-2. input. . .” (redundant “:”) “. . .order of 2 mol C or 10%” (units?)

P19 Top line “. . .but the more. . .” (redundant “the”). “A recent. . .” (not “Recent”)

P23 Lloyd & Taylor reference title is incorrect : “. . .soil respiration”

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