Biogeosciences Discuss., 4, S16–S18, 2007
www.biogeosciences-discuss.net/4/S16/2007/
© Author(s) 2007. This work is licensed
under a Creative Commons License.

Biogeosciences Discussions



# *Interactive comment on* "An airborne regional carbon balance for Central Amazonia" *by* J. Lloyd et al.

**R. Leuning (Referee)**

ray.leuning@csiro.au

Received and published: 14 February 2007

This is a well-written paper that warrants publication with only minor revisions. The paper provides sound evidence using atmospheric boundary layer (ABL) budgets of $CO_2$ concentrations that eddy covariance measurements at two flux stations in the Amazon underestimate the nocturnal efflux of $CO_2$, thereby leading to an overestimate of the net ecosystem uptake of carbon by the forest.

A deficiency of the study is that the ABL budgets are available for a very short period of 14 days, but the resulting analysis is still strong enough to confirm the conclusions of several recent studies that horizontal and vertical advection in the control volume below the flux tower is the cause of the underestimation of nocturnal $CO_2$ fluxes by the eddy covariance method.

**Minor comments**

P102 L20 . . . LICOR 6251 . . .

P104 L19 . . . air into the measurement . . .

P104 L20 Clarify sentence to explain what is meant by . . . vertical variations . . .

P105 L4 It is not clear to me that the profiles of specific humidity or potential temperature shows that the ABL height is 750 m. It is much clearer in the $CO_2$ profile.

P105 L5 . . . height ($h$) of about . . . (insert space)

P105 L12 . . . the afternoon humidity profile to be complex . . . (I think the potential temperature profile is not complex)

P105 L14 Explain what is meant by "fluctuations in" – relative to what. I think you mean deviations from the mean mixing ratios for the ABL

P105 L19 . . . evidenced by the slight positive gradient . . . .

P106 L2. It is not clear which periods shown in Table 1 were used.

P107 L6. Vertical advection is also possible and this term is not measured by eddy covariance.

P108 Pa1. Reference should also be made to Cleugh et al. (2004). Boundary Layer Meteorology 110, 99-137. This paper provides a detailed analysis of the errors in ABL budget methods.

P108 L11. Explain more fully how Fig 1 demonstrates the assertion that there was probably no advective effects between any tow flights.

P108 L25 . . . we have made a good an attempt as possible . . . (I suggest deleting this because you do not show results of other possible analyses.)

P109 L9 Clarify sentences after . . . that 24-h integrals may be independent of the nigh



BGD

4, S16–S18, 2007

Interactive Comment

time turbulence regime . . . Figure 4.

P110 L6. I suggest using “underestimation of night time fluxes’, rather than “night-time flux loss”. The measurements are underestimating the net exchange, rather than losing them.

P10 L24 – L29. It is not clear how the discussion here addresses the issues raised in the preceding sentences. Please clarify.

P110 L26 Fig 3 does not show integrals, do you mean Fig. 6?

P111 L24 . . . substantial coarse woody debris present . . .

P116 L18 Note repetition of one line in reference

---

Interactive comment on Biogeosciences Discuss., 4, 99, 2007.