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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The use of disjunct eddy sampling methods for the determination of ecosystem level fluxes of trace gases." *by* A. A. Turnipseed et al.

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This is a useful and mostly well-written review of disjunct sampling techniques for measuring fluxes of trace atmospheric constituents and demonstration of the performance of a newly-developed disjunct sampling system. The main criticisms I have are related to the derivations on pp. 5-8, and subsequent discussion, which need some attention. Overall, I find that this is a significant research contribution. I believe that the suggested modifications can be expeditiously dealt with, and that the manuscript should be acceptable for publication after the authors have responded satisfactorily.

minor comments:

p. 3, l. 20: The sampling period depends on height–especially in the surface layer. With moderately strong winds at 2 m height, 0.2 s might not be short enough. The integral scale (IS) normalized by height above the surface is ˜1 in a convective PBL. This gives IS = 2 m. For a mean wind of 8 m/s, 0.2 s gives an averaging length of 1.6 m. This would likely result in some flux loss, roughly about 10%. Thus, it might be worth adding that, ($<$ 0.2 s for measuring heights $>$ 2m), or something similar.

Eq.(1) and (3) : The integration limit should be T_{avg}, since the integral is normalized by T_{avg}.

p. 5, l. 18-19: The ensemble average is the average obtained by averaging together an infinite set of repetitions of an experiment under identical conditions. Thus, it is unattainable in practice, but useful in theory. So, the right expression of (2) is not an ensemble average, but perhaps an estimate of the ensemble average.

p. 6, l. 5: "of this type" needs to be spelled out; i.e. frequency-dependent corrections.

p. 7, l. 5: What are the units of k?

p. 7, l. 8: ...and the mass *of scalar* (not e.g. of air)

p. 7, bottom: Eq.(10) uses cˆ+ and cˆ-, which are not defined. Similarly, {\overbar c} in (4) is not defined. I don't understand the derivation of (10). Since Vˆ+ = Vˆ- = V_{tot}/2, it seems that you could say on line 16 that you multiply (8) by 1/2 instead of V_{tot}/2V, based on the expression on line 14. Am I missing something?

p. 9, l. 13: What is the definition of "the standard deviation of the slope?" The slope of what? Is it related to the increase in error variance as a function of the sampling time interval normalized by the total record time?

p. 9, Eq.(17): Where did this equation come from? Is it purely empirical? It is certainly not the expression derived by Lenschow et al. (1994). Why did you not use their equation?

ACPD

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Interactive Comment

p. 10, top: I don't understand how an increase of 8% in overall error variance is equivalent to a 28% increase in standard deviation. Using Eq. (58) from Lenschow et al. (1994), I get a standard percent error of 15.5% for the values given on l. 2, instead of 30%. Why the discrepancy?

p. 11, l. 9-11: The deposition velocity (or the equivalent velocity used here) depends on using a reference height for specifying the mean concentration. What is the reference height(s) used for the estimates in Table 2?

p. 11, Eq.(19): I think that there is a mistake here. The factor should be 1.6 instead of 2.5.

p. 18, l. 21-23: Did you use the maximum covariance (magnitude) as an indication of the time lag?

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 13413, 2008.