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Biogeosciences Discussions

Interactive comment on "Mean vertical velocities and flow tilt angles at a fetch-limited forest site in the context of carbon dioxide vertical advection" *by* E. Dellwik et al.

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GENERAL COMMENTS

This paper is very significant. While it was difficult for me to assimilate all of the numerous details, the paper clearly shows that more work is needed for confident flux evaluations for a broad range of conditions. A significant fraction of the resources devoted to the many flux sites around the world should be devoted to reduction of such flux uncertainties. I also concluded from this paper that improvement in instrumentation would be most beneficial since attempting to correct for sonic misalignment and flow distortion in the presence of true mean vertical motion is a very difficult problem with

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no obvious general solution. The use of the Lidar, even though preliminary, provides unique independent information.

One could argue that fetch limited sites should be avoided. However, much/most of the world's land surface is fetch limited and therefore must be an important part of our observational strategy. I hope this paper has a big impact on the flux community.

SOME SMALL COMMENTS

8175. The assumptions behind equation 2 often break down including inability to define the integral scale (or sensitivity to method of calculation). The assumption that the integral scale can be estimated as Lw/U assumes that convection is not important. If I understand Section 2.2 correctly, the integral scale is finally computed as (z_m - d)/U? While this estimate is probably not very general, (z_m - d)/U has the calculation advantage of independence from the turbulence calculation. However, it can yield very small values. For example, z-d = 10 m and U=5 m/s yields an integral scale of only 2 s.

Apparently fluctuations on all time scales up to 1800s are considered as turbulence, regardless of stability?

8186, line 22 Is it possible that the lowest sonic anemometer is closest enough to the trees to inadvertently capture mean vertical motions associated with individual roughness elements?

8189, line 22. Is this a pessimistic estimate of the error since it implies that the order of magnitude of the error is not reduced by the correction? A vertical velocity error of order of 0.1m/s would be fatal to much of the existing analysis of sonic anemometer data. Would not the estimate of the angle uncertainty in the subsequent line be sensitive to wind speed and stability? I am not completely sure where these numbers are coming from. Also a vertical velocity error as high as 0.1 m/s would lead to maximum angle errors greater than the 1 degree reported on the next line?

8184-8185. How common was negative shear and how common was U<1 m/s? At

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some continental sites, these conditions are common at night in summer. I suppose uncertainties would be even greater for these conditions.

8186, line 5. were the mean angles computed by first averaging U and W or were the angles directly averaged?

8187 line 7. Is this the correlation between 30 minute flow angles? The low Rˆ2 could use commenting.

8190 line 20. How would computing mean flow angles reduce the vertical velocity error?

8191 line 24. I assume you are referring to flexing of support brackets, which requires very strong winds?

Interactive comment on Biogeosciences Discuss., 6, 8167, 2009.