Atmos. Chem. Phys. Discuss., 7, S6479–S6481, 2007
www.atmos-chem-phys-discuss.net/7/S6479/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Cospectral analysis of high frequency signal loss in eddy covariance measurements" *by* A. Wolf and E. A. Laca

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Received and published: 31 October 2007

I appreciate these thoughtful and constructive comments. I should point out that the goal of this paper is not to use the transfer functions to correct cospectra per se, but rather to examine the characteristics of cospectra under different stability regimes and determine whether there is undermeasurement due to unresolved flux beyond the Nyquist frequency. To the extent that we know the transfer function H(f) and the filter coefficients, the transfer functions were applied for completeness. They affected the results very little.

I found little published on characacteristics of measured cospectra, particularly of scalars besides temperature, and found that they could be useful for others. Kaimal's work deals largely with spectra, not cospectra, and works like Horst (1997) and Massman (2000) are largely theoretical. The value of this paper is that it is focused on true

measurements.

1) My equation 5 is based on Horst's (1997) equation 7, by way of Massman's (2000) equation 7, both of which have the term in the denominator raised to power 1. I now see that this refers to the integral form of the function H(f) in Horst's eq 5, which has the term raised to power 2. In general this transfer affected the cospectra only slightly, certainly not enough to contradict the general findings of the paper. Nonetheless, I thank the reviewer for pointing out this error, and after changing the exponent it may indeed have more of an effect on the results.

2) I am working from Massman 2000, a lengthy and thorough analysis which treats the Li7500 and CSAT sensors as unambiguously first-order. In Massman's paper in the Handbook of Micrometeorology, he examines whether the closed-path Li6262 should be treated as not first order and concludes that it too could be treated as first order.

3). As mentioned in my response (1) after changing this exponent, we will see what the undermeasurement at the high frequency is, and whether it affects the slope of the decay in the inertial subrange. I should point out however that even though the cospectra may be undercorrected in the inertial subrange they already decay slower than the -4/3 law, which is shown in figure 7d. Although changing the transfer function H(f) will necessarily change these results, they will not make them closer to -4/3. We will check to make sure, but we do not believe these qualitative results will be changed by altering H(f).

4) The approach we present for calculating the lost flux beyond the Nyquist frequency depends on the Nyquist frequency (fN) and the cospectral height at fN. These two coordinates are very sensitive to stability (Figure 7a,b). To the limited extent that high frequency cospectral noise affects the determination of the cospectral height at fN, this noise is addressed by using a regression of the last several cospectral bins. And if cospectra were indeed measured to the point when H(f) reached zero, then it is unlikely that there is much lost flux beyond fN anyway!

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 13151, 2007.

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