Author reply to the review by Anonymous Referee #2 of the manuscript amt-2012-43

Title: "Eddy Covariance flux measurements with a weight-shift microlight aircraft"

by S. Metzger et al.

We thank Anonymous Referee #2 for his / her valuable feedback on this manuscript. In below text we hope to answer your questions and clarify the approach of our study. The comments by the reviewer are indicated with an asterix (*) and are cited in italics, followed by our reply.

General comments

* *In my opinion, the authors could consider to join "Results" and "Discussion" as I have an impression that there are some repetitions in both sections.*

The authors agree that joining the sections 'Results' and 'Discussion' could shorten the manuscript by few redundancies. Yet it is our intention to organize the manuscript as transparent as possible, which we hope to achieve by structuring the sections with increasing complexity. That is, from fundamental properties of the weight-shift microlight aircraft (WSMA) to inter-comparisons between different measurement platforms. From this perspective it is straightforward to divide the 'Results' section into different stages of the assessment. However, a comprehensive discussion of the results warrants synthesizing various stages of such assessment. E.g., the discussion of the WSMA spectral properties (Sect. 4, page 22 line 28 in the revised manuscript) utilizes spectra of WSMA motion sensors (Sect. 3.2), spectra of wind measurements (Sect. 3.3.3), as well as co-spectra between the measurements of the vertical wind and scalars (Sect. 3.3.4).

In order to maximize the clarity of a complex assessment, as well as the readability of the manuscript, we did not merge the sections 'Results' and 'Discussion'.

Specific comments

* **Page 2592, line 20.** *The spectrum in Fig. 3 could be presented in the form fS(f) (as it is in Fig. 5) rather than S(f) – it would allow not only to compare both spectra, but also give information on integral length scale measured by both methods.*

The authors agree that presenting both, Fig. 3 and Fig. 5 in their weighted forms $nS(n)$ and $nCo(n)$, respectively, could improve comparability. However, for this purpose $nS(n)$ would also have to be shown as a function of the normalized frequency $n=f\ z/U$. In Fig. 5 n was chosen as independent variable in order to correspond to the definition of the reference cospectrum of Massman and Clement (2004). Yet, the primary purpose of Fig. 3 is the identification of spectral artefacts in the wind measurements, resulting from motions of the WSMA. The WSMA motions are defined in its inertial frame of reference with frequency f (Fig. 1), and are not a function of flight altitude z or airspeed U. In order to enable visual comparability with Fig. 1, f was also chosen as independent variable in Fig. 3.

The wavelength at the spectral peak of $nS(n)$ is representative of the size of the most energy transporting eddies. However using $nS(n)$ for the calculation of integral length scales requires further processing steps (Lenschow and Stankov, 1986). Hence depicting $nS(n)$ would not provide the reader with a direct link to the integral length scales calculated from the autocorrelation function Eq. (A1), and used for the calculation of the random error Eq. (A3).

For these reasons we did not change Fig. 3.

References

Lenschow, D. H., and Stankov, B. B.: Length Scales in the Convective Boundary Layer, Journal Of The Atmospheric Sciences, 43, 1198-1209, doi:10.1175/1520-0469(1986)043<1198:LSITCB>2.0.CO;2 1986.

Massman, W. J., and Clement, R.: Uncertainty in Eddy Covariance flux estimates resulting from spectral attenuation, in: Handbook of Micrometeorology: A Guide for Surface Flux Measurement and Analysis, 1 ed., edited by: Lee, X., Law, B., and Massman, W., Springer Netherlands, Dordrecht, 264, 2004.