

Interactive comment on “Optimization of a gas sampling system for measuring eddy-covariance fluxes of H₂O and CO₂” by S. Metzger et al.

Anonymous Referee #1

Received and published: 30 November 2015

General comment:

The study investigates the effect of rain cap, tube and filter components of an eddy covariance (EC) system on CO₂ and H₂O signals using the LiCor enclosed-path LI-7200 infrared gas analyser. It is shown that components of the gas sampling system contribute to high-frequency attenuation to a varying degree, depending on the different models of rain caps, particulate filters and intake tubes used for the gas sampling system and whether the tube and filter were heated or not. The results presented are based on laboratory tests and field experiments.

Generally, the manuscript is well written and gives a detailed description of the results

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that can seem a bit lengthy at times. Describing results and discussion in separate sections could improve the overall readability of the text.

The authors cite NEON design requirements throughout the text which makes the manuscript seem very NEON specific, but the author's findings are of interest for all research groups designing an EC enclosed path gas sampling system.

I recommend publication of the manuscript in AMT once the issues listed below were addressed by the authors.

Specific comments:

1) P10990, L7 “In order to allow automated procedures for high-frequency spectral corrections . . .”: This refers to the wavelet-based correction. Additional reasoning for this statement should be given to help the reader understand the relevance of the findings.

2) P10992, L5: I suggest to give more details about the linear interpolation of missing values. How many values were interpolated before the analysis of the dataset?

3) P10993, Equations 6-10: Concerning the comments of reviewer S. Sargent: please clarify if the transfer function is based on power spectra; in addition it should be clarified if a non-conventional usage of the term “half-power frequency” was used throughout the paper and if so, it must be clearly stated. Please verify if the results based on these equations are correct.

4) P10994, L17: The listing of NEON requirements is a bit extensive and seems out of place here. I suggest to not include descriptions of NEON requirements in the main text, but to keep it in the supplement. On the other hand, I am fine with NEON references in the text where needed. Moving all NEON references to a table would also be an option.

5) P10997, L21: How many missing values were linearly interpolated? Does the linear interpolation of data points have an effect on the wavelet-based correction method?

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- 6) P10998, L10: Please clarify what the definition of a successful lag correction is. If it refers to a clear covariance peak between the turbulent time series this should be stated. In this case it should also be mentioned how a clear peak was defined.
- 7) P11023, Figure 2: The figure legend should mention that the results shown are from laboratory measurements. This information (laboratory or field data) should also be added to all other figures where needed.
- 8) P11028, Figure 7: The y-axis of the right plot needs a label, using the same label as for the left plot is not correct because the shown data points are differences (as correctly shown in the text on the top of the plot).
- 9) I agree with other reviewers that the title of the manuscript should include "enclosed gas analyzer".
- 10) Please consider the findings by Aubinet et al. 2015 (AMTD) in your discussion. In addition, conference posters should not be included in the references (De Ligne et al., 2014).
- 11) In the "Results and discussion" and "Summary and conclusions" sections of the manuscript, please add what your findings mean for the conventional high-frequency cospectral correction methods in comparison to the wavelet-based approach.

Technical corrections:

- 1) P10985, L8 "...exceed several 10%,...": Should be reworded, maybe give maximum values using "up to" or a range.
- 2) P10987, L21: I suggest to give the exact number of laboratory tests.
- 3) P10995, L23: The meaning of SDM should be given.
- 4) P10995, L24: The correct expression is "...using the Network Time Protocol (NTP)".
- 5) P10996, L17: Similar to 7), the correct term is "...using the Precision Time Protocol

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(PTP)." I assume that PTP was used for the mentioned synchronization.

- 6) P11004, L9: I assume "NL" refers to the new Licor rain cap and should read "LN".
- 7) P11023, Figure 2: For clarity, I suggest changing either the red or green line to a different color (is most likely not distinguishable for those with red-green colorblindness) or use markers in addition to lines.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 10983, 2015.

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