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Atmospheric Measurement Techniques Discussions

Interactive comment on "Technical note: Dimensioning IRGA gas sampling system: laboratory and field experiments" *by* M. Aubinet et al.

Anonymous Referee #1

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This paper describes how the frequency response and pressure of enclosed IRGA (LI-7200, LI-COR) are affected by the selection (presence) of filter and rain cup via laboratory and field experiments. This study is unique in that the authors developed a dynamic calibration bench for checking frequency attenuation and pressure drop by filters in the laboratory experiment. I think this paper is generally well written, concise and informative.

However, as pointed out by Dr Sargent in the interactive discussion, cut-off frequency is normally defined as the half-power point, and the amplitude spectrum at this frequency falls to $1/\sqrt{2} = 0.707$, not $1/2 = 0.5$. Please check it and re-calculate the results if

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necessary.

Throughout the MS Authors used the term “rain **cup**” throughout this MS, but I think it should be “rain **cap**”. Please check it.
(Note that I also used “rain **cup**” in this review, for convenience.)

P10738L11,12 The paper by Massman and Ibrom (2008) cited here is a “discussion paper” (P10747L13–15). Please cite the final version as follows.

- Massman, W.J. and Ibrom, A.: Attenuation of concentration fluctuations of water vapor and other trace gases in turbulent tube flow. Atmos. Chem. Phys., 8, 6245–6259, 2008.

Eqs. (2)–(4) These equations and their coefficients are not readily available from Massman and Ibrom (2008ACP). Though Foken et al.(2012) is somewhat helpful, but it will be useful and helpful to readers if the derivation of these equations (especially Eq. (2)) is provided in the Appendix.

- Foken, T., Leuning, R., Oncley, S.R,. Mauder, M., and Aubinet, M.: Corrections and data quality control. in: Eddy Covariance: a Practical Guide to Measurement and Data Analysis, edited by: Aubinet, M., Vesala, T., and Papale, D., Springer Atmospheric Sciences, Springer, The Netherlands, doi:10.1007/978-94-007-2351-1_4, 85–131, 2012.

P10738L13(Eq. (2)) There is no explanation about the symbol f_{co} (cut-off frequency).

P10738L14–15 Put “Re” following “Reynolds number” to read “the Reynolds number Re is a function of Q”. Otherwise, there is no explanation about the symbol Re.

P10738L20(Eq. (4)) There is no explanation about the symbol ν (molecular viscosity of air).

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Section 3 Information about rain cups is quite limited. Please provide the inner and outer diameter and volume of these cups. And the photos or schematic diagram of these rain cups will be helpful.

P10740L15–17 Again, the amplitude at the cut-off frequency would be 0.707, not 0.5. Please check it.

P10742L7 and henceforth Part number of the old LI-COR rain cup (officially "Intake Screen") is 9972-043, not 9972-43.

P10741L15 and henceforth Part number of the new LI-COR rain cup (officially "Intake Tube Rain **Cap**") is 9972-072, not 9972-72.

P10742L8 non linearly → 'nonlinearly' or 'non-linearly'

P10742L15, P10744L5 No information was provided about the size of "exchange surface" of the filters.

Section 4.1.2 According to Section 3.1.2, the cut-off frequency seems to be identified in 1-Hz resolution, but the data in Figure 4 looks not 1-Hz resolution. I think more detailed explanation is required how you identified the cut-off frequency in Section 3.1.2.

Section 4.2 Though the authors concluded that the main cause of cut-off frequency decrease should be due to the rain cup, it might be due to multiple causes. The only supporting data are the ones observed using a stuffing gland, with cut-off frequency of about 8 Hz. Readers might want to know the relationship between the shape of rain cups and cut-off frequency decreases. In addition, no one can imagine the shape and size of stuffing gland because of the lack of information.

P10744L23–24 which probably is probably site specific → which is probably site specific

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 10735, 2015.