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Atmospheric Measurement Techniques Discussions

Interactive comment on "A new disjunct eddy-covariance system for BVOC flux measurements – validation on CO_2 and H_2O fluxes" *by* R. Baghi et al.

Anonymous Referee #1

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The paper is suitable for publication in the AMT and I have only a few minor and technical comments on it, listed below.

Page 4158, lines 4-5: "A new disjunct sampling system (called MEDEE) was developed and validated". The passive form seems awkward here, I would rather use active form, i.e. "We developed and validated a new disjunct sampling system called MEDEE".

Page 4158, line 6 ". . .moving piston. It was designed. . ." Here it seems that "it" refers to the piston, even though I believe it should refer to the entire MEDEE system. The sentence should be rephrased.

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Page 4161, line 16: Reference “Karl et al., 2001” should be “Karl et al 2002”.

Page 4162, lines 19-21: “The complete turbulent flux of a scalar is described as the mean product of the vertical wind component w and the scalar concentration c” and Equation (1). Equation (1) comprises actually both the turbulent flux and the advective flux. Usually only the part consisting of fluctuations is called turbulent flux.

Page 4163, lines 21-23: “It has been shown that as long as the time interval Deltat between two measurements is less than the integral time scale of the turbulence, the flux can be estimated with only a small increase in random error (Lenshow et al., 1994)”. This sentence is only partially true. Equation (4) and this sentence cannot be applied to the same data set, as Eq (4) assumes that the subsequent samples are independent, i.e. sample interval is longer than the integral timescale. Furthermore, one obtains the same uncertainty with different sample intervals if sample number (and variance of w’c’) is the same (see e.g. Rinne and Ammann, 2012).

Page 4164, lines 19-21: “The blue arrow on the figure indicates the number of samples of the MEDEE system in the two field campaigns of the present study. The expected uncertainty is thus no larger than 8 %” and Page 4167, lines 17-19: “. . .155 samples are analysed during half an hour, which would correspond to a low uncertainty (8 %) on the covariance estimate (see Fig. 1)”. The line in Figure 1, which describes the Eq. (4), does not describe flux uncertainty divided by the magnitude of the flux, but uncertainty of the flux divided by standard deviation of w’c’.

Page 4164, line 22: “Other sources of uncertainty for the DEC system are the sample carry-over”. Sample carry-over causes also bias, not only increased uncertainty. The bias is quantified by Langford et al. (2009).

Page 4175, lines 10-12: “The air temperature measured on the scaffolding tower was used for the conversion instead of leaf temperature because this latter was not available”. Even larger source of error than the use of air rather than leaf temperature is the use of above-canopy PAR without canopy shadowing effects. The authors should

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comment on this as well.

Page 4175, lines 21-22: “The resulting emission rate was of 39.7 μg g$-$1 h$-$1”. I believe there are too many significant digits in this figure. The number of the significant digits should reflect the uncertainty of the figure.

References

Langford B, Davison B, Nemitz E, Hewitt CN (2009) Mixing ratios and eddy covariance flux measurements of volatile organic compounds from an urban canopy (Manchester, UK). Atmos Chem Phys 9:1971–1987

Rinne, J., Ammann, C., 2012. Disjunct Eddy Covariance Method. In: Aubinet, M., Vesala, T., Papale, D., (eds.): Eddy Covariance Handbook. Springer, ISBN 978-94-007-2350-4. pp 289-305.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 4157, 2012.