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Atmospheric Measurement Techniques Discussions

Interactive comment on "Uncertainty of the hourly average concentration values derived from non-continuous measurements" *by* László Haszpra and Ernő Prácser

Anonymous Referee #1

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General: The manuscript deals with the uncertainties of hourly averaged concentrations derived from non-continuous measurements as often applied at tall tower stations to optimize instrument investments, i.e. one instrument for several intakes and corresponding switching between different intake heights. This leads to continuous records only for limited periods within an hour and shifted in time for different intakes. The product build by the length of the flushing and sampling period times the frequency of the same intake reading depends on the number of intakes to be sampled within an hour. The manuscript clearly documents, which is to be expected, that the higher (lower) the frequency of one intake reading is (higher rate of switching between intakes) the lower (higher) deviations from the true hourly average (continuous records) and the lower

(higher) the uncertainties become. Furthermore, they investigated linear and cubic spline fitting averaging methods and compared these with a simple arithmetic mean. This study is important for modellers who would like to use them in different model approaches and thereby to have detailed information about uncertainties of hourly averages associated with non-continuous sampling. Despite this investigation is most-probably site-specific, as pointed out by the authors, it is worthwhile information how to deal with this issue at other stations. The manuscript is very nicely written with detailed information how the method works and how it is used and applied to data of a Hungarian station that exhibits very strong seasonalities and short-term fluctuations mainly due to photosynthesis/respiration processes. The figures and their legends are clear and concise. It was easy to read the manuscript and I would like to congratulate the authors. I have only a few rather minor comments and suggestions. I suggest to publish it once these comments have been taken into consideration. Minor points: Line 90: 35-45 s: Why does it take so long to reach the equilibrium values within 0.1 μmol mol-1 when the transfer time is less than 10 seconds and the flow 220 ml/min. The cell volume of the Picarro instrument in use (2301) is 33 ml and its regulated pressure I guess is at 140 Torr. Therefore, I would expect a rather rapid equilibration within a few seconds (e-folding time is 1.66 seconds equal to (33ml*140Torr/760Torr)/220ml/min*60s/min).

Line 104: I do not understand the values in parenthesis, please comment on them.

Line 155: I would rewrite this sentence to: At such a resolution the available data are insufficient in number for reliably estimate the scale parameter of the Cauchy distribution.

Line 157ff: The results are rather qualitative than quantitative but ...

Line 160ff: Do you have the data available also for the different interpolations (linear, cubic spline)? If yes, then add this information already here. Figure 3: Legend, change . . .the true value for a typical summer morning hour . . .

Line 198: Delete starting a new paragraph

Line 201: change the sentence to: The higher the sampling frequency the better the arithmetic mean mirrors the concentration course and the lower the uncertainty of the estimated hourly average becomes.

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