

Authors' response to Reviewer#1

First of all, we would like to thank the Reviewer for his/her positive evaluation of our manuscript and would like to thank him/her for the comments and suggestions, which help us to improve the manuscript. Below you will find our detailed point-by-point response to the comments and suggestions:

Comment: *Line 90: 35-45 s: Why does it take so long to reach the equilibrium values within $0.1 \mu\text{mol mol}^{-1}$ 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 $(33\text{ml} \cdot 140\text{Torr} / 760\text{Torr}) / 220\text{ml/min} \cdot 60\text{s/min}$).*

Response: The Reviewer is right, theoretically stable reading should be achieved within a few seconds after the sample enters the measuring cell. The technical specification of Picarro G2301 declares <3 s for 10-90% / 90-10 % rise/fall response time, which indicates a somewhat longer time for achieving stable reading. One of the problems with measuring the response time of the system is the 5 s resolution of the readings. It can immediately introduce a maximum of 5 s error in both the beginning and end times of the flushing. Keeping in mind the temporal resolution and this type of error, our experience show 5-20 s stabilization time up to 20 ppm concentration difference. In the case of higher concentration difference between Standard 1 and Standard 2 the stabilization time gradually increases presumably due to some sort of a memory effect in the system. In the original manuscript the worst case was presented to support the decision on the flushing time, which is safely enough even in the worst case. This idea was not clearly exposed in the manuscript. In the revised manuscript we add that at usual concentration changes the response time is significantly shorter than 35-45 s.

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

Response: In the case of 2, 3, and 4 intakes 100 s sampling period results in 18, 12, and 9 full cycles through the intakes, respectively. 100 s sampling time cannot be applied for 5 intakes if full cycles are requested within an hour. (It would result in 7.2 cycles.) Because of the 5 s temporal resolution of the measurement, the sampling period has to be also divisible by 5. The shortest sampling time >100 s satisfying the requirements is 120 s, which results in 6 full cycles through the intakes within an hour. That is why the sampling period for 5 intakes are mentioned separately, in parentheses.

Comment: *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.*

Response: The sentence will be corrected in the revised manuscript following the Reviewer's suggestion.

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

Response: The sentence will be corrected in the revised manuscript following the Reviewer's suggestion.

Comment: *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...*

Response: The requested information is available in the Supplementary material, although it was not clearly stated in the text. The sentence in line 161 of the original manuscript will be completed as follows: For other sampling periods, numbers of intakes, and averaging methods, the data are presented in the Supplementary material. The legend of Fig. 3 will be corrected according to the Reviewer's suggestion.

Comment: *Line 198: Delete starting a new paragraph*

Response: Accepted for the revised version of the manuscript.

Comment: *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.*

Response: We will replace the sentence with the suggested one.