

Interactive comment on “Methane emission estimates using chamber and tracer release experiments for a municipal waste water treatment plant” by C. E. Yver-Kwok et al.
W. Eugster (Referee)

So as already noted in my online assessment, I find the paper interesting; I take note that the authors have been able to address the main critique from the previous round (I considered the short duration in combination with gappy ^{222}Rn data from the FTIR a major flow, hence recommended major revisions). Thus, the remaining details to address for the final version are listed below.

We would thank the reviewer to have taken the time to review once more our manuscript and provided helpful comments.

The issues below will be addressed in the revised manuscript as will be detailed after each of them.

Minor Issues

2961: 6, 8 (and elsewhere): use comma as the separator in numbers exceeding thousands (18,600, not 18 600)

In the .tex file, we did use the comma as a separator for numbers exceeding thousands but it seems that this convention is not applied by AMT and was modified in the published manuscript.

2964: 11: please give a reference to clarify the Gaussian error propagation. I came across Lo (2005) Ecological Monographs, 75(4), 451–466 who claims that this technique is not well known and rarely used in ecology, thus maybe other readers would also profit from seeing a reference to understand the details of the concept.

Gaussian error propagation is, to our knowledge, relatively common in physical sciences, but not always necessarily termed “Gaussian” error propagation but also “propagation of uncertainty”. This is described, for example, in P. R. Bevington and D. K. Robinson: Data reduction and Error Analysis for the Physical Sciences, WCB McGraw-Hill, New York, 1992. Since we realized that the term “Gaussian error propagation” might seem a bit uncommon, we will speak of “propagation of uncertainty” in the revised manuscript with reference to the above mentioned publication.

2966: 1: to calculate the unknown flux you need a regression not a correlation here (or I misunderstood your approach)

Indeed, there was an error in the phrasing, this will be corrected.

2966: 24: how independent are data in the time series averaged at 1-s intervals? I assume that there is a high autocorrelation. Maybe add a statement how much oversampling this means, or clarify that the system really provides serially uncorrelated data at this resolution (which I however doubt).

The data at 1s are used to plot the methane and acetylene signals and calculate the area under these signals. The more data points are used, the better is the resolution of the signal, which allows for a finer area estimation. It is true that the errors on the 1s data are autocorrelated but this is taken into account in the global error which is the aggregation of the different errors. Moreover, these data are not used as a serie of observations but to determine one single observation (the area under the signal).

We will clarify the text.

P2966 1.24

Indeed, the more data points are used, the better is the resolution of the signal, which allows for a finer area estimation which is the observation we are looking to extract. The autocorrelation of the errors on the 1s data is taken into account in the global error which is the aggregation of the different errors.

2966: 29: 500 km is too much – add m for meters after 500 to avoid misinterpretation.

This error will be corrected in the revised text.

2967: 10: if ! Though

This will be replaced.

2969: 1: it would not hurt to mention the year of the field study again, e.g. “took place in year 2012 from . . .”

This will be added in the revised text.

2973: 6: fast ! Quick

This will be replaced.

2973: 22–24: I disagree with the statement “We can then reasonably expect that if we had calibrated the CRDS instrument more often, we would reach the recommended goal even for polluted air masses”. These instruments are very sensitive to changing temperatures and pressure conditions, because their control loops are tuned to optimize minute drifts as in a nicely thermostatised laboratory environment. In my view more frequent calibration does not really solve the issue, such instruments always have a lower performance in outdoor real-world applications than in a perfect laboratory. We accept this, and are fine with this, but I am not convinced at all that this simply can be overcome by more frequent calibration. Most likely a better insulation and temperature and pressure control will have a much stronger (positive) effect on performance. At least that is my experience. You may want to modify the wording to be less categorical with this statement.

The calibration of the instrument allows to correct part of the pressure and temperature influence. It is however true that measuring in an insulated shelter would have been the best solution. We will rephrase accordingly in the text.

P 2973 1.22

We can then reasonably expect that if we had calibrated the CRDS instrument more often, we would reach the recommended goal even for polluted air masses. Indeed, more frequent calibrations would have helped compensating the temperature and atmospheric pressure influences on the measurements. However, the best solution would be to have the instruments in insulated shelters.

2976: 5–7: This is an interesting statement!

We found it striking that at the onset of aeration, methane is released from the pond in large quantities, and the longer the basin was left without aeration, the more methane came out. That is why we inferred that methane is produced during non-aeration times. It would be very interesting to determine the oxygen depletion during non-aeration times to verify this hypothesis. This has not been done in the presented study, however.

Fig. 4: you have a turn in wind direction most likely via North late on 18 September, but with points connected with lines it looks like the clockwise turn has stopped and jumped to NE via S. Probably using dots (as in panel a) without connecting lines better represents conditions.

We will use dots in the revised figure.

Fig. 6: use a–h to label panels (this is also easier to refer to in the text where I first struggled across this)

We will label the panels as suggested and correct the text accordingly in the revised text and figure.

Fig. 10: there are only three tracer release episodes shown here, you removed one but should also reflect this in the first line of the caption.

This will be corrected.