Anonymous Referee #1

In Ars et al., the authors describe a new method for estimating gas emission rates from industrial facilities, by combining 1) tracer flux measurements, 2) Gaussian dispersion modelling and 3) a statistical inversion algorithm. The new method is evaluated using controlled methane/acetylene releases and compared to results from tracer flux. Four tracer placement scenarios are evaluated to demonstrate the improved accuracy of the method in situations where the tracer and the emission source are not perfectly collocated.

Resubmission review comments

Upon re-reviewing the paper, I am satisfied with the edits and responses to review comments. Given current uncertainties that were pointed out in review and were not addressed with additional experiments due to other limitations, I agree with changing the description from "method" to "concept". Provided the editors of AMT are amenable to publishing "concepts/frameworks", then this manuscript should be published subject to minor technical corrections.

We thank the reviewer for taking the time to review the new version of our manuscript and for this positive assessment. We remind that our paper provides a practical implementation for our concept and first tests with real measurements, even if in favorable experimental conditions, so that it cannot be summarized as a concept paper.

All the suggested technical corrections are towards making clearer figures. The editing and revisions to the main text were excellent and I could not find any errors.

We will take into account these comments to improve the figures of our manuscript.

All figures: perhaps adding a descriptive word would help keep track of the different configurations. For example, configuration 1 could be relabelled 1: co-located tracer, 2: upwind tracer, 3: lateral tracer, 4: multiple sources.

We added the description of the different configurations on the figure 1,2 and 5 but also on the table 2 to help the reader remember these configurations.

All figures: check figure resolution, many appeared blurry to me

The resolution of the figures has been improved (especially those with subfigures).

Figure 1: axis tick frequency in the methane plots is inconsistent between the top panel (configs 1, 2) and bottom panel

We changed the axis tick frequency and used the same one for of each plot. We adapted the color of the points indicating the position of the sources to this new background.

Figure 2: I found this difficult to interpret without a careful look. I would zoom in more on the tracer/methane locations. It also difficult to see black text on top of the map

We zoomed into the experiment area and increased the transparency of the map to improve the readability of the figure.

Figure 3: This figure is in French, and should probably be translated to English.

This figure has been replaced by its English version.

Figure 5: axis labels too small, and blurry

We increased as much as possible the size of the axis labels. We also applied similar corrections to Figure 6.

Anonymous Referee #2

Suggestions for revision or reasons for rejection

The manuscript is indeed improved and the authors made a thorough effort to address properly the several comments received and the discussion proposed during the first review process. I appreciate that the authors had particular care in responding to the scientific issues raised by the Reviewers and Colleagues.

Now the presentation of the topic and methods are in general better explained and organized, and the discussion of the findings and results is more detailed.

We thank the reviewer for taking the time to review the new version of our manuscript and for this positive assessment.

I find still too dense the manuscript itself. It is not a matter of number of lines, but of the risk of missing the key points and findings. More focused and concise statements, in particular when arriving at the discussion and conclusions, would help highlighting what are the real and final outputs of this study. It is difficult to give suggestions about this aspect, since the way of telling is a personal attitude, but I think it is worth to submit this issue to the attention of the authors.

We rewrote and shortened the long sentences of the previous manuscript to make them more understandable and concise for the reader. We also added and modified some sentences in the abstract and in section 4 to better highlight the key results from this study.

A few more additional comments are reported hereafter.

1. There are some long sentences that make the reading difficult, for instance: lines 76-80, 90-94, 146-150, 235-240 etc. Please consider to rephrase them: in general, all sentences longer than, let's say, three lines might be probably better streamlined.
We have rephrased the longest sentences to help the reader to follow the argument.

2. Lines 72-74: this sentence is not much clear, at least to me; I could not get what in practice is done.

The sentence has been changed into "Moreover, when targeting several sources, this technique relies on the mathematical inversion of a square matrix characterizing the atmospheric transport that links the set of sources to the observation data. This artificially requires extending or limiting the number of observation data from the measurement series to the number of sources to be quantified.".

3. Line 192: should 'h' (observation operator) be a capital letter?

In the case of the tracer release method and when targeting one emission rate only, the observation operator used is a scalar. We think that 'h' is more appropriate to refer to such a scalar and to better differentiate against situations when the observation operator is a matrix **H**, even though, strictly speaking, the H (not bold) notation was also eligible.

4. Line 700: 'can ranged' should be 'can range'

Done

5. Line 828: 'in any cases' should be 'in any case'

Done

6. Figures 2 and 4 are not cited neither commented in the text.

Figure 2 is cited and commented line 524 and figure 4 line 666.