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Atmospheric Measurement Techniques Discussions

Interactive comment on "Facility level measurement of off-shore oil gas installations from a small airborne platform: Method development for quantification and source identification of methane emissions" *by* James France et al.

Anonymous Referee #2

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France et al. quantify CH4 emissions from offshore oil platforms using combinations of instruments aboard a Twin Otter aircraft. They describe the lessons learned from two years of flying downwind of these platforms. They also discuss methods of distinguishing sources of CH4 based on isotopic measurements and correlations with ethane. They find ethane:CH4 emission ratios of 0.029 in both years of flying, in line with published estimates. Their estimates of CH4 mass fluxes improved significantly when flying in 2019 in a well-mixed marine boundary layer.

This paper provides a straightforward description of the project. As such, there is not much to critique. They lessons the authors learned during the two years were mostly to be expected, i.e., faster response instruments were able distinguish source locations better than slow response instruments; a well-mixed marine boundary layer was easier to measure a downwind plume than a layered, poorly-mixed marine boundary layer; etc. However, since the paper will stand as an overview of the project studying emissions from offshore platforms, and because it provides some guidelines for future projects, it is worthy of publication in this journal. I have mostly minor comments related below.

line 54, "pinpoint" seems redundant. Is there a difference between locating and pinpointing emission sources? Maybe the authors mean locate facilities that are emitting, then pinpoint where in the facility the emissions are? And I think this sentence would read better if it were presented in a hypothetical chronological order: first locate emissions, second quantify them, third validate inventories, fourth design effective mitigation.

line 131, stating the precision of the ethane measurement in flight would be more appropriate than in the lab

line 315, when the authors say a "vertical run", do they mean a vertically-stacked horizontal run?

In Figure 7, please state how far downwind the aircraft was for each of these two flights.

line 355, I don't think the word "ideally" is necessary. There must be some variability in the source strength compared to the background in order to fit a line through the data points.

Other comments:

line 253, what does NAME stand for?

Grammar suggestions:

line 23, add comma after (SLCP)

line 93, it looks like the superscript “-1” is a different font

line 103, it looks like the second end parenthesis of the O’Shea reference is a different size?

line 176, it is unclear what “fit” means here

line 181 and elsewhere, suggest changing “in O’Shea” to “by O’Shea”

line 188, suggest “canister sampling” instead of “canisters sampling”

line 199, need ending parenthesis after Lowry reference

line 245, suggest “by Stull” instead of “in Stull”

line 255, change “decision” to “decisions”

line 319, I found this sentence a little confusing to read. I suggest instead of “between the maximal and minimal altitude transects that do not demonstrate CH4 enhancements so are outside of the plume”, perhaps say “between the highest and lowest transects without CH4 enhancements, which are above and below the plume, respectively”

line 328, same strange small parenthesis in the Plant reference

line 346, suggest “by Peischl” instead of “in Peischl”

line 352, suggest “by Keeling” instead of “in Keeling”

line 384, “dramatically” is subjective. I suggest removing this word.

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