Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-108

Anonymous Referee #1

Referee comment on "Air–sea exchange of acetone, acetaldehyde, DMS and isoprene at a UK coastal site" by Daniel P. Phillips et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-108-RC1, 2021

This study presents new measurements of VOC fluxes near the coast. Interestingly, the coastal fluxes are comparable to previous measurements in open ocean of similar latitude. Flux magnitudes were dependent on the wind-sector, with generally larger fluxes for acetone and acetaldehyde from the terrestrial sector. The authors compare their observed fluxes to those in global models and discuss some of the similarities and differences.

Overall, I think this paper is well written and organized. The research of this paper is novel and helps fill a void in our current scientific understanding of air-sea flux of VOCs. I recommend it for publication after some minor comments are addressed.

Line 121-122: Can a quantitative number be placed on this? For example, how much does the humidity impact the background and overall, what is the correction?

Line 160: Is there a statistical difference in the day versus night fluxes?

Line 179: Again, what effect does humidity have? Is it a few % or tens of percent?

Line 242: Table 2?

Line 246-248: It would be helpful to provide the concentration data here from these other studies in addition to the percent differences reported. Precents depend on magnitude so smaller concentrations could be largely different in percent terms. It would just help the reader not have to dig up those papers to find values.

Line 250-265: This section is a bit dense with all the comparison and numbers. It would benefit from a (supplementary) figure that shows the different means from the various studies for each compound.

Line 250: Were all the atmospheric concentrations observed just over one day or even a few days? If so, this should be highlighted more than just the brief note made in the first sentence. This could explain quite a bit of differences between the various studies.

Section 3.5: The first paragraph is strange. I was expecting a discussion about flux and then it is about a lifetime calculation. Which atmospheric lifetimes are calculated? The ones in the model? A bit vague.

Section 4: What research needs to be done to solve some these discrepancies? What would the next research project look like? "Future work should…"

General comment: Models are only as good as the data going into them. This study provides more constraints for the models. Thank you for your contributions.

Figure 2: Please avoid using red & green together for color-blind accessibility.

Figure 3:

- I understand it's hard to keep all the subpanels on the same vertical axis range, but it is also then hard for the reader to compare the different fluxes. Panels B & C can at least be on the same range (possibly -50 to 20)
- I was confused having the blue dashed lines mean different things between panel A and panels B-D. Maybe a shaded gray area would be better for the LOD?
- The gridlines between the subpanels are of different increments.

Figure 4: The gridlines are strange in this figure as well. (Maybe it is just how the graphics were saved in my PDF) but double check for publication.

Figure 5:

- Please avoid using red & green together for color-blind accessibility. (Not as critical here since the markers are different, but a general comment).
- Gridlines are inconsistent

Figure 6:

- Gridlines are inconsistent

Figure 7:

- The omission of color in panels B and C seems like a mistake.
- Panels B and C are heard to read because the marker sizes of the triangles and circles are small.
- What are the dashed black lines, the uncertainty bands? Please provide clarity in the figure caption.
- Poly fit is to the observed data, I assume?

Table 1:

- Please add bottom borders under "open-water" and "Plymouth Sound" to make it easier to know which columns go under each sector
- I appreciate the raw values especially for future comparisons.

Table 2:

- Provide the sampling date(s) for the atmospheric mixing ratios.
- Please add bottom borders under "open-water" and "Plymouth Sound" to make it easier to know which columns go under each sector