

Comment on acp-2021-343

Anonymous Referee #1

Referee comment on "Evaluating the impact of storage-and-release on aircraft-based mass-balance methodology using a regional air-quality model" by Sepehr Fathi et al.,
Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-343-RC2>, 2021

The authors validate the accuracy of the aircraft-based top-down emission rate retrieval algorithm. They investigated the impact of meteorology and surrounding emissions on the derived emission rates and gave suggestions to design aircraft campaign. The investigation looks sound to me, but the manuscript is not very easy to follow. I would suggest polishing the paper. I would recommend revision before publication.

General comments:

- I would recommend rephrasing the introduction. The authors have conducted a good literature review by listing several studies in the first and second paragraph. However, it is a pity that the literatures have not been well organized. It is hard for readers to tell why those literatures are chosen as representativity and how our knowledge has been gained gradually. For example, the pro and con of current methods are missing. I'm not very sure about the major point of the 2nd paragraph. Please try to better organize those two paragraphs in the revised manuscript. Additionally, is the term of "Storage-and-Release" invented by this study? If so, I'm wondering how this effect has been described by previous studies? What is the motivation of giving it a new name here?
- Equations in Section 2.2.1. There are many equations in this subsection. It is very easy for me to get lost after reading all the equations. For example, some variables in Eq.(6). can be derived from previous equations, some not. I would recommend a flow chart to demonstration the calculation.
- The fundamental differences between the three methods have not been clearly stated. I would appreciate a figure or chart to compare them. Additional text to summary the figure/chart is also appreciated. I noticed that there are some texts about this in the conclusion part. But I feel it would be much easier for readers to follow the content if such description appears earlier.

Specific comments:

- Is emission rate retrieval over- and under-estimation a common word to use? It sounds uneasy to follow to me. Would you suggest emission biases? Additionally, the last sentence of the abstract is unclear.
- Page 2, line 35. What does the mass-balance technique refer to here? It is difficult for readers without good knowledge of this specific topic to catch.
- Page 2, line 46. Which model is used here? air quality model?
- Page 2, line 50. Please clarify which species has been considered in Gordon et al. (2015).
- Page 3, line 59. Please clarify the definition of mass transfer.
- Fig 1. The color recognized as dark green in the caption looks like blue from my screen. I recommend using thicker white lines to identify the flight tracks.
- Page 6, line 139. Shall "their use" be replaced by "our use" considering the reference is from the same authors?
- Page 6, line 152. Please clarify the definition of virtual sampling.
- Page 6, line 158. Please consider changing studied cases to case studies.
- Page 21, line 513. The citation of AMS, 2020 is unclear to me.