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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Online measurements of the emissions of intermediate-volatility and semi-volatile organic compounds from aircraft" *by* E. S. Cross et al.

Anonymous Referee #2

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Comments to authors:

The following is a review of the manuscript "Online measurements of the emissions of intermediate-volatility and semi-volatile organic compounds from aircraft" by Cross et al. (acpd-13-8065-2013). This manuscript describes novel measurements of the intermediate- and semi-volatile organic compounds found in jet engine exhaust using cryogenic focusing and thermal desorption of engine emissions into a high resolution time-of-flight mass spectrometer, with high sample time resolution (∼9min here).

Overall, this is a strong manuscript. It is written clearly, and grammar is very good

throughout. Clearly this is a powerful new technique to analyze I/SVOCs with high time resolution. Future work needs to focus on additional separation of signal, investigation of oxy-I/SVOCs, and robust quantification techniques for a range of compound classes. I offer the additional following comments and suggestions:

1) Page 8067, line 16: remove first “of”

2) Page 8067, line 26: Do the authors of the previous studies suggest the mechanism for this switch?

3) Page 8069, line 23: sentence is awkward, please revise for clarity.

4) Section 2.2, first paragraph: please explain why 2 fuel types were used for this study then, if you were predicting them to be well mixed at 143m. Were there other investigators closer to the engines to gain information on fuel type differences?

5) Page 8071, line 13: Do you model the conditions to determine the gas/particle split for measured SVOCs?

6) Page 8072, line 8: What is the i.d. of the collection tube? Have the authors either empirically (using standards) or modeled (using diffusion rates) the collection efficiency over the range of organic compounds of interest? If done empirically, this would include desorption and transfer efficiency as well.

7) Page 8072, line 28: specify the masses that are filtered.

8) Page 8073, line 6: what are the consequences of heating your trap to 280C, and having your transfer line to ToF-MS at a lower 250C?

9) Page 8074, line 1: The hexane peak is never observed tailing into the volatility region > 50C? It has a listed boiling point temperature in the high 60C’s.

10) Page 8074, line 28: why is the aromatic signal almost as large as the aliphatic signal for JP-8? Because the aromatic representative fragment here constitutes a large fraction of the total aromatic signal, with the aliphatics fragmenting into more ions?

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Please clarify.

11) Clearly this calibration is not ideal, but the authors have tried to recover quantitative information using lab results. Future studies need a more robust calibration.

12) Equation 1: You're measuring an emission index 143m from the source. How would this index change if you were, for example, at 10m or 1000m?

13) Page 8082, line 3: Q/Qexp=0.06? This is very low. Please explain.

14) PMF analysis: Did the authors try higher factor solutions? If so, did more compound classes appear?

15) Have you tried oxy-IVOC standards to understand what range of oxy-species you may be detecting?

16) Fig 1.: component labels appear washed out. Also, please add label for quadrupole high pass filter.

17) Fig. 5,7,8: These are really interesting desorption profiles, with lots of information buried in the high resolution mass spectrometry data. It will be exciting to evaluate these types of profiles for many future applications of this technique.

18) Fig. 8: Increase size of figure. Maybe include O:C and H:C ratios on the figure?

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 8065, 2013.