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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Identification of secondary aerosol precursors emitted by an aircraft turbofan" *by* Dogushan Kilic et al.

Anonymous Referee #1

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This is a very will written and informative paper on a quite relevant and timely subject regarding aircraft PM emissions. The authors have extended work in this area in important ways, with proper and appropriate recognition of the prior work that they are building upon. The results are interesting, important, and appropriately qualified for the application of these data in assessing the environmental impact of aviation emissions. Their brief discussion of impacts in the conclusions section will help consumers of this data to use it for impact assessments.

This paper is very well written, and I noted no typographical errors or mistakes.

My only comment is the following.

In the discussion of Figure 6, the authors note that the measured SOA at "cruise" is

significantly higher than that predicted based on oxidation and gas-to-particle conversion of the measured precursors. They go on to point out that the levels are quite low at "cruise", so that this doesn't affect their primary conclusions. I understand and do not take issue with any of those comments.

My suggestion to the authors is to consider a contribution to the measured SOA from engine oil. Much work has been done to quantify the engine oil contribution to the volatile PM (Timko et al., 2010, Yu et al., 2010, Timko et al., 2014 and others), where the mass spectra of oil compounds from AMS data were identified and analyzed. An oil contribution would add to the measured SOA, yet not be a factor in the measured gas phase emissions. Thus it might help explain the lack of mass closure in the budget in Figure 6. The engine oil contribution is not combustion-related, and thus will not have the significant power variation as seen the the gaseous combustion emissions precursors. As such, the oil contribution might not change as much with power. This means that it could be a significant component at "cruise" power conditions where SOA is low, yet be negligible at idle where the gaseous emissions are much higher.

I do not know whether the authors can identify oil fragment peaks in the AMS data, but I would suggest they look. At the very least, I would suggest that in the discussion for Figure 6, they acknowledge that engine oil is a possible explanation for their lack of mass closure on the SOA budget.

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