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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The influence of local oil exploration, regional wildfires, and long range transport on summer 2015 aerosol over the North Slope of Alaska" *by* Jessie M. Creamean et al.

Anonymous Referee #2

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This paper presents measurements of aerosols made during the U.S. Department of Energy Atmospheric Radiation Measurement (ARM) program's Fifth Airborne Carbon Measurements (ACME-V) campaign along the North Slope of Alaska during the summer of 2015. The paper focuses on how local oil extraction activities long-range transport influence aerosols and trace gases in the North Slope of Alaska. The authors should try to go beyond presenting the measurements and use the data in a clearer way to demonstrate the scientific conclusions that can be made using the data. This paper is within the scope of ACP and should be published following after the authors address the following comments:

1. I agree with reviewer #1 that the authors should rethink how to present the data in a less superficial way in addition to showing the data as a function of the flight number. I don't object to showing these figures (Figs. 3, 7 and 9) as long as the data is shown again in a more synthetic way later in the paper, allowing the authors to draw more clear conclusions from the measurements.

2. The choice for the classification parameters and thresholds values in Table 2 should be more clearly justified. Have these been chosen using the Hysplit analysis?

3. The way that Hysplit has been run should be more clearly described and justified. Even though the authors reference another paper for the description of the Hysplit runs, there is not enough information to fully understand how Hysplit was run. I assume this was run in backward mode from the measurement locations, but this is not clear. The reason for the choice of the five locations in the active fire region is also not clear. I also cannot fully understand Figure 2d and Figure 6d.

4. The reason for showing the data as column averaged values in Figures 2 and 6 needs to be justified. Don't we lose information by showing the data in this way? The main advantage of using aircraft data is that we know where the aerosol layers are vertically. The information we can learn from the altitude of the aerosol layers should be a clearer part of this analysis.

5. The MODIS detected fire hotspots should be shown on Figure 5 relative to the fire size or fire radiative power, such that more active fires can be identified vs. less active fires.

6. The influence of oil exploration is not clear to me. Is the location of oil exploration activities known? The discussion of oil exploration influenced air that was sampled should be clarified. The discussion of long range transport also needs to be developed, as noted by reviewer #1.

7. The authors should review the manuscript writing to clean up the writing style and

typos before resubmission.

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