

Interactive comment on “Aircraft measurements of High Arctic springtime aerosol show evidence for vertically varying sources, transport and composition” by Megan D. Willis et al.

Anonymous Referee #1

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Willis et al describe aircraft measurements of aerosols during the NETCARE campaign in the high Arctic during springtime. The revisions made following the quick review have significantly improved the manuscript, and I only have minor suggested revisions here. These line numbers correspond to the track changes version of the manuscript. The title now reflects the unique aspects of this particular study, which is helpful, and inclusion of the new Figure 4 in the main text is helpful as well.

My main comments correspond to Page 9, Lines 6-7: What density is assumed to compare the ToF-AMS non-refractory aerosol with the UHSAS aerosol mass? Also, it is stated that the AMS mass and UHSAS mass were within a factor of two. Was the bias

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consistently in one direction? Was there a meaningful temporal variation associated with the difference? A factor of two could mean that the AMS may have measured half or twice as much aerosol mass, which is a lot! This should be commented on. Was the discrepancy correlated with periods influenced by NaCl⁺, suggesting that the missing mass could be sea salt?

Minor Comments: Page 1, Lines 5-6: Remove reference.

Page 1, Line 8: What is the reason for listing ammonium as “NH₄” instead of showing the 2+ charge and showing the 4 as subscript? This “NH₄” formatting is used throughout.

Page 1, Lines 18-19: Also state in this sentence that these species are altitude-dependent. Surface-based measurements will reflect long-range transport at the surface, but not the total transport to the Arctic. Please clarify this sentence.

Page 2, Line 28: Add reference.

Page 11, Line 13: This is an old reference, and given the changing climate, it would seem that the temperature inversion frequency and depths may have changed over time. Is there a newer reference, or any evidence of recent change?

Page 11, Line 18: Add Oltmans et al 2012, JGR, which shows ozonesonde data for near-surface vertically-resolved ozone levels.

Page 14, Lines 6-7: For context, please provide the ammonium content in parentheses, or integrate in the sentence.

Figure 7: Please remove plot (b) “Neutralization”, since this discussion has been removed per the quick review. The other three plots in this figure are very useful. Could the absolute concentrations be integrated in this figure, as well, perhaps as average markers?

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-628>,

2018.

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