Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2019-130-RC2, 2019

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Biogenic and Anthropogenic sources of Arctic Aerosols" *by* Ingeborg E. Nielsen et al.

Anonymous Referee #3

Received and published: 22 April 2019

The paper presents an analysis of aerosol composition measured at the Villum Research Station in Northern Greenland based on SP-AMS data collected over 3 months in 2015. There is a lack of measurements of organic aerosol in the Arctic and, in particular, measurements of the composition of the organics and how that changes with season. Hence, the data provided here make a substantial contribution to our understanding of the importance of marine and anthropogenic sources of organics to the Arctic atmosphere with changes in solar radiation levels and sea ice extent. The paper is well-written and the balance between material in the main text and the SI is appropriate. I only a few minor concerns which are listed below.

Lines 24 – 25: Do "organic matter" and "organic aerosol" both refer to organic aerosol concentrations as ug C/m3 or as total particulate organic matter including H and O?

Printer-friendly version

Discussion paper

Lines 78 – 79: Decreasing trends in nss SO4 and BC have been documented for Barrow. Please see Chapter 9 of the 2015 AMAP report on Black Carbon and ozone as Arctic climate forcers (www.amap.no).

Line 214: Applying a uniform specific absorption coefficient for BC could affect temporal variability if the nature of the BC (source, aging processes, etc.) lead to varying specific absorption coefficients.

Lines 248 – 249 and SI lines 85 – 98: It is not clear from the main text that periods where differences between PM1 determined from the SP-AMS and the SMPS were at least 2 ug/m3 (late March/early April and mid-April) were excluded from the data analysis. It states in the SI that data from Feb 21 – 26 and Mar 29 – Apr 2 were excluded. Please clarify this in the main text. Also – what is the impact of not including sea salt in the SP-AMS derived PM1 since it will be included in the SMPS PM1? The modal number diameter of the sea salt mode is ∼200 to 300 nm so should be detected by the SMPS.

Lines 312 - 315: What is the MSA to SO4 ratio during periods when MSA was detected? Can the ratio be used to assess the importance of biogenic vs. anthropogenic sources of SO4?

Line 340 – 342: Is the attribution of Cl and NO3 to frost flowers (i.e., a local source) due to their presence in the supermicron size range? Please clarify in the main text.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2019-130, 2019.

Printer-friendly version

Discussion paper