

Atmos. Chem. Phys. Discuss., referee comment RC1
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Referee Comment on acp-2022-413

Anonymous Referee #1

Referee comment on "Measurement report: High Arctic aerosol hygroscopicity at sub- and supersaturated conditions during spring and summer" by Andreas Massling et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-413-RC1>, 2022

Results of aerosol hygroscopicity measurements from a CCNC and an HTDMA are presented for spring and summer periods in 2016 at the Villum monitoring station in Greenland. These types of measurements are rare in the Arctic so the paper is a significant contribution to what is known about Arctic aerosol hygroscopicity. The research methods and analysis are thorough and the paper is well written. I only have the few comments listed below.

Figure 3. Were there no UVA measurements available between August 25 and September 29 or was there no measurable UVA?

Section 3.2 and Figure 4: The sampling periods are not the same in the text and the figure. For example, the text says 20 April – 10 May and the figure says 20 April – 8 May.

Line 441: Providing a theoretical value for ammonium bisulfate would be helpful.

Lines 552 – 566: This discussion is a little confusing. It is likely true that “the organic

mass fraction must be assumed to contribute significantly to the hygroscopicity of the observed aerosol at Villum”. However, the measurement techniques used focus on the particle size range where mass is negligible and number concentrations are highest. A more in-depth description of this discrepancy would be helpful along with more details on what is known about the size dependence of the organics in the Arctic. Nielsen et al. measured organics in PM1. Can more information be provided about how that organic mass is distributed across the PM1 size range? Perhaps from the Croft et al. results?

Line 589: “likely caused by the more numerous and diverse active aerosol sources during the summer measurement period”. Perhaps this should be local aerosol sources? Spring aerosol sources can be quite diverse given the long range transport that occurs during that time of year.