Atmos. Chem. Phys. Discuss., 11, C871–C873, 2011
www.atmos-chem-phys-discuss.net/11/C871/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Absorption, scattering and single scattering albedo of aerosols obtained from in situ measurements in the subarctic coastal region of Norway" *by* E. Montilla et al.

Anonymous Referee #1

Received and published: 15 March 2011

The paper presents aerosol light absorption and scattering data measured at a site north of the Arctic circle on the island of Andoya during IPY. By examining the absorption and scattering data and its relationship to the corresponding angstrom exponents, the authors conclude that the sampling location was very clean with respect to aerosols and only episodically influenced by small particles resulting from long range transport. The relationship between single scattering albedo and the absorption coefficient (Cappa et al., 2009) is well applied. That said, I found the paper to be lacking in data with too much conjecture about sources of aerosol to the sampling site. The analysis would be much improved by the addition of trajectory analysis and any available aerosol composition data. These would serve to support the evidence provided

for transport of dust and small, continental aerosols to the site. In addition, there is a complete omission of organic aerosols and the impact they may have on the measured optical properties.

Abstract, line 7: should this be “which frequently are transported to the Arctic region?”

Abstract and throughout: Can scattering and absorption really be measured with an accuracy of 1/1000ths? I suggest decreasing the number of significant figures used.

p. 2163, lines 5 – 15: This discussion leaves out organic aerosol species which can dominate other chemical components in certain regions.

p. 2163, lines 20 – 22: May want to re-phrase as “The Arctic summer provides an excellent environment for studying remote, background aerosols as there are few sources of natural particles and limited influence of man-made sources.”

p. 2164, lines 20 – 25: This discussion is confusing because it is switching between spectral dependence of single scattering albedo and absorption with no interpretation of the data presented.

p. 2165, lines 5 – 7: Why does the absence of regional pollution sources make the site suitable for tropospheric measurements? Do you mean measurements of remote, background aerosols?

Section 2: Were the scattering data corrected for truncation errors as described by Anderson et al.?

Section 3: Again, only 2 significant figures are likely warranted.

p. 2168, lines 0 – 4: Figure 2 only shows the scattering coefficient varying between near 0 to 25, not 2 orders of magnitude. The absorption coefficient varied between near zero to 2.5 so there was a common factor of 2 variability in both.

p. 2168, lines 14 – 21: Given the remote, background location of the sampling site, single scattering albedo values near 0.6 are quite low. Were there local sources of

ACPD

11, C871–C873, 2011

contamination (vehicles, snow mobiles, etc.) that could be responsible for these low values? Were the data screened for such contamination?

p. 2169: Is there evidence other than a low value of the angstrom exponent of the single scattering albedo for transport of dust to the site during the campaign? This argument would be greatly strengthened by trajectory analyses and any aerosol chemical composition information that was available. What other sources contributed to the wide range of values? Trajectory analysis and composition information would help address this question, too.

p. 2170 and Figure 5: The data and the discussion of the data that are presented is not very in depth. There appears to be two populations of aerosol based on the biomodality shown in Figure 4b and the two slopes shown in Figure 5a. It is acknowledged that there are multiple aerosol types and stated that they are "probably maritime aerosols" and "maybe continental aerosols." It is clear that only presenting scattering and absorption data is not sufficient to fully describe aerosol type and source.

p. 2171: line 5 – 7: Again – was the sampling of local emissions avoided so that all small, absorbing aerosol can be attributed to long range transport?

Overall: What about organics and other biogenic aerosols? Previous papers have reported the occurrence of large concentrations of small, biogenic aerosols during the Arctic summer (e.g., Ricard et al., JGR, 2002, Quinn et al., JGR, 2002; Leck and Bigg, GRL, 2005).

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 2161, 2011.