

Interactive comment on “Measurements of optical properties of atmospheric aerosols in Northern Finland” by V. Aaltonen et al.

Anonymous Referee #3

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Review of "Measurements of optical properties of atmospheric aerosols in Northern Finland", by Aaltonen et al.

General comments:

This is a straightforward presentation of the results of aerosol optical and size measurements from the Pallas GAW station. The techniques and analysis performed seem to be fairly sound. However, there are some things that can be clarified or improved as outlined below.

Specific comments:

1) It should be clarified what the units Mm^{-1} stand for.

- 2) Abstract, lines 10-13: This sentence is confusing until you read the paper. One would expect high backscatter fraction to be associated with polluted air.
- 3) The Introduction does not contain a complete list of works on aerosols and radiative forcing nor on aerosol measurements. I would suggest adding "e.g." to the citation lists in places where the list may not be comprehensive.
- 4) Section 2.2: In the measurements of scattering, it sounds like no particles greater than $5\ \mu\text{m}$ were measured, while in measurements of total aerosol concentration, there was a channel for $D_p > 5.0\ \mu\text{m}$. The implications of this in the analysis of the results that follows should be discussed.
- 5) Section 3.1: Is Barrow, Alaska considered more polluted by Arctic haze? Is Ny-Alesund considered less polluted by Arctic haze? In other words, are these comparisons as expected?
- 6) Section 3.2: "The hemispheric backscattering fraction was also found to be dependent on the magnitude of the scattering coefficient... b started to increase very rapidly with decreasing scattering coefficient in very clean air." - Since the scattering coefficient appears in the denominator of the backscattering fraction, these two statements are obvious mathematically. What needs to be emphasized is that it indicates that the backscattering coefficient does not increase/decrease similarly to the scattering coefficient. What are the implications of that?
- 7) Section 3.2, discussion of Figure 5: (b) and (c) are labelled opposite in the figure caption to in the discussion. Which is correct? Also, (b) and (c) look somewhat similar. Why is a connection assumed in (b) only?
- 8) Section 3.3: The sentence beginning, "Figure 9..." should probably be included in the next paragraph.
- 9) Summary and Conclusions: A statement or two about the implications of the results for remote areas in general would enhance this section.

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