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Atmospheric Measurement Techniques Discussions

Interactive comment on "Aerosol optical properties in Northern Norway and Svalbard" *by* Y.-C. Chen et al.

Anonymous Referee #1

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General Comments: This paper shows some evaluation of the aerosol optical thickness (AOT) and the Angstrom Exponent (AE) during four years of measurements (2008-2011) at two different AERONET station, one located in the northern part of continental Norway (Andenes), and one in the Svalbard islands. Daily and monthly statistics are presented, also taking into account inter-annual variability.Besides this compete statistical analysis, some events are deeply investigated, examining both backward trajectories and aerosol model prediction system. Quite interesting the great inter-annual AOT variability found at Andenes, while Hornsund seems to be quite more stable during various years. For the most part of the paper the analysis of AOT and AE is quite robust, however I would like to address some specific issues to the authors:

Specific Comments:

page 10762 , line 17: the authors claim: "the direct effect is caused by large aerosol particles": could the authors focus on this sentence (especially relating the word large with the term fine and coarse that are commonly used in AERONET sunphotometry)"

page 10764 , line 10: the authors claim " the angstrom exponent values were estimated from simple pairs of AOT values in the range from 550 to 700 nm" : the paper states that a best fit procedure was utilized to derive the Angstrom Exponent, while the Angstrom Exponent was estimated in term of simple pair of AOT (generally around 412 nm and 675 nm)

page 10767 , line 24 and more : the authors describes the SDA algorithm (O'Neill et al, 2001a, 2003). It would be possible to add some notes about the relative high error in Angstrom Exponent evaluation (due to the typical low values of AOT in Arctic) and the corresponding error in the fine and coarse AOT evaluation? (i.e the first and second derivative of spectral AOT)

page 10770 , line 10 : the authors claim: " the alfa value, which were computed from observations at a wavelength of 500 nm" : could the authors explain deeply this sentences?

page 10774 , line 5 (and figure 10): the authors show and discuss some NAAPS's AOT forecast simulation, and for the case event of 28 of April 2008, the NAAPS AOT in Hornsund is characterized by dust presence: how this can fit with the relative high value of Angstrom Exponent? Please add some comment about this, also taking into account the Saha et al paper [PanâĂŘArctic sunphotometry during the ARCTASâĂŘA campaign of April 2008 (GRL, VOL. 37, L05803, doi:10.1029/2009GL041375, 2010)]

figure 5(b) and 7(b) show respectively SDA results and PSD evaluated for the Hornsund data: the authors should add a comment about the almost overlapping fine mode and coarse mode AOT presented in figure 5(b) for the 2011 dataset, the high values of AE in the 2011 (table 2) and the PSD retrieved in 2011.