

## ***Interactive comment on “Interannual and seasonal variations in aerosol optical depth of the atmosphere in two regions of Spitsbergen Archipelago (2002–2018)” by Dmitry M. Kabanov et al.***

### **Anonymous Referee #2**

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The authors present a comparison of columnar optical aerosol characteristics measured at two arctic sites in Svalbard during a 16 years-long period. They report quasi-contemporaneous results from the two sites in terms of total, fine and coarse modes. The methods used to obtain the two modes are also discussed. The effect of forest-fire outbreaks are evaluated.

The paper can be considered of interest as a contribution to climatological studies on aerosol optical depth in this particular zone of the Arctic.

C1

#### Specific comments

L14 “Tau fine” at the beginning of the sentence is a refuse?

L101 A conjunction is missing before the word “altitude”.

L131 “Larger AOD values occur...” are these values the differences between different stations?

L143 Maximal -> maximum

L142-145 As the AOD usually decreases with increasing wavelengths, the same is obvious for the difference between different measurements. These differences should be normalized by the AOD value in the correspondent wavelength to estimate a relative contribution of fine and coarse particles.

L206 “by empirical method (EM)”. It should be “an” or “the empirical method”. Furthermore, in the rest of the text (e.g. L 387) you sometimes call it “base method” or “base empirical method”. Please use always the same name, or better, the acronym EM.

L211 “using THE spectral deconvolution algorithm”.

L215-216 Not clear to me: the average difference ranges from 0.006 to 0.024? And the associated SD is 0.007?

L261 Please define “disperse composition”

L265-269 So you use IM1? You say you do not show the results for “aerosol dispersed composition” because they are more complex and dependent on the choices of the refractive index. But aren’t the results of  $\tau_{\text{aer}}$  and  $\tau_{\text{aer}0.5}$  equally dependent on it in this case (IM1)?

L303 Variations between the two periods?

Table3 Characteristics -> Parameters. Remove the empty line.

L335-337 So, in this comparison you are not using “near time coincident” values?

C2

L359 How you detected the smoke?

Table4 Characteristics -> Parameters.

L373 The difference between 0.07 and 0.03 is 0.04, that is much higher of 0.015-0.016 that you report on the previous line. There is something I don't catch?

Figure 3. Caption: EA -> EM

Figure 9. What are the two red lines?

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