We thank the reviewer for the careful reading and the generally positive review. We answered all questions and remarks. See below:

L 14: we do not use a symbol in the abstract any longer

L 101: thanks – corrected

L 131 "Larger AOD values occur"

Yes, this difference in AOD is between two stations, not between seasonal or annual values, but between specific situations. For a more clarity, we corrected somewhat the sentence:

"Large differences in AOD between these stations occur in periods of the Arctic haze and outflows of smokes from forest fires".

L 143: thanks – corrected!

L 142-145: decreasing AOD towards IR and variability

This is a good remark. However, we considered this: In Fig 11 it will be shown later that the AOD at 0.38 µm is typically less than a factor of 4 larger than the AOD at 0.87µm, while the difference between the sites is almost a factor of 5.

We add (new part in bold)

This feature **is real despite the decreasing AOD at longer wavelengths and** indicates that fine aerosol is more abundant in the atmosphere of Barentsburg

L 206: Thanks we use always EM in the new version.

L 211: thanks – corrected

L215 – 216:

We clarify that the average difference in τ^c, calculated by different methods (and for different conditions), relative to the empirical method is, indeed, no higher than 0.007. While the standard deviations of the regression between the two compared τ^c values are in the range of 0.006-0.024 (see [Kabanov et al., 2016] for more detail).

L 261: disperse composition

By disperse composition we mean the size distribution and changed the wording in the manuscript.

L 265 – 269:

Here, there are two questions.

1. Yes, in this case we used IM1, which has much better characteristics of the interrelation with EM data. You are right: IM1 also depends on the choice of the refractive index. But this is not important because at the last stage of implementation of this method (see Line 239-240), we also use the regression relation and select the approximation parameters. That is, we could specify a slightly different refractive index and select slightly different approximation parameters for the linear regression. We made so and obtained about the same result. In principle, simpler methods of the τ^c calculation could be used (e.g., RM2). From Table 2 it can be seen that the errors of different methods differ insignificantly.

2. Of course, seasonal and interannual variations are easier to analyze in the optical characteristics: they are just two, τ^c and τ^f. Analysis of variations in microphysical composition of aerosol is a more complex problem: it will be necessary to consider the particle distribution functions (i.e., changes in two or three parameters for each aerosol fraction) and, moreover, the refractive index, which is at all unknown, in this case.

L 303:

We corrected somewhat two sentences in this paragraph:

"The relative variations in $\tau^f_{0.5}$ and τ^c are about the same: their variation coefficients V are 14-29%. Neither AOD component shows a clear predominance of variation coefficients".

Table 3: line deleted, thanks!

L 335 – 337:

The seasonal and interannual AOD variations were analyzed individually over a full dataset in each region. That is, no selection of data with identical hours of measurements was performed in this case.

L 359:

To identify smoke outflows (in the cases of large AOD values), we used data on back trajectories of air mass motion (HYSPLIT) in combination with satellite maps of fire centers (temperature anomalies).

Table 4: thanks - corrected

L 373:

We clarify that the average and modal (most probable) values are different statistical characteristics. The first sentence of this paragraph is about the average values, presented in Table 4 and in Fig. 10. In turn, the second sentence is about modal values, which are presented in Fig. 12a. Thus, there is no contradiction in that the average values decrease by the amount 0.015-0.016, while modal values decrease from 0.07 to 0.03.

Figure Caption 3: thanks – corrected

Figure 9:

The solid line is the unconstrained fit (Y=aX+b). The dotted line is the fit through the origin (Y*aX). We explain this in the new version.