Reply to comments of the Editor

About terms of fine and coarse:
In the third paragraph of Section 2, we added an explanation regarding the sizes of *fine and coarse* particles. Additional explanations are as follows.
With respect to the origin and optical manifestation, researchers usually single out two basic (fine and coarse) aerosol fractions, a conventional boundary between which lies in the region of 0.4-0.7 μm in terms of radius or 0.8-1.5 μm in terms of diameter (see, e.g., Fig. 5). The GRIMM and AZ-10 particle counters measure particle concentrations in 15 and 6 size sub-ranges, respectively (see Table 1). The boundary at d=1 μm, coinciding in different counters, is most suitable to identify these two aerosol fractions. The standard indicators (PM 2.5/10) use a coarser division into size ranges (into just two), which does not coincide with GRIMM and AZ-10 counter size ranges.

Abstract
In the penultimate sentence (line 38) added: "… of the total sum of water-soluble components**."**

Introduction
1) The paragraph about methane removed (lines 36-41).

2) In the list of references are removed:
Dmitrenko, I.A., Kirillov, S.A., Tremblay, L.B., Kassens, H., Anisimov, O., Lavrov, S.A., Razumov, S.O., and Grigoriev, M.N.: Recent changes in shelf hydrography in the Siberian Arctic: potential for subsea permafrost instability, J. Geophys. Res.-Oceans, 116, C10027, doi:10.1029/2011JC007218, 2011.
Jacob, D.J.: Heterogeneous chemistry and tropospheric ozone, Atmos. Environ., 34, 2131–2159, 2000.
Redington, A.L. and Derwent, R.G.: Calculation of sulphate and nitrate aerosol concentrations over Europe using a Lagrangian dispersion model, Atmos. Environ., 36, 4425–4439, 2002.
Sasakawa, M., Shimoyama, K., Machida, T., Tsuda, N., Suto, H., Arshinov, M., Davydov, D., Fofonov, A., Krasnov, O., Saeki, T., Koyama, Y., and Maksyutov, S.: Continuous measurements of methane from a tower network over Siberia, Tellus, 62, 403–416, 2010.

3) At the end of the Introduction of the phrase is added:
These studies allowed us to ascertain the optical and microphysical aerosol characteristics in the present-day period. The AOD value in an extended wavelength range of 0.34-2.14 μm was determined for the first time. Quantitative data on the decrease of AOD and aerosol concentration during warm period (polar day) were obtained. At the same time, we noted opposite seasonal variations in the mass concentration of black carbon (with concentration larger during summer than spring). The elevated concentrations of black carbon during summer period seem to be due to blow-out of coarsely dispersed particles of coal origin from bared underlying surface.

Section 2
1) In the first paragraph be added year of measurements (2013).

2) In the first sentence of the second paragraph (line 28) after the word AOD added (τ^a), after the word content is added (W). When the equation (1) added: "where λ is the wavelength".

3) P 4, lines 18,24,26:
Sorting out of data (exclusion of false measurements) was performed in the cases when the device-recorded elevated aerosol concentrations did not coincide with visually observed smoke pipe plumes in the direction of intake device or smells from venting shafts. We consider that there is no need to write about so obvious control of the quality of measurements, which is used in real measurements in some or another degree. No other simple method of control of local sources exists.

Section 3.2

(a) We think that the first sentence of section 3.2 is necessary for the understanding of the purpose of the research of the boundary layer of the atmosphere in the Arctic.

(b) We have added a clarification in the 4th paragraph of section 3.2.1 and fixed indices in equation (3):

The BL height is determined by calculating the matrix of interlevel correlation (3) of time series of attenuated ratio P'(z,t) (Total_Attenuated_Backscatter_532 L1B CALIPSO DATA) of scattering at the wavelength of 532 nm for different heights in a specified time window:

$$\eta_{i,j} = \frac{\sum_{k=1}^{M}[(P'_{i,k} - \overline{P'_i})(P'_{j,k} - \overline{P'_j})]}{\sqrt{\sum_{k=1}^{M}(P'_{i,k} - \overline{P'_i})^2 \cdot \sum_{k=1}^{M}(P'_{j,k} - \overline{P'_j})^2}} \quad (3)$$

$$\overline{P'_{i(j)}} = \frac{1}{M}\sum_{k=1}^{M} P'_{i(j),k} \quad (4)$$

where $P'_{i,k} = P'(z_i,t_k)$ and $P'_{j,k} = P'(z_j,t_k)$, $\forall i < j \in [1..N], k \in [1..M]$ are discrete representations of P'(z,t), N – number of altitude bins, M – number of temporal (or what is the same, spatial) bins. The matrix of interlevel correlation was calculated by considering only a fragment of signal, corresponding to the height interval of 100 m4000 m (N=130).

Section 3.2.2

P. 8, line 8 (and p.9, line 7):

The phrase "on roadstead of port" is replaced by "near the port".

Section 4.1

P 9, lines 45-48:

Replace the two sentences (Lines 43-47) for the following:

The average aerosol number concentration in the region *F* turned out to be the lowest (by more than a factor of two) among other Arctic regions, while the mass concentration differed insignificantly.

The seeming mismatch between N_A and M_A values in the Far East sector (relative to other regions) is explained by relatively large content of coarsely dispersed aerosol, which was caused by hydrometeorological conditions.

P. 10, lines 14-16:

We have corrected these sentences (lines 14-17):

… The maximum values of dV/dr in the entire size range are characteristic for subpolar and, virtually, internal White Sea. Intermediate values of dV/dr were observed in Kara Sea and on Spitsbergen archipelago (Barentsburg), and the lowest level was observed over Arctic Ocean and in Tiksi. Low volume concentration of submicron particles …….

Section 4.3

P. 13, lines 6-8:

We agree with your proposal to replace (line 6-8) to the following:

Because of the limited amount of data available for the regression analysis, the same fitting parameters may not be ideal for future measurements.

Section 5.3

The term 'gaseous impurities' was replaced by 'gas phase spetsies'.

Section 5.4

The term 'flux' was replaced by 'deposition'.

In the list of references complemented omitted link:

Pol'kin V.V., Panchenko M.V., Golobokova L.P.: Ion composition of near-water aerosol over White Sea in Augusts of 2003-2006, Atmos. Ocean. Opt., 20(11), 911-916, 2007.

In the list of references, please replace the item (Sakerin, 2014) by English-language version of the journal:

Sakerin, S. M., Andreev, S. Y., Kabanov, D. M., Nikolashkin, S. V., Prahov, A. N., Radionov, V. F., Turchinovich, Y. S., Chernov, D. G., Holben, B. N., Smirnov, A., and Sorokin, M. G.: On results of studies of atmospheric aerosol optical depth in Arctic regions, Atmos. Ocean. Opt., 27, 517–528, 2014.

In addition, a professional translator checked the text (manuscript) and introduced certain corrections. After an ultimate decision about publication is made, an extra English-language editing in specific parts of the text can then be performed.