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Interactive comment on "Radiative characteristics of aerosol under smoke mist conditions in Siberia during summer 2012" *by* Tatiana B. Zhuravleva et al.

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We thank the reviewer for taking the time to review our paper manuscript and provide useful feedback. Our responses are provided below.

General comments 1. It was stated in Chapter 2.1 that "An original approach, relying upon ground-based spectral measurements of AOD and radiance phase functions, was also used in addition to the algorithm of Dubovik and King (2000) to solve the inverse problem" (lines 104-105). But throughout the paper, only AERONET retrievals are considered. It would be worth to compare them with SSMART retrievals in certain situations. Especially it concerns SSA and asymmetry factors retrieved directly from the data of AOD and sky radiance measurements by means of RTE equation solution.

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Discussion paper

We accounted for this comment in the paper text. Subsection 4.2.3 is extended: we extracted a separate subsection 4.2.3.1, which presents comparisons of single scattering albedo and asymmetry factor, retrieved using SSMART and AERONET algorithms.

2. Relative contribution of coarse aerosol fraction into AOD is much greater in IR spectral region (1020 nm), than in blue (440 nm). In Table 3, only the regression equation between volume concentration of coarse aerosol and AOD (440 nm) is given. What about 1020 nm?

Naturally, the relative contribution of coarse aerosol fraction into AOD is much greater in IR spectral region. We present regression equations between concentration of coarse aerosol and AOD(1020). The correlation coefficient between and for the sample of "ordinary smokes, 2003-2011, 2013" is almost two times higher than for ; whereas the correlation coefficients R(CVc,tau440) and R(CVc,tau1020) during summer 2012 were practically the same (see a fragment of the table 1). We think it is inexpedient to introduce these data in the paper text. Specific comments

Line 24. -"SSA(440 nm)=0,92". Change comma to dot. This is corrected in the text

Lines 33-35. -"The maximal values of DRE were observed on July 27 (AOD(500 nm)=3.5), when DRE(BOA) reached -180Wm-2, while DRE(TOA) and DRE of the atmosphere were -80 W m-2." These values do not coincide with those on lines 560 – 561. We agree with this comment. Changes are introduced in the abstract: "The maximal values of DRE were observed on July 27 (AOD(500 nm)=3.5), when DRE(BOA) reached -150 W m(-2), while DRE(TOA) and DRE of the atmosphere were -75 W m(-2)."

Line38. - "diurnally radiative effects of smoke and background aerosol". Diurnal. We agree: "diurnal radiative effects of smoke and background aerosol" is more correct

Line 82. - "CE 318 has been operated at "Fonovaya" observatory:" Words "has been" are extra. This is corrected in the text.

Lines 177-178. - “(particle size 0.4-15 micrometer)”. Do these values refer to particle radius? These values refer to particle diameter. This is corrected in the text: “(particle diameter 0.25-30 micrometer)”

Line 253-255. -“The slight increase in Ångström exponent, which depends on the interrelation between contributions of fine and coarse aerosols to AOD, also indicates that small particles predominate in smoke aerosol”. Angstrom exponent depends not only upon relation between fine and coarse fraction, but also upon parameters of fine fraction.

We did not write that the Ångström exponent depends ONLY on the interrelation between contributions of fine and coarse aerosols. The dependence on the particle refractive index and sizes is also known to exist. However, the interrelation between two aerosol fractions has the main effect on the ïĄą value. To avoid ambiguous interpretation, the word “mainly” is added in the following sentence: “The slight increase in Ångström exponent, which mainly depends on the interrelation between contributions of fine and coarse aerosols to AOD, also indicates that small particles predominate in smoke aerosol.”

Lines 596-597. -“The width of the fine mode distribution increased...”. What are the quantitative parameters of the fine mode broadening? In addition to the volume median radius, Table 3 also presents the standard deviation for fine fraction, which characterizes the width of the fine mode distribution. This value varies from 0.422 ± 0.058 under the conditions of the ordinary smokes to 0.507 ± 0.058 during summer 2012.

Lines 601-602. “The . . . variations in the wavelength interval of 675-1020 nm are not as strong”. May be “not so strong”? This is corrected in the text

Fine fraction is called throughout the text as “finely dispersed fraction” This is corrected in the text. Phrase of “finely dispersed fraction” is changed to “fine fraction”

Please also note the supplement to this comment:

http://www.atmos-meas-tech-discuss.net/amt-2016-244/amt-2016-244-AC1-supplement.pdf

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