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# ***Interactive comment on “Complex experiment on studying the microphysical, chemical, and optical properties of aerosol particles and estimating the contribution of atmospheric aerosol to Earth radiation budget” by G. G. Matvienko et al.***

## **Anonymous Referee #3**

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Summary The manuscript presents results of three enhanced experiments on measuring the atmospheric aerosol properties, performed in 2013 in Western Siberia. Measurements were carried out at three IAO SB RAS monitoring stations and onboard the flying laboratory TU-134 OPTIK. Satellite data from Terra and Aqua platforms were also involved into the analysis. The data obtained were used in calculations of the downward radiative fluxes. Measured and recalculated radiative fluxes were found to be in a satisfactory agreement. Nowadays there is a lack of the data on the aerosol content and optical and microphysical characteristics over the vast territory of Siberia. The

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amount and quality of the data from various sensors, presented and analyzed in the paper are unique for the field aerosol experiments in Russia. The data gained during intensive observation periods and in routine measurements can be the experimental background for following detailed studies of the optical, radiative and climatic effects of atmospheric aerosols. The paper of G.G. Matvienko et al. is worthy of publication in AMT once the general and specific comments have been addressed

### General comments

1. In the abstract, as the primary objective of the Complex Aerosol Experiment, measurements of microphysical chemical, and optical properties of aerosol particles in the surface air layer and free atmosphere were pointed. In Chapter 2 (p. 5774, line 4) this objective is changed to “to study radiative characteristics of the atmosphere”. Choose one formulation, please. 2. One of the tasks of investigations was stated as study and analysis of the influence of vertical variability of optical parameters of tropospheric aerosol on radiative effects of aerosol under typical conditions of Western Siberia (p. 577, lines 1-3). No analysis of the effects of vertical variability of optical parameters of tropospheric aerosol on radiative effects of aerosol can be found in the text. 3. Although the Experiment was aimed at the study of the radiative characteristics of atmosphere, only a small part of the paper concerns radiative effects. Nothing is said about the aerosol radiative forcing over the territory of Western Siberia and its seasonal behavior. This chapter should be extended. 4. The results of observations, presented in the paper, refer mostly to year 2013. But comparison between the measured and calculated fluxes was made for 2010-2012. Please explain how the results of the Intensive Observational Periods in 2013 were applied in radiative calculations for 2010-2012. And what was the obstacle for such the calculations in 2013? 5. In some chapters of the paper, the diameter is meant under particle size, and in others is radius. This complicates understanding the results.

### Specific comments

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P. 5773, line 20. -The word “collected” is extra. P. 5775, lines 9-10. -Are these centers or boundaries of size intervals? Please specify. P. 5775, line 23. -“SP-9 multiwave sun photometer”. May be you meant “multiwavelength”? P. 5776, line 1. - “microstructure parameters of particles sized from 0.1 to 10  $\mu\text{m}$ ”. Standard AERONET product is aerosol size distribution in the radius range from 0.05 to 15 micrometers. P. 5776, lines 9-10. - “photoelectric particle counters from scattered radiation”. Please correct the sentence. P. 5776, lines 14-15. -Please specify, to what kind of concentration (number, volume, asf) is proportional the angular scattering coefficient at 45 deg. P. 5776, line 23. -Check the reference. P. 5776, line 24. -Three-wavelength. P. 5781, line 24. - Aerosol mass concentration does not depend upon wavelength. Correct, please. P. 5782, line 1. - What do you mean under “solar weather”? P. 5783, lines 9-10. -If one will subtract standard deviation from mean value, one will get negative concentration. How can you compare effective radius given by AERONET (radius range 0.05 -15 micrometers) with yours retrievals? P. 5784, line 2. -Change “revel” to level. Figure 10. -Unknown units “mkm”.

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