

Interactive comment on “Assessment of urban aerosol pollution over Moscow megacity by MAIAC aerosol product” by Ekaterina Y. Zhdanova et al.

Anonymous Referee #3

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In this paper, the authors considered the distribution of aerosol optical thickness (AOT) with a spatial resolution of 1 km over Moscow megacity using MAIAC aerosol product based on MODIS satellite data (for the warm period of year (May-September)). The subject area of the study is urgent because an efficient aerosol retrieval under heavy loading conditions is critical and it can be useful for investigations on regional climate change, air pollution control, and aerosol.

General comments

1. For a more detailed description of the spatial distribution of aerosol over Moscow megacity the authors use the MAIAC aerosol product with a spatial resolution of 1 km. It is reasonable to add a section (or subsection), comparing the obtained results not only with data from ground-based AERONET observations at Moscow_MSU_MO_site

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and Zvenigorod site (Zvenigorod scientific station of Institute of Atmospheric Physics RAS), but also with data of standard MODIS collection MYDD04_3K (3K AOT product).

2. It is not quite clear why the authors included in the paper the results concerning the distribution of $\Delta\check{R}\check{d}\check{D}\check{c}$ for different morning hours (Figures 7-8). Is this still another aspect associated with validation? Why, although presenting data exclusively for morning hours, the authors nonetheless say about diurnal variations of $\Delta\check{R}\check{d}\check{D}\check{c}$?

3. It is useful to turn attention to the paper by Jin et al., Retrieval of 500 m Aerosol Optical Depths from MODIS Measurements over Urban Surfaces under Heavy Aerosol Loading Conditions in Winter, Remote Sens. 2019, 11, 2218; doi:10.3390/rs11192218. That paper appeared after E. Zhdanova and coauthors had already submitted their research for publication in AMT. However, at this stage it makes sense to compare the results, obtained by the authors, with data, presented by Jin et al., 2019

Minor comments

1. Line numbers 124-125: "... MAIAC AOT data were spatially averaged with a 5-km circle 125 centred at the Moscow_MSU_MO and Zvenigorod sites...". Why circle with diameter (radius?) of 5 km is chosen?

2. Line number 136: "... Statistical estimates of the quality of the AOT...". Caption of Table 1 indicates precisely what characteristics are considered by the authors. It would be better to move them to the text of the paper because the indicated abbreviations are also used below (see, e.g., line number 364).

3. Figure 2. Information on fitting equation, correlation coefficient, root-mean-square and number of retrieval should be added in the field of the figure.

4. Figure 4 and comments. In section 2 (line numbers 87-88) it is indicated that "MAIAC uses 8 different regional aerosol models tuned to the AERONET...". What the data in Fig. 4b, accompanied by the comments "MAIAC", and indication that "MAIAC is regional model", correspond to, in this case?

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5. It makes sense to work on the style of the presentation. For example, within one paragraph the authors write “One can see. . . .” (line numbers 327, 330), “We can see. . . .” (line number 333), etc.

6. The reference

Sever, L., Alpert, P., Lyapustin, A., Wang, Y. and Chudnovsky, A.: An example of aerosol pattern variability over bright surface using high resolution MODIS MAIAC: The eastern and western areas of the Dead Sea and environs, *Atmospheric Environment*, 165, 359–369, doi:10.1016/j.atmosenv.2017.06.047, 2017.

is repeated twice.

In my opinion, the article contains useful information and can be published after revision.

Please also note the supplement to this comment:

<https://www.atmos-meas-tech-discuss.net/amt-2019-325/amt-2019-325-RC1-supplement.pdf>

Interactive comment on *Atmos. Meas. Tech. Discuss.*, doi:10.5194/amt-2019-325, 2019.