

Interactive comment on “Long-term MAX-DOAS network observations of NO₂ in Russia and Asia (MADRAS) during 2007–2012: instrumentation, elucidation of climatology, and comparisons with OMI satellite observations and global model simulations” by Y. Kanaya et al.

Anonymous Referee #2

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The paper by Kanaya et al. describes in detail the long-term MAX-DOAS network for observations of NO₂ in Russia and Asia. Results from 2007 to 2012 have been used to validate OMI satellite observations and global chemistry transport model simulations. The study is quite comprehensive and definitely merits publication in AMT. Since I'm a bit late with my review I refer in the following to the manuscript taking into account the comments by reviewer 1 and related replies by the authors.

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Minor revisions are needed as detailed below.

Detailed comments:

- Was there an intercomparison with all instruments part of MADRAS at the same site? Even the instruments are quite similar some important parts are not, which might lead to systematic differences. For section 2.1 I prefer to have in addition a table illustrating more clearly the differences between the setups instead of a lengthy and difficult to read description. A similar comment to section 2.2: Please add information on site characteristics to Table 1.
- Please avoid as much acronyms as possible. Since the text is already quite technical, in particular unusual acronyms like EL (for elevation angle!) and also TropoNO₂VCD (why not just name it “tropospheric NO₂ column”?) do not improve the readability.
- Comparison between MAX-DOAS and satellite data: Please refer in your discussion on pp 2901 and 2902 to the study by Leitao et al., (Leitão, J., Richter, A., Vrekoussis, M., Kokhanovsky, A., Zhang, Q. J., Beekmann, M., and Burrows, J. P.: On the improvement of NO₂ satellite retrievals – aerosol impact on the airmass factors, Atmos. Meas. Tech., 3, 475-493, 2010) where in detail the impact of aerosols on the satellite observations has been investigated. P. 2902, l21: Please remove or rephrase the statement: “Future satellite observations with smaller footprint sizes will improve the analysis.” This would be the case, if spatial inhomogeneity is the major reason for the underestimation by satellite instruments. But the outcome of this (and other) study (ies) is quite clear, that this is not the case.
- Figure 12: This plot is too busy. Please select either months representative for the different seasons or use seasonal averages (e.g. December to February for winter like in Figure 17).

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