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Interactive comment on “Quantification of model uncertainty in aerosol optical thickness retrieval from Ozone Monitoring Instrument (OMI) measurements” by A. Määttä et al.

Anonymous Referee #3

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The paper quantitatively explores and discusses the error in retrieved AOD caused by uncertainties in the modeled aerosol reflectance used for the retrieval. Identification and quantification of the individual errors within aerosol retrieval algorithms is of high interest for existing and emerging satellite instruments (specifically, TROPOMI), and the manuscript under review presents a new approach to this challenge. In this sense, I believe that the paper is worthy of publication in AMT, after some minor revisions. In particular, I would like to see the results put into more context by addressing the following questions: (1) roughly how large is the error caused by the aerosol model in comparison to other error sources, such as incorrect surface reflectance function

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or even cloud contamination? And (2), how do your results apply to other aerosol retrievals, like that from MODIS, the most popular aerosol sensor?

The manuscript is well-structured and well written, although the authors may consider inserting articles at several positions. Other minor comments are given below.

P. 8511 - on lines 2-7 you list satellite instruments used for aerosol retrieval, but fail to mention instruments on geo-stationary platforms, e.g. SEVIRI.

P.8512, line 1 - composes -> plays

P.8512, line 18 - build up -> built up (or, even better: composed)

P.8513, lines 17-18 - "The retrievals from (...) aerosol characteristics" -> "OMI-measured Earth radiance and solar irradiance spectra with moderate spatial resolution are used to retrieve (among others) aerosol characteristics,"

P.8514, lines 7-8 - "OMAERO product uses (...) five years." -> "OMAERO product uses a surface albedo climatology based on five years of OMI observations (cite Kleipool et al., JGR 113, D18, 2008) for pixels over land"

P.8514, line 10 - "chlorophyll concentration climatology" -> "chlorophyll concentration from a climatology"

P.8514, line 25 - ending up -> adding up

P.8514, line 25 - "the content of the aerosol models" -> what do you mean? The calculated reflectance?

P.8515, line 6 - remove "at present pixel"

P.8515, line 10 - please specify the range of L

P.8517, line 5 - data sets -> data set

P.8517, line 5 - "infinite" is an exaggeration; "many" or "a large number of" seems more appropriate

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P.8520, line 11 - reflectance spectra -> reflectance spectrum

P.8520, lines 14-15 - "and the modeled reflectance ... but opposite way" -> " and the two modeled curves show similar, though opposite deviations from the observed curve"

P.8520, line 19 - "acknowledging" -> account for

P.8521, lines 4-10 - this paragraph is quite unclear. Can you explain in more detail what was done? What "different atmospheric situations" did you include? Figure 2 doesn't clarify anything at this point.

P.8525, lines 3-6 - why do you use a different surface albedo climatology?

P.8527, line 17 - storm -> storms

P.8527, line 18 - helped the dust to transport a long way -> transported the dust a long way

P.8528, lines 8-9 - "limited" is a euphemism here; "too small" is probably more appropriate

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 8509, 2013.

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