

Interactive comment on “Aerosol Single Scattering Albedo retrieval in the UV range: an application to OMI satellite validation” by I. Ialongo et al.

Anonymous Referee #2

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The authors use the methodology of Bais et al., 2005 in order to derive single scattering albedo (SSA) in the UV wavelength range. For this purpose they use global irradiance spectral measurements performed with a Brewer single spectroradiometer. They apply their results in a correction methodology (Kazadzis et al., 2009 and Krotkov et al., 2005). The OMI / ground based differences are considerably reduced with the use of this methodology/measurement combination. The description of the state of the art, methodologies, applications and the paper structure make it suitable for publication in this journal. There are only a few publications that are dealing with aerosol absorption issues in the UV solar irradiance range and that gives extra value to this work, providing important and interesting results.

Here are three issues that have to be clarified/more discussed, in order to improve the

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manuscript status.

Comment 1: There is an important issue that has to be clarified and has to do with the spectral measurement accuracy and the sensitivity of the methodology used to derive the SSA. More specific:

- a. Based on the fact that the overall accuracy of the UV spectral measurements are in the order of 5% an estimation on the uncertainties for SSA calculations can be reported together with ones of AAOD.
- b. Please clarify if different points in single hourly UV measurements (spectral scans in figure 1) are calculated using the 1% model/measurement accuracy matching or the 5% measurement uncertainty in combination with the model matching.
- c. It has to be clarified if the error bars in figures 2a and 2b refer to the standard deviation of the monthly means or to the uncertainty in the calculation of SSA and AAOD values. It would be useful if this uncertainty (based on mean AOD and SZA for each month) can be added as dashed lines in these figures.
- d. It has been mentioned that the annual pattern of AAOD (figure 3) is within the limits of the 0.02–0.026 uncertainty that is reported.

My opinion is that it has to be mentioned in the text that the uncertainty of the SSA retrieval using the global UV irradiance measurements is quite large due to the sensitivity of this method. For example the difference of 9% between the two last Qasume visits at Rome (from $\sim -6\%$ (2006) to $\sim +3\%$ (2008)) can lead to a difference in the order of 0.15 in the calculated SSA, which is more or less outside any required limits for scientific use of this parameter. In addition, the $+3\%$ difference of Rome instrument with Qasume (2008 report) can lead to a systematic overestimation of SSA that will slightly affect also the OMI comparison results. Also, some very brief description of the cosine correction procedure has to be added.

Comment 2 Some additional comments on the conclusion section regarding EDR-

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remaining OMI/ground based differences after the correction:

In addition to what is mentioned there can be deviations related with the total ozone differences as derived from the Brewer and OMI and also the fact that the calculated slopes for SSA at 324nm using AOD at 320nm can be a bit different due to the enhanced absorption and larger AOD at lower UVB wavelengths. Also, due to the fact that EDR calculated from the single Brewer uses an approach (modeling ?) for including UVA irradiance contribution to the calculated EDR.

Comment 3

Part of the above can be confirmed from figures 5 and 6. UV irradiance at 324nm OMI/Brewer comparison seems like showing a solar zenith angle dependence and EDR comparison seem to include an additional shift. Is there any explanation about this solar zenith angle dependence ? Could it be a wintertime AAOD underestimation ?

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 19009, 2009.

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