Atmos. Meas. Tech. Discuss., 3, C1239–C1242, 2010
www.atmos-meas-tech-discuss.net/3/C1239/2010/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Aerosol Single Scattering Albedo retrieved from ground-based measurements in the UV-visible" *by* V. Buchard et al.

Anonymous Referee #1

Received and published: 23 August 2010

Review of the paper: Aerosol Single Scattering Albedo retrieved from ground-based measurements in the UV-visible by V. Buchard, C. Brogniez, F. Auriol, and B. Bonnel

This is a very interesting work towards the progress of retrieving aerosol absorbing properties by the use of spectroradiometric measurements. The authors present results of an already established methodology using global and diffuse as well as aerosol optical depth measurements in order to use them as inputs in a radiative transfer model retrieving SSA. The authors use AERONET measurements in order to validate their results. I would suggest the publication of this work in Atmospheric Measurements and

Techniques after taking into account the below mentioned comments.

Abstract

page3180 – line 27 satellite.. change to satellites

Introduction.

Some additional information could be included in the introduction based on the current status of aerosol absorption measurements from ground based radiation instruments. Two publications that have to be mentioned and discuss extensively such issues are the following:

Corr, C. A., Krotkov, N., Madronich, S., Slusser, J. R., Holben, B.,Gao, W., Flynn, J., Lefer, B., and Kreidenweis, S. M.: Retrieval of aerosol single scattering albedo at ultraviolet wavelengths at the T1 site during MILAGRO, Atmos. Chem. Phys., 9, 5813–5827, doi:10.5194/acp-9-5813-2009, 2009

Bergstrom, R.W., Pilewskie, P., Russell, P. B., Redemann, J., Bond, T. C., Quinn, P. K., and Sierau, B.: Spectral absorption properties of atmospheric aerosols, Atmos. Chem. Phys., 7, 5937–5943, doi:10.5194/acp-7-5937-2007, 2007.

In addition current studies that present such SSA retrieval results are:

Ialongo, I., Buchard, V., Brogniez, C., Casale, G. R., and Siani, A. M.: Aerosol Single Scattering Albedo retrieval in the UV range: an application to OMI satellite validation, Atmos. Chem. Phys., 10, 331–340, doi:10.5194/acp-10-331-2010, 2010

Kazadzis, S., Gröbner, J., Arola, A., and Amiridis, V.: The effect of the global UV irradiance measurement accuracy on the single scattering albedo retrieval, Atmos. Meas. Tech., 3, 1029-1037, doi:10.5194/amt-3-1029-2010, 2010.

Ground-based instrument

As measurements of global and direct irradiance differ by 15 minutes, please clarify if

you apply any time or solar zenith angle fitting approach in order to match the timing of the global and the diffuse spectral irradiance measurement as such different can be crucial especially at high solar zenith angles.

SSA retrieval.

There is a discussion about the AOD retrieval based on Brogniez et al. 2008 paper. Could you include some discussion about issues such as how the shadow-disc used for diffuse measurements affects the retrieval? This can influence both the AOD retrieval (included in the RT model inputs) but also the absolute diffuse irradiance measurement. For example if the portion of the diffuse irradiance measured is underestimated, due to the dimensions of the shadowing disc compared with the diffuser dimensions (and this is AOD, wavelength and solar zenith angle dependent), there will be a systematic offset in the SSA retrieved values.

3183-28. concerning the asymmetry parameter and the surface albedo uncertainties: It is not clear how the authors have calculated the 0.01 variation of SSA.

Figures 3 and 4. Since differences comparing sub figures a-c and b-d are difficult to be clearly seen by the reader I would suggest to merge plots 3a and 3c to one figure with axis limits (e.g. from 0.8 to 1) and also the 3b and 3d also in one, using different symbols for the new spectrum and the Thuillier. Similar changes can be introduced also in figure 4.

Figure 5. My understanding is that there were diffuse measurements only in part of 2003 and then 2005 and 2006. I cannot see any reason to separate these periods except if there are technical/instrumental differences not mentioned in the text. However, the relationship of AERONET SSA uncertainty with low (<0.2) or high (>0.2) AOD can be used to separate the two plots. So if figure 5a includes only AOD<0.2 cases (for both periods) the dash (bisector) lines have to be drawn taking into account the AERONET uncertainty for this AOD levels. The same can be introduced for figure 5b (AOD>0.2, both periods).

Figure 6. The authors try to discuss seasonal variations of SSA at different wavelengths. The fact that there is lack of summer measurements for 2003 and only few measurements for wintertime for 2006 makes the interpretation of the plot and the discussion difficult for the reader. I would suggest to include all analysis data of figure 6 in one plot in order to show the seasonal patterns that are also obvious in figure 5.

What we figure out from figures 5 and 6 is that

a. for low AOD's there is a big spectral dependence of SSA

b. There is higher SSA's at UV at low AOD's and lower SSA's at UV for high AOD's compared to the visible SSA's measured at the same time.

c. Overall higher AOD's are linked with higher SSA's at all wavelengths.

One figure that could possibly show more clear the above conclusions would be to plot 340 (figure a) and 440 (figure b) nm AOD (YY' Axis) versus SSA(XX' Axis) and discuss the above considerations.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 3179, 2010.