

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

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Answers to referee #3 comments, received and published on 30 September 2010, on the manuscript:

“Aerosol Single Scattering Albedo retrieved from ground-based measurements in the UV-visible”

General comments:

The paper describes a method and results of single scattering albedo (SSA) retrieved

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from ground-based measurements of spectral and diffuse solar irradiance in the ultraviolet and visible region. Knowledge on the SSA, which is an important parameter describing the optical characteristics of atmospheric aerosols also in the UV region, will help to better quantify and understand the role of atmospheric aerosols for climate. The subject is within the scope of the Journal. The paper is well written, but needs a few additions, as described below.

Title: It is not clear what ‘UV-visible’ means (from : : to?). I recommend replacing it by ‘UV and visible region’

Reply: We agree with the reviewer suggestion, so we have changed this part of the title.

Introduction: It should be mentioned in the beginning, how single scattering albedo, as it is referred to in the paper, is defined (e.g. dimensionless quantity defined as the ratio between aerosol absorption and extinction optical depth at a selected wavelength).

Reply: As request by the reviewer, we have added how SSA is defined in the introduction part.

“SSA (i.e. the ratio of scattering coefficient to extinction coefficient)” and also: “a SSA averaged over the vertical column”

Section 2.1, page 3182: During the alternate measurements of global and diffuse spectral irradiance, which takes about 6 minutes each with your instrument, solar zenith angle (SZA) changes, considerably at higher SZA. Have you applied a correction to take account of its effect for the direct/diffuse ratios, or is the SSA retrieval method limited to a certain range of smaller SZA, where the change is negligible?

Reply: We have more detailed this part in the new manuscript in the paragraph “2.1 Ground-based instrument” p. 3182 l. 26. We have limited our SSA retrievals for SZA < 65 degrees.

“The difference between the global spectral irradiance and the mean of the two diffuse

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spectral irradiances, performed 15 min apart, enables to derive the direct spectral irradiance. The time lag introduces some errors depending on the aerosol content and on the variation of the SZA during the registration of the spectra. The error is estimated and corrected in the processing. ”

Page 3184, line 21: ‘latter’ Reply: it has been done.

Page 3184, line 25: Which of the extraterrestrial spectra that are offered by the SHICrvm algorithm published by Slaper et al. (1995) have you selected? Please, cite the author(s).

Reply: We have mentioned that we use the high resolution spectra KP320at3 constructed by H. Slaper for his SCHICrvm software.

“...the oscillations are larger than when using the reconstructed high resolution spectrum, KP320at3, provided in the SCHICrvm software”

Section 3, page 3186: The overall number of cases of 109 + 51 for 3 years is not large, because you have restricted the analysis to clear sky cases. For sites with even lesser clear sky conditions, the number of results for SSA would still be smaller and probably not suffice to derive an SSA ‘climatology’. Have you analyzed data with the sun not occluded, but with few scattered clouds in the sky, as to what extent the measurements could be used for retrieval of the SSA and with which uncertainty?

Reply: We didn’t analyzed data with few scattered clouds because the estimation of the SSA from global and diffuse measurements that are not performed simultaneously needs that the atmosphere is unchanged. So we have only limited our study to clear sky conditions.

Page 3186, line25: better ‘: : : of the SSA retrieved from the spectroradiometer : : :’
Reply: it has been changed.

Page 3198, Fig. 7: AERONET data designated as circles look like squares Reply: Right, we have changed circles by squares in the designation of AERONET data.

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

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