

Interactive comment on “Validation of UV-visible aerosol optical thickness retrieved from spectroradiometer measurements” by C. Brogniez et al.

C. Brogniez et al.

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Answers to referee 1 comments

General comments:

The manuscript describes a method to obtain spectral aerosol optical thicknesses from measurements with a spectroradiometer in the UV-visible range. The direct solar light is inferred from the difference between total radiation and diffuse radiation. The latter is obtained by the use of a sun blocking disc. An error budget is presented. The results are validated against the measurements with a co-located sunphotometer from the aernet/photons network. The comparisons are presented with a lot of figures but the authors leave the interpretation to a large part to the reader. Some figures could

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be more clarified (see specific comments).

Reply: Following the reviewer comment we have added a detailed interpretation to figures n° 9 and 10, and captions of fig 3 and 7 have been clarified (see below).

Specific comments:

- It would be nice to include a comparison of the performance of this technique with the performance achieved with other methods to determine the AOT in the UV. For example one could discuss the results in comparison with different methods to retrieve Aerosol information from observations with Brewer spectrophotometers. As the authors have here spectral information on the AOT, the differences attributed to the difference in wavelength of the observations can be quantified, and compared with differences found when UV AOT's from Brewers (320 nm) are compared to CIMEL/AERONET data (340 or 380 nm)

Reply: The aim of our paper is to show that our spectral AOT are consistent with sun-photometer measurements. We don't want to judge the comparison works of other teams using Brewers, they are already published that means that the referees of the corresponding papers have considered that the results were correct. We have only added a comment in our paper, page 3902 : "Compared to other spectroradiometers such as Brewers, whose largest measurement wavelength is 320 or 365 nm, the advantage of our spectroradiometer is that its spectral range is large enough to avoid extrapolation for comparison with AERONET/PHOTONS AOT at one or several wavelengths in the UV-visible".

- Fig 3 and 7: the legend does not explain where the error bars stand for.

Reply: we have now explained in the captions where the error bars stand for:

Figure 3. Daily variations of AOT from the spectroradiometer and from AERONET/PHOTONS at 340 and 440 nm on 3 July 2006. Vertical bars correspond to AOT uncertainties. (Note that the uncertainties on AOT from AERONET/PHOTONS

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are very small).

Figure 7. Daily variations of the Angström exponents retrieved from the spectroradiometer's AOT at 340 and 440 nm, from the regression on the spectroradiometer's AOT in the 330-440 nm range and from AERONET/PHOTONS's AOT at 340 and 440 nm. Vertical bars correspond to uncertainties on alpha from AERONET/PHOTONS.

- What is the additional information of fig 10? The discussion at the end of section 3 (bottom p 3904-top page 3905) is very brief and should be extended/clarified. If not, the fig can be omitted.

Reply: We agree that the discussion was too brief. We think that Fig 10 adds interesting information so we have kept it and made an extended discussion:

"As observed in Fig 9 there is a correlation between the AOT at 440 nm and alphaA/P. Small AOT values are obtained for large alphaA/P, i.e. for small aerosols. Fig 10 shows that there is also a correlation between the AOT difference and alphaA/P. Small AOT difference values are obtained for large alphaA/P, i.e. for small aerosols, confirming the AOT effect seen in Fig 5 (smaller AOT differences at small AOT). A similar behaviour is observed for the AOT differences at 340 and 380 nm (not shown). This phenomenon could be an effect of the increasing uncertainty on alphaA/P when the AOT are small, i.e. when the AOT relative uncertainties are large, it needs confirmation with additional measurements."

- Additionally possible seasonal effects in the differences could be investigated

Reply: We have searched for a seasonal effect but the number of clear sky measurements is not at all regularly distributed over the year and it is impossible to detect with confidence any effect, thus we do not show time series. Maybe, later, additional years of data will allow exhibiting a seasonal behaviour.

- The abstract and the conclusion should mention more quantitative results on the performance of the method, in support of the "very good agreement"; (line 9 p 3905).

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This could be done on the basis of the error budget calculations and the results of the intercomparisons.

Reply: According to the reviewer suggestion we have added quantitative results in the abstract and in the conclusion.

In the abstract, line 10: "... show good agreement: in 2003-2005 at 440 nm the correlation coefficient, the slope and the intercept of the regression line are [0.97, 0.95, 0.025], in 2006 at 440, 380 and 340 nm they are [0.97, 1.00, -0.013], [0.97, 0.98, -0.007], and [0.98, 0.98, -0.002] respectively."

In the conclusion, line 9: "The comparisons show good agreement with high correlation coefficients (≥ 0.97), slopes of the regression line close to 1 and intercepts very small. Moreover for SZA smaller than 65° , the differences are generally smaller than the uncertainties on the spectroradiometer's AOT."

Technical corrections:

- p 3897 line 17: replace "later"; by "latter".

The correction has been made

- p 3898 line 27-28: this could be formulated simpler: The error introduced by this approximation depend on the aerosol content and on the variation of the SZA during the registration of the spectra.

Thanks for the suggestion, the sentence is now easier to read.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 3895, 2008.

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