

Interactive
Comment

Interactive comment on “Intercomparison of aerosol optical depth from Brewer ozone spectrophotometers and CIMEL sunphotometers measurements” by A. Cheymol et al.

A. Cheymol et al.

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Dear Reviewer,

Thanks for you comments.

>This type of paper has limited value to the reader. The paper discusses intercomparison >between several Brewer spectroemters and co-located or nearby CIMEL sun-photometers.

The aim of this study is to validate the method with intercomparisons between 2 types of instrument having two way of calibration (Brewer and CIMEL). In comparing the AOD from these two types of instrument, it can prove that the method used to retrieve AOD

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from Brewer is accurate and can be used on all the Brewer. Moreover, even if the information about aerosols is limited (compared to information from CIMEL for example), the approach here is still useful since it potentially makes it possible to determine AOD for about 200 instruments: some of them have 15-20 year long records. With this method, the type of the aerosol cannot be retrieved.

>Since there is no discussion of instrument calibration, instrument problems >(if any), or the methods used to obtain the aerosol optical depth. The authors mention >the Langley method, but make no attempt to evaluate the calibration accuracy at >each site or the quality of the data. Because of this, there is no way for the reader >or reviewer to evaluate the meaning of the intercomparison.

This is extensively discussed in a previous paper (references are given in the paper Cheymol and de Backer, 2003; Cheymol et al., 2006). The method is explained and accuracy estimated.

>Of course, the statement >that the instruments must be co-located to obtain a high correlation is both true and >obvious, since aerosol plumes have high spatial variability.

Another conclusion from comparison would invalidate the method. This is also an offside conclusion: the main conclusion is that Brewers can be used to estimate AOD accurately.

>While the CIMEL 340 nm channel is almost free of an ozone effect, the 320 nm Brewer >channel has a small O₃ absorption effect. How big is this effect?

For the calculation of AOD with the Brewer instrument, we removed the effect of ozone (see Cheymol and De Backer, 2003) like the Rayleigh scattering. Moreover, the ozone variation has a very small effect on AOD at 320nm (see also Cheymol and De Backer, 2003).

>The one time series shown seems to have good correlation, but a number of values >that disagree between the two instruments. Why?

There is no explanation but the number is very low (11/7386 at El Arenosillo and 45/3385 at Rome) and does not change the main conclusions.

>Is there an effect from differences in aerosol absorption bewtween 320 and 340 nm?

To evaluate better the intercomparison, relating to feedback of another reviewer, we removed the wavelength effect on AOD in applying the Angstrom's law. The results are clearly improved.

>What types of aerosols were being measured?

From the Brewer measurements, the type of aerosol cannot be retrieved. In any way, even if the type of aerosol at compared location are very different, the method seems aerosol type independent.

>Do the single Brewers have a scattered or stray light problem at 320 nm. If so, what is >the magnitude of the error and its effect on AOD.

There is no stray light effect at 320nm [see Cede et al, 2006]. The single Brewer instrument has a NiSO₄ filter to cut off light from longer wavelengths. Is has the best transmittance at 315-320nm.

>How good were the Langley calibrations? Was there any deviation from straight-line >behavior? If so, what was the effect?

There is a table in the text with estimation of error from calibration. More information can be found in the references. The Calibration factors are determined in applying different tests on the Langley plot method (see articles Cheymol 2003 and 2006) to select the best fit for one day. These tests select the day for wich the meteorological conditions are stable and then the points are very close to the regression line. We are applying also the Langley plot method on long time series of data and then even in this method we consider that the AOD are constant during one day to calibrate the instrument, the number of value to average the calibration factors smooth the errors due to the hypothesis on the variability of AOD during one day.

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>Are there differences in the field of view of the Brewers and CIMELS? What is the
>effect?

We didn't test the effect of the difference field of view on AOD. It could be a very interested way for another study.

>While K&Z specify 0.2 degrees pointing accuracy, experience indicates that this may
>or may not be correct unless some effort is made to find the centroid of the sun. Was
>this done? A small pointing error can have a significant effect on AOD that will differ
>from one Brewer to the next. The CIMELS use a centroiding algorithm to avoid this very
>problem.

We didn't test the impact of the centroid error on the AOD but this is certainly a very interesting task for a future study. The aim of the paper is general figures about accuracy of AOD retrieval from Brewer and not intercalibration of instruments.

Best regards,

Anne

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 11997, 2008.

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