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Atmospheric Measurement Techniques Discussions

Interactive comment on "Aerosol Optical Depth measurements at 340 nm with a Brewer spectrophotometer and comparison with Cimel observations at Uccle, Belgium" *by* V. De Bock et al.

Anonymous Referee #1

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GENERAL COMMENTS: The paper presents interesting results on AOD measurements retrieved with a Brewer spectroradiometer. The authors use Brewer direct spectral scans from 335-345nm and calibrate them with the Langley method. Then they compare with CIMEL measurements with encouraging results. Some more discussion has to be included on the stability of the calibration functions. The authors use the conclusions of the Cheymoll paper in order to justify the Langley method used here. However, the Cheymoll approach uses a Brewer measurement (DS) that due to the

facts that a. HG internal lamp Brewer calibrations and b. no spectrometer movement are included in these (DS) measurements makes the calibration much more reliable. In addition, there are gaps on the cloud detection methodology. The elimination of Brewer outliers have to be accompanied with some discussion on the reasons and suggestions for improvments especially for future users. So, I recommend the publication of this paper after taking into account the coments below:

SPECIFIC COMMENTS: 2747 what is the brewer measuring wavelength step and scan duration? Is slit function 1 used similar to UV scans? 2748 line 25. Describe in brief the Langley plot method used here. Is the Langley method derived for the weighted (with the camel bandpass) direct irradiance or AOD is derived for each wavelength and then you weight? How often the Langley method was was used and what was the stability of the ET values over the 3+ year period that is analyzed here? 2751. It is better not to repeat the Cheymoll criteria because DS measurements are not used here. But just to mention the criteria adopted to the sun scans. The non-ozone influence is repeated here. 2751. As mentioned, 2nd criterion cannot be adopted. But also I cannot see how the 4th criterion can be adopted since sun scans are measured once and probably need $\sim$1 minute to be performed. Unless 5 repeated observations are taken so that has to be clarified in the text. 2751 line 23. How do the authors compare unitless (not calibrated) direct sun scans measured by the Brewer with TUV model direct sun irradiances? 2751 line 23. I do not agree that the ratio of the sun scans with a constant (real AOD) versus TUV results with a constant AOD have to be constant during the day. For example, in case that TUV input AOD = A and real AOD= 2*A (constant during the day) the Brewer/TUV is solar zenith angle dependent with lower values at high solar angles. Some discussion on the AOD values used as TUV inputs compared to real AOD values have to be included in the text. 2751 line 25. As mentioned by the authors, ozone is negligible for this comparison. 2753 some comments on the removal of the larger than 2 AOD values. You have to mention that you have removed larger than 2 AOD values as measured from the Brewer as the CIMEL has a cloud detection criterion (more or less similar with the Cheymoll Brewer

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DS one). For future work I would suggest the improvement of this criterion by simply using Brewer/TUV ratios for single wavelengths and discard scans that show variability of this ratio during one Brewer sun scan. Or use pyranometer measurements that are high frequency measurements. Table 1: The mentioning of the days has no scientific significance. While a table with the days and the CCF together with a discussion on the instrument calibration stability has to be included. Since sun scans are used in this study there has to be a connection of these CCFs with changes on the UV scan calibrations factors of the same instrument too. Figures 3 and 5. Removing the outliers without further discussion on the issues behind these deviations does not help future users of this method to adopt it easily. I would suggest presenting also outliers that not presented in figure 3 with some discussion on the deviations. 2755. Does the AOD climatology includes all scans or outliers have been deleted? This has to be clarified. Figure 6 does not provide more information than figures 7 and 8 so it can be deleted for making the discussion straighter. Figure 10 also is out of the scope of this work.

TECHNICAL CORRECTIONS: 2745: much attention has been paid .. please rephrase 2745 too much information on UV radiation which is not the issue of this paper,.. please shorten text 2746 line 7 add also the following reference: Kazadzis, S., Kouremeti, N., Bais, A., Kazantzidis, A., and Meleti, C.: Aerosol forcing efficiency in the UVA region from spectral solar irradiance measurements at an urban environment, Ann. Geophys., 27, 2515-2522, doi:10.5194/angeo-27-2515-2009, 2009 2747 reference to Brewer manual can be deleted 2747 line 10 make -> perform 2749 line 12 governed -> rephrase

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