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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Comparison of UV irradiances from Aura/Ozone Monitoring Instrument (OMI) with Brewer measurements at El Arenosillo (Spain) – Part 1: Analysis of parameter influence" *by* M. Antón et al.

Anonymous Referee #1

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There is a bias between UV-index and UV-irradiance measurements made by ground-based instruments and instruments on board spacecraft. This bias has been known for more than a decade. This paper investigates this bias for one ground instrument (the Brewer at El Arenosillo) and one space dataset: (OMUVB). In order to investigate the dependence on clouds, aerosols and ozone, use is made of four more datasets: OMI LER as a proxy for clouds and a CIMEL sun photometer as a proxy for aerosols, and two total ozone datasets.

The results from this paper are that clouds have little systematic effect on the bias, they

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just add noise ("scatter") to the results. The bias clearly depends on AOD, but does not disappear in the limit AOD=0. The bias has a small dependence on SZA.

The are three potential pitfalls when using these datasets. Although I am sure the authors are aware of them the paper does not properly deal with them.

Pitfall 1. De Brewer instrument does not measure the whole UV spectrum. So, to get a UVER number a "correction" has to be applied to the brewer scan. This correction should be described in detail, and an estimation of the errors (both systematic and random) associated with this correction should be given. Of course, a reference to a published manuscript (where all this is formation is detailed) will suffice.

Pitfall 2. There is a difference in bandwidth between OMI (0.45 nm) and the Brewer (0.6 nm). Again an analysis of the systematic and random errors is in place.

Pitfall 3. The OMUVB products contains a large number of UV dataset, many of which are not suitable for this study. The authors should specify EXACTLY which OMUVB datasets have been used (e.g. OPErythemalDoseRate, LambertianEquivalentReïňĆectivity, OPIrradiance305,.....).

Furthermore I have some minor issues and questions. "P" and "L" refer to "page" and "line".

P6799 L3 from Ozone Monitoring Instrument.... -> from the Ozone Monitoring Instrument"

P6799 L6 Why call it a Brewer spectroradiometer" when the manufacturer calls it a "Brewer spectrophotometer"?

P6799 L20 "...is clearly documented as due to..." This is an exaggeration. This paper shows that aerosol extinction plays an important role, but it does also shows there is more than aerosol extinction.

P8603 L12 The estimated accuracy of the Brewer UVER is 5%. Is it possible to indicate

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if this error is “systematic” (meaning likely to be the same in all the measurements) or is there a pseudo random component (e.g. errors change from calibration to calibration)?

P6803 L28 El Arenosillo is on the coast. Please indicate this. (This could be relevant if there is a persistent cloud-cover gradient over the station)

P6804 L11 Am I correct to assume that only one OMI pixel per day has been used, even if there are two orbits over El Arenosillo? If so, which one has been used?

P6804 L13 I am confused about the time window mentioned here. Did you use the Brewer UV-scan closest in time to the OMI overpass (then why is the window relevant?), or did you average the Brewer data in this window?

P6804 L22 Fortunately you have an instrument to measure AOD at all relevant wavelengths. It is called a “Brewer spectrophotometer” (I think).

P6804 L23 “being the shortest channel” is not clear. I assume you refer to “the channel that observes light with the shortest wavelength”.

P6804 L23 The CIMEL measures both AOD 440 and alpha. It is conceivable that you estimate from this an AOD 305, AOD 310, AOD 324 etc. You chose not to do so. Why not?

P6804 L13/L26 Is “local solar time” the same as “true solar time”? I think the phrase is simply “solar time”, not to be confused with “local mean time”.

P6805 L13/L14 Could you please consider using “OMUVB” rather than “OMI” when you refer to the OMI UV products?

P6806 L22 When I look at figure 2, I see MBE values of 14, 13, 12, 9, 11% for LER<30%. The values quoted in the text are different (5-13%).

P6807 L13 Why haven’t you used both OMI-LER and AERONET cloud-screening to select cloud-free days?

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P6807 L25 “The statistical parameters show that agreement is excellent for all OMI products”. If you change OMI to OMUVB (see above) this claim becomes more reasonable.

P6808 L15-16 We are discussing here the 1.31% difference in OMI (to use yet another acronym: OMTO3) en Brewer ozone data. This is close to the noise in the Brewer and the representativeness error in OMTO3. So a low correlation with UV biases is not surprising. I think the real argument is that a 1.31% difference in ozone cannot explain 13% bias in UV.

P6808 Last paragraph. AOD, AAOD, extinction AOD. Please help the reader a bit. Do these acronyms refer to physical quantities, satellite products, or something altogether different?

P6809 L4 Please consider removing the word “second”.

P6809 L20-22 I think it says here: “if we accept and compensate for the bias, look how nice the UV measurements are”. Fine. But it could be interpreted as “when there are no clouds and no aerosols, the bias disappears”. Wrong. Please formulate a bit more carefully.

P6810 L17 “according to the aerosol climatology in our area”. I am not sure what this refers to. When I ignore this phrase the paper continues to make sense.

P6810 L26 “the aerosol influence over the Brewer spectral measurements”. This suggests the Brewer measurements are wrong! Please rephrase.

P6811 L18 The dependence of the UV bias on AOD is quite different. Wheis is quoted as 1.05 to 1.35; figure 3r shows roughly 1.12 to 1.20. “agree” is too strong a word.

P6813 L12 Where do the values 8% and 14% come from? Table 2 quotes 12.27, 13.01, 10.87, 18.22. Figure 2 shows all kinds of values but I don’t see 8%. Figure 3 shows values between 10 and 20 %.

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