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Interactive comment on “Correcting spaceborne reflectivity measurements for application in solar ultraviolet radiation levels calculations at ground level” by P. N. den Outer et al.

P. N. den Outer et al.

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Received and published: 22 March 2012

Reply to Referee 5

We thank the referee for carefully reading the manuscript and supplying us with detailed comments and accompanying valuable discussions on the subject. We believe that in dealing with your comments, the clarity of the manuscript will be greatly improved. We will handle your objections successively. We copied part of each text block for identification purposes and wrote our reply directly underneath it.

"A more usual approach is to average the ground-based measurements for a period around local noon, or the satellite overpass time, and compare with the ground

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measured UV with the satellite estimates."

Reply: Our focus is on daily UV-sums. Daily sums are the building blocks to assess the UV radiation induced health and environmental effects that relate to total received dose. Therefore, less emphasis has been put on seeking the optimal correlation between satellite and ground-based UV by reducing the integration time of the ground-based measurements. We will better explain our starting point in the introduction.

"The apparent lower agreement with OMI data is disturbing in the absence of an explanation."

Reply: In our paper we are pointing out the fact that there is a difference as a first step. As a next step, we will elaborate a bit more in order to give an explanation. Differences exist in used wavelength and initial spatial resolution, both could lead to the observed differences. A discussion will be added and made more quantitatively.

"The authors should discuss the effects of using inconsistent data sets. (w.r.t. LER measured at different wavelength)"

Reply: A discussion will be added at the introduction of the used datasets. even so a discussion on the aerosols effect combined with LER-estimates for UV-radiations.

"For the procedures Cor211 and Cor2A1 on page 75, please reference Figure 5." Reply: Will be done

"This should be independent of latitude, except near the poles, but will depend on the OMI scan angle. On the scale that the authors are using, 1 x 1 degree, or about 100x100 km for nadir view, there should be no latitude effect from pixel sampling. Perhaps, further explanation is needed to understand the effect."

Reply: We do not fully understand what is meant by the referee. We did not want to rule out any hidden correlation on beforehand during the search for the optimal correlation of ground-based versus satellite based CMFs. Indeed we find none. Only a dependence on the SZA is found.

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"Is it correct that the daily integrated UV erythemal flux (joules/m²) measured on the ground are being compared with the same quantity from the satellite?" Reply: This is indeed the case under the given constraints as explained in par. 2.

"The description on page 69 lines 12 to 17 is not clear. What does it mean that the models were rescaled? "

Reply: The details are a bit beyond the scope of this paper, it has been discussed in Den Outer JGR 2010. Scaling is exclusively applied to the ground-based modeled data set. What we meant to say here is that for the period prior to the onset of ground-based UV-measurements, we use modeled data. The modeled data is based on ground-based input data. The irradiance levels delivered by the models are scaled such that for the period with UV measurements, the calibrations match. This is what we call the best estimate for the past UV record, prior to the actual UV-measurements. We will add some more text to clarify this point.

"What is the difference between the two OMI LER data sets? Why does the earlier OMI LER data set not need corrections?"

Reply: That is indeed a true and valid question. We made a statistical analysis of delivered data products and made the observations as presented in the paper. The general version indicator '8' for the TOMS-LER data set contain different generation versions, and may involve recalibrations. Versions/generation indicators are not a part of the delivered filenames. There are listed announcements on the WebPages <http://ozoneeq.gsfc.nasa.gov> considering recalibrations, however a link or the corresponding code in the header lines of the data files is not given. We will compare the dates of these announcements with the download dates of our data set, in order to obtain information on the different calibrations.

The use of the word "ridge" is not common. Perhaps a different term could be used or a definition given.

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Reply: A discussion will be added explaining how we obtained this so-called ridge. Fig. 3 shows the density of data points, the "mountain ridge" is the line formed by the connected local maxima, shown for each instrument and for the SZA-intervals indicated in fig. 4. The locations of the local maxima are sought by moving an imaginary line with slope -1 over the density plot and recording the locations of the maxima along this line while moving. A line with slope of -1 is roughly perpendicular to the orientation of the ridge. Other slopes lead to similar locations of the maxima in the density plots.

A discussion on the effect of tropospheric ozone absorption on the CMF will be added.

Interactive comment on *Atmos. Meas. Tech. Discuss.*, 5, 61, 2012.

AMTD

5, C344–C347, 2012

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