

Interactive comment on “Validation of satellite-based noontime UVI with NDACC ground-based instruments: influence of topography, environment and overpass time” by Colette Brogniez et al.

Anonymous Referee #3

Received and published: 18 May 2016

General comments

The manuscript by Brogniez is a straightforward paper, describing the difference of satellite- and ground-based UVI measurements at three sites using various statistical quantities. As already pointed out by Referee #2, one important shortcoming of the paper is that the uncertainty of the ground-based measurements is not well quantified. I urge the authors to include a comprehensive uncertainty budget of their measurements when submitted a revised version of the manuscript.

At least OMI provides the UVI also at the time of the satellite overpass (other data

C1

products include the UVI at local solar noon and the daily UV dose). Satellite- and ground-based measurements performed at the time of the overpass should agree better than the respective datasets for solar noon that are discussed in the manuscript. For example, changes in cloud cover between the time of the overpass and solar noon would not contribute to differences between the ground- and satellite datasets if the comparison had been based on overpass data. I suggest that the authors also consider a comparison of the difference of satellite- and ground-based observations at the time of the satellite overpass. This does not have to be lengthy.

The manuscript should be thoroughly copy-edited before publication in ACP is considered. For example, the article “the” is frequently missing and many other grammatical errors should also be addressed.

Specific comments

L22: The main difference between versions v1.2 and v1.3 (i.e., treatment of aerosols) should be mentioned here.

L33: “that did not account for absorbing aerosols.” should be mentioned earlier (i.e., L22)

L65: It should also be discussed here that the ground-based UVI measurement and SDR may not be representative for the UVI of the satellite pixel because the majority of the area contributing to the satellite measurement is the UVI over the ocean. Cloud cover over the ocean may be quite different from that over the mountainous island of La Reunion!

L50: Delete “Thus, GB measurements are essential for validation of finer scale satellite measurements”. (I don’t understand what’s meant with “finer scale satellite measurements”. At least such measurements are not discussed in the manuscript.)

L60: “All these OMI validations were conducted using data collected at the time of the satellite overpass.” Please explain why your study is based on comparisons for local

C2

noon instead.

L72: Mention the websites here or point to the appendix where those are provided.

L74: Regarding “. . . during about four years (January 2009-September 2012, date of the replacement of OMI version 1.2 by version 1.3). Both versions of OMI data are used to assess the effect of the absorbing aerosol correction that has been recently introduced (v1.3 available since end of March 2014).” The two sentences contradict each other. The first suggests that v1.2. was available up to September 2012 and was then replaced by v1.3. The second sentence suggests that v1.3. is only available from March 2014 onward. Please clarify. Ideally, comparisons of OMI versions v1.2. and v1.3 with ground-based data should be based on the same time period. Was this the case?

L104: The period (full stop) in “25.10-3 Wm-2.” is confusing. It should be 25 x 10-3 Wm-2.

L105: MAJOR POINT: The uncertainty of the ground-based measurements needs to be discussed in much greater detail. What is the basis of the conclusion that “The irradiance uncertainty leads to an UVI uncertainty for a coverage factor $k = 2$ of about 5 %?” Is there a paper that could be cited? The results of the intercomparison with the QASUME instrument should also be discussed in detail. I assume that there is a QASUME report that could be cited.

L194: Can the qualitative statement “variations around noon must be smooth” be quantified?

L196: Explain “SEVIRI/MSG”

L198: The sentence “One has considered two limits for the distance between the GB station and the cross track position (CTP) for OMI and the grid cell centre point for GOME-2.” comes out of the blue. Do you mean “We have considered . . .” If so, what are the limits?

C3

L206: The following recent paper could also be cited here: <http://www.atmos-chem-phys.net/15/7391/2015/>

L220 and all figures with the exception of Figure 5: I don't see a need to use different colors for OMI-v1.3 and GOME-2 in the upper and lower panels of those figures!

L 455: Regarding “Due to the mountainous topography of . . .” Not only that. A good fraction of the satellite pixel covers the ocean rather than the land where the instrument is located. This must have some effect. For example, cloud cover over the ocean is likely different from that over land.

Language:

L13: “in very” > “at very”

L21: Delete “date of the change of OMI data processing. UVI” (the phrase is more confusing than helpful considering that the differences in the processing method implemented after September 2012 are not discussed here).

L26: “Correlation” > The correlation”

L27: “for both spatial instruments” > “for both space-borne instruments”

L37: “as is a goal” > “which is the goal”

L73: “confrontation”? Do you mean comparison?

L81: “are listed” > “are provided”

L109: “to NDACC” > “with NDACC”

L116: “on aura” > “on the AURA” ; “on July 2004” > “in July 2004”

L120: “Thanks to Aura orbit and large OMI swath width” > “Thanks to the AURA orbit and the large OMI swath width”

L134: “the high positive bias between OMI” > “a large portion of the high positive bias

C4

between OMI”

L150: “on Metop-A platform” > “on the Metop-A platform”

L167: “in the same grid.” > “on the same grid.”

L189: “has been made.” > “was calculated”

L225 (and similar for OHP and SDR): “means (STD nearly 40., means nearly 21)” > “means (STD nearly 40%, means nearly 21%)” Please add “%” also to similar phrases in the OHP and SDR sections.

L237: “in CS conditions.” > “for CS conditions.”

L237 (and similar for OHP and SDR): “weak (STD<10., means<8.)” > “weak (STD<10%, means<8%)”

L246: “are reliable.” > “statistically robust”.

L250 (and other places): “weak UVI” > “small UVI”

L255: Please rephrase. The sentence as it stands is confusing.

L291: “As expected, v1.3 product is more reliable than v1.2 one.” > “As expected, version v1.3 data are more accurate than version v1.2 data.”

L315: “in CS” > “for CS”

L324, L361, L400: “The statistics results” > “Statistics of the results”

L332: What do you mean with “previous study”?

L345: “than the site one” > “ compared to the actual altitude of the site”

L364: “that v1.3 product is more reliable than v1.2 one” > “that the v1.3 dataset is more accurate than the v1.2. dataset.

L365: “black plots” > “datasets indicated by black broken lines”

C5

L373: “on average much far from noon than OMI.” could be deleted. also: “SDR site” > “SDR”

L396: “One has checked”. Do you mean “We have checked”?

L416: “weakly reliable” > “ not statistically significant”

L442: “Overall, these changes are weak and not significant. This could be understood because, as can be seen in Fig. 5 (blue plots). The aerosol content is small (small AOD (Fig. 5a)) and the aerosols are weakly absorbing (large SSA (Fig. 5b)). Thus the correction factor is close to unity (Fig. 5c), leading v1.3 products to be little improved compared to v1.2 at SDR.” > “The small difference between the v1.2 and v1.3 datasets is due to the small AOD (Fig. 5a) and large SSA (Fig. 5b) at SDR. Correction factors are therefore close to unity (Fig. 5c), resulting in only small difference between the two versions.”

L454: “to NDACC” > “with NDACC”

L457: “these two latter sites are hindered by aerosols of pollutant origin” > “VDA and OHP are affected by aerosols caused by air pollution”.

L463: “is worth” > “is worth considering”

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-262, 2016.

C6