

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-356

Anonymous Referee #2

Referee comment on "Ground-based validation of the MetOp-A and MetOp-B GOME-2 OCIO measurements" by Gaia Pinardi et al., Atmos. Meas. Tech. Discuss.,
<https://doi.org/10.5194/amt-2021-356-RC2>, 2022

This manuscript describes comparisons between satellite-derived and ground-based observations of OCIO. The manuscript is generally well written and presents important validation for the GOME-2 (A and B) satellite data records. The manuscript is well within the scope of AMT and with revision should be acceptable for publication. There are two areas in which the article should be clarified:

1) While the comparison is reported as a bias (offset between satellite observation and ground-based observation), the data appear to fit a model where the satellite observations have a lower slope and relatively small intercept. Potential reasons for this behavior should be discussed.

2) Some of the airmass factor analysis was not clear and needed further explanation.

Specific issues (listed by line number) are below:

Abstract, line 10: Are these slopes compared to ground-based observations?

Line 78: This appears to be an anonymous FTP server. Many of these servers will transition to other more secure means. Is this transition envisioned? How will data be accessed in the future?

Line 84: Is "Eta" explained in some citable source (e.g. the ATBD?). If so, please cite it.

Line 90: This "normalization" seems more like a "bias" correction for the orbit based upon a region where OCIO is not expected. Should this be called a bias correction?

Line 116: is "Annex A1" the right name? Appendix?

Line 153: I am unclear on how the errors are being represented. If I understand right, you are expressing a percentage of $15 \times 10^{13} \text{ molec/cm}^2$. Doesn't that mean you are really talking about a SCD error (say 10% of this "reference" would mean $1.5 \times 10^{13} \text{ molec/cm}^2$). I think that if the primary values are SCD errors, they should be expressed that way, and you can then give the percentage of this reference as secondary. Note that the 15 ± 2 is quite confusing in this context. Are you dividing by a number with error and also propagating this error?

Line 171: Typically bias is an offset in intercept, and slope error is a multiplicative error. I think you mean that the intercepts are small, so the differences between the measurements are mostly in the slope.

Line 178-185: I don't understand this; it is exploring the different cross sections? How is this done?

Table 3: What is "-" and are "n.a." in this table? If the "-" means no error, why not say 0? Ny-Alesund seems to also use the 213K OCIO cross section, wouldn't that lead to no error, but 2.5 is listed.

Line 200-202: How does this AMF relate to "photochemical AMFs"? It seems like Figure 7 lower panel indicates that the OCIO SCD is within noise of zero at 70 degrees? Can this be explained further?

Figure 7 caption typo -- it says "offset"

Figure 8 shows AMFs that are quite different from the AMFs shown in Figure 6. Can it be explained why these two AMFs are so different and how both are used?

On Figure 9, some points seem to go below the lowest values plotted on the plot. This seems particularly true of the Neumayer data.

Line 298-299: Can the authors explain the sentence "Unfortunately the gap in ..." I don't understand the information in the parentheses about "...pixels SZA..." or the "...prevents to detect the..." phrases.

Table 4 and discussion of Table 4: Although there is a low bias, it appears that the intercepts are a lot smaller than the bias, indicating that the slope being under unity is the largest contributor to the negative bias.

Line 350: Day-to-day variations are mentioned in OCIO, but it is a bit hard to see on the plots that the data follow on these timescales. It appears from the data that many of the variations are on a slower than day-to-day timescale, so it seems like the agreement is more in the longer term behavior.

In a number of places near Figure A.3 caption, "Ny-Alesund" is misspelled.