Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
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Reviewer comments on amt-2021-412

Anonymous Referee #1

Referee comment on "Combined UV and IR ozone profile retrieval from TROPOMI and CrIS measurements" by Nora Mettig et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-412-RC1, 2022

The paper is dedicated to retrievals of ozone profiles using combination of UV measurements by TROPOMI and IR measurements by CrIS. The paper describes the retrieval methodology and validation.

The paper is generally well organized and written. Although the improvement from synergy of using TROPOMI and CrIS is rather small, the paper discusses the reasons and a possible way forward. My specific (minor) comments are below.

COMMENTS

L66 : “However, the IR only retrieval is better than the combined approach in the troposphere”. A general comment here (also relevant to the further description and discussion): Is it possible to use only IR retrievals in the troposphere? In other words, one can consider combination of Level 2profiles by using, for example, a smooth transition to pure IR retrievals in the troposphere. Were there attempts of using such approach?

L.82: “launch next year” -> It is better to specify the year.

L.95: For consistency with Sect.2.1, simply ”CrIS” as subsection title would be better.

L.103: Please explain the abbreviation CLIMCAPS.

L. 118-120: Please explain (very) shortly the meaning of "precision" and "accuracy" (or / and give the reference).

L163-164: “The underlying problem is the different SNR of TROPOMI and CrIS and the different spatial resolution of the instrument’s measurements from the binning of the pixels”. This contradicts with the previous statement in lines 87-88: “The smaller TROPOMI pixels are binned together to match the coarser spatial resolution of CrIS”. Please clarify.

L.181-182: Please clarify why both profiles and total column a priori are needed? A general expectation would be that the total column can be obtained from profiles by integration.

L.242: It is better to write “(panel B)”

L.265 and below: Day and night tropospheric ozone can be different substantially. However, this is not seen clearly in validation results. Please comment.

Figure 5. What is the reason for showing the temporal evolution during ~ 1 year? The temporal evolution is not discussed in the paper. Maybe, box-and-whisker plot (without resolving temporal evolution), for each retrieval type, would be more informative?

L305: "The results for the other stations are given in the supplement (Fig. S1)". Please say in a few words if the results are the same or different.

Figure 8 caption. "The differences to MLS and CrIS data…" Please check the caption and the legends in the figure: there is inconsistency.

Figure 9. As in Figure 5, please consider using box-and-whisker plots

Section 5.3 title: Probably, "Comparisons with MLS " would be a better title.

L392, misprint in "example"

L.412: "…MLS provides the most reliable profiles above 16 km.." This is true for tropics only. I suggest including the comparison results at least down to the tropopause

Since Sect.6 also contains a discussion, I suggest name this section "Summary and discussion"

Figure 12. I suggest including also the panel showing |UV-MLS | minus |UV& IR – MLS|, where |.| is absolute value (i.e., difference of absolute deviations from MLS). Then the regions of improvement will be clearly seen.