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Comment on amt-2021-61

Anonymous Referee #3

Referee comment on "Total ozone column from Ozone Mapping and Profiler Suite Nadir Mapper (OMPS-NM) measurements using the broadband weighting function fitting approach (WFFA)" by Andrea Orfanoz-Cheuquelaf et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-61-RC2, 2021

Review comment on

Andrea Orfanoz-Cheuquelaf, Alexei Rozanov, Mark Weber, Carlo Arosio, Annette Ladstätter-Weißenmayer, and John P. Burrows

Total ozone column retrieval from OMPS-NM measurements

The paper describes a total ozone Ozone retrieval form OMPS-NM data using a modified DOAS approach.

As preparational work a new ozone climatology has been generated. Which might be interesting in itself, is this available for other user? Has it been compared to existing data sets?

The algorithm is based on the Weighting Function Differential Optical Absorption Spectroscopy algorithm (WFDOAS), that is adapted to the OMPS-NM. However OMPS-nm has a spectral resolution of 1 nm and a spectral sampling of 0.42 nm, hence the slit function is represented by ~2.2 measurements points, for a classical DOAS analysis this might cause an undersampling issue. The authors solve this issue by skipping half of the spectral points (using only the odd spectral channel) - which gives reasonable results compared to other observations, however no real explanation is given why the approach is

working. Moreover, when the other half of the data is used the comparison shows stronger deviation.

The comparison showed a good agreement with operational OMPS and TROMPOMI data sets, as well as with ground based Brewer and Dobson measurements.

general comment

The analysis is applied to roughly 44 data points (316-336nm) where only half of the data is used. The algorithm is described to become unstable if the complete data range is used. Is its possible that the major deviation are caused by just a few data points? To check this possibility I suggest to run the analysis for one orbit skipping one even data point after the other. A combination might also be possible but this might easily end up in larger study.

minor comments:

5.3 S5P/TROPOMI

L 197 This reference is about a tropospheric ozone retrieval but in this context it seems to be a reference on the RTM LIDORT.

L 207 why gridding data from two algorithms applied to TROPOPMI spectra for the comparison? Both resulting VCDs have identical coverage. So a direct mapping seems easier.

6 Validation

L 218 For the comparison of OMPS with TROPOMI the data are again gridded, this probably can not be avoided. But I suggest to use only one gridded TROPOMI data set

here.

Figure 5: The seasonal map shows a strong orbital pattern, which seems surprising when 4 years of data were averaged.

6.2 Comparison with OMPS-NM operational product and S5P/TROPOMI

For the OMPS-NM data set only the central field of view was used in the comparison 150km, while for TROPOMI the complete swath was taken into account ~2600 km. I suppose the comparison will improve if also for TROPOMI only the central pixels (~210 to 240) are used.

technical comments

Figure 2: [VMR] stands for volume mixing ratio and is hence not a correct unit, please change to [ppm]

Figure 4: in Figure 3 a positive bias between S5P/TROPOMI WFDOAS relative to the ground based observations is shown, here (in figure4) it seems there is a negative bias of the Operational OFFL data relative to the WFDOAS. I suggest showing WFDOAS - OFFL instead, to have more consistent figures.

Figure4: The minus sign at (-10) has disappeared from scale.