

Atmos. Meas. Tech. Discuss., referee comment RC1  
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## Comment on amt-2022-122

Anonymous Referee #3

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Referee comment on "Intercomparison of Sentinel-5P TROPOMI cloud products for tropospheric trace gas retrievals" by Miriam Latsch et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-122-RC1>, 2022

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Review of AMT\_2022\_122 "Intercomparison of Sentinel-5P TROPOMI cloud products for tropospheric trace gas retrievals" by Latsch et al.

Cloud parameters (cloud fraction and cloud height) from different cloud retrieval algorithms for Sentinel-5 Precursor (S5P) TROPOMI are compared in scatter diagrams, latitude-longitude maps, tabular intercomparisons, and daily across-track intercomparisons. The variety of graphs of the intercomparisons are insightful and allows the reader to assess adequately the general aspects of the intercomparisons in a quantitative manner.

Main points:

This paper compares the different cloud products such as cloud fraction and cloud height, but goes no further than the intercomparisons. The intercomparisons need to be placed into context to the uncertainties of the primary recommended cloud fraction and cloud height TROPOMI data products. Are particular cloud products recommended by the TROPOMI science team? If so, which data products? If not, this should be stated. What are the cloud fraction and cloud height uncertainties of the primary products (if recommended), and how do these uncertainties relate to the spread in the intercomparisons presented in this paper?

As an additional request, Figure 16 cloud fraction curves of various algorithms have a spread of 0.2 in the cloud fraction values. Other instruments also generate cloud fractions. What are the uncertainties associated with e.g. MODIS, and how do the MODIS uncertainties compare to the TROPOMI spread in the cloud products? This sort of additional information will enhance the value of the paper. It is not requested to do

MODIS – TROPOMI data intercomparisons, but a several- sentence discussion of typical MODIS cloud data product uncertainties would be informative.

Several paragraphs need to be added to the paper to address these requests before publication.

Minor points

My copy of the paper does not have indented paragraphs. Should line 49 and subsequent paragraphs be indented?

The Figure 5 and Figure 11 numbers and x axis labels associated with the small boxes are too small to be readable. Please increase the font size.

Line 586 has a blank line. Please correct this typo.

Criteria

- Does the paper address relevant scientific questions within the scope of AMT? Yes, intercomparisons of data products fall within the scope of AMT.
  
- Does the paper present novel concepts, ideas, tools, or data? The intercomparisons are useful and straightforward. Novel concepts are not introduced by the paper.
- Are substantial conclusions reached? The intended outcomes of the intercomparisons are discussed in an adequate manner.
  
- Are the scientific methods and assumptions valid and clearly outlined? Yes
- Are the results sufficient to support the interpretations and conclusions? Yes
- Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes
- Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes
- Does the title clearly reflect the contents of the paper? Yes
- Does the abstract provide a concise and complete summary? Yes
- Is the overall presentation well-structured and clear? Yes

- Is the language fluent and precise? Yes.
- Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes.
- Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? The intercomparisons need to be placed into context (related to the uncertainties of the primary TROPOMI and/or other instrument (e.g. MODIS) cloud data products used by the research community. See Main Points above.
- Are the number and quality of references appropriate? Referencing of the various algorithms is adequate.
- Is the amount and quality of supplementary material appropriate? Yes