We would like to thank the reviewer for his/her insightful comments on the manuscript. Below is our response (black) to the referee comments (red).

RC2: 'Comment on amt-2021-112', Anonymous Referee #2, 26 Jun 2021

The authors present an overview of the MOPITT standard data product (clear-sky observations or over low clouds for ocean scenes). The authors present a quantitative study of including low cloud areas in the retrievals. The authors quantitatively show that MOPITT data were improved when low cloud areas were included in the retrievals. Given that MOPITT has measured CO since 2000 updating the current L2 data product is essential. Therefore, the authors need to address improving the current MOPITT data product to include low cloud areas in the retrievals. A section about validation and comparison between MOPITT, IASI, TROPOMI, and ground-based measurements is needed.

Based on the major issues highlighted below, I can't recommend the manuscript for publication in its current form. However, the authors can resubmit the manuscript if they address the major issues.

As we noted in our response to Reviewer 1 (and in our response below), there was some confusion as the focus of the manuscript. We have significantly revised the manuscript and have changed the title to better describe the unique contribution of this analysis to the evaluation of the MOPITT V9 product. In addition, this study shows comparisons with the IASI instrument that are not presented elsewhere.

Major Issues:

1. A quantitative study without any detailed analysis. Plots of the daily mean of total CO columns with and without low cloud areas included.

We have significantly revised the manuscript and we reduced the number of cases. Now the analysis of the impact of clouds on the observational coverage is much more quantitative analysis as new sections 4.5 and 4.6 are added.

2. Description of error sources and analysis.

The focus of the paper is not on MOPITT retrieval algorithm, so it would be beyond the scope of the work to go into a detailed discussion of retrieval error analysis that is discussed by Deeter et al. (2021).

3. A clear plan to adopt and improve on the current MOPITT L2 data product is missing. The authors did not state or propose to modify the current version of MOPITT data.

We apologize for the confusion; our plan was not to propose a new product. However, the paper aimed to investigate the issue of increasing the number of MOPITT observations and suggest a way of increasing the coverage rate in cloudy conditions. Work was being done in parallel with our colleagues at NCAR to produce a new product, version 9 (V9), and a description of this new product was published recently in Remote Sensing of Environment by Deeter et al., 2021. This new MOPITT V9 version product is available now to the public. As a result, we have restructured the manuscript to better reflect this and to complement Deeter et al. (2021). We have revised the paper to complement Deeter's work by providing a detailed analysis of the improvements in V9 MOPITT observational coverage. The analysis is conducted to understand the impact of cloud conditions on the MOPITT observational coverage of V9 and V8, with a particular focus on observations over Canada using Moderate Resolution Imaging Spectroradiometer (MODIS) cloud heights and cloud mask products along with MOPITT retrieval cloud flag descriptors.

4. Addition of validation and comparison between MOPITT, IASI, TROPOMI, and ground-based measurements section.

A quantitative comparison of MOPITT V9 TIR with the corresponding IASI CO is conducted for three cases. The first and third cases are associated with biomass burning emissions, while the second case represents typical conditions with no extreme air pollution. The study revealed positive bias of IASI relative to MOPITT which mostly occur at high CO values, and since the added data in V9 are mainly in heavily polluted regions, the IASI bias is greater for V9 than V8. Understanding the factors that potentially contribute to the discrepancies between MOPITT and IASI will be further investigated in future work.

the performance of the revised cloud detection algorithm is evaluated through validation based on a set of in-situ CO profiles acquired during the ACRIDICON-CHUVA campaign and NOAA Aircraft Profiles by Deeter et al., 2021.

Given the emphasis of the analysis on the impact of clouds on observational coverage, expanding the analysis to include TROPOMI would require a more challenging validation focus of the manuscript because of the differences in timing and spatial resolution of the MOPITT and TROPOMI measurements (morning, 10.30 am, compared to afternoon, 1.30 pm, and 22x22 km compared to 4x5km). The average kernels are also significantly different.

Minor Issues:

1. Low-quality images.

   We apologize for the confusion; the figures are repeated in the revised manuscript with better quality.

2. Some discussion of the physics of the retrievals can be beneficial.

As noted above, the focus of the paper is not on the MOPITT retrieval, so it would be inappropriate to go into a detailed discussion of the physics of the retrievals. Additionally, in the lines 50:60 of the manuscript the retrieval details are referred to in references such as Drummond et al. (1996), Drummond et al. (2010), and Deeter et al. (2003). However, the details of the MOPITT cloud detection algorithm are discussed in detail in section 3.

Lack of references (ex. L51).

References are added in line 49 in the revised manuscript.

Specific Comments:

1. Clarify L99.

It is rephrased for clarification. The statement "Consequently, adjustments to the current MOPITT cloud detection scheme is the only one of the four approaches that can be employed" in line 99 is now changed to "Consequently, adjustments or modifications to the current MOPITT cloud detection scheme is the only way to improve CO retrievals in cloudy conditions" in line 95.

2. L114 implies other products are available. If this is true, please elaborate.

This line (114) is removed in the revised manuscript.