

Atmos. Meas. Tech. Discuss., referee comment RC2
<https://doi.org/10.5194/amt-2021-36-RC2>, 2021
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Comment on amt-2021-36

Anonymous Referee #2

Referee comment on "Validation of methane and carbon monoxide from Sentinel-5 Precursor using TCCON and NDACC-IRWG stations" by Mahesh Kumar Sha et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-36-RC2>, 2021

A. General Comments

The advantage of the TROPOMI measurement is its capability to cover entire globe in a single day with higher spatial resolution. Readers are interested in its validation for the data with large satellite zenith angles and how accurate the fast L2 retrieval algorithm is. The present manuscript looks like a technical report. The research paper must be concise and needs analysis for root causes of bias. The manuscript includes many redundant portions, which must be shortened. The abstract and the conclusion are also too long. Major revision is needed.

I have following suggestions.

(1) Match up condition

As TORPOMI has higher sampling density and spatial resolution, stricter match up conditions can be applied than for existing instruments such as GOSAT and OCO-2. 100 km or 50 km is too long for the sites located near urban area such as Saga.

(2) Summary table

There are several numbers of systematic errors in the abstract, the main text, and the conclusion. The summary table with numbers and conditions will help readers' understanding.

(3) NDAC

There are already plenty of match up data with TCCON. Explanation why NDAC data is additionally need, is required in more detail. Do authors need more data at high latitude stations with large solar angles?

(4) Geometry dependency

Authors mentioned solar zenith angle dependency. TROPOMI has wide cross-track coverage. Is there also viewing angle dependency? Is the bias due to forward calculation error by the radiative transfer model used in the L2 retrieval?

Discussion on how to reduce bias such as SZA dependent and surface-albedo dependent ones will be useful for readers.

B. Specific Comments

(1) Abstract, page 2, line 12

A brief explanation of "QA" in the abstract is needed.

(2) Page 2, line 16, Page 8 line 207, "Smoothing uncertainty", Page 8

It appears in the abstract. In the main text, it appears first in Page 8. Brief explanation

will help readers' understanding.

(3) Page 8, Line 209

Detailed explanations on TCCON site are not main topics of this paper. The information is available in the TCCON WIKI and not needed in the main text.

(4) page 9, line 241, "a priori alignment"

The explanation will help readers' understanding.

(5) Page 16, line 479, "sufficient number"

How many pixels are needed for robust statistics?

C. Technical Corrections

(1) Page 40, Figure 2, Page 48. Figure 10, Page 74 Figure 36

There are too many colors to identify each site.