

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-400

Anonymous Referee #1

Referee comment on "A comparison of the impact of TROPOMI and OMI tropospheric NO₂ on global chemical data assimilation" by Takashi Sekiya et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-400-RC1>, 2022

General Comments

In this manuscript, the authors present a systematic comparison of the Tropospheric Monitoring Instrument (TROPOMI) version 1.2 and Ozone Monitoring Instrument (OMI) QA4ECV tropospheric NO₂ column through global chemical data assimilation (DA) integration. The comparison of the impact of TROPOMI and OMI tropospheric NO₂ on global chemical data assimilation is comprehensive. The topic of the manuscript fits the scope of AMT. The manuscript is mostly well written. However, some details of observation data and discussions are needed. The paper can be published after some minor revisions.

The study is based on only two months (the period April–May 2018). To my knowledge, TROPOMI has strong negative bias in wintertime. If the study is conducted for the winter period or other months, will the conclusion be different? The discussion is missing in the paper.

Specific comments:

L71: typo: rfraction to fraction.

L88-93 section 2.2.1, can you please provide more details about the NO₂ observations in the Atom aircraft-campaign? Such as: what is the time window of the no₂ observations on each day? The frequency of the no₂ observations, per minute? Per hour?

L169: spatial representativeness error, should it be $\sqrt{\sigma_m^2 + \sigma_r^2}$?

L 265-261: How did you compare the vertical profiles between aircraft measurements to the model simulation? Can you give more details? Did you average the profiles over the area?

L417-450: The study time period of the data assimilation is April-May not the whole year. Please mention this in the conclusion. If you get the same conclusions or not when you include winter period. It could be nice that you can add some discussion here.

L426: It is not accurate to conclude the global change of NO_x emissions per year. Please rephrase the sentence or mention the time period.