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Comment on acp-2022-579

Anonymous Referee #1

Referee comment on "Quantifying daily NO_x and CO_2 emissions from Wuhan using satellite observations from TROPOMI and OCO-2" by Qianqian Zhang et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-579-RC1, 2022

This manuscript investigated NO_x and CO_2 emissions at a high spatial and temporal resolution based on an improved method. It provides insights into the real-time and detailed emission quantification and control of NO_x and CO_2. This study is well organized and developed. I thinks this work is interesting from a scientific point of view.

Some revisions are suggested below to improve the quality of the manuscript:

- Only the photochemical loss of NO_2 is considered in the establishment of the superposition column model, how does the other pathways of NO2 loss? Are they also play a role in NO_x chemistry?
- It is not clear to me how the 'starting background NO_2 value' is determined.
- In line 140-145, the authors say that the negative α value reflects the decay of upwind NO_2 pollution along the wind, how come there are still positive α values?
- The study obtains only 50 out of 365 days of valid data to quantify the NO_x and CO_2 emissions, isn't it too few to estimate the daily variation of NOx and CO2 emissions?
- Is there a difference in the overpass time of the TROPOMI and OCO-2 satellites? And how is this considered in the study?
- According to Fig. S1, the predicted NO_x emission pattern is 'smoother' compared to the bottom-up emissions, do the authors think about the reason?
- S4 shows that when the study domain is smaller, the estimated NOx lifetime is longer, how come?