Comment on acp-2022-579
Anonymous Referee #1

Referee comment on "Quantifying daily NO\textsubscript{x} and CO\textsubscript{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\textsubscript{x} and CO\textsubscript{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\textsubscript{x} and CO\textsubscript{2}. This study is well organized and developed. I think 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\textsubscript{2} is considered in the establishment of the superposition column model, how does the other pathways of NO\textsubscript{2} loss? Are they also play a role in NO\textsubscript{x} chemistry?
- It is not clear to me how the 'starting background NO\textsubscript{2} value' is determined.
- In line 140-145, the authors say that the negative α value reflects the decay of upwind NO\textsubscript{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\textsubscript{x} and CO\textsubscript{2} emissions, isn’t it too few to estimate the daily variation of NO\textsubscript{x} and CO\textsubscript{2} 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\textsubscript{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 NO\textsubscript{x} lifetime is longer, how come?