Below we reply to the reviewer comments point by point. The reviewer comments are shown in *italic*, and corresponding modifications and citations of the manuscript are quoted.

Thank you to Dr. Liu and all the authors for a clear response to my comments. My concerns have been addressed, I would just suggest that some of the points touched on in their response be included in the paper.
Response: We thank Dr. Laughner for the comments again. All suggested points have been added in the revised manuscript.

- I'm surprised that applying the TROPOMI AKs is as significant a computational effort as it sounds, but I accept that I'm not familiar with your set up. Perhaps include in the AMF discussion under sect. 3.3 that carrying out this analysis is computationally expensive, which is why it will be done in the future.
Response: We add the statement about future work in Section 3.3, as below:
"Given the extensive computational demands of such a sensitivity analysis, we had to exclude it from this study. Instead, we aim to perform a comprehensive investigation in future research."

- In the revised sect. 2.2 when discussing the consistency between the 1D and 2D methods, I suggest you include that the cities which failed the validation also show consistency. That's a nice piece of concrete evidence that the two methods are self-consistent by design and that comparing them does not add information.
Response: Following the recommendation, we include that the cities which failed the validation also show consistency in Section 2.2, as follows:
"The cities listed in Table S1 that failed NU-WRF validation demonstrate a similar consistency between the two methods, with a relative difference 1% ± 14%."

- For the background NO_2, what I was getting at more generally is that to use the background as done here, we have to assume that the background NO_2 is constant over each city's plume. Physically, to me this means that either the background NO_2 is above the PBL, where all the urban chemistry won't affect it, or that the steady state between non-local emissions, NO_x recycling from gas/aerosol phase reservoirs, and loss processes remains unchanged between the up- and down- wind sectors. Given the plethora of emissions coming from a city, it makes more sense to me that an invariant background would come from free troposphere or residual stratosphere NO_2. However, I think a statement in sect. 2.2 that this method assumes a relatively constant background would be sufficient.
Response: We add a statement in Section 2.2 that this method assumes a relatively constant background, as follows:
"Note that we assume a relatively constant background and subtract the NO_2 background b from Ω in the calculation of the divergences and the sinks"