Reviewer 2:
We would like to thank you for your comments as we appreciate the time dedicated for this review and have made changes to the manuscript to reflect the suggestions. Individual comments from the review are bolded below with our responses in italics.

The present manuscript presents the evaluation of S5P TROPOMI tropospheric NO2 column densities with the aid of airborne and ground-based spectrometers in New York City and Long Island Sound. The advantage/ challenge of this region is that the NO2 concentrations are highly heterogeneous in time and space. The validation of S5P TROPOMI tropospheric NO2 column densities is separated in two major categories: (1) comparison between airborne NO2 TrVC and TROPOMI NO2 TrVC and (2) comparison between ground-based NO2 TrVC and TROPOMI NO2 TrVC. From the abovementioned comparisons, the authors observe a bias in TROPOMI NO2 TrVC and the effect of clouds and a-priori profile in the TROPOMI retrieval are examined into details. I strongly recommend the publication of the manuscript after consideration of a minor number of specific considerations:

Specific comments:
– Page 2, Line 60: It would be interesting to add the exact spatial resolution of OMI and OMPS.
Spatial resolutions were added to this discussion.

– Page 4, Line 110: I suggest that for the reader it would be more practical if you include a small separate section or subsection called "LISTOS campaign" and write there the information about the campaign, as you already did in Section 2.
The first paragraph in Section 2 serves this purpose as the campaign description. I added a subsection header to this paragraph so that a reader can easily identify where the campaign information is discussed.

– Page 7, Line 218: Please explain the PRATMO acronym
In other sources that cite this model, PRATMO is not defined as an acronym. However, we did find out it is short for 'Prather Atmospheric Model'. I defined this in the text.

– Page 8, Line 234: If I understand well, did you assume that the aerosol a-priori profile in the AMF calculation is zero? So, you assumed that no aerosols are present in the atmosphere, or not? If this the case, is this assumption leading to realistic results?
You understood the assumption correctly that aerosol a priori profile is zero for this analysis. However, as shown by our comparison to Pandora, in which the direct-sun measurements are largely insensitive to aerosols at the levels observed, we still compare really well so we expect impacts due to aerosols to be smaller than the other sources of bias we have found in this analysis. However, in future work, we plan to incorporate the HALO aerosol profile data into our retrieval to directly assess potential impacts.

– Page 18, Line 580: Can you provide an approximate value for the Pandora horizontal sensitivity?
Assuming this comment is referring to the horizontal bars in the figure mentioned (Figure 10), the temporal variation in Pandora is proportional to pollution level (10^{th}-90^{th} percentile range vs. Pandora TrVC: r^2=0.69 and y(range)=0.47(TrVC)-0.52x10^{15} molecules cm^{-2}). I added the following sentence to the text: 'Pandora's temporal variation is proportional to pollution level (r^2=0.69).'

– Page 19, Line 581: This means that the Pandora data are not filtered for clouds?
I think you are referring to the phrase 'Although cloud information for Pandora comparisons at TROPOMI sub-pixel resolution is not readily available…' does make it sound like Pandora data were not cloud filtered but this is not the case. Clouds are filtered in Pandora algorithm through their quality flags. The intention was that Pandora has the ability to still have a clear direct line of the sun even if TROPOMI has broken clouds (elevated

cloud fractions), but we don't have direct measurements of sub-pixel cloud coverage like we do from the airborne spectrometer data.

I changed this sentence to be clearer: 'Unlike with airborne spectrometer data, sub-TROPOMI pixel cloud information is not readily available for these comparisons to Pandora. However, the impact of coincidence criteria…'

– Page 21, Line 650: Is there a reason why you did not compare Pandora TrVC (vs) TROPOMI-NAMCMAQ for the extended time period? I would be interesting to add a figure with this comparison.
The NAMCMAQ runs that we used are only available through September 2018 as they were run as part of the LISTOS campaign and not operationally. Future work in this area (as many of these Pandoras will operate over a longer time period in this region) will consider sources for higher resolution a priori data available over a longer time period (e.g., the NASA GEOS-CF at 25 km resolution) and assess the impact to the results.

– Page 21, Line 678: You could cite studies that use MAX-DOAS measurements to evaluate the TROPOMI NO2 product.
I added studies using the MAX-DOAS technique to evaluate TROPOMI NO2. Though it is noted 1 has been accepted but not available yet (Chan), and the final two are still in discussion in AMTD. .

Chan, K. L., Wiegner, M., Alberti, C., and Wenig, M.: MAX-DOAS measurements of tropospheric NO_2 and HCHO in Munich and the comparison to OMI and TROPOMI satellite observations, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2020-35, in review, 2020.

Liu, M., Lin, J., Kong, H., Boersma, K. F., Eskes, H., Kanaya, Y., He, Q., Tian, X., Qin, K., Xie, P., Spurr, R., Ni, R., Yan, Y., Weng, H., and Wang, J.: A new TROPOMI product for tropospheric NO_2 columns over East Asia with explicit aerosol corrections, Atmos. Meas. Tech., 13, 4247–4259, https://doi.org/10.5194/amt-13-4247-2020, 2020.

Dimitropoulou, E., Hendrick, F., Pinardi, G., Friedrich, M. M., Merlaud, A., Tack, F., De Longueville, H., Fayt, C., Hermans, C., Laffineur, Q., Fierens, F., and Van Roozendael, M.: Validation of TROPOMI tropospheric NO_2 columns using dual-scan MAX-DOAS measurements in Uccle, Brussels, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2020-33, in review, 2020.

Verhoelst, T., Compernolle, S., Pinardi, G., Lambert, J.-C., Eskes, H. J., Eichmann, K.-U., Fjæraa, A. M., Granville, J., Niemeijer, S., Cede, A., Tiefengraber, M., Hendrick, F., Pazmiño, A., Bais, A., Bazureau, A., Boersma, K. F., Bognar, K., Dehn, A., Donner, S., Elokhov, A., Gebetsberger, M., Goutail, F., Grutter de la Mora, M., Gruzdev, A., Gratsea, M., Hansen, G. H., Irie, H., Jepsen, N., Kanaya, Y., Karagkiozidis, D., Kivi, R., Kreher, K., Levelt, P. F., Liu, C., Müller, M., Navarro Comas, M., Piters, A. J. M., Pommereau, J.-P., Portafaix, T., Puentedura, O., Querel, R., Remmers, J., Richter, A., Rimmer, J., Rivera Cárdenas, C., Saavedra de Miguel, L., Sinyakov, V. P., Strong, K., Van Roozendael, M., Veefkind, J. P., Wagner, T., Wittrock, F., Yela González, M., and Zehner, C.: Ground-based validation of the Copernicus Sentinel-5p TROPOMI NO_2 measurements with the NDACC ZSL-DOAS, MAX-DOAS and Pandonia global networks, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2020-119, in review, 2020.

– Page 22, Line 699: Please add some reference studies.
A couple references were added to the text in reference to this line.

– Page 39, Table 5: Is there a reason why you did not present the median percentage difference for the Standard Slant Column?
I may have had a reason initially, which was likely because it was a slant column comparison and we don't expect them to be comparable, however, I added the statistics just to be consistent since I do report the linear fits (which demonstrates how correlated the two datasets are).

– Page 46, Figure 6: I would suggest that in Fig. 6a, you include the reported TROPOMI SCD error.

*There is not a reported tropospheric SCD precision in the product file. However, I did look into calculating an uncertainty for tropospheric slant column by considering the slant column equivalent of the first two terms in equation 22 in the ATBD (*http://www.tropomi.eu/sites/default/files/files/publicS5P-KNMI-L2-0005-RP-ATBD_NO2_data_products-20190206_v140.pdf*) and the value is small enough that the vertical error bars are not visible in Figure 6a. The mean is 5.5x10^{14} molecules cm^{-2} with a standard deviation of 7.4x10^{13} molecules cm^{-2}. In the figure caption, I added a statement about this.*

– Page 47, Figure 7: The figure does not contain error bars in the vertical axis. Is there any way to estimate the TROPOMI-NAMCMAQ error and add it to the figure?
We do not have an estimate of TROPOMI-NAMCMAQ error.