Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2022-582

Anonymous Referee #2

Referee comment on "Measurement report: Spatiotemporal variability of peroxy acyl nitrates (PANs) over Mexico City from TES and CrIS satellite measurements" by Madison J. Shogrin et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-582-RC2, 2022

Madison et al., 2022., ACPD, Measurement Report: Spatiotemporal variability of peroxy acyl nitrates (PANs) over Mexico City from TES and CrIS satellite measurements.

General description of the manuscript:

In this measurement report, the authors demonstrate the spatiotemporal variability of PANs over Mexico City and its surrounding area using the space-based observations from the Tropospheric Emission Spectrometer (TES) and the Suomi National Polar-orbiting Partnership (S-NPP) Cross-Track Infrared Sounder (CrIS) instruments and exploring the spatial outflow pattern of PANs produced within urban Mexico City during the seasonal maxima.

General Comments:

Overall, this is an interesting work. I suggest it be considered for publishing subject to some of the technical comments mentioned below.

Abstract:

State the observation years of the study.

Line 19 : Please define the Mexico City spring.

Line 22: The authors should expand the abbreviation(NW) for the first time.

Line 80: Include references for TES and CrIS.

Line 204: Can you add a reference to justify the screening? Is it applicable for both CO and PAN retrievals? How does PAN retrieval differ from Payne et al. (2022)

Line 240: Correct the overpass time of Terra and Aqua satellites.

Line 250; Figure 3: What do the white pixels on the maps represent? You can change the color scale to include the NaNs or missing data. Monthly mean TES transects (n = 2)… what does the 'n' indicate?

Line 255 & 253: The author uses 'urban Mexico City' and 'urban box'. Please be consistent. Is the 'center of Mexico City' same as MCMA (as in line 38)? Please define them clearly and be consistent.

Line 263: Please ensure consistency Fig/Figure.

Figure 4: Missing labels on the map: for the X-Y axes and the 'Background'& 'Urban' boxes.

Figure 5: Use either '-ve' or 'W' for the longitude.

Is "nearby background" in Figure 5 the same as "background' region in Figure 4?

Figure 6: You may include the surface O_3 data source (RAMA?) to match with other data in the caption.

Line 317: During these months.. More specific here.

Line 325: Is there any specific reason for choosing a different/larger region for the fire counts?

Line 390-340: Not very clear. Please reword the sentence.

Line 339 – 340: *Note that the region included in Fig. 6 may not encompass all the fires that impact this location*. *Which* ***location*** *are you mentioning here?* Is it the urban box in Figure 5 and Figure 6?

Figure 8: Missing x-labels for the figure. Histograms (panels (d-f))are not consistent in bin size. Please define counts.

Line 421: *…the PANs observed by CrIS are not all formed from local anthropogenic NOx emissions.* It would be nice to add the percentage contributions from the NOx sources.

Line 454: Replace surface NO_2 by surface NOx

Authors find that the Seasonal maximums in local photochemistry and fire activity contribute to the seasonal maxima in PANs (in conclusion, line 441). However, there is a contradictory statement that *the PAN observed by CrIS over this region may not be associated with local surface photochemistry* (line 347). The authors should clarify this contradiction.

Do the authors check the directions of PANs outflow in MCMA for other seasonal maxima (e.g., August)? That would be strong evidence to draw a generalized conclusion of the directions of PANs outflow for seasonal maximums.

Reference:

Payne et al. 2022: https://doi.org/10.5194/amt-15-3497-2022