

# ***Interactive comment on “The impact of Los Angeles basin pollution and stratospheric intrusions on the surrounding San Gabriel Mountains as seen by surface measurements, lidar, and numerical models” by Fernando Chouza et al.***

## **Anonymous Referee #3**

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The submitted manuscript submitted by F. Chouza and co-authors concerns the analysis of ozone measurements at the TOLNet/NDACC JPL/Table Mountain (TMO) California station.

The manuscript focuses on the impact of Los Angeles basin pollution transport and stratospheric intrusions on the surface ozone levels observed in the San Gabriel Mountains is investigated based on a combination of surface and lidar measurements as

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well as WRF-Chem (Weather Research and Forecasting with Chemistry) and WACCM (Whole Atmosphere Community Climate Model) model runs.

This manuscript poses a variety of central thematically relevant questions that could be explored further. The introduction hints at but does not investigate increasing the accuracy of detangling the high-altitude sites (generally use for long term background/clean trends) and their respective local ozone episodes. There is comparisons with model data, but there really isn't a way to extract conclusions that are satisfying in my opinion. The manuscript also begins to describe the ozone NAAQS and ozone exceedance episodes from a regulatory perspective, but does not really go beyond a simple description and table which is not referenced in the case studies later in the manuscript. Many of this has been done previously by the papers referenced within the document (e.g. Cooper, Lin, Langford).

I suggest the authors reorder the manuscript to re-emphasize the new case studies and comment on their regulatory implications in a discussion section. What is clear is the rich and novel data set in the latter half of the manuscript, especially the 2020 episode. This is very appropriate for this journal with a description of new science learned from this case study. This shows clear evidence of the upslope flow/LA basin impact followed directly by a stratospheric intrusion.

L23 – Carbon monoxide is not central to the photolysis to generate ozone. CO is certainly a useful tracer. Did you mean OH radical? L25 – for this site location, is transport notionally from the LA Basin in a regional sense or inter-continental transport on a synoptic scale?

L45 – a “few”, is there a way to more quantitatively define this? L75 – is this lidar also part of the NASA TOLNet network? I assume so considering the work in LeBlanc et. Al. 2018.

Figure 2: What is trying to be conveyed in this z axis? That there is negligible instrument drift? Would a time series be more appropriate? Are the 90ppbv measurements

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taken during the lidar data shown in subsequent sections? Having a 100m to surface comparison would also be useful to illustrate the gradient on select days.

L118 – If the model does not include stratospheric chemistry, is this really an appropriately rigorous evaluation?

Figure 5 – The back-trajectories are difficult to see. Consider alternative approach. Since most of the trajectories are in the same general cardinal direction, why not use a vertical image instead to illustrate the particle dispersion and upslope/mountain chimney effects?

Figure 8 – It is challenging to see a clear result from this figure. Is this an emphasis on showing seasonal changes in ozone or an evaluation of the model? Is the model just not bringing enough stratospheric ozone into the troposphere? There is a systematic bias above 7500km. Could this figure be replicated but for a time series of Tropospheric ozone Columns? This product may also be relevant to the upcoming geostationary satellites.

Figure 12 – This is a careful examination of the model and geophysical features. Well done.

Figure 14 – This is the clearest evidence of a LA Basin pollution transport followed by a stratospheric intrusion reaching the western US I have seen. Very appropriate for the journal and the community needs to be aware of these measurements. This should be re-emphasized as the central part of this manuscript.

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