



Comment on acp-2021-579

Anonymous Referee #2

Referee comment on "Impact of the COVID-19 pandemic on the observed vertical distributions of PM_{2.5}, NO_x, and O₃ from a tower in the Pearl River Delta" by Lei Li et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-579-RC2>, 2021

General Comments

The Covid-19 lockdown provides a unique opportunity for assessing the effects of substantial emission reductions on atmospheric chemistry. This paper used ambient measurements from a tower situated in the Pearl River Delta of China to explore the response of air pollutants to the lockdown. While this paper is within the scope of ACP, the present paper is limited to a cursory data analysis, without significant contribution to our existing knowledge. The absence of sound analysis accompanied by a lack of in-depth discussion of the observed phenomenon make this paper unpublishable in the present form. Besides the lack of novel insights, I found the manuscript overall hard to follow due to lots of typos throughout the manuscript. While addressing the specific comments below may improve the paper, I don't think these improvements could justify publication in ACP. Therefore, I would recommend this paper to be rejected.

Major comments:

- 1) Line 33-34: Why photochemical reactions are not considered as a significant ozone source? While anthropogenic emissions are low during the lockdown period, the oxidation of biogenic VOC still contributes to the ozone formation given the elevated BVOC emissions over the PRD.
- 2) Line 150-158: Please consider simplifying these statements since they are not key contents regarding scientific publication.
- 3) Line 196: The authors mention that "observed at different heights". Does the data presented in Figure 1(a)-(c) represent the average value of vertical observations? Please clarify.
- 4) Line 205-209: I suggest removing these contents since the MDA8 ozone is a well-known indicator that is used to infer the magnitude of ozone pollution.
- 5) Line 210: Please clarify the potential reasons for this phenomenon. Possibly attributed to less titration effects of NO because primary NO_x emission substantially decreased.
- 6) Line 216-219: Please clarify the reason for the comparison of air pollutants and meteorological parameters between 2017 and 2020. Does the meteorological condition

quite similar? Otherwise, it is not comparable.

7) Line 257-259: While the observations from the tower depict insignificant variations in meteorological parameters, the mesoscale process and large-scale synoptic pattern could still alter the air pollutants levels. I don't think the evidence is sufficient to make the conclusion.

8) Line 270-272: The authors indicate that nearby forests constrain the dispersion of PM while this explanation appears contradictory to the phenomenon that PM levels at 110-120m are higher than ground-level. The authors should comment on this interesting behavior.

9) Line 331-332: actually, ozone levels did not increase at night (as seen in Figure 5). The elevated ratio clearly demonstrates less effective NO_x titration at night which leads to relatively higher ozone concentrations at night compared to pre-covid.

10) Line 383: The PRD is well-known for the substantial biogenic VOCs emitted from vegetation and it is highly possible that the enhanced HCHO column depicted by TROPOMI is attributed to the oxidation of biogenic hydrocarbons. I suggest the authors discuss the type of trees nearby the tower (possibly broadleaf trees that have strong BVOC emission potential).

11) Line 413: I am confused by the statement that PM and ozone don't have related source. As widely acknowledged in-field measurements and laboratory work, both NO_x and VOCs from anthropogenic and biogenic are important precursors for secondary pollutants (PM, ozone).

Minor comments:

1) Please clarify the aim of this study in the last paragraph of the Introduction.

2) The grammar is in need of much attention. I suggest the authors carefully read through the manuscript and correct typos.

Technique typos:

Line 30: remove "dominant".

Line 81: scholars->studies

Line 92: air quality factors->air pollutants levels

Line 106: population->residents

Line 113: Do you mean "favorable to the accumulation and formation of air pollutants"?

Line 145: Elements->parameters

Line 155: her->the

Line 174: substantial ->significant

Line 301: prevention->mitigation

Line 319: furtherly->further

Line 435-437: remove "to be".

Line 480: curves->pattern