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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of reduced anthropogenic emissions during COVID-19 on air quality in India" *by* Mengyuan Zhang et al.

Anonymous Referee #2

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The manuscript presents a topical research, i.e. to understand the air quality change in India during the COVID-19 lockdown period. The reported ozone and PM changes from the ground-based observations reveal the sensitivity of major pollutions to the drastic emission reduction in India which is one of the most polluted regions in the world. The WRF-CMAQ model simulations further shed light on the relative contributions from primary emissions and secondary formation of aerosols. The manuscript is easy to follow and fit to the scope of ACP very well. I recommend its publication with ACP, while I also have comments below for the authors to address.

1) The major results of this study are based on the comparison between the Lockdown and Pre-lockdown periods. Figs. 1-3 show observed changes in PM and ozone. I'm wondering how different the meteorological conditions are during those two periods?

The recent COVID-19-related studies (e.g. Le et al., 2020, Science) have stressed the importance of ventilation conditions and relative humidity in regulating the air pollution at the short time scale. Since the authors have obtain the meteorological data and conducted WRF simulations, it should be a low-hanging fruit to perform a more comparative analysis of meteorology (precipitation, winds, PBL height, etc.), in addition to the present Fig. S2 of temperature comparison. The outcome of this analysis should be also discussed in the context with the recent studies focusing on the air quality changes during the COVID-19.

2) There is no doubt that HCHO is closely linked with VOCs, but it is unclear to me how well the HCHO can be used to represent the total VOCs in a quantitative manner. Can the authors show their correlations based on the CMAQ model results?

3) Spaceborne measurements of HCHO and NO2 are available from the latest satellites, such as TROPOMI. There are near-real-time products. The authors may want to explore those data and validate the modeled HCHO and NO2 and see their changes in observations.

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