

Interactive comment on “Modeling the Impact of COVID-19 on Air Quality in Southern California: Implications for Future Control Policies” by Zhe Jiang et al.

Anonymous Referee #1

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The manuscript addresses a topical and critical science question, i.e. how air pollution responded to the abrupt changes in the human activities during the COVID-19 pandemic. A series of WRF-Chem simulations and ground-based observations are employed to understand the emission-pollution relationship in Southern California. The authors' effort of using observations of meteorology and pollution to evaluate and calibrate the WRF-Chem model is commendable. The finding about the dominant role of nitrate chemistry and primary PM emission in the observed PM_{2.5} reduction reinforce the importance of those two critical pathways for regional haze pollution in LA and lay out scientific foundation for future mitigation policy development. I recommend its publication with ACP, while I also have comments below for the authors to address.

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1) The SI tables and figures contain very useful information about how the model is set up and the simulation results are evaluated. Since the main text only consists of three figures, I strongly suggest the authors move all SI tables and figures to the main text.

2) For Fig. 3a,b, better to separate the urban and rural areas, as they are in different ozone formation regimes. A simple regional average would largely reduce the ozone sensitivity to NO_x or VOC in your plot.

3) Is the Miyazaki 2020c the same with Miyazaki 2020b?

4) The present study assesses the meteorological influence on the pollution concentrations by contrasting the lockdown and pre-lockdown time periods. It is a relatively crude way to achieve that objective, as the underlying assumption is that the pre-lockdown meteorology represents the climatological conditions during that time of the year. A more robust method is to conduct ensemble simulations over multiple years or use multi-year averaged meteorological conditions to serve as a reference state in the model (e.g. Le et al., 2020). The uncertainty here needs to be acknowledged.

5) The results in Table S3 are based on hourly or daily data? Over what area? A recent study by Rooney et al. (2020, ACP, p14597–14616, Fig. 5) found WRF-Chem tends to overpredict the nighttime low temperature in California. I wonder if the simulations presented here encounter the same issue.

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