Supporting Information for "Impacts of Traffic Reductions Associated with COVID-19 on Southern California Air Quality"

H.A. Parker¹, S. Hasheminassab², J.D. Crounse¹, C.M. Roehl¹, P.O. Wennberg¹

¹Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA, USA

²South Coast Air Quality Management District, Diamond Bar, CA, USA

Contents of this file

1. Text S1
2. Figures S1 to S16
3. Table S1
Text S1. Caltech Air Quality Station (CITAQS)

The Caltech Air Quality Station (CITAQS) contains a set of high sensitivity Teledyne air quality sensors including continuous measurements of PM$_{10}$ and PM$_{2.5}$ (Teledyne T640); trace gas measurements of NO and NO$_y$ (Teledyne T200U), CO (Teledyne M300EU2), SO$_2$ (Teledyne T100U); and optical trace gas measurements of O$_3$ (Teledyne T400) and NO$_2$ (Teledyne T500U) that reports at a one minute temporal resolution. The CITAQS was deployed outside the Linde Robinson Building on Caltech campus in Pasadena, CA on March 20, 2020 to continue measuring indefinitely.
**Figure S1.** Left: 7-day moving average temperature (top), relative humidity (middle), and wind speed (bottom) in 2020 and 2015 to 2019 in the South Coast Air Basin. For 2020, measurements before 19 March are in green and after 19 March are in red. The averages of the measurements for 2015 to 2019 are in black with the associated range as grey shading. Right: Monthly average precipitation in the South Coast Air Basin in 2020 and 2015 to 2019 in centimeters per month.
Figure S2. Left: Breakdown of monitoring sites and the measurements included in the analysis. Right: Map of the locations of the sites described in the table on the left.

Table S1. 2000 to 2019 trends and 2020 anomalies in afternoon (12:00 - 16:00 local) NO\textsubscript{2}, O\textsubscript{3}, and O\textsubscript{x} concentrations for sites in the basin that have measurements of both NO\textsubscript{2} and O\textsubscript{3} for the 2000 to 2020 period. Anomalies represent the difference between values observed during 2020 COVID period afternoons and the values expected from a 2000-2019 fit of COVID period afternoons. Values in parentheses represent the anomaly values for the 19 April to 30 June period instead of the 19 March to 30 June period.
**Figure S3.** Plots of mean O₃ concentrations by hour of day and day of week in Pasadena for our analysis period in 2020 and the average of 2015 to 2019. Vertical lines mark 12pm and 4pm respectively in each plot.
Figure S4. Air quality index time series for daily AQI values for LA county for 2010 to 2020 generated on the EPA website (https://www.epa.gov/outdoor-air-quality-data/air-data-multiyear-tile-plot).
Figure S5. Air quality index time series for daily AQI values for San Bernardino county for 2010 to 2020 generated on the EPA website (https://www.epa.gov/outdoor-air-quality-data/air-data-multiyear-tile-plot).
Figure S6. Air quality index time series for daily AQI values for Riverside county for 2010 to 2020 generated on the EPA website (https://www.epa.gov/outdoor-air-quality-data/air-data-multiyear-tile-plot).
Figure S7. Air quality index time series for daily AQI values for Orange county for 2010 to 2020 generated on the EPA website (https://www.epa.gov/outdoor-air-quality-data/air-data-mutiyear-tile-plot).
Figure S8. Sensitivity test by excluding the rainy days from the analysis (right, in red) in comparison to including all the days (left, in black). The means are reported to the right of the box plots with the standard deviation in parenthesis.
Figure S9. Left: Box plots of 8-hr DM O$_3$ values during the 2015 to 2019 COVID period and 2020 COVID period. Right: Map of the difference between the 2015 to 2019 COVID period and 2020 COVID period in parts per billion (top) and percentage (bottom).
Figure S10. Left: Box plots for 1-hr daily maximum NO\textsubscript{x} values during the 2015 to 2019 COVID period and 2020 COVID period. Right: Map of the difference between the 2015 to 2019 COVID period and 2020 COVID period in parts per billion (top) and percentage (bottom).
Figure S11. Left: Box plots for 24-hr PM$_{2.5}$ values during the 2015 to 2019 COVID period and 2020 COVID period. Right: Map of the difference between the 2015 to 2019 COVID period and 2020 COVID period in $\mu$g m$^{-3}$ (top) and percentage (bottom).
Figure S12. Left: Box plots for the column CH$_2$O concentrations for the COVID period for 2015 to 2019 and for 2020. Right: Time series of the yearly COVID period CH$_2$O concentrations. Error bars represent the standard error in the mean.
Figure S13. Left: Box plots for the Pasadena temperature measurements for the COVID period for 2015 to 2019 and for 2020. Right: Time series of the yearly COVID period temperature measurements. Error bars represent the standard error in the mean.
Figure S14. Hourly afternoon O$_3$ concentrations are plotted against temperature and color coded by NO$_2$, all in ppb. The grey boxes are CalNex O$_3$ concentrations in ppb. All data shown here is from Pasadena. In the left and middle panels, the upper and lower black lines are the 10% and 90% quantile values for the 2015 to 2019 values, respectively.
Figure S15. Left: Box plots for weekend (red) and weekday (blue) 1-hr daily maximum NO\textsubscript{x} for the COVID period in 2020 and 2015 to 2019. Right: Difference between weekend and weekday 1-hr daily maximum NO\textsubscript{x} for the COVID period in 2020 and 2015 to 2019 in parts per billion (top) and percent (bottom). Error bars represent the standard error in the mean.
Figure S16. Left: Box plots for weekend (red) and weekday (blue) 8-hr daily maximum O$_3$ for the COVID period in 2020 and 2015 to 2019. Right: Difference between weekend and weekday 8-hr daily maximum O$_3$ for the COVID period in 2020 and 2015 to 2019 in parts per billion (top) and percent (bottom). Error bars represent the standard error in the mean.