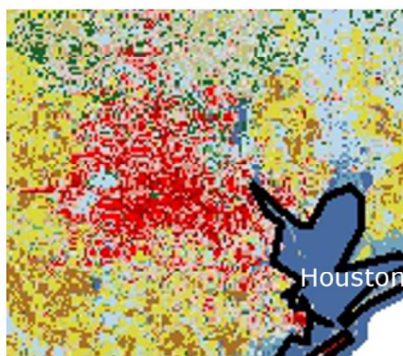
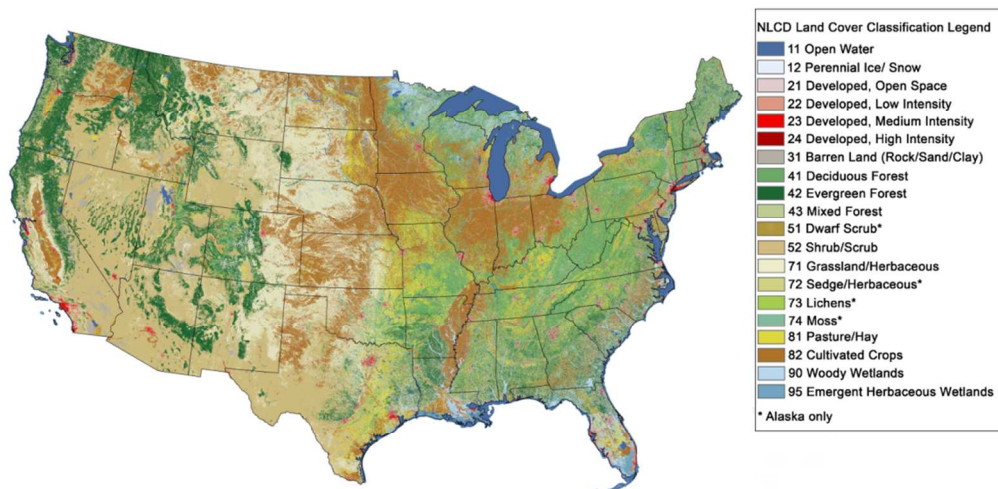


Supplemental Information for: Ozone trends across the United States over a period of decreasing NO_x and VOC emissions

Heather Simon, Adam Reff, Benjamin Wells, Jia Xing, Neil Frank

12 Pages

13 Figures



Figures S-1: NLCD 2006 land cover classifications for the United States, the Chicago area, the Los Angeles area, the New York City area, and the Houston area. Image reproduced from NLCD 2006 product data downloads:

http://www.mrlc.gov/nlcd06_data.php.

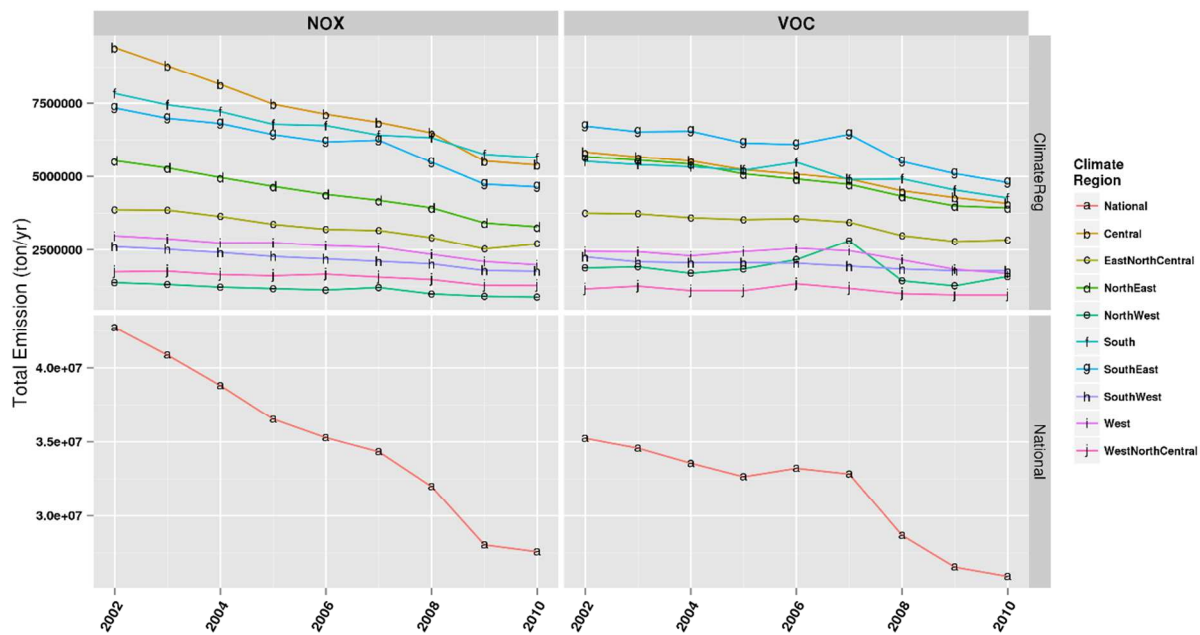


Figure S-2: U.S. and regional annual NOx and VOC emissions from 2002 to 2010 based and Xing et al ¹. This figure can be directly compared to Figure 2 in the main paper which shows the same data from the NEI.

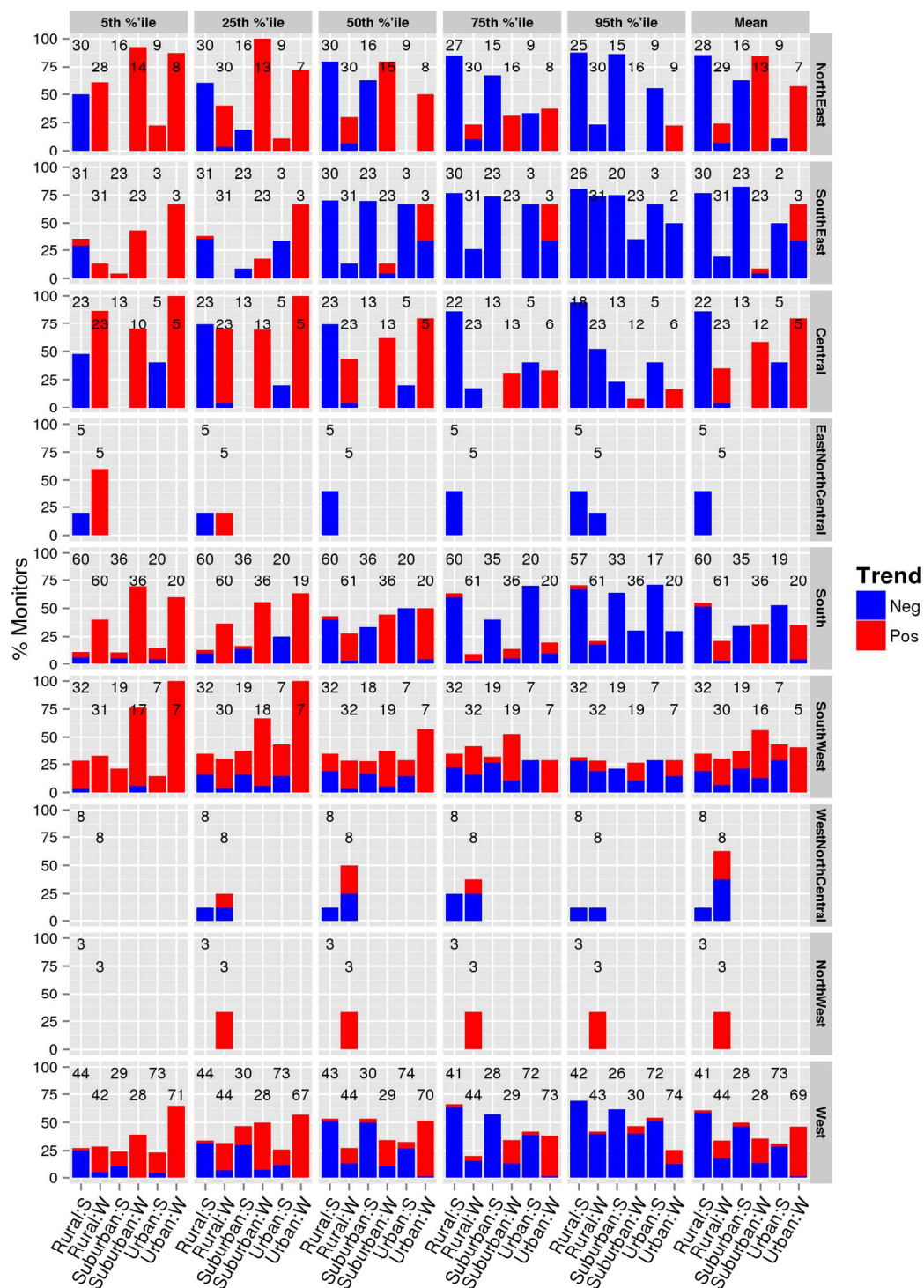


Figure S-3: Regional percentage of year-round monitoring sites in each season and degree of urbanization classification which experienced statistically significant negative (decreasing) ozone trends or statistically significant positive (increasing) ozone trends. S and W labels refer to trends in summer and winter months respectively. The difference between the bar top and 100% is the % of insignificant monitors. The number of total monitors which were included in each classification is shown in the middle of each bar. This figure can be directly compared to Figure 4 in the main paper which shows this same data using all monitors with data for the 1998-2013 period instead of the subset which measure ozone year-round.

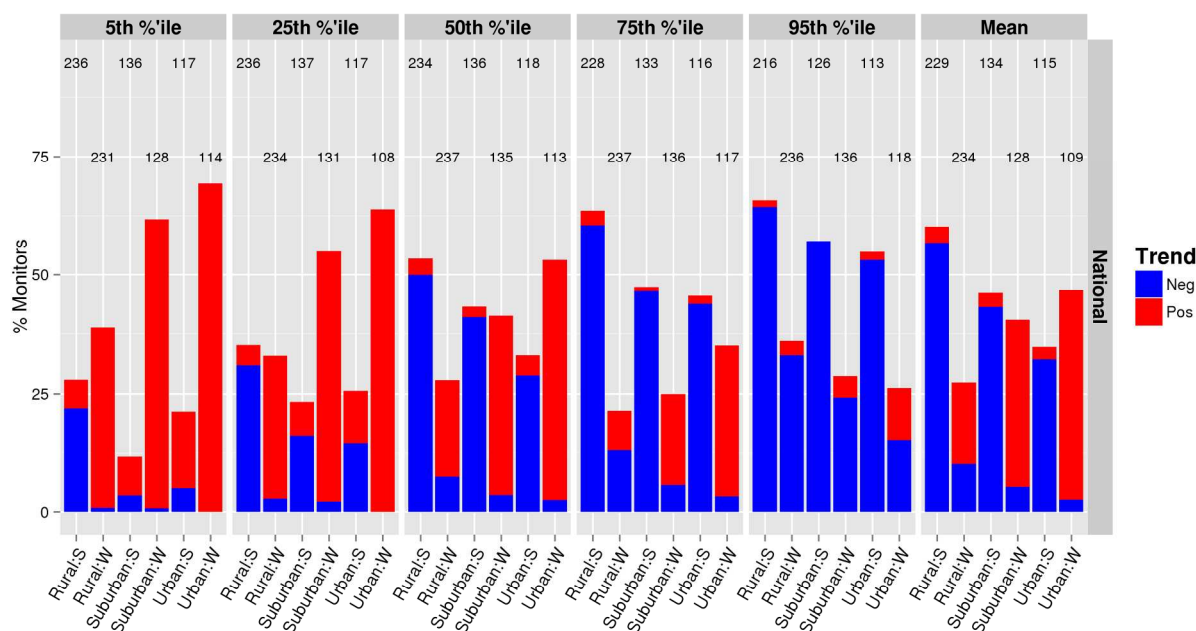


Figure S-4: National percentage of year-round monitoring sites in each season and degree of urbanization classification which experienced statistically significant negative (decreasing) ozone trends or statistically significant positive (increasing) ozone trends. S and W labels refer to trends in summer and winter months respectively. The difference between the bar top and 100% is the % of insignificant monitors. The number of total monitors which were included in each classification is shown in the middle of each bar. This figure can be directly compared to Figure 5 in the main paper which shows this same data using all monitors with data for the 1998-2013 period instead of the subset which measure ozone year-round.



Figure S-5: Magnitude of 1998-2013 average ozone trends (ppb/yr) at urban sites across the continental US. Summer season (S) trends displayed in left-hand plots, winter season (W) trends displayed in right-hand plots. Panels from top to bottom display trends in 5th percentile, 25th percentile, 50th percentile, 75th percentile, and 95th percentile ozone concentrations.



Figure S-6: Magnitude of 1998-2013 average ozone trends (ppb/yr) at suburban sites across the continental US. Summer season (S) trends displayed in left-hand plots, winter season (W) trends displayed in right-hand plots. Panels from top to bottom display trends in 5th percentile, 25th percentile, 50th percentile, 75th percentile, and 95th percentile ozone concentrations.

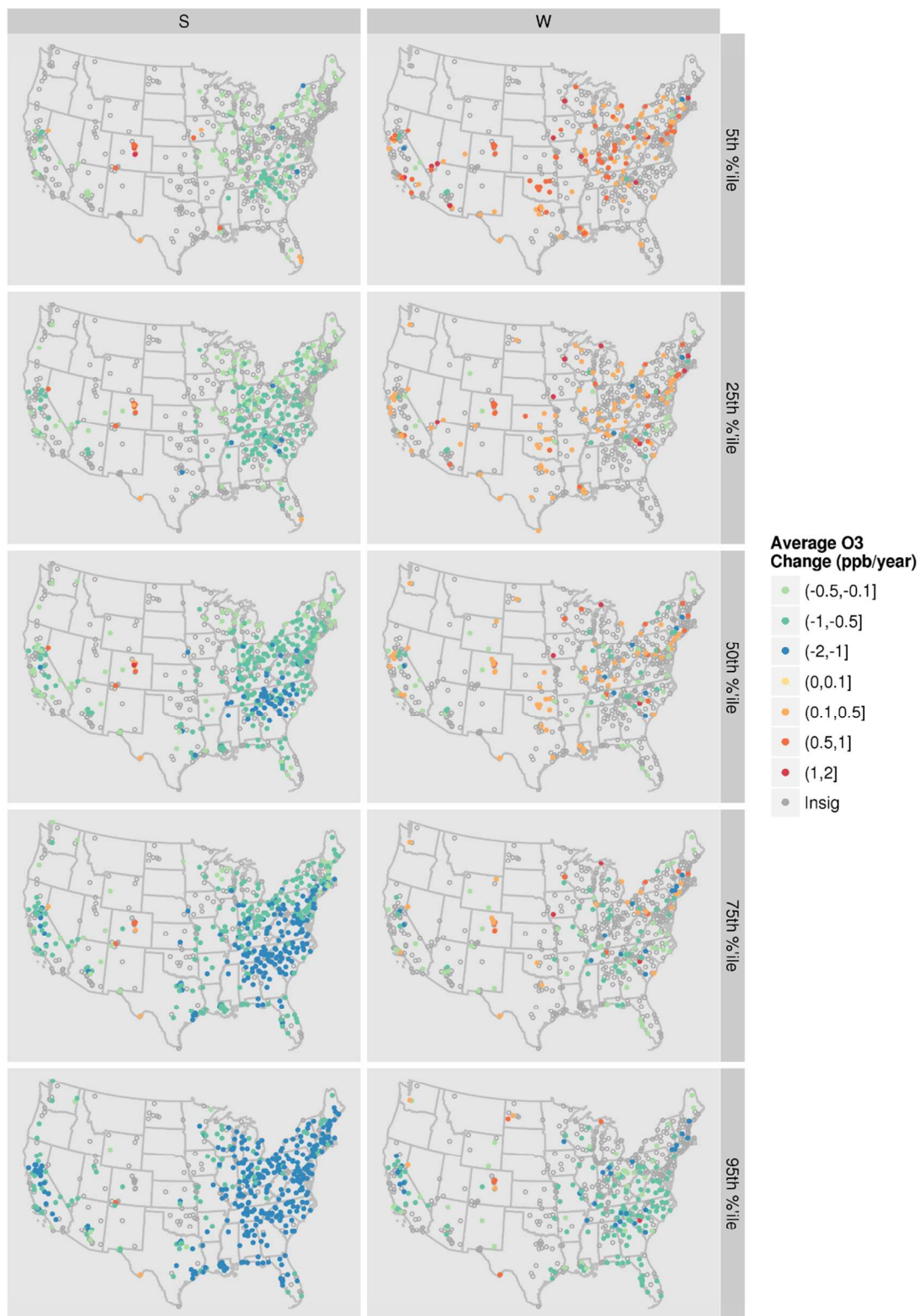


Figure S-7: Magnitude of 1998-2013 average ozone trends (ppb/yr) at rural sites across the continental US. Summer season (S) trends displayed in left-hand plots, winter season (W) trends displayed in right-hand plots. Panels from top to bottom display trends in 5th percentile, 25th percentile, 50th percentile, 75th percentile, and 95th percentile ozone concentrations.

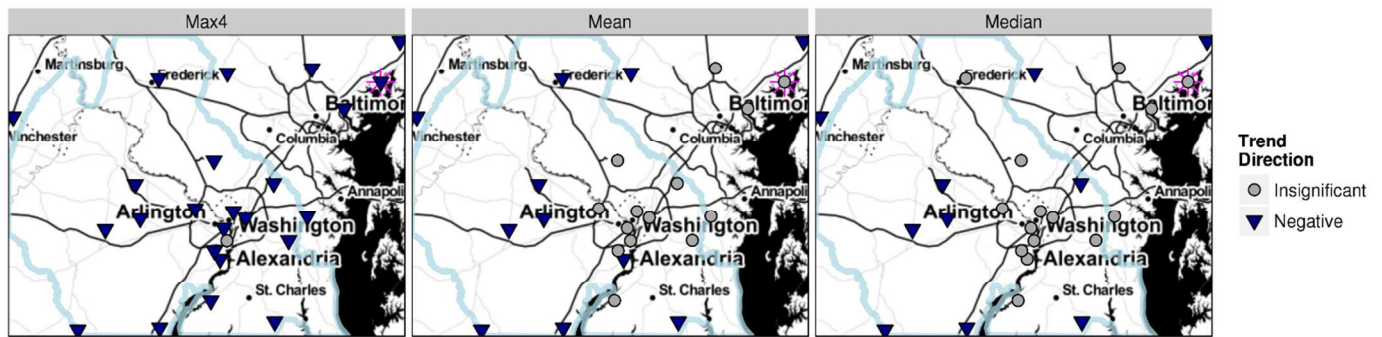


Figure S-8: Map of summer season O₃ trends at specific monitors in the Washington D.C. and Baltimore areas. All upward and downward facing triangles represent statistically significant trends from 1998-2013 ($p < 0.05$), circles represent locations with no significant trends. Only monitors with at least nine years of data are displayed. The pink star indicates the site with the highest design value in 2013. The MSA border as defined by the U.S. census bureau is delineated by the light blue line. Left panel shows trends in summer season 4th highest 8-h daily maximum O₃ values, center panel shows trends in summer season mean 8-h daily maximum O₃ values, and right panel shows trends in summer season median 8-h daily maximum O₃ values.

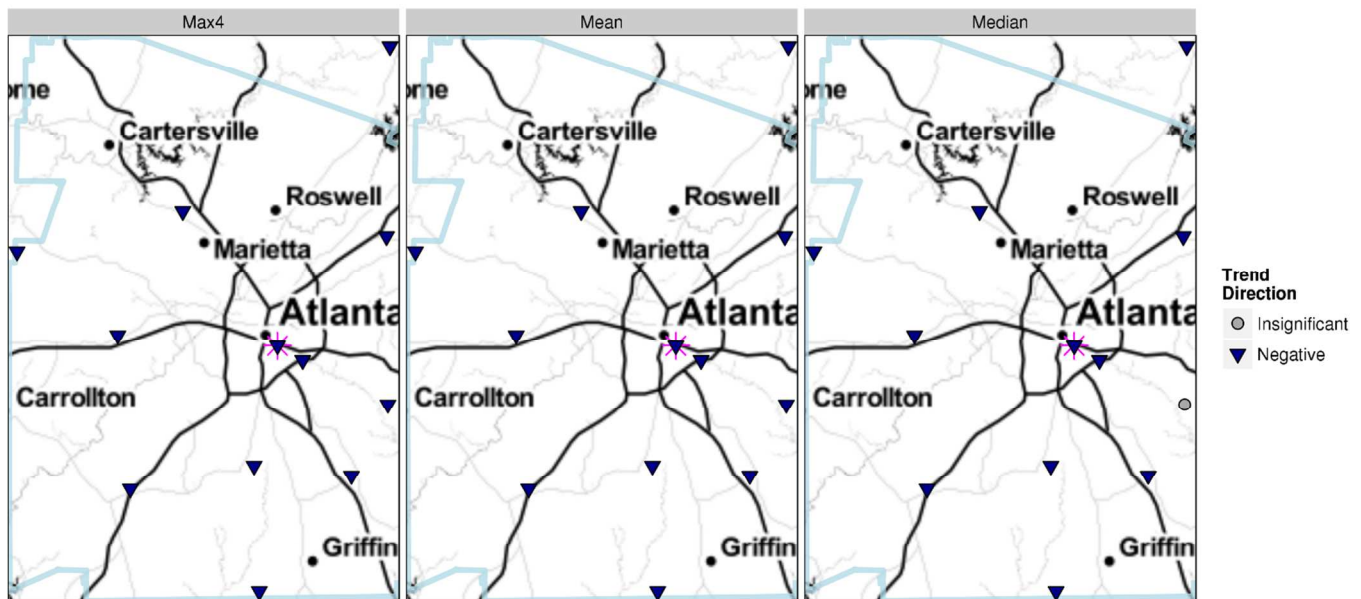


Figure S-9: Map of summer season O₃ trends at specific monitors in the Atlanta area. All upward and downward facing triangles represent statistically significant trends from 1998-2013 ($p < 0.05$), circles represent locations with no significant trends. Only monitors with at least nine years of data are displayed. The pink star indicates the site with the highest design value in 2013. The MSA border as defined by the U.S. census bureau is delineated by the light blue line. Left panel shows trends in summer season 4th highest 8-h daily maximum O₃ values, center panel shows trends in summer season mean 8-h daily maximum O₃ values, and right panel shows trends in summer season median 8-h daily maximum O₃ values.

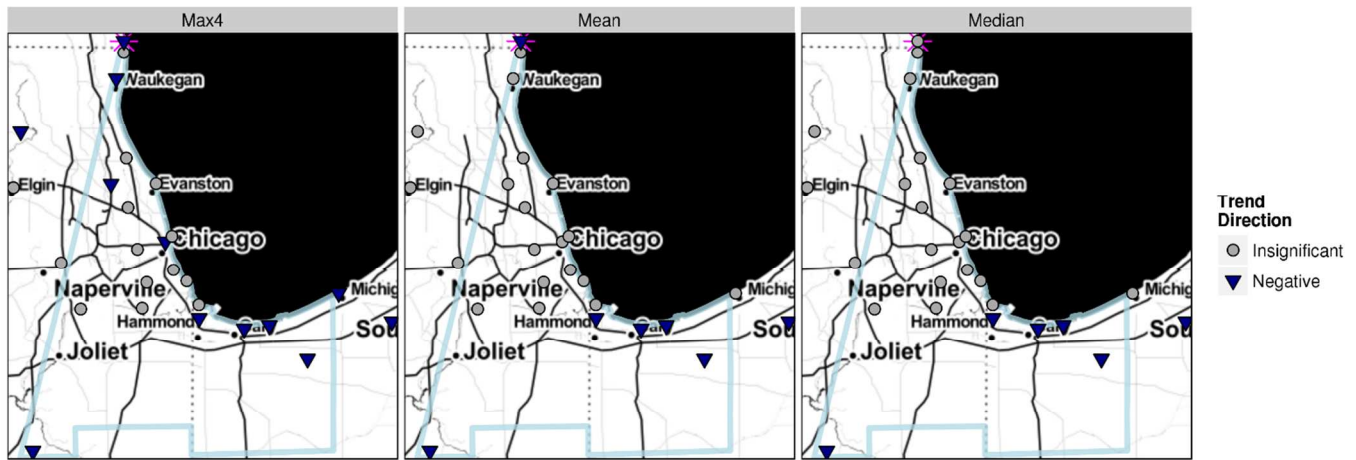


Figure S-10: Map of summer season O₃ trends at specific monitors in the Chicago area. All upward and downward facing triangles represent statistically significant trends from 1998-2013 ($p < 0.05$), circles represent locations with no significant trends. Only monitors with at least nine years of data are displayed. The pink star indicates the site with the highest design value in 2013. The MSA border as defined by the U.S. census bureau is delineated by the light blue line. Left panel shows trends in summer season 4th highest 8-h daily maximum O₃ values, center panel shows trends in summer season mean 8-h daily maximum O₃ values, and right panel shows trends in summer season median 8-h daily maximum O₃ values.

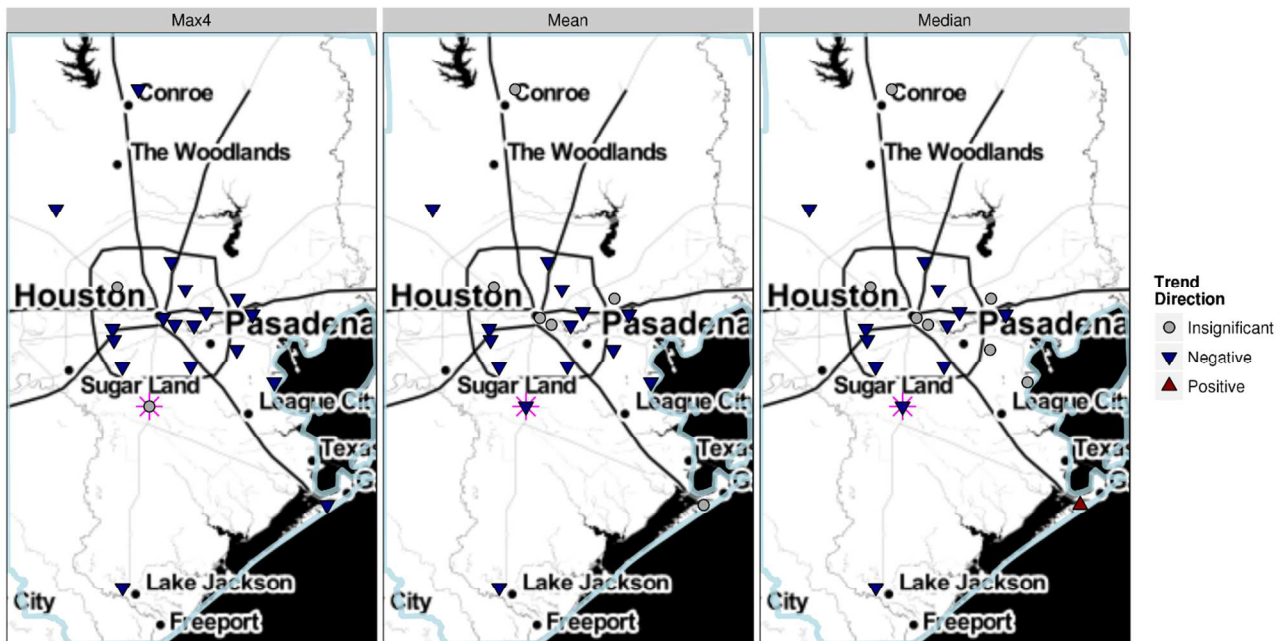


Figure S-11: Map of summer season O₃ trends at specific monitors in the Houston area. All upward and downward facing triangles represent statistically significant trends from 1998-2013 ($p < 0.05$), circles represent locations with no significant trends. Only monitors with at least nine years of data are displayed. The pink star indicates the site with the highest design value in 2013. The MSA border as defined by the U.S. census bureau is delineated by the light blue line. Left panel shows trends in summer season 4th highest 8-h daily maximum O₃ values, center panel shows trends in summer season mean 8-h daily maximum O₃ values, and right panel shows trends in summer season median 8-h daily maximum O₃ values.

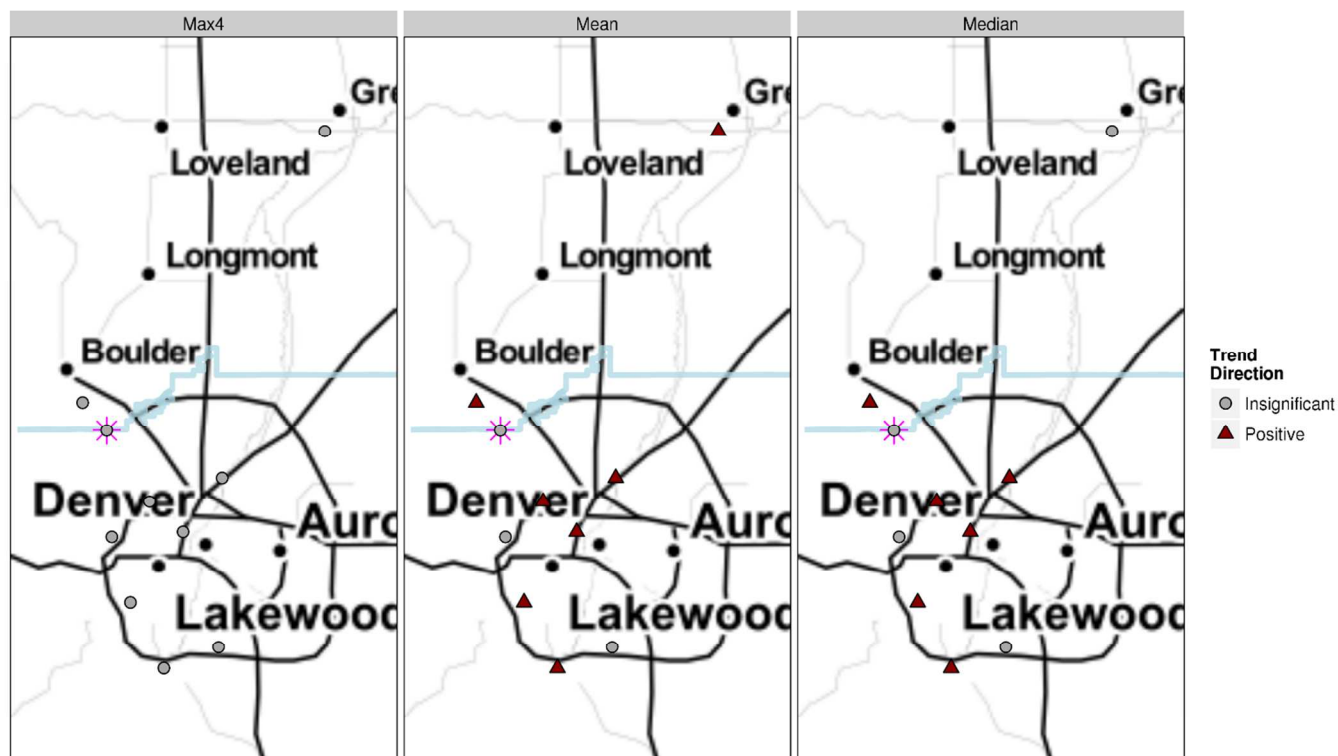


Figure S-12: Map of summer season O₃ trends at specific monitors in the Denver area. All upward and downward facing triangles represent statistically significant trends from 1998-2013 ($p < 0.05$), circles represent locations with no significant trends. Only monitors with at least nine years of data are displayed. The pink star indicates the site with the highest design value in 2013. The MSA border as defined by the U.S. census bureau is delineated by the light blue line. Left panel shows trends in summer season 4th highest 8-h daily maximum O₃ values, center panel shows trends in summer season mean 8-h daily maximum O₃ values, and right panel shows trends in summer season median 8-h daily maximum O₃ values.

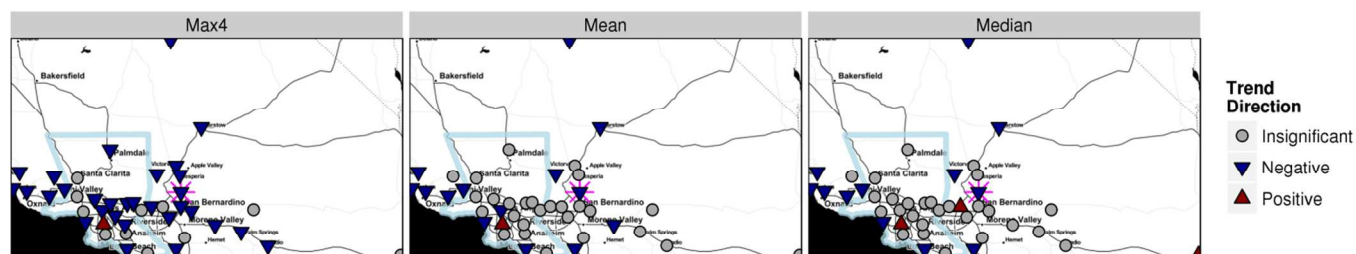


Figure S-13: Map of summer season O₃ trends at specific monitors in the Los Angeles area. All upward and downward facing triangles represent statistically significant trends from 1998-2013 ($p < 0.05$), circles represent locations with no significant trends. Only monitors with at least nine years of data are displayed. The pink star indicates the site with the highest design value in 2013. The MSA border as defined by the U.S. census bureau is delineated by the light blue line. Left panel shows trends in summer season 4th highest 8-h daily maximum O₃ values, center panel shows trends in summer season mean 8-h daily maximum O₃ values, and right panel shows trends in summer season median 8-h daily maximum O₃ values.

References:

1. Xing, J.; Pleim, J.; Mathur, R.; Pouliot, G.; Hogrefe, C.; Gan, C. M.; Wei, C., Historical gaseous and primary aerosol emissions in the United States from 1990 to 2010. *Atmos. Chem. Phys.* **2013**, *13* (15), 7531-7549.