Effects of nitrogen oxide emission controls on Eastern US surface ozone: A comparison between urban cores and rural background sites

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Nitrogen oxide (NO_x) emission controls have led to improved air quality over the past two decades, particularly over the Eastern US. In recent work we quantified the effects of the efforts to abate surface ozone (O_3) pollution under the NO_x State Implementation Plan (NO_x SIP Call) for Eastern US background sites (available from the Clean Air Status and Trends Network (CASTNET)) using methods from statistical extreme value theory (Rieder et al., 2013). Our analysis showed that the number of summer (JJA) days above the US national ambient air quality standard (NAAQS) declined on average by a factor of two between 1988-1998 and 1999-2009 and that probabilistic 1-yr O_3 return values declined by about 10 ppb between these two time periods. Here we extend the analysis to observations available from the US EPA Air Quality System (AQS), comprising sites ranging from polluted urban cores to rural sites. We focus on changes in (i) the seasonal and annual average number of days with maximum daily 8-hour average surface O_3 above the NAAQS and (ii) probabilistic O_3 return values following the NO_x SIP Call. Particular focus is given on similarities and differences in surface O_3 responses on regional to local level and on contrasting urban cores and rural background sites.

References:
Rieder H.E., Fiore A.M., Polvani L.M., Lamarque J.-F., Fang Y. (2013): Changes in the frequency and return level of high ozone pollution events over the Eastern United States following emission controls, Environ. Res. Lett., 8, 014012, 2013.