Ozone

Trends in Ground-Level Ozone Concentrations

In March 2008, EPA strengthened the national standards for ground-level ozone, setting an 8-hour standard at 0.075 parts per million (ppm). Nationally, average ground-level ozone concentrations were 13 percent lower in 2010 than in 2001, as shown in Figure 7. The trend showed a notable decline after 2002. When comparing the three-year periods 2001-2003 and 2008-2010, approximately 82 percent of the monitoring sites recorded a significant decline (> 0.005 ppm) in ozone concentrations. Sites that showed the greatest improvement were in or near the following metropolitan areas: South Bend, IN; Buffalo, NY; Chicago, IL; Milwaukee, WI; and Cleveland, OH. Ozone trends can vary locally. One site may show increases in ozone levels while nearby sites show decreases.

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Figure 8 shows a snapshot of ozone concentrations in 2010. The highest ozone concentrations occurred in California. Note that the high concentration levels in Utah occurred in winter. Elevated wintertime ozone concentrations are most likely to occur when local sources of NOx and VOC emissions are trapped in a snow-covered valley on a clear day with light winds. Nationally, approximately 24 percent of all sites measured concentrations above the standard of 0.075 ppm on four or more days in 2010.

Over the years, EPA has adopted a number of regulations that helped reduce ozone levels nationwide. Other recently adopted regulations will help to continue to make progress toward lower, healthier ozone levels. These regulations include:

- Coordinated steps to reduce power plant pollution
  - » NOx State Implementation Plan (SIP) Call
  - » Acid Rain Program
  - » Cross-State Air Pollution Rule (CSAPR)
- Requiring other stationary sources to reduce pollution
  - » Aerosol, architectural, autobody, and miscellaneous coatings
  - » Consumer products
  - » Regional haze requirements
- Limiting emissions from mobile sources
  - » Light Duty Tier 2 Rule - new cars, SUVs, trucks and vans
  - » Heavy-Duty Diesel Rule on and nonroad
  - » Requirements for marine vehicles, and locomotives
- On December 30, 2011, the D.C. Circuit Court stayed the CSAPR rule pending judicial review. This decision delays implementation of CSAPR and leaves the Clean Air Interstate Rule in place pending the court's decision.

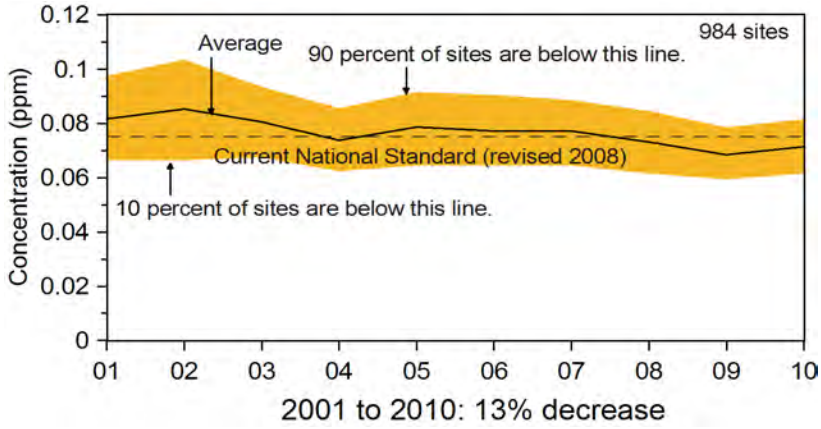

Figure 7. National 8-hour ozone air quality trend, 2001-2010 (average of annual fourth highest daily maximum 8 hour concentrations in ppm).

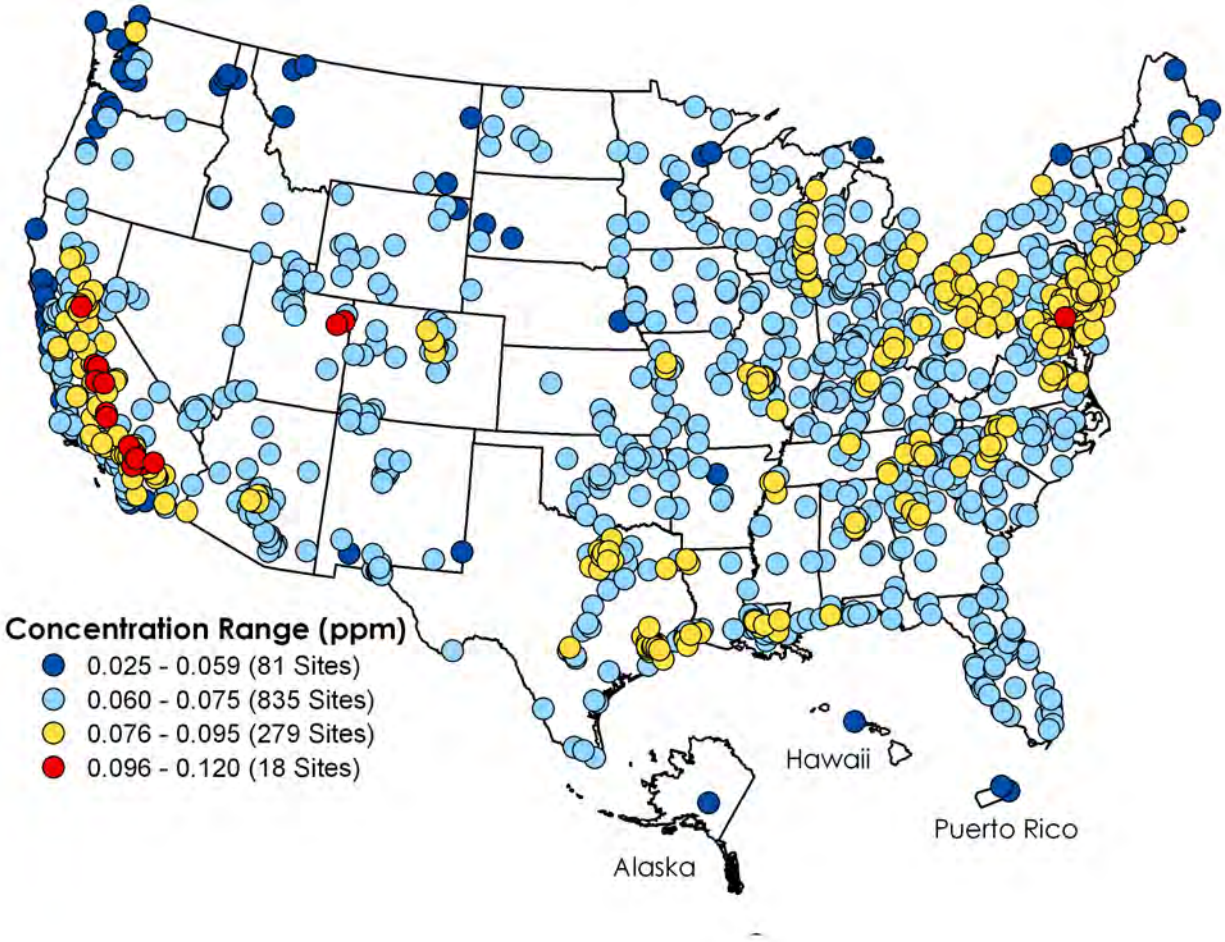

Figure 8. Ozone concentrations in ppm, 2010 (fourth highest daily maximum 8-hour concentration).

Weather Influences Ozone

In addition to precursor emissions, weather plays an important role in the formation of ozone. A large number of hot, dry days can lead to higher ozone levels in any given year, even if ozone-forming emissions remain unchanged. To better evaluate the progress and effectiveness of ozone precursor emission reduction programs, EPA uses a statistical model to estimate the influence of weather on ozone formation.

Figure 9 shows trends in average seasonal ozone levels from 2001 through 2010 across 180 selected sites, before and after adjusting for weather-related effects. For example, the summer of 2009 was characterized by cooler than normal conditions across much of the Eastern U.S., which contributed to less ozone formation and resulted in an upward adjustment to the ozone trend. By contrast, hot and dry conditions in the Eastern U.S. during the summer of 2010 contributed to more ozone formation, resulting in a downward adjustment to the ozone trend.

Both the observed and adjusted ozone trends are characterized by a large decrease in ozone in the Eastern U.S. between 2002 and 2004. This abrupt decline in ozone levels coincides with the large reduction in NOx emissions brought about by EPA's NOx SIP Call program which began in 2003 and was fully implemented in 2004. Removing the effects of weather confirms that ozone levels have continued to improve across the U.S. in recent years due to emission reduction programs.

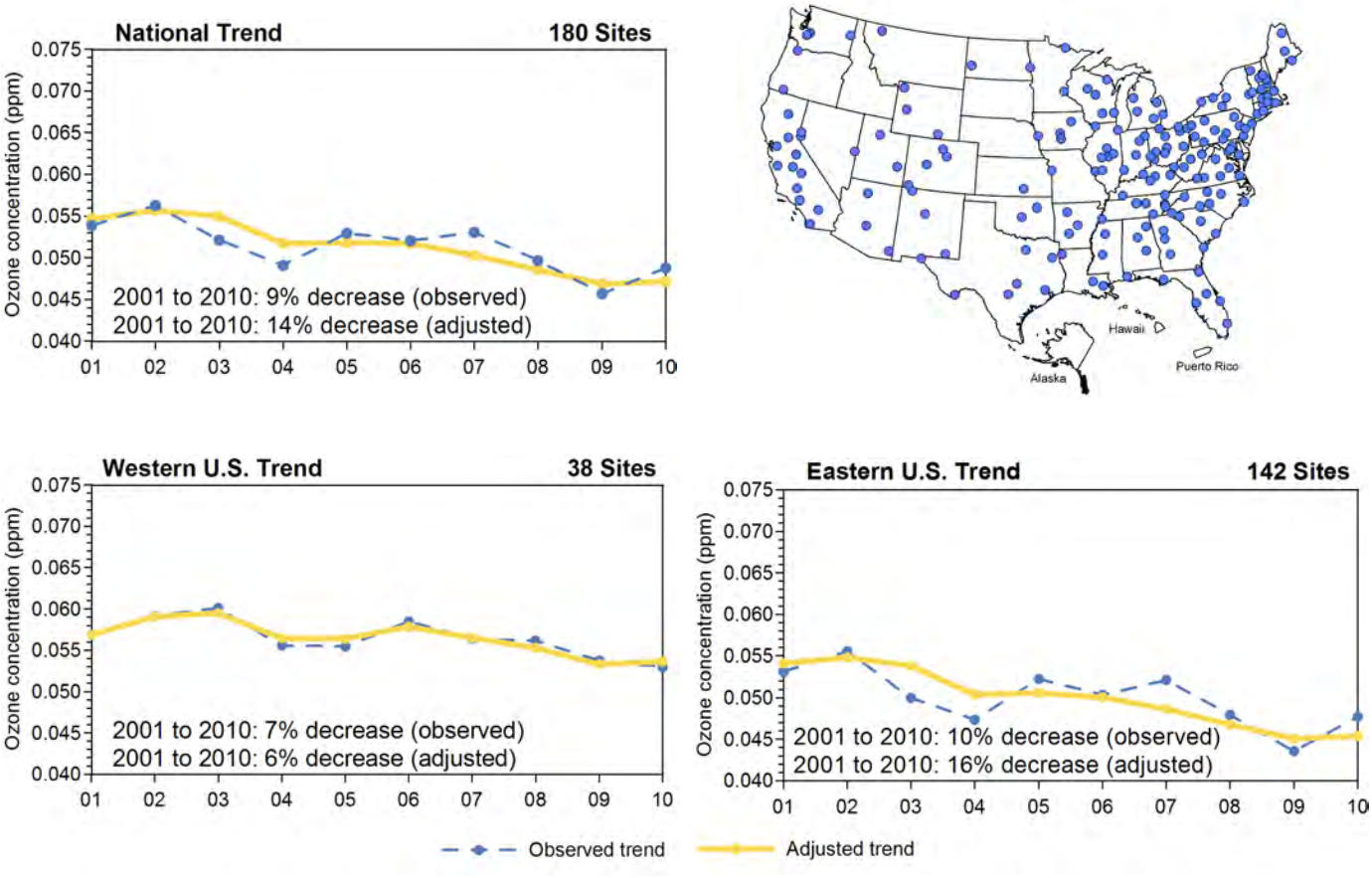

Figure 9. Trends in average summertime daily maximum 8-hour ozone concentrations in ppm (May-September), before and after adjusting for weather nationally, in western states, and in eastern states, (and the location of monitoring sites used in the averages).