

# Update on LADCO Activities

Michael Koerber

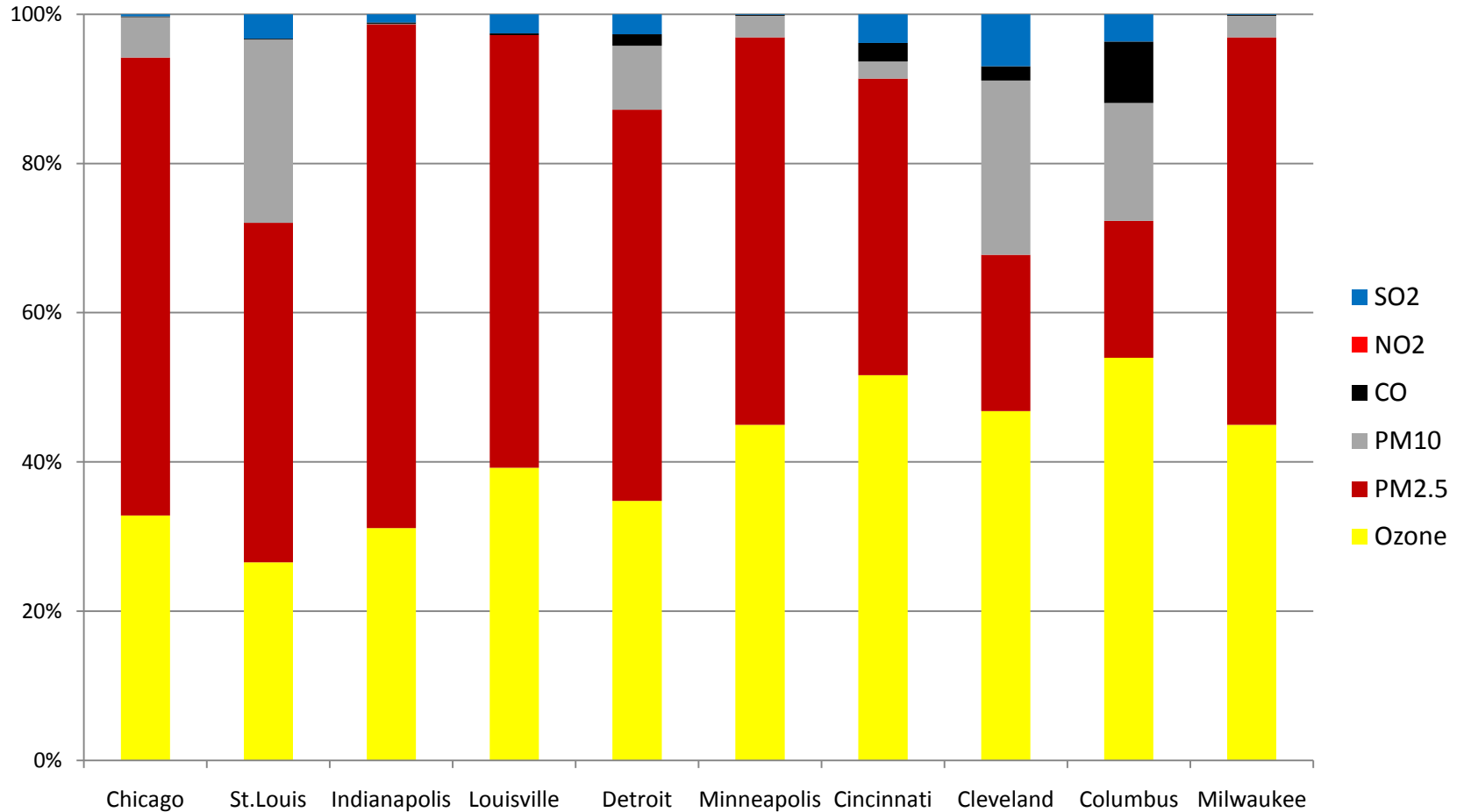
Lake Michigan Air Directors Consortium

October 26, 2010

# LADCO Priorities for FY2011

- Support development of state control plans for ozone, PM<sub>2.5</sub>, and regional haze
- Address other regional air quality issues
  - Support state monitoring, support multi-pollutant planning, and conduct energy-related project
- Provide forum for members to discuss air quality issues
- Support outreach efforts
  - Newsletter, website, and stakeholder meetings
- Organize and coordinate training

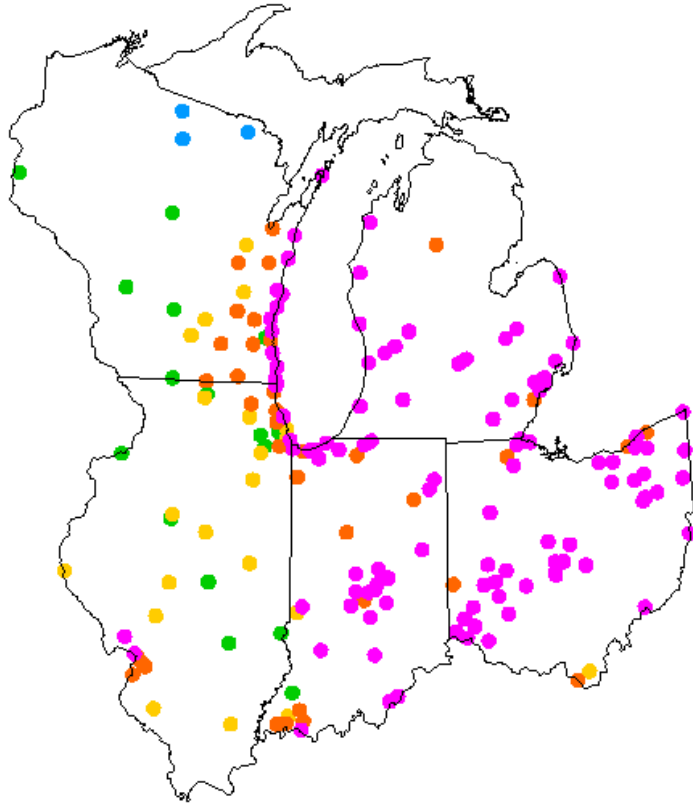
# Air Quality Index: Controlling Air Pollutant



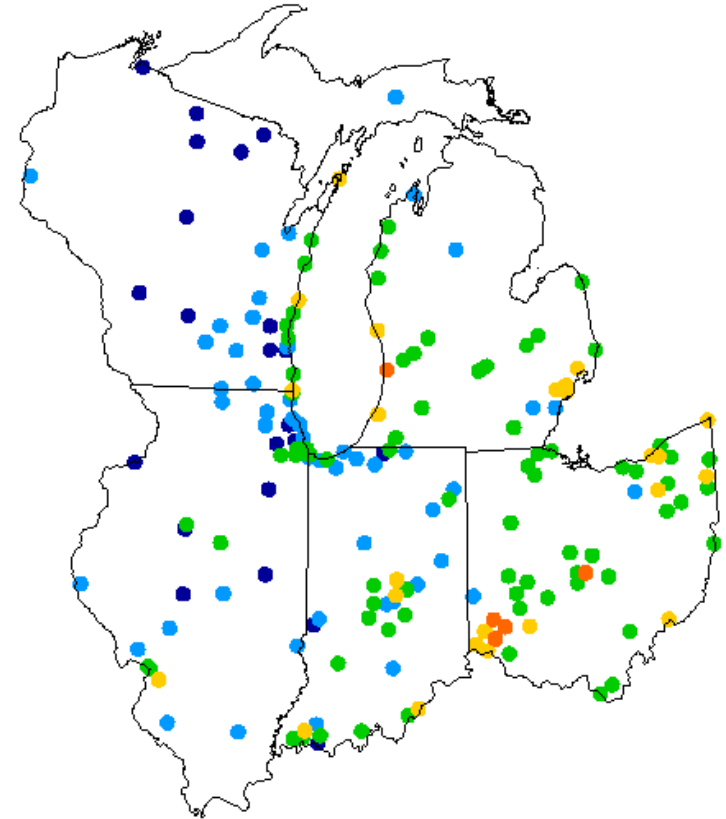
# Ozone

# Ozone Design Values: 8-Hour

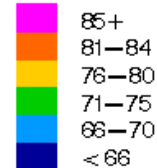
2001-2003



2007-2009



DV, in ppb

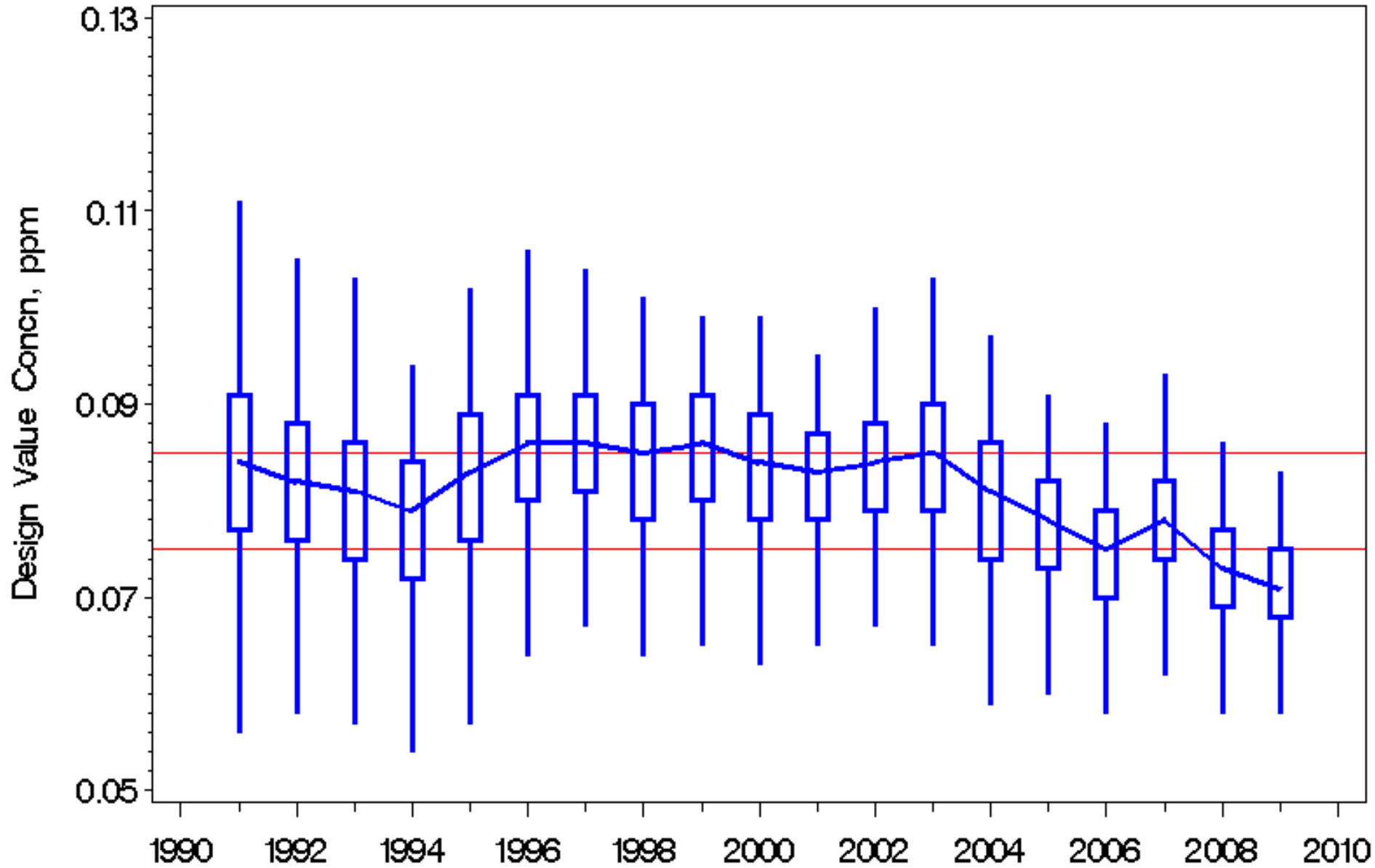


# sites > NAAQS

'01-'03 183

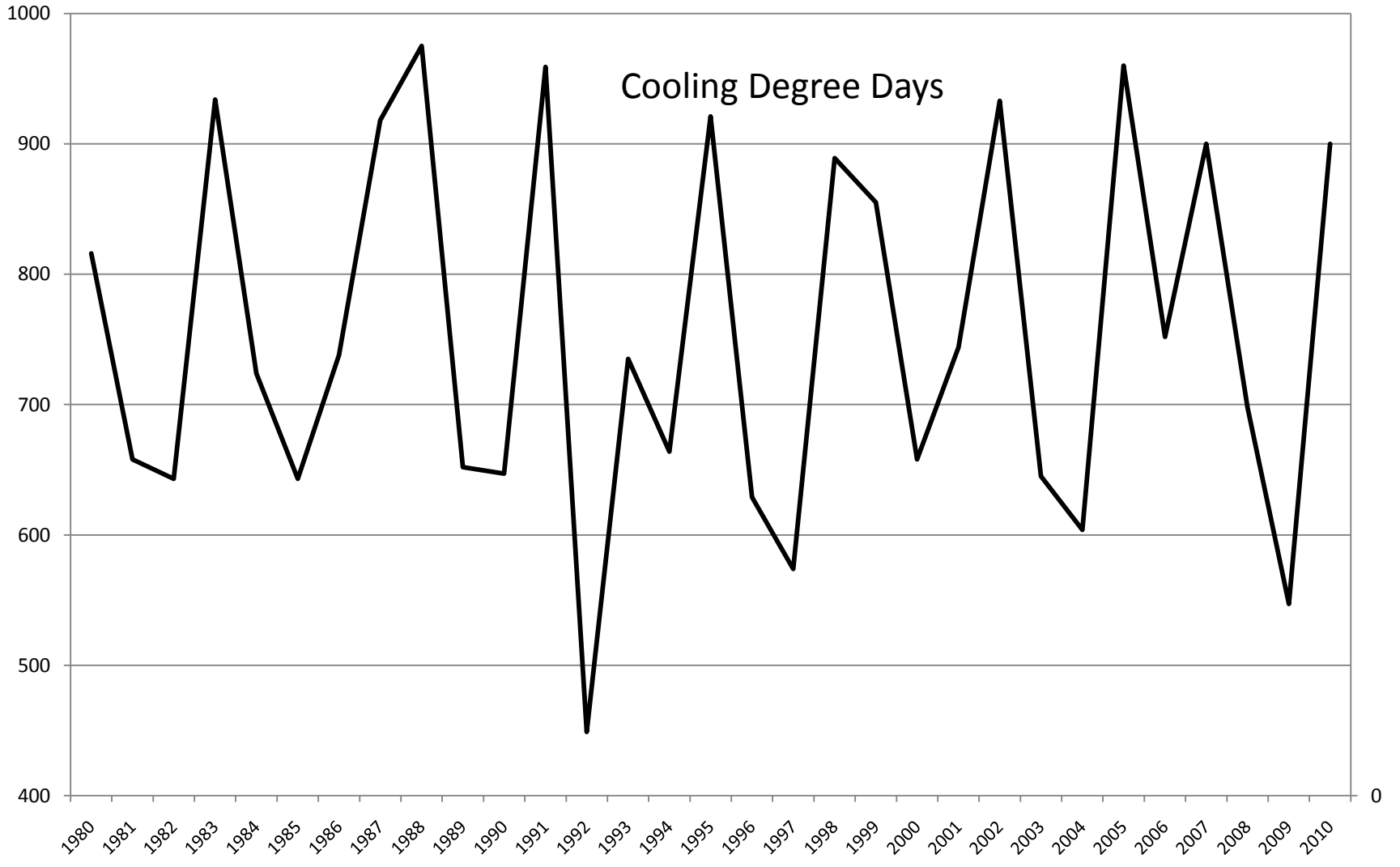
'07-'09 29

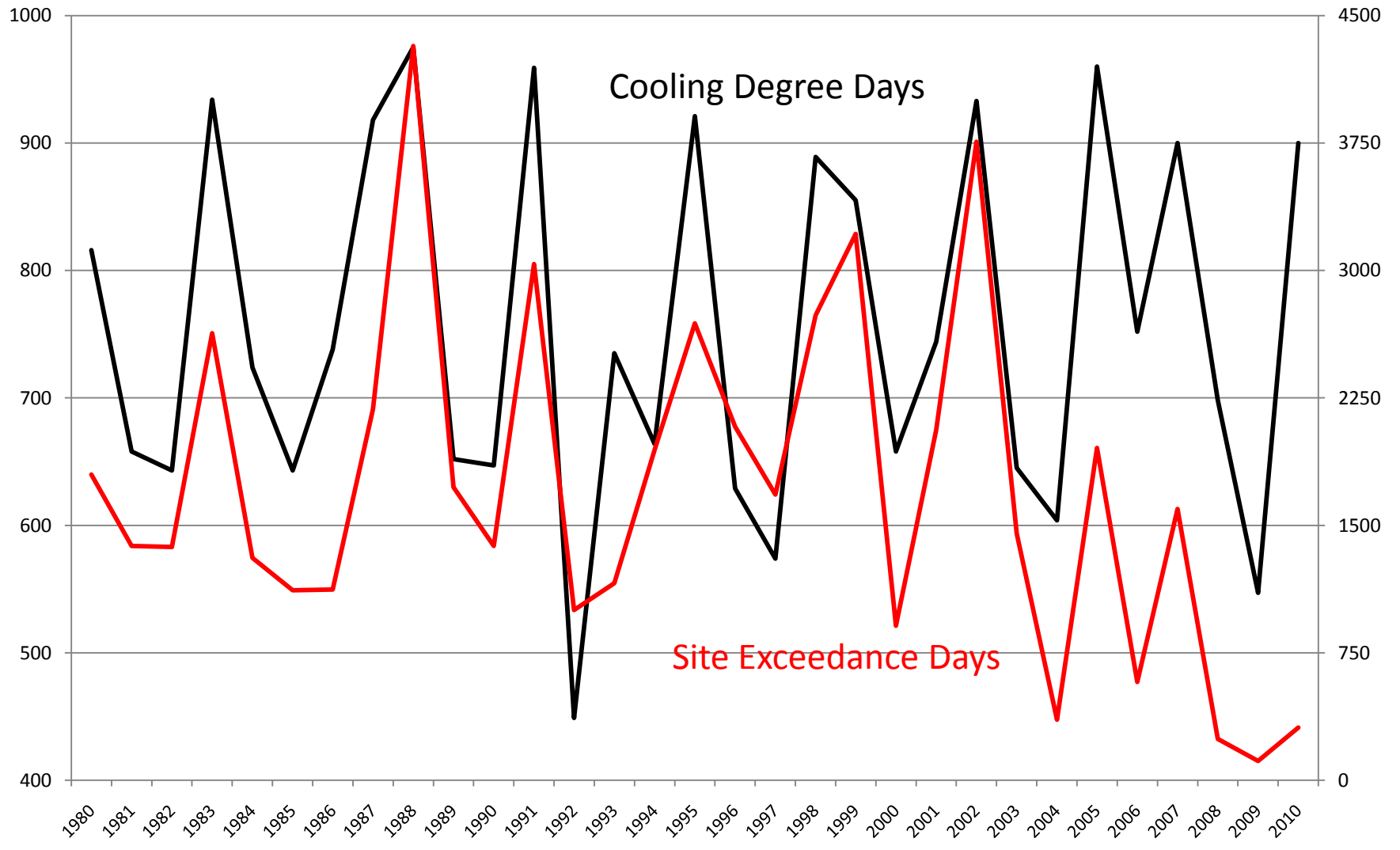
# Ozone Air Quality Trends



Design value plotted by end year of 3-year period.

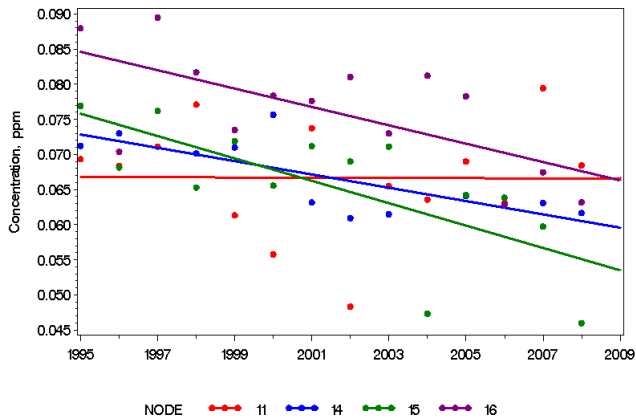
# Cooling Degree Days



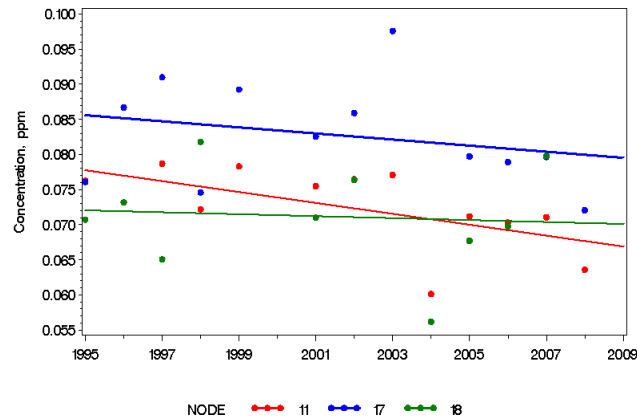


# Meteorologically-Adjusted Ozone Trends

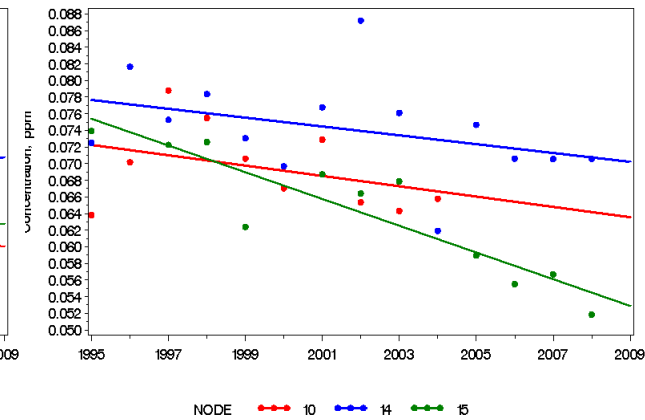
## Chicago



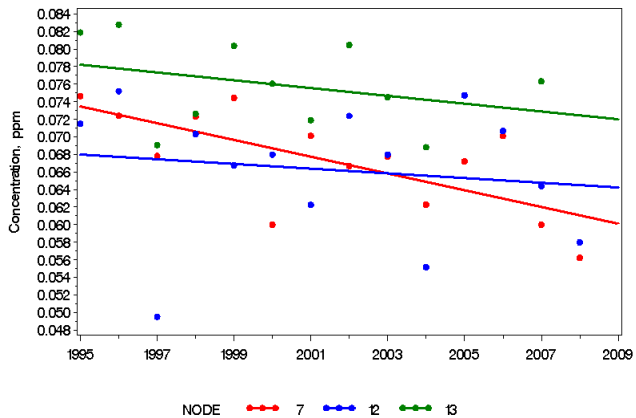
## Detroit



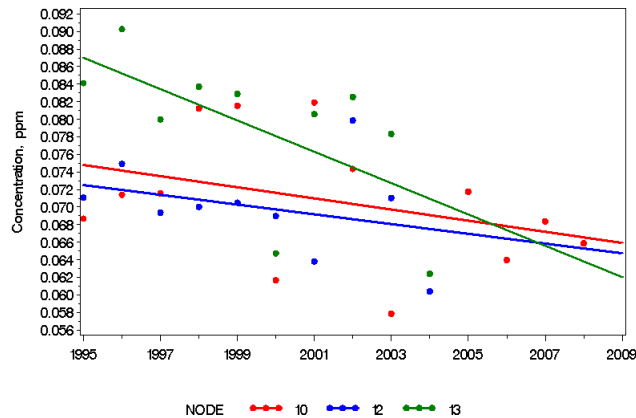
## Cleveland



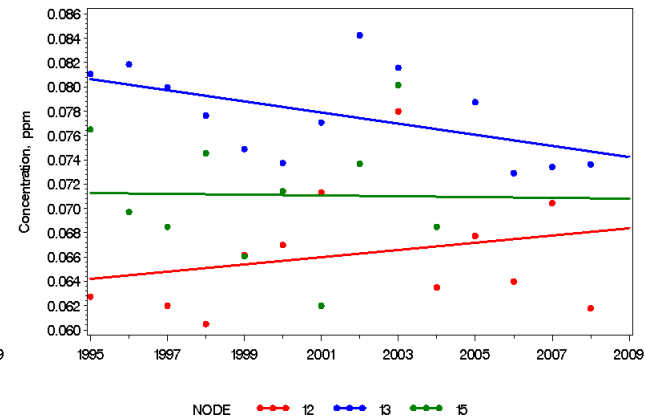
## St. Louis



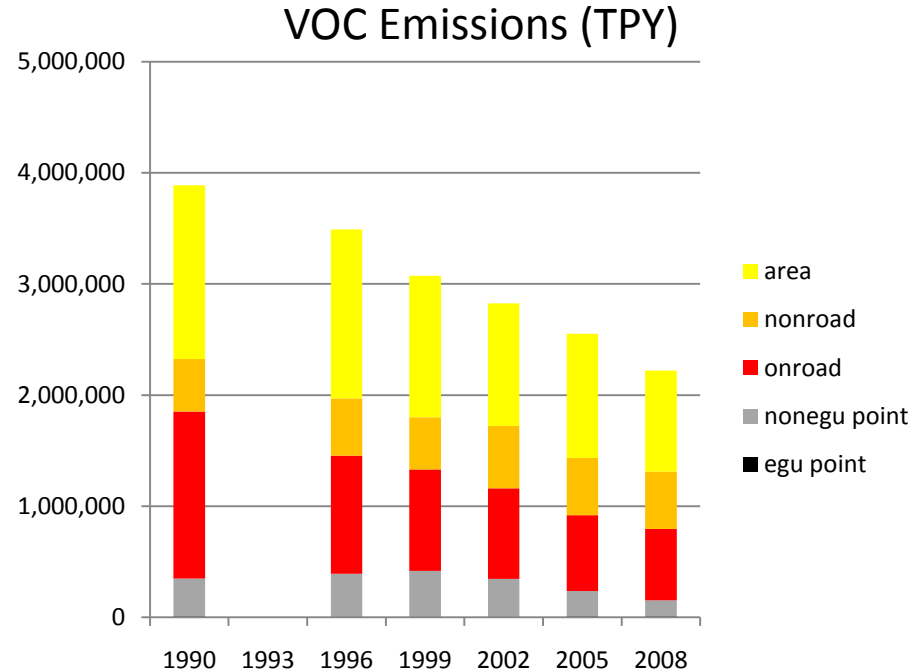
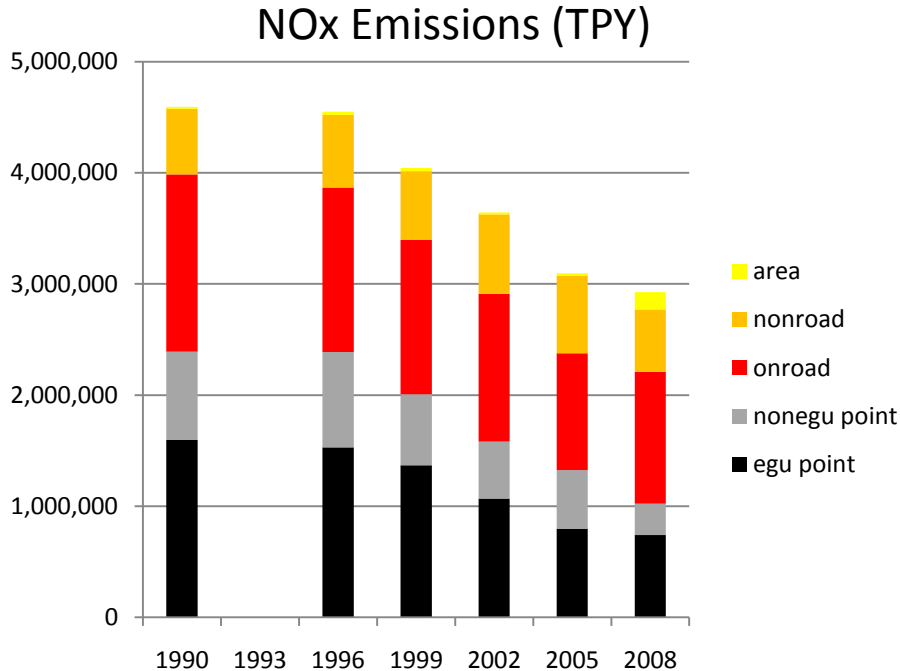
## Indianapolis



## Cincinnati



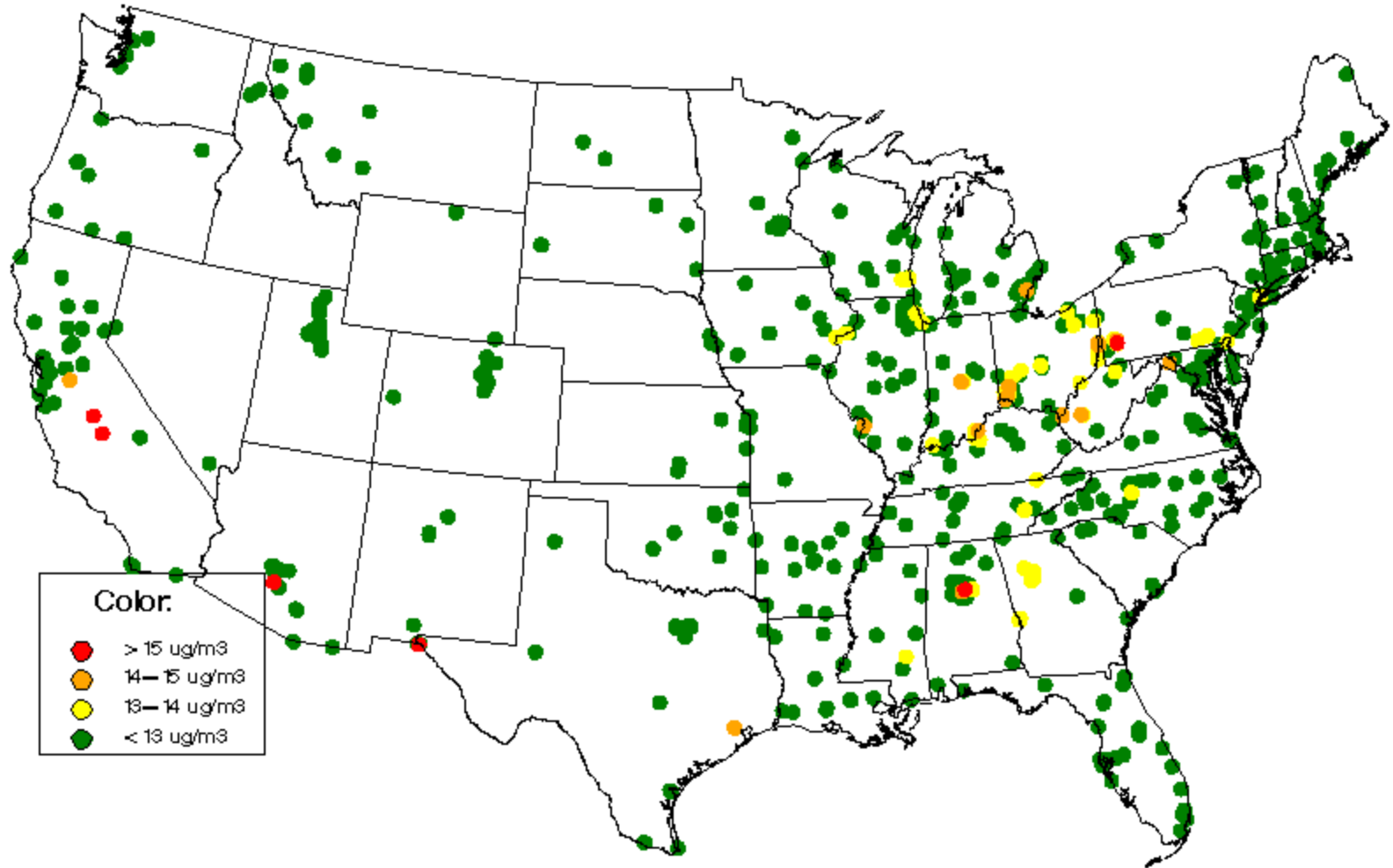
# Why is ozone getting better?



*Emission totals for 5-state LADCO region based on NEI (1990-2005) and draft LADCO 2008*

PM<sub>2.5</sub>

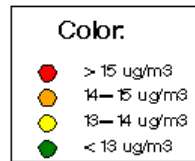
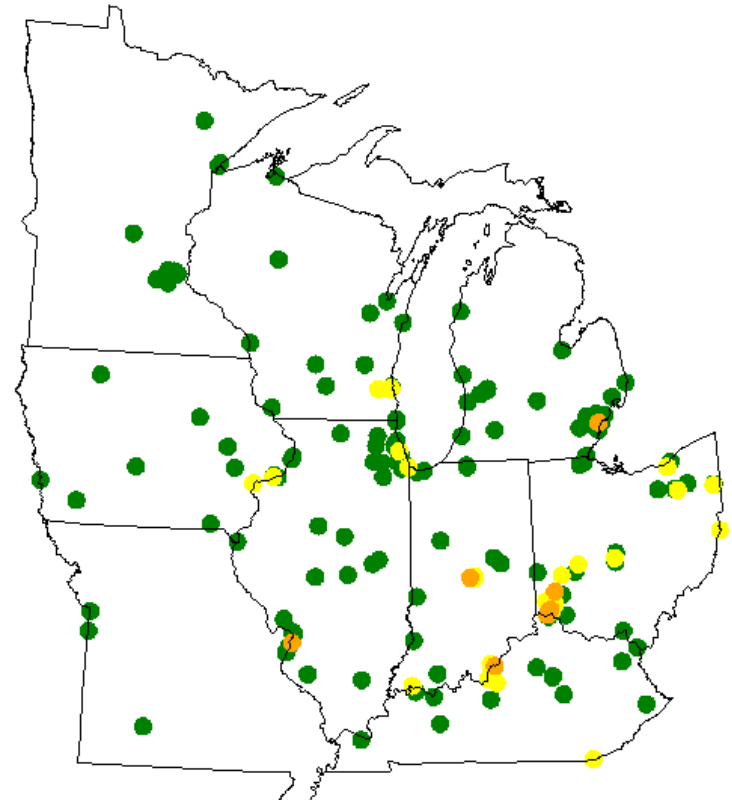
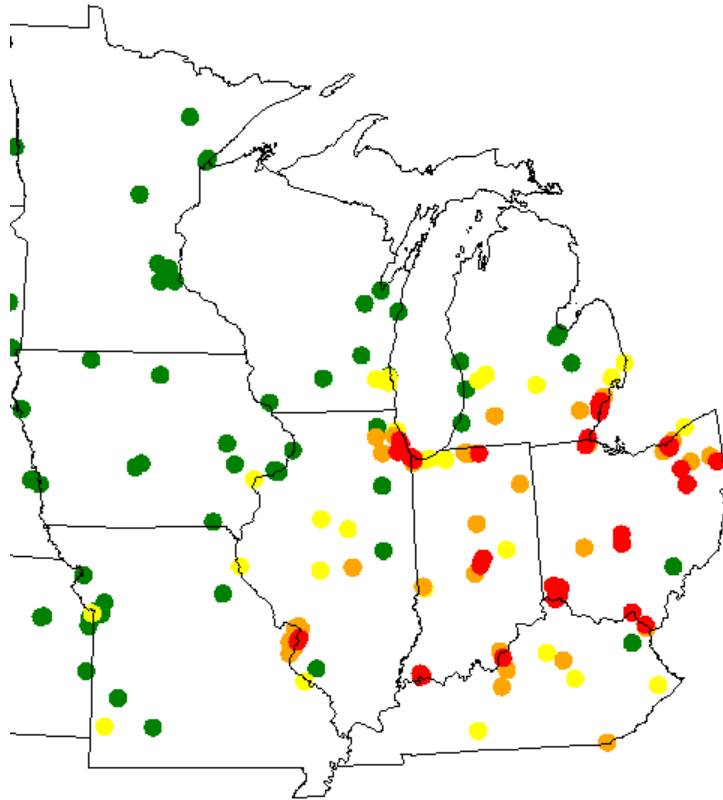
# PM2.5 FRM Annual Design Values, 2007–2009



# PM<sub>2.5</sub> Design Value: Annual Standard

2001-2003

2007-2009

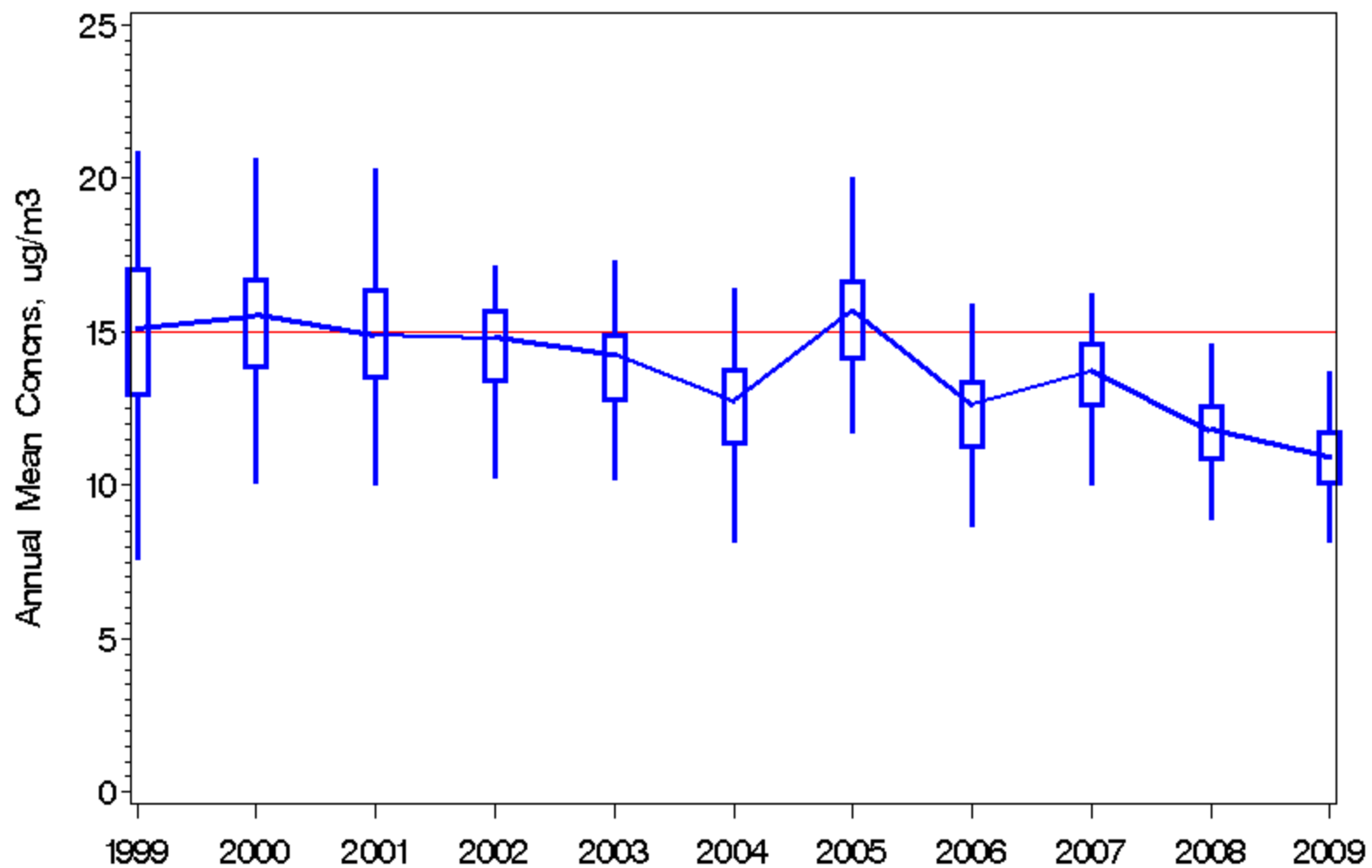


# sites > NAAQS

'01-'03 66

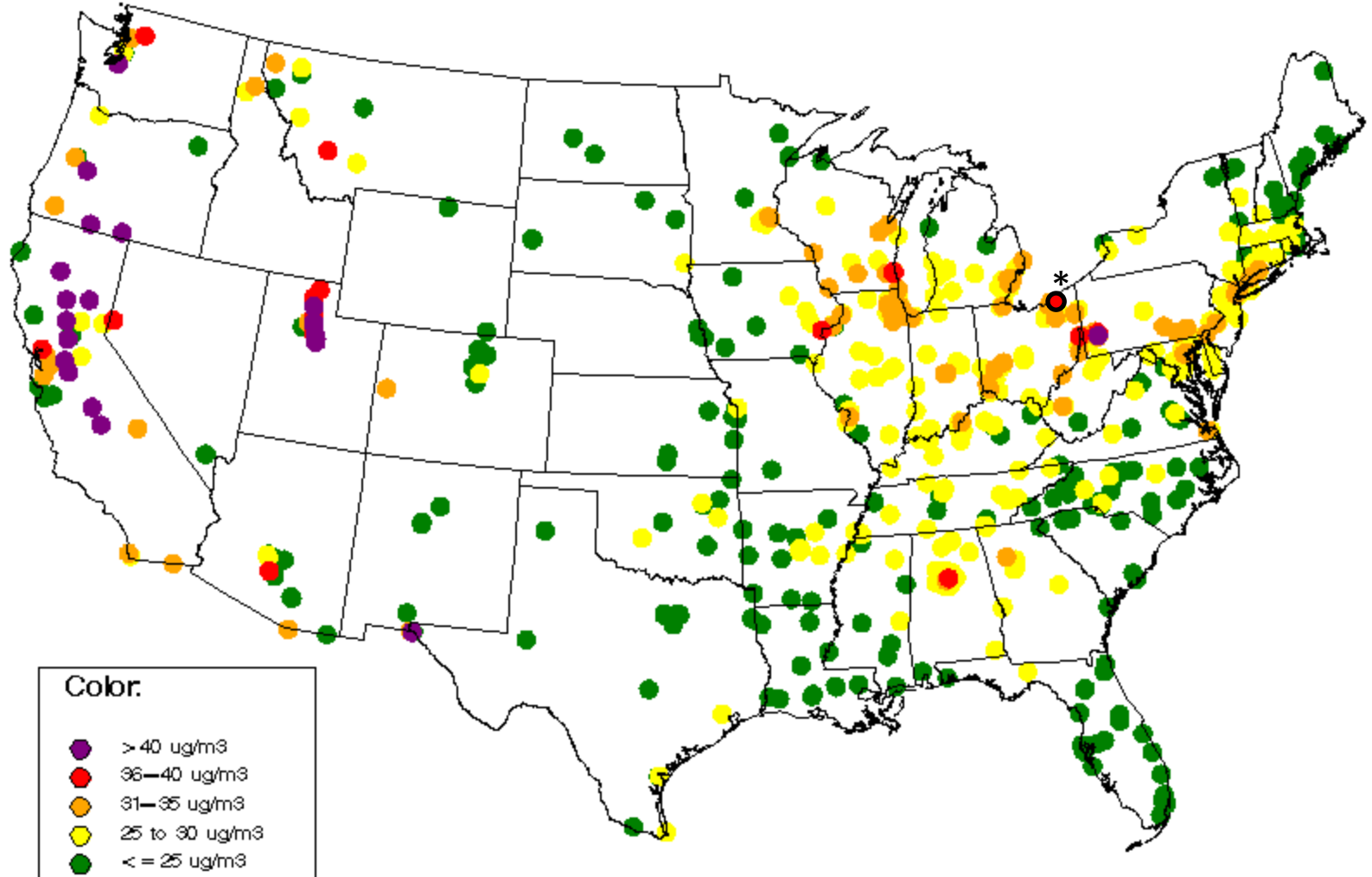
'07-'09 0

## PM2.5 Annual Mean Trends, Midwest States, 1999–2009



Trends for monitors with at least 8 years of data

# PM2.5 FRM 98th Percentile Concentration, 2007–2009

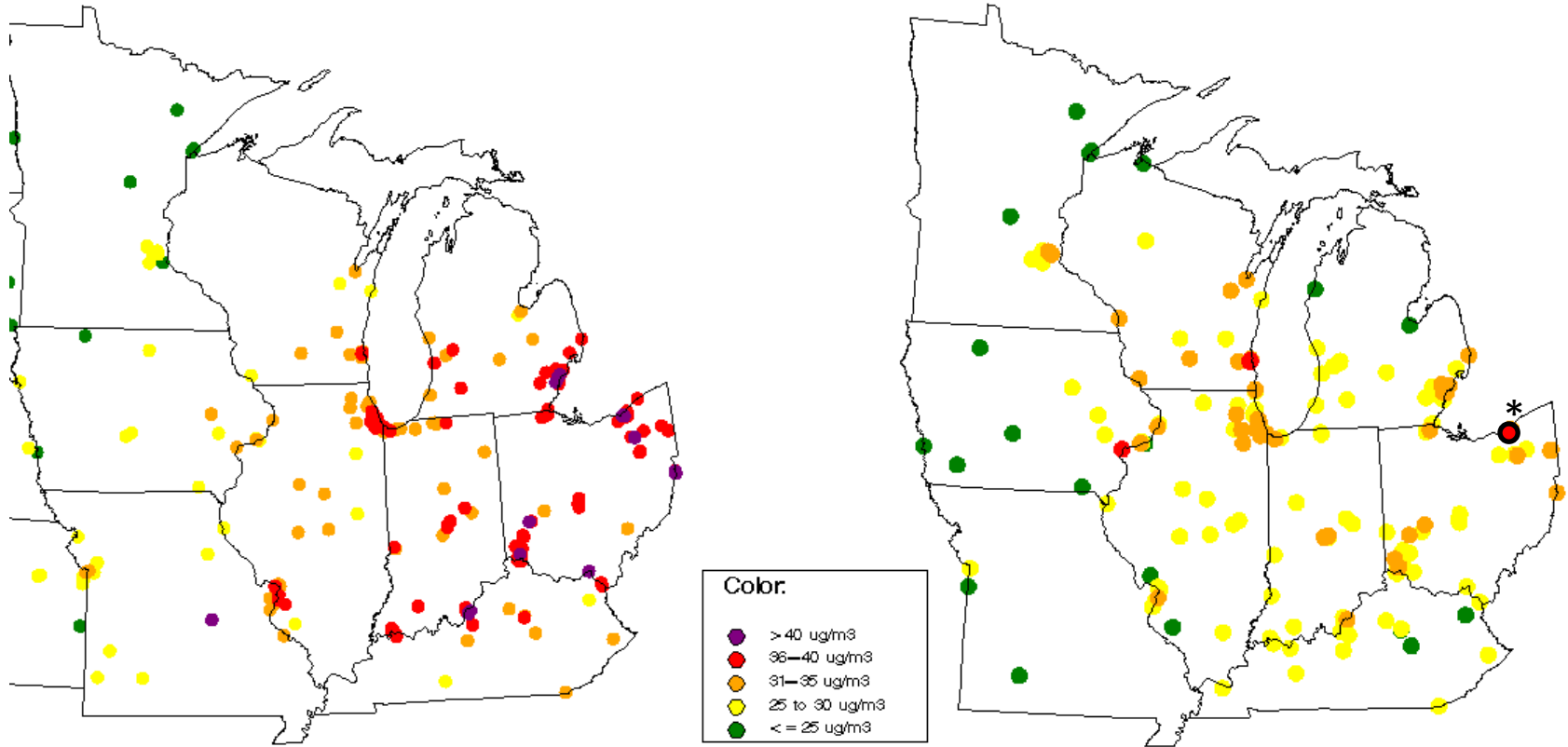


\* = d.v. > 35 ug/m<sup>3</sup>, but incomplete data

# PM<sub>2.5</sub> Design Value: Daily Standard

2001-2003

2007-2009



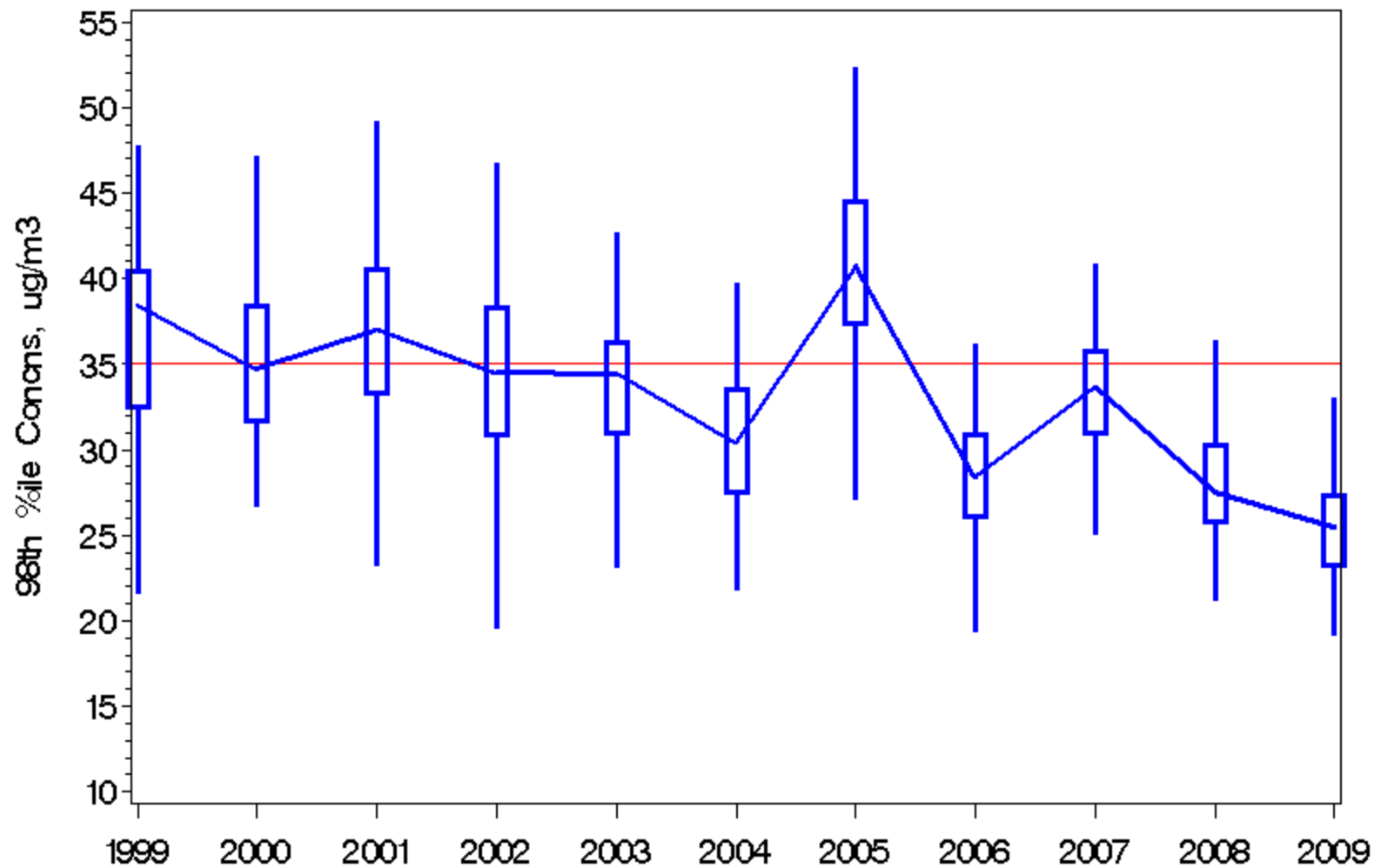
\* = d.v. > 35 ug/m<sup>3</sup>, but incomplete data

## # sites > NAAQS

'01-'03 88

'07-'09 4

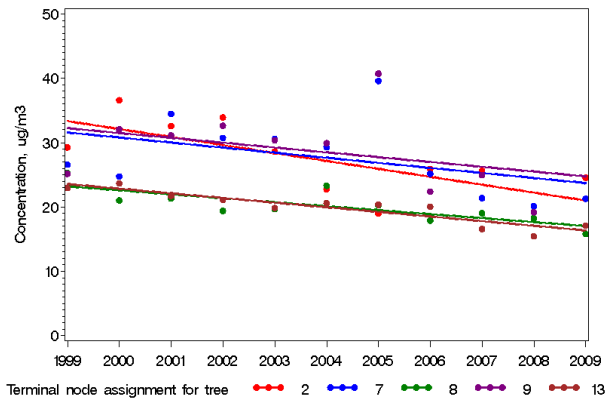
## PM2.5 98th Percentile Trends, Midwest States, 1999–2009



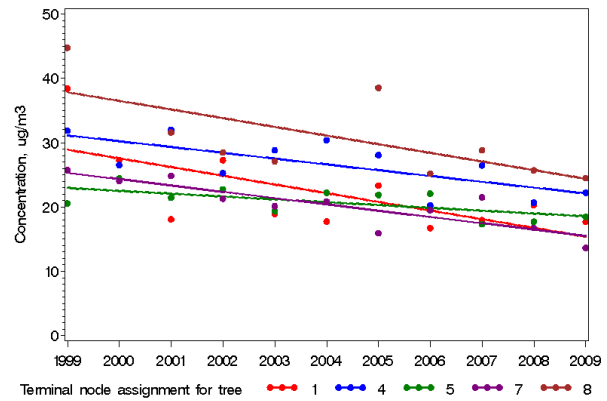
Trends for monitors with at least 8 years of data

# Meteorologically-Adjusted PM<sub>2.5</sub> Trends

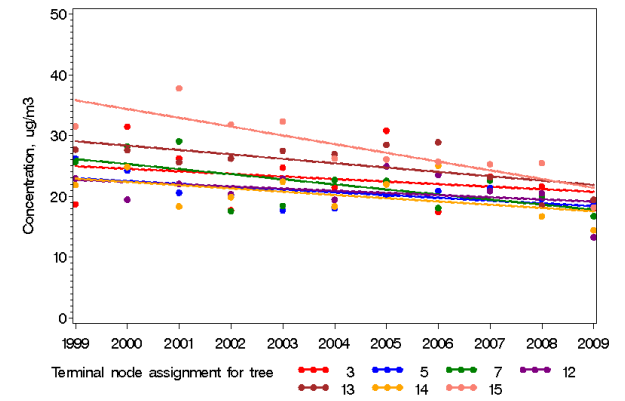
Chicago



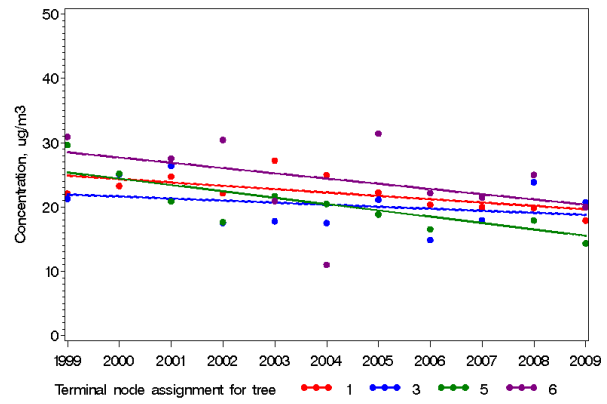
Detroit



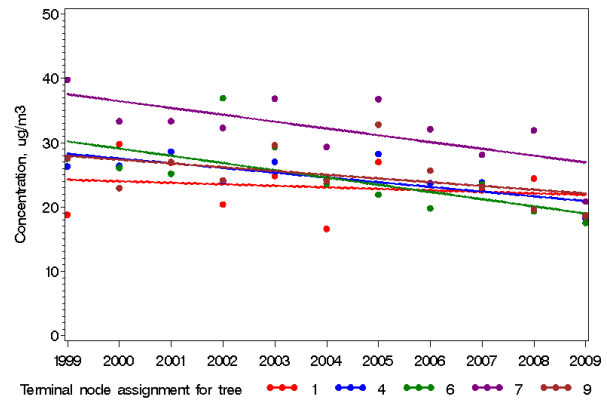
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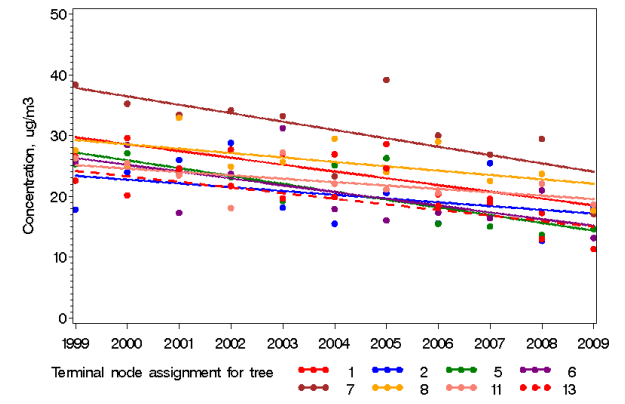
St. Louis



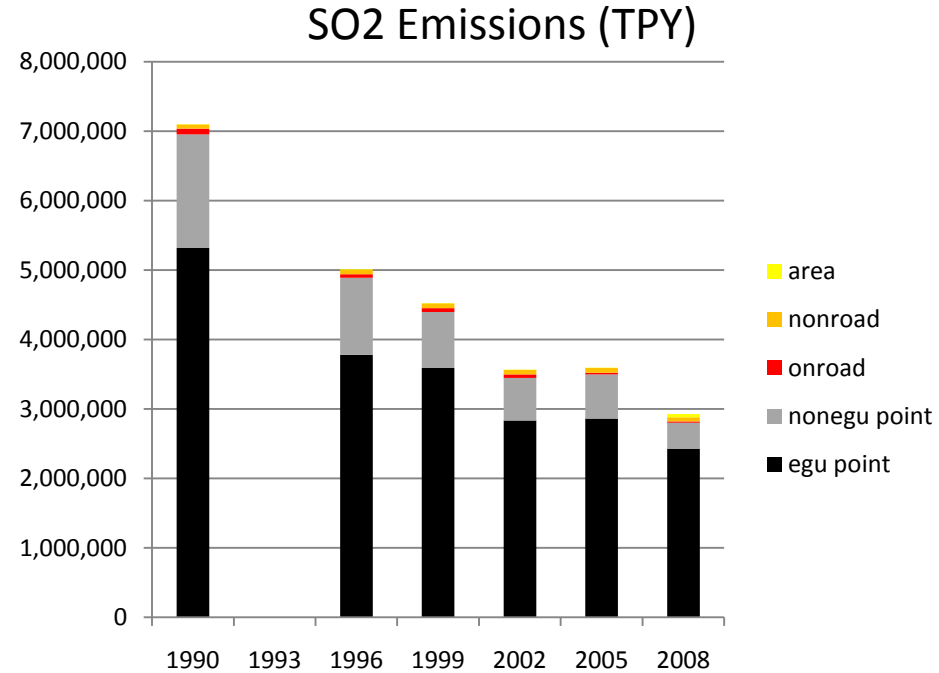
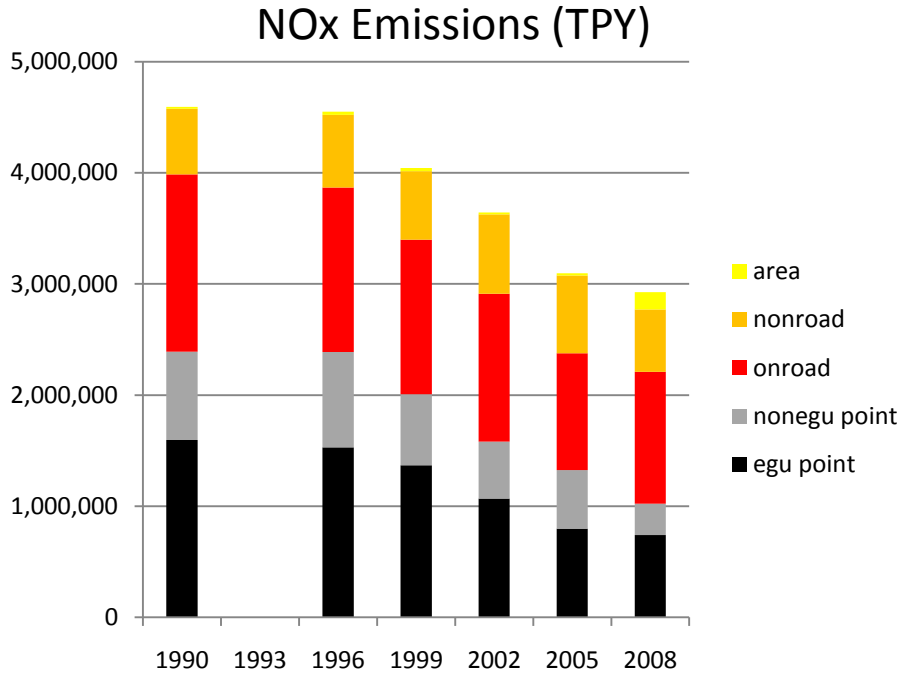
Indianapolis



Cincinnati



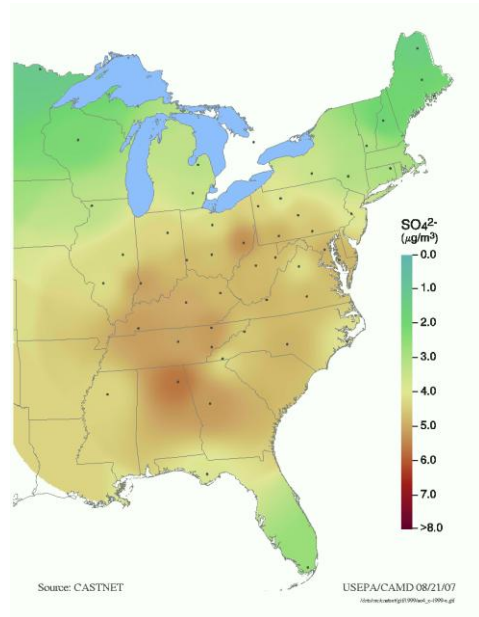
# Why is PM<sub>2.5</sub> getting better?



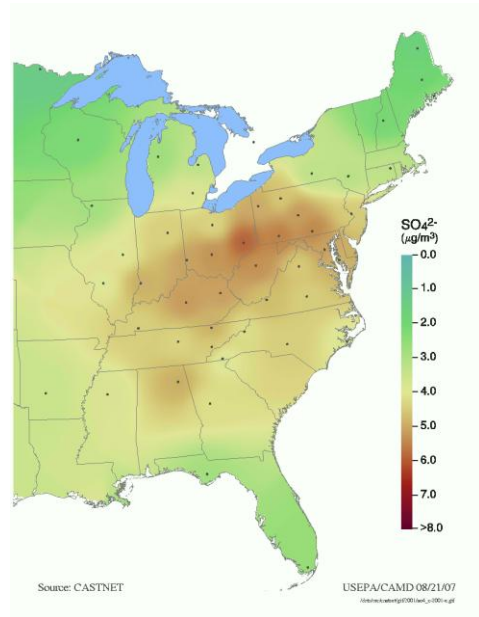
*Emission totals for 5-state LADCO region based on NEI (1990-2005) and draft LADCO 2008*

# Particulate Sulfate

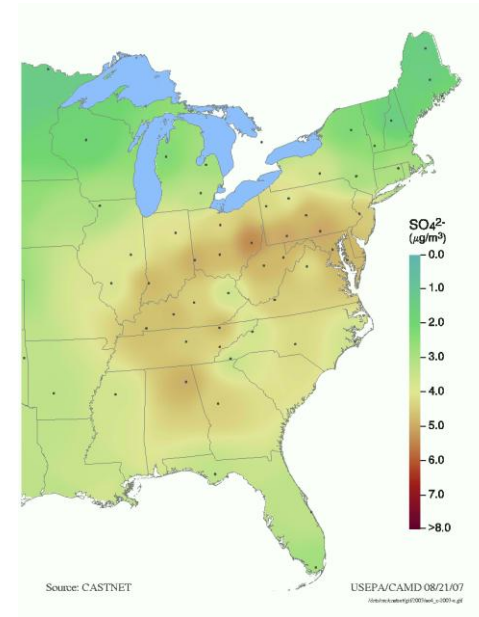
1999



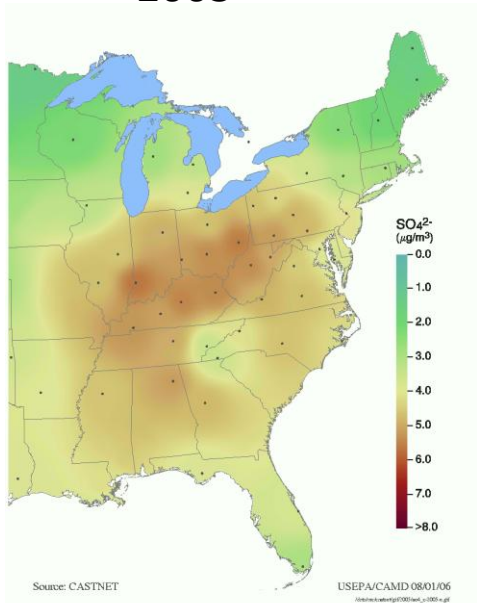
2001



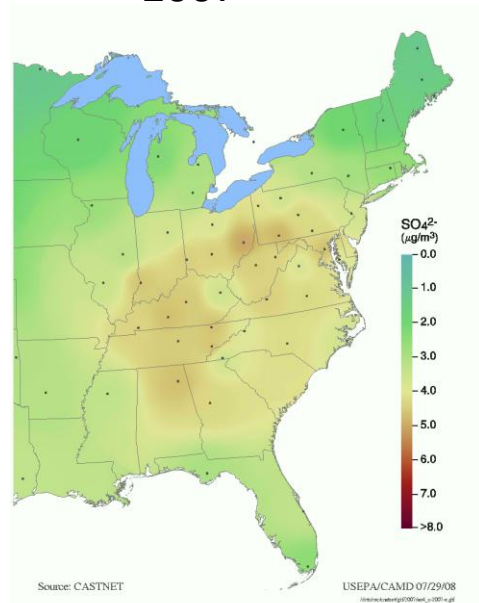
2003



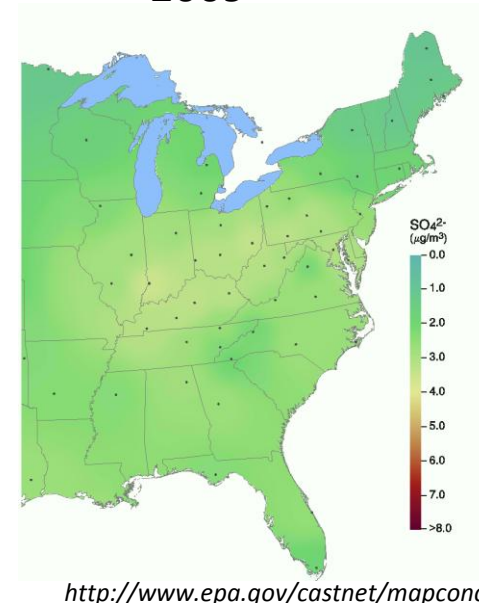
2005



2007

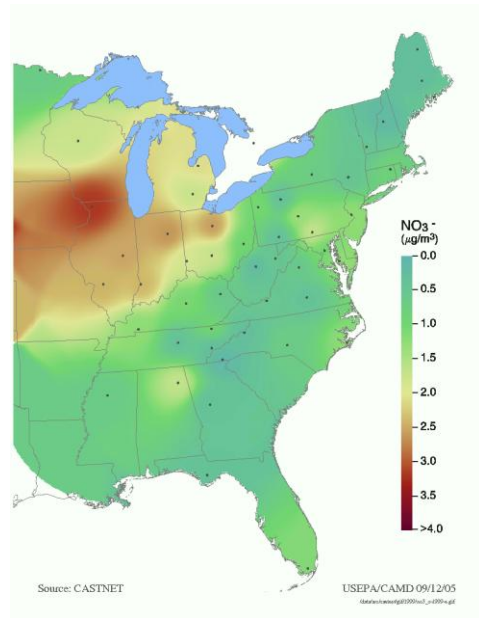


2009

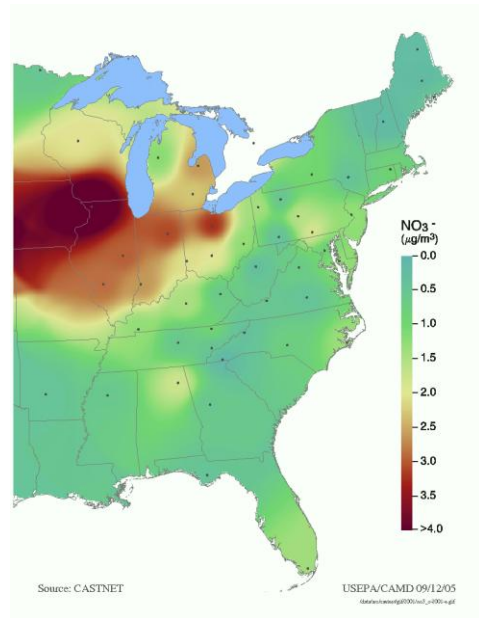


# Particulate Nitrate

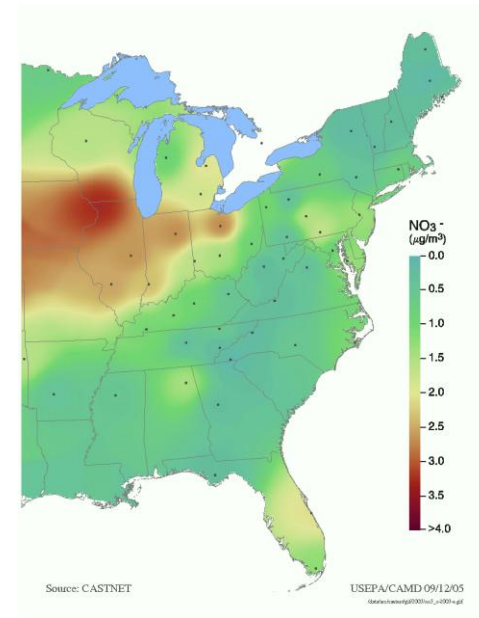
1999



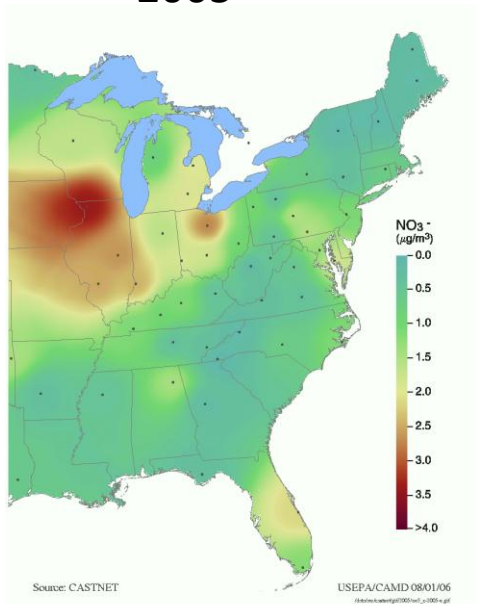
2001



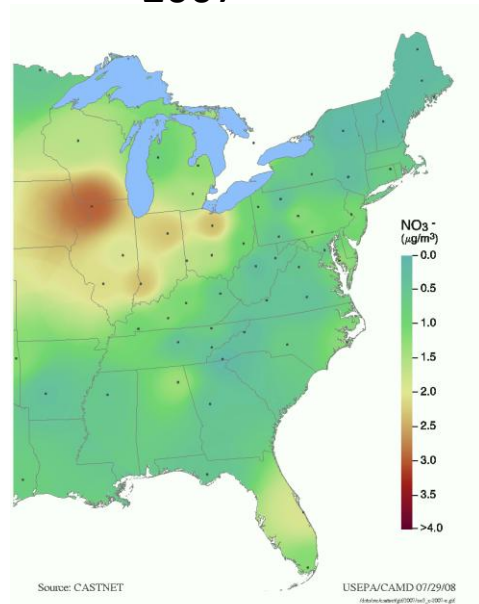
2003



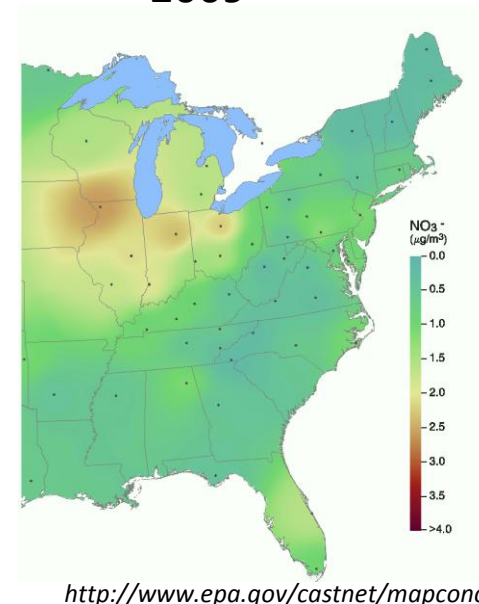
2005



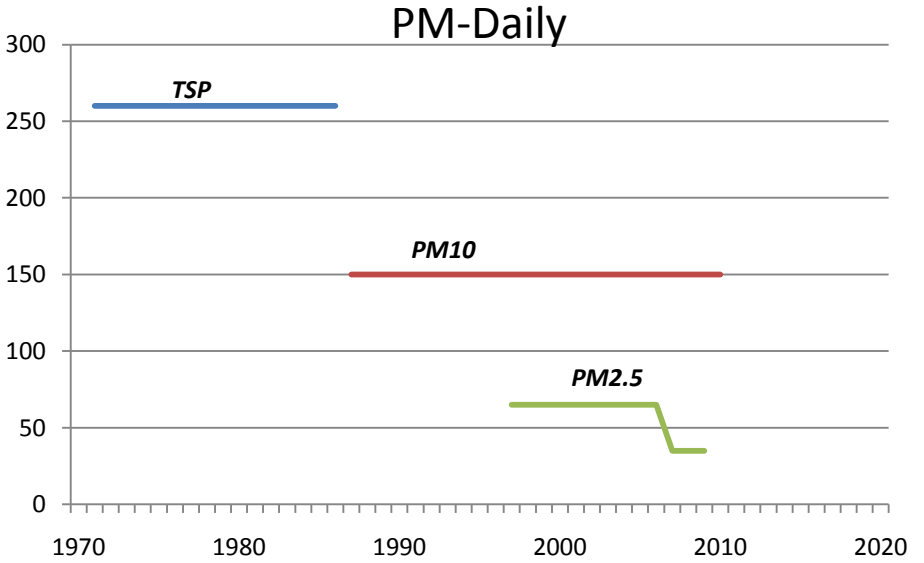
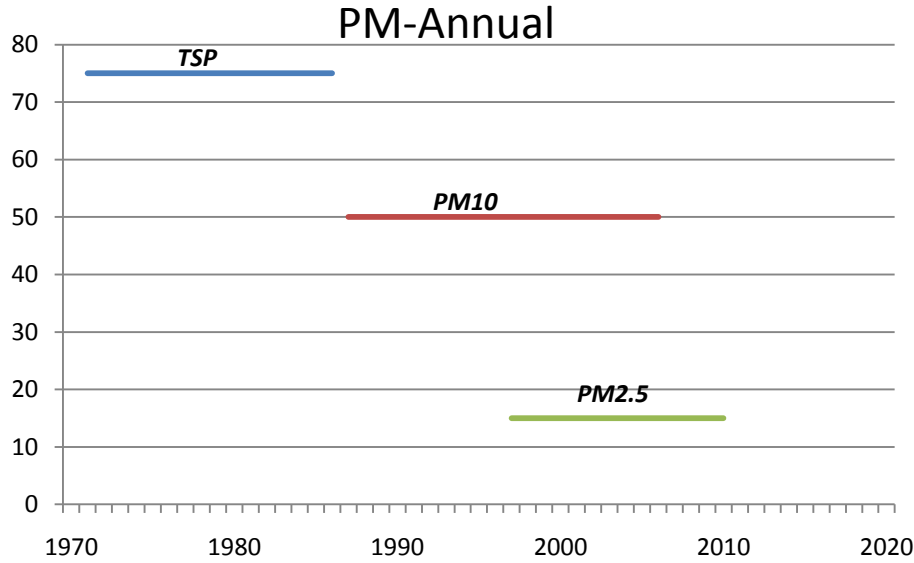
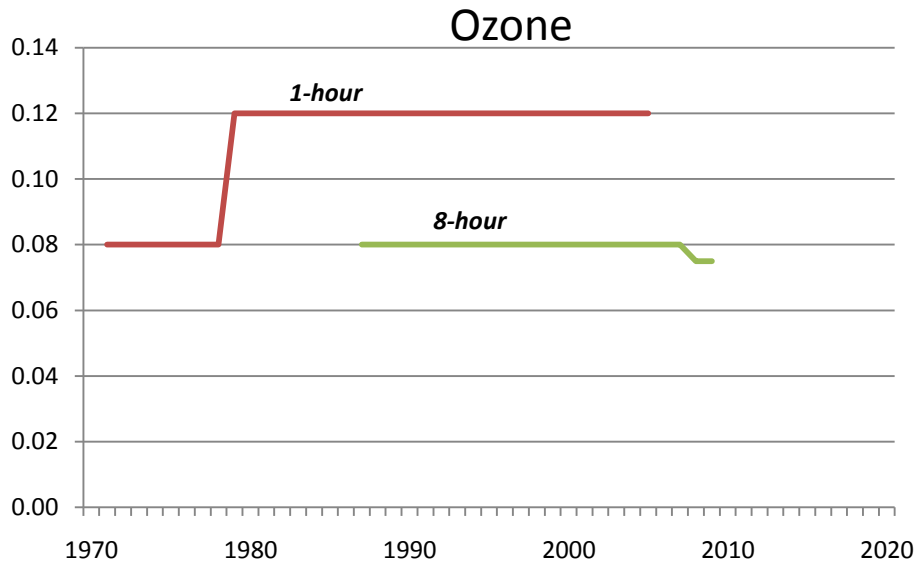
2007



2009



# History of NAAQS for Ozone and PM



# Strategy Development

- Planning
  - Technical assessments – conceptual models, photochemical modeling, special monitoring studies (wintertime PM<sub>2.5</sub>, organic carbon)
  - Evaluate and identify effective control programs
- Action
  - Adopt and implement control plan
  - Track progress - improve state/local monitoring programs (better precursor monitoring)

# Conceptual Model: Data Analyses

- Basic description of air quality problem
  - Current conditions and spatial, temporal, and chemical variation
- Assess meteorology (what role does meteorology play in high pollution events?)
- Source apportionment analyses (what can we say about contributing sources?)
  - CMB and PMF
  - Back trajectories
- Assess effectiveness of emission reductions (what can we say about emission reduction strategies?)
  - Observation-based methods
  - Trends

# New Photochemical Modeling

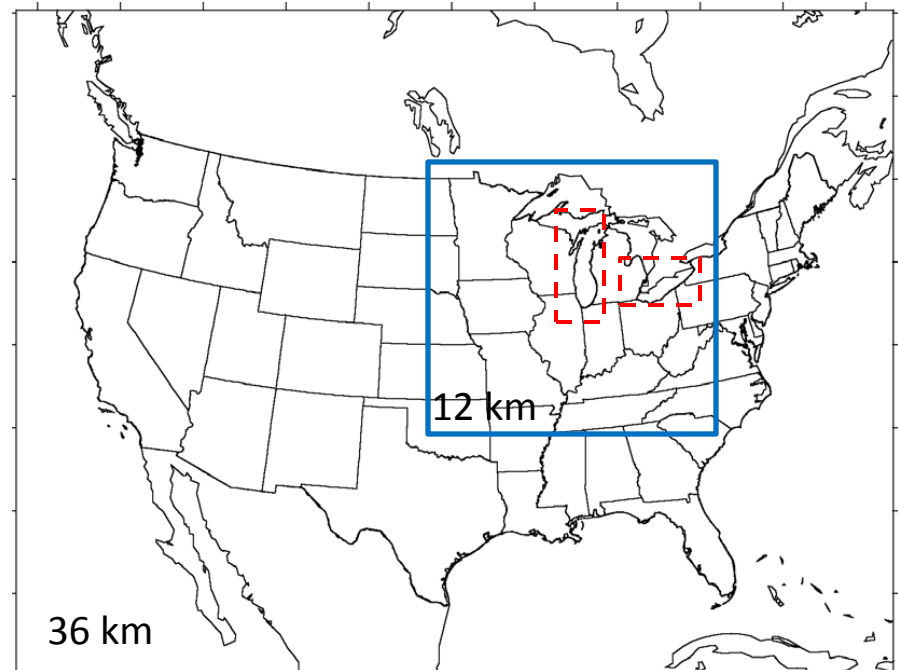
Model: CAMx (and CMAQ)

Domain/Grid: U.S./Canada  
(36 km), Midwest (12 km),  
Lake Mich/Det/Clev (4 km)

Meteorology: 2007, 2008

Base Year: 2007/2008 (emissions)

Future Years: 2014, 2017?, 2020?,  
2025-2030



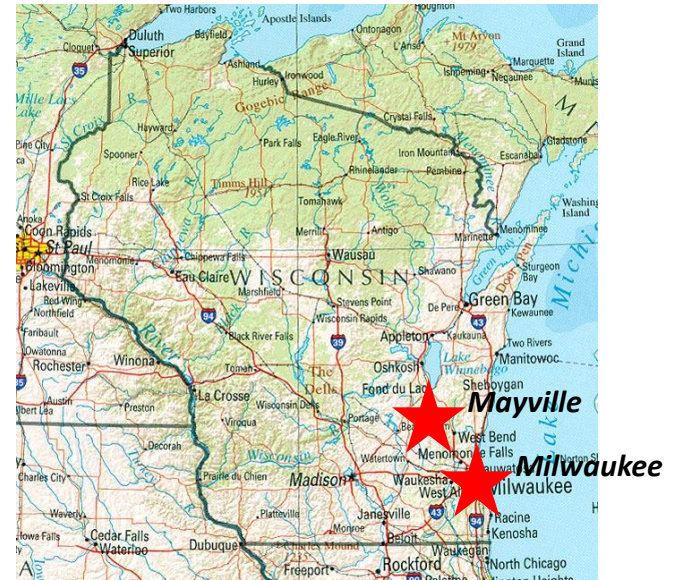
# Winter Nitrate Study

Purpose: Improve understanding of role of emissions (NO<sub>x</sub> and ammonia) and meteorology in winter PM<sub>2.5</sub> episodes

## Tasks

(1) Sampling: Collect continuous measurements of NH<sub>3</sub>, HNO<sub>3</sub>, NO<sub>y</sub>, sulfates, and nitrates at two sites in Wisconsin (December 2008 – March 2009) - *done*

(2) Data Analysis: Examine spatial and temporal relationships of ammonia and particulate nitrate, and assess relative effectiveness of reductions in ammonia and nitric acid on PM<sub>2.5</sub> – *on-going*



# Weight of Evidence Approach

- Conceptual model
  - Ambient data analyses to assess current conditions, data variability (spatial, temporal, and chemical), influence of meteorology, precursor sensitivity, and source culpability
- Photochemical modeling
  - Investigative analyses (source culpability, sensitivity analyses)
  - Assess effectiveness of candidate control programs (model-based projections, attainment test)
- Ambient data analyses (including special monitoring studies)
  - Source contribution (back trajectories, receptor modeling)
  - Important pollutants (thermodynamic equilibrium modeling)
  - Strategy effectiveness (emissions-monitoring data based projections)
- Putting it all together
  - Is a given area likely to attain (by attainment date) with current (“OTB”) controls?
  - If not, then what additional measures (pollutant, source sector, source region, level of control) will be most effective?
  - Will the proposed SIP measures be sufficient to provide for attainment (by attainment date)?