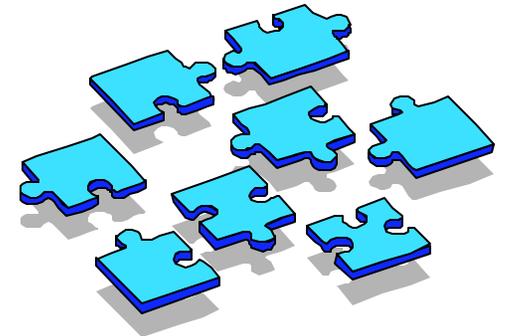
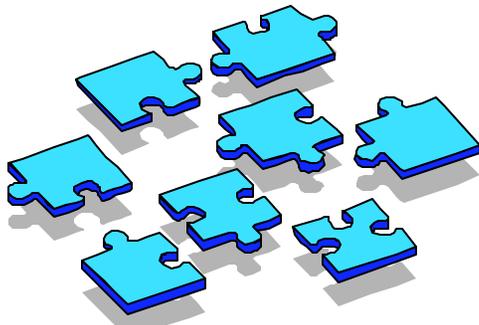


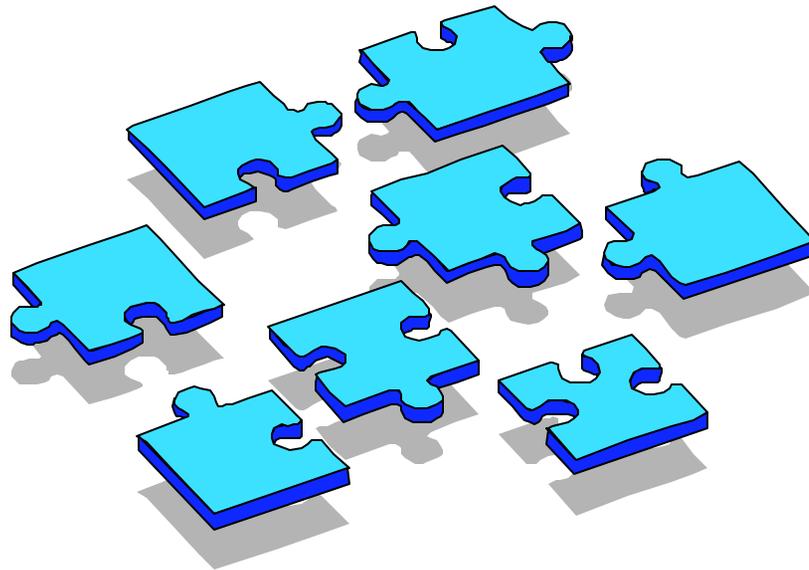
Region 5 Network Assessment

**Air Monitoring Section
Air and Radiation Division
Region 5**



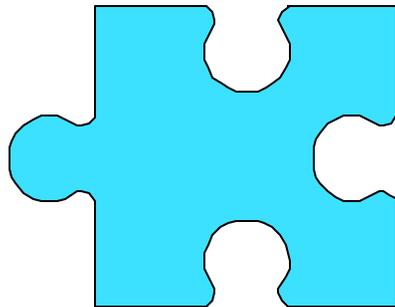
Region 5 PM_{2.5} Network

"Top-Down" Assessment



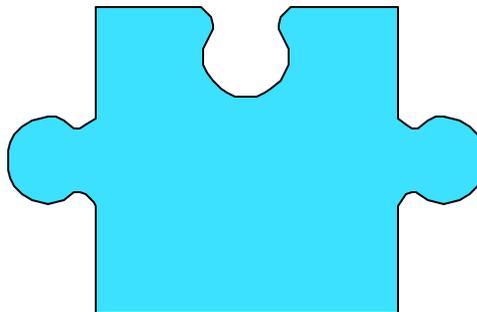
Purpose of PM_{2.5} Network Assessment

- Identify low value and high value PM_{2.5} monitoring sites
- Provide States with informational support for their own proposed network redesign
- Complement national network assessment by providing finer local-scale resolution

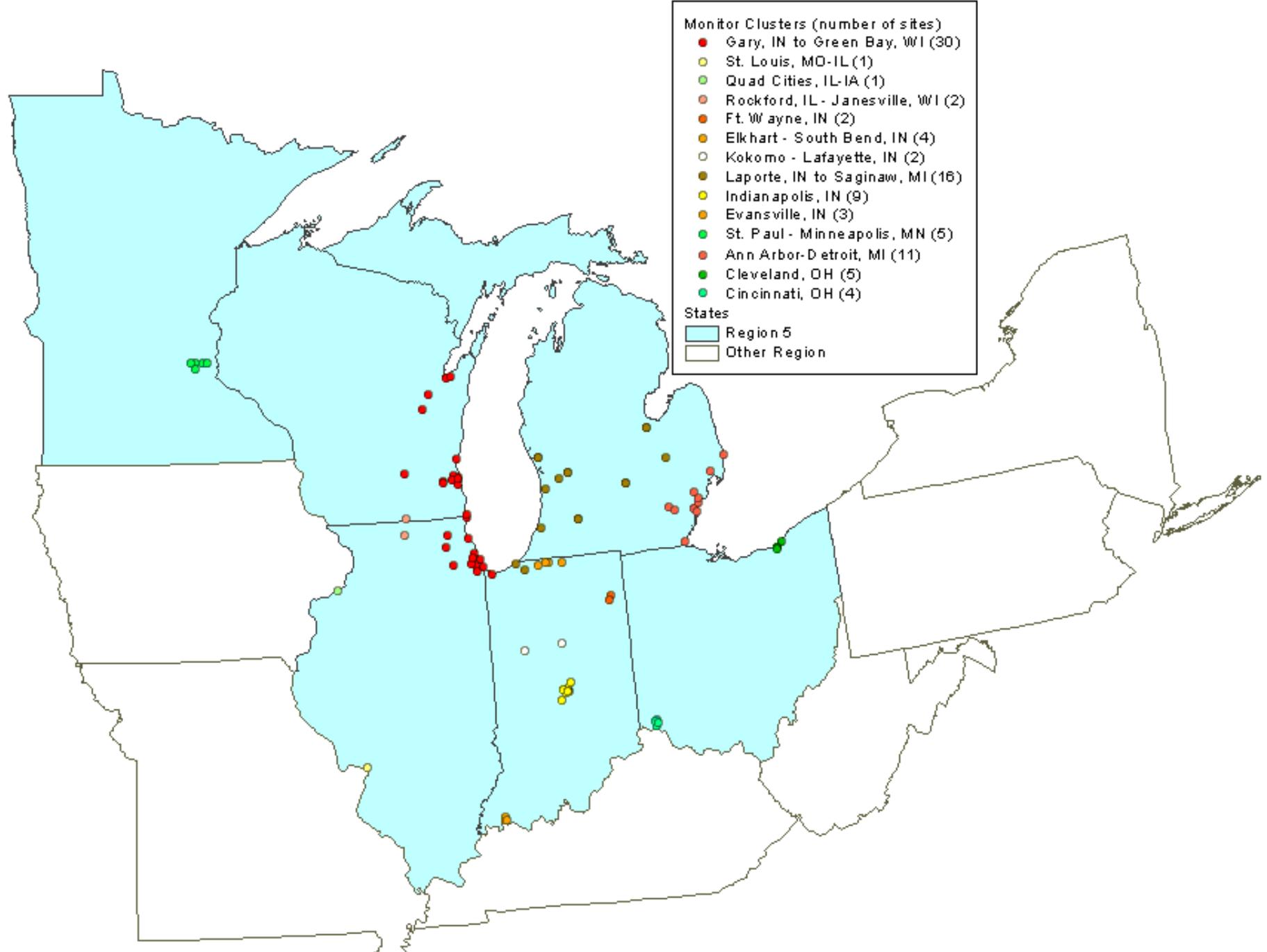


Data Evaluated

- In June 2001, AMS polled all available AIRS data for FRM PM_{2.5} monitoring sites in Region 5 and bordering states. We summarized site information, created a site map, calculated summary statistics, and performed correlation analysis.



Region 5 PM25: Clusters of Monitors with $R > 0.95$



Monitor Evaluation Criteria

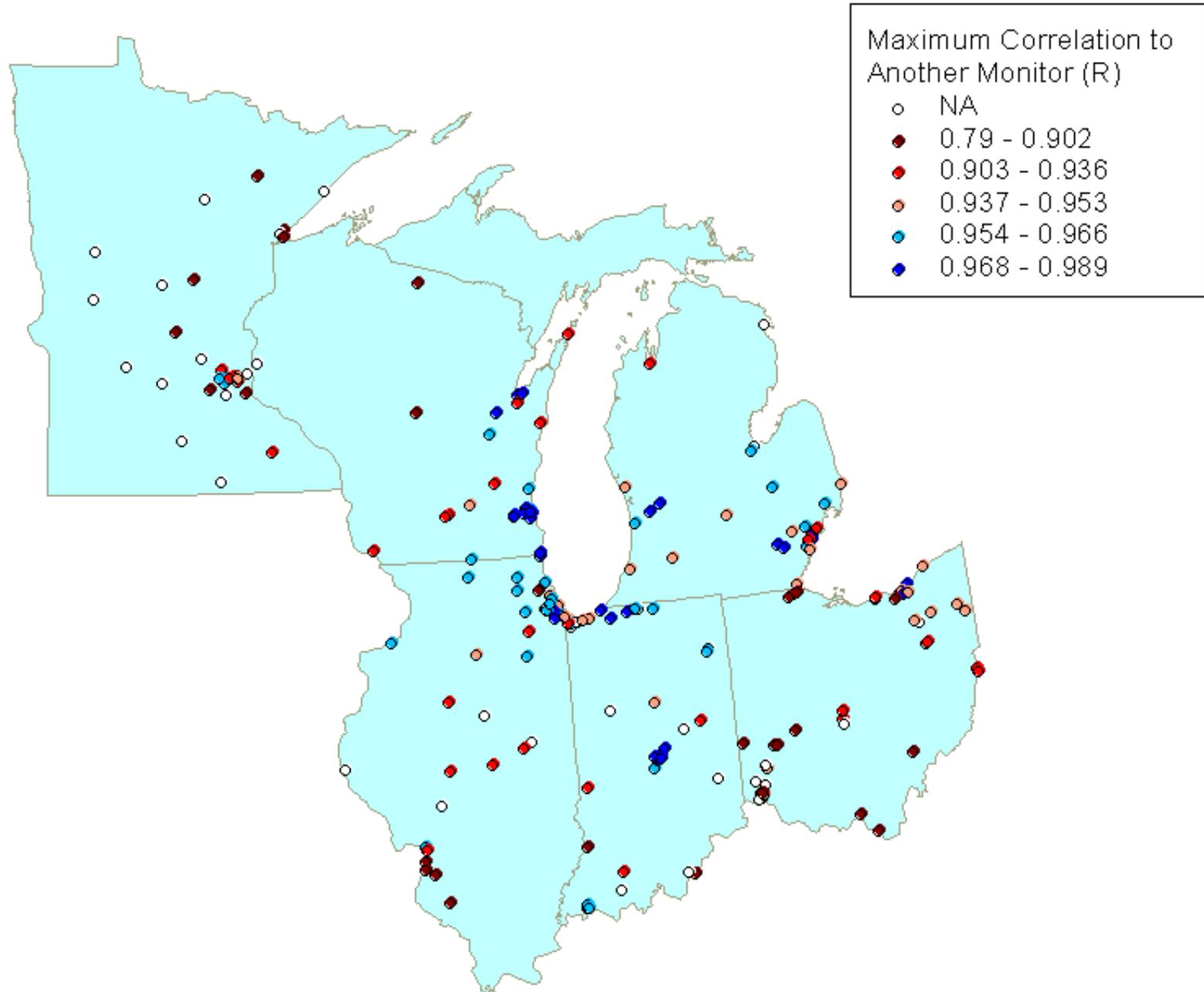
- We evaluated Region 5 PM_{2.5} monitors on the basis of four decision criteria:
 - correlation
 - monitor density
 - mean concentration
 - population change
- The "least value" monitor would be one highly correlated to others ($R^2 \sim 0.95$), close to other sites, showing low means, and located in area of decreasing population



U.S. Environmental Protection Agency
Region 5 - Air and Radiation

08/17/01, Air Monitoring Section

Region 5 PM_{2.5} Monitor Correlations





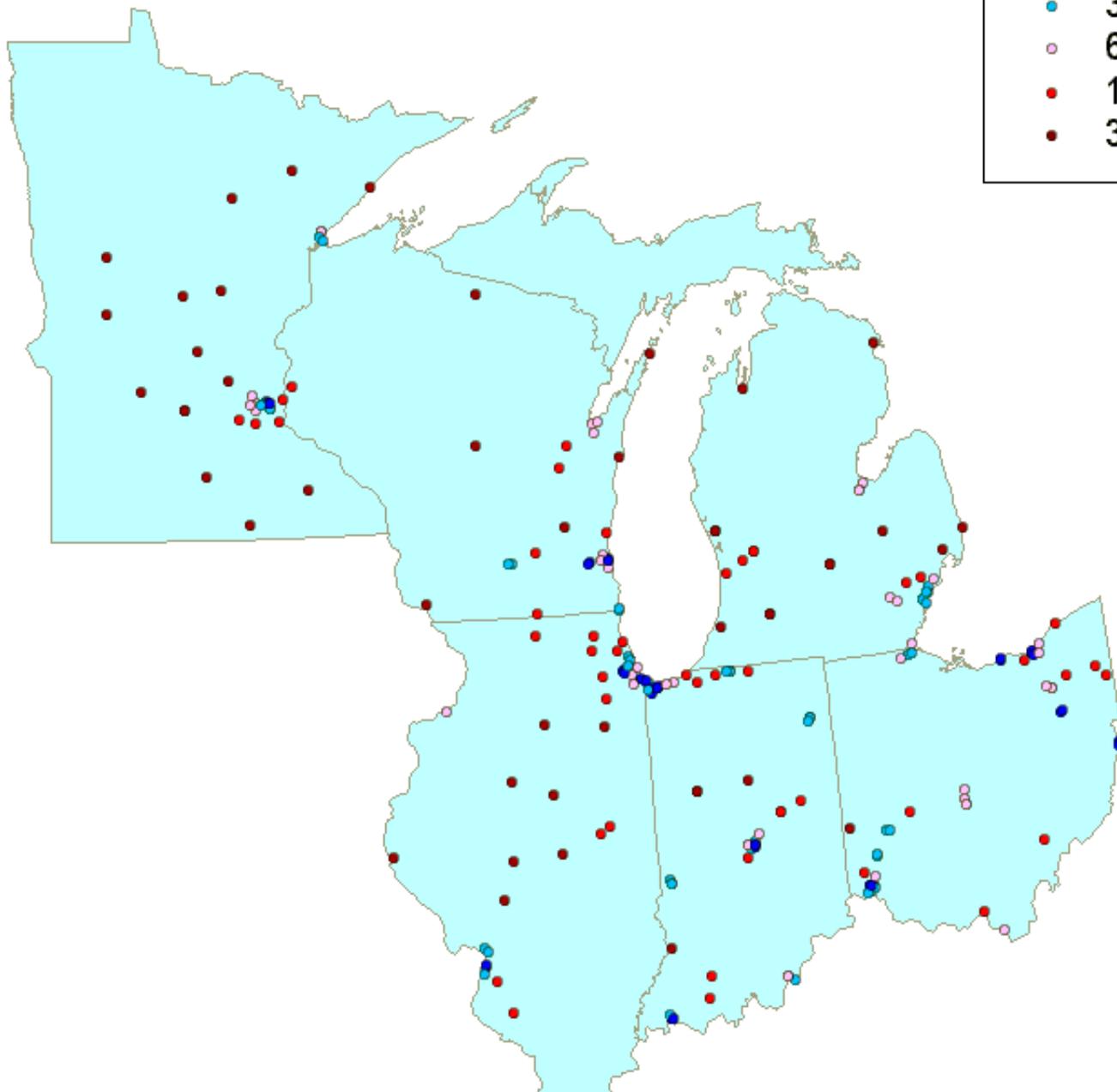
U.S. Environmental Protection Agency
Region 5 - Air and Radiation

08/09/01, Air Monitoring Section

Region 5 PM2.5 Monitor Density

Distance to Nearest
Monitor, km

- 0.9 - 3.3
- 3.5 - 6.3
- 6.4 - 12.2
- 13 - 34.2
- 34.5 - 190





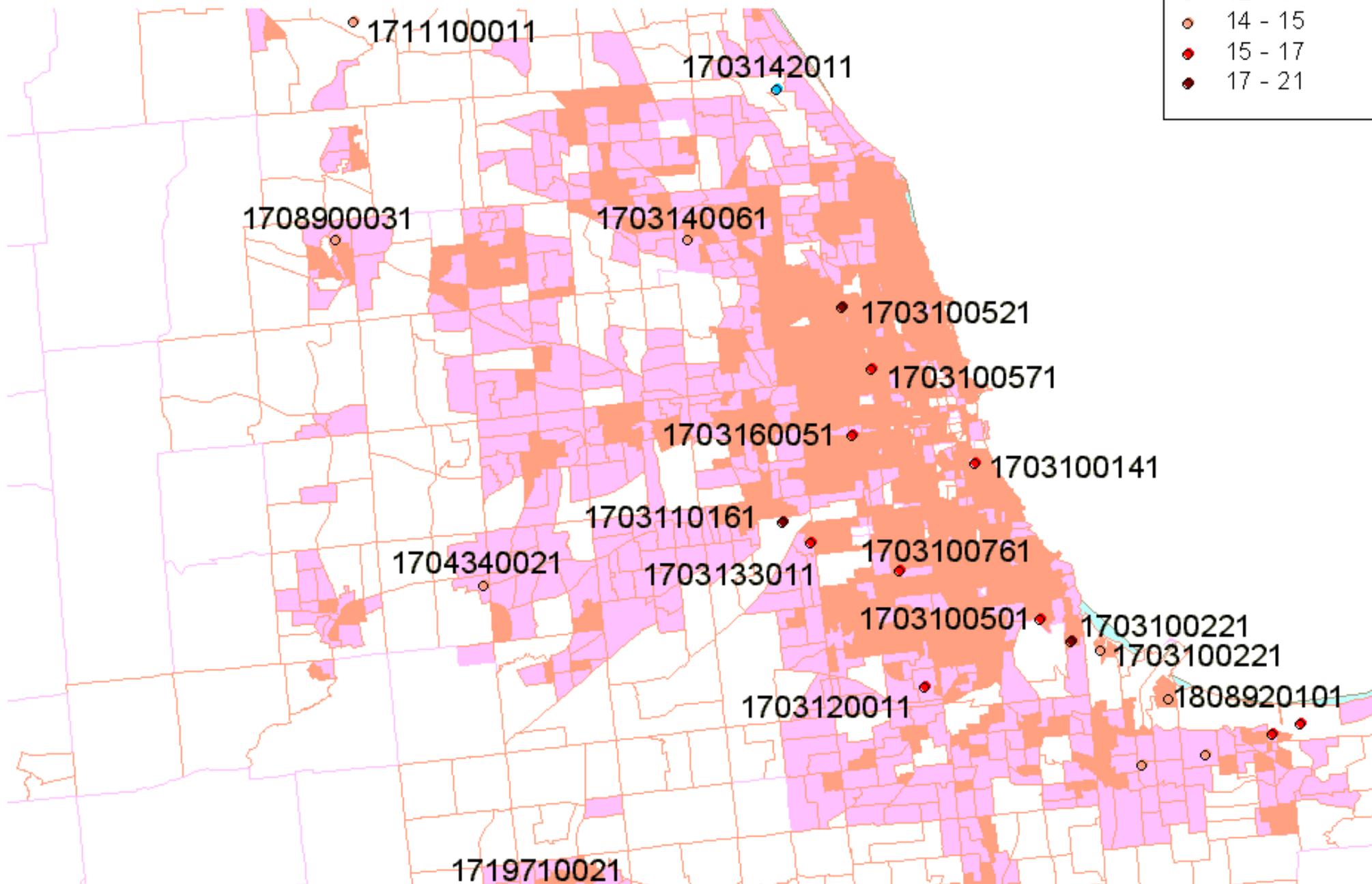
U.S. Environmental Protection Agency
Region 5 - Air and Radiation

08/06/01, Air Monitoring Section

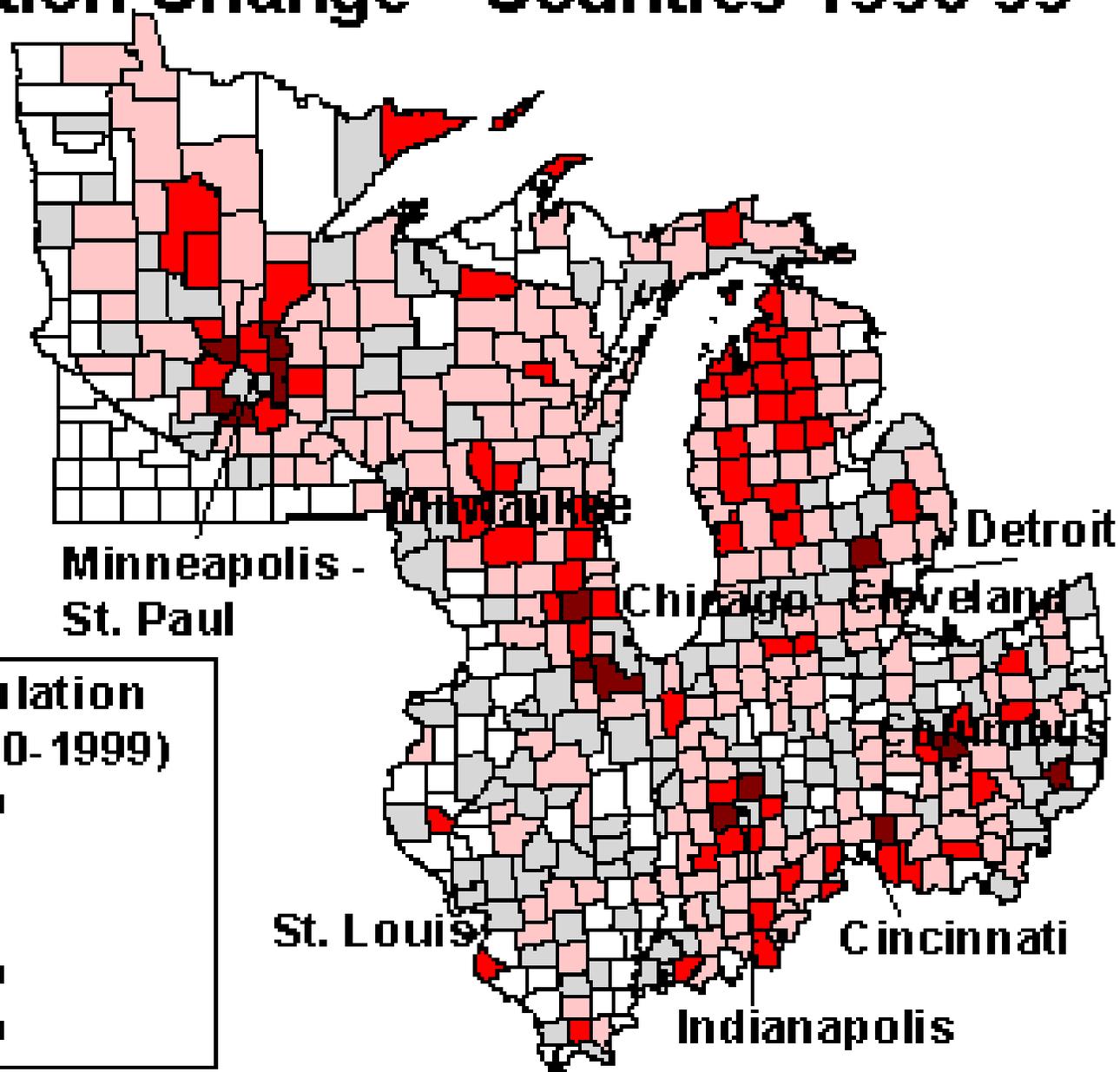
PM2.5 Mean, Chicago, IL

Mean PM2.5,
Quintiles (ug/m3)

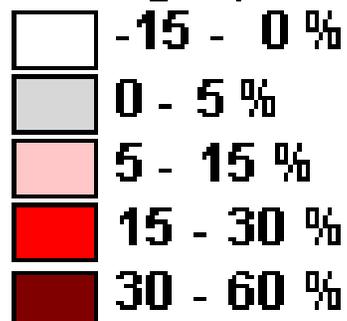
- 7 - 12
- 12 - 14
- 14 - 15
- 15 - 17
- 17 - 21



Population Change - Counties 1990-99

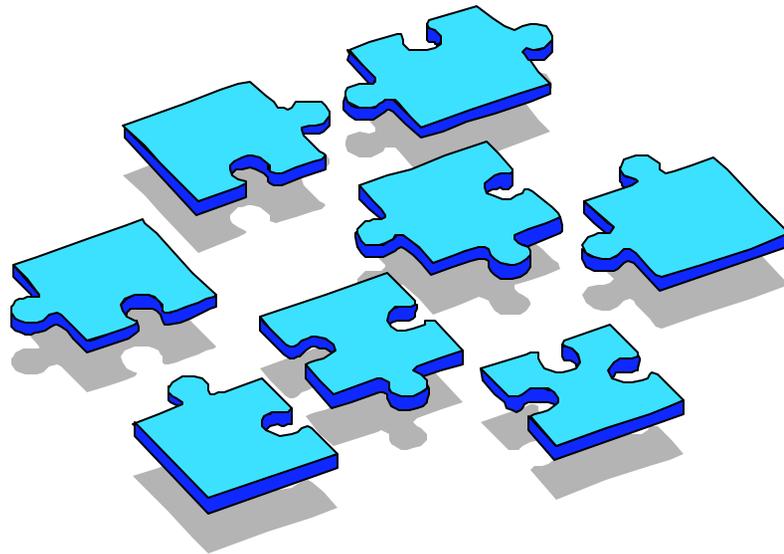


County Population Change (1990-1999)



Region 5 Ozone Network

More "Top-Down" Assessment



Ozone Analysis

■ Correlation Analysis

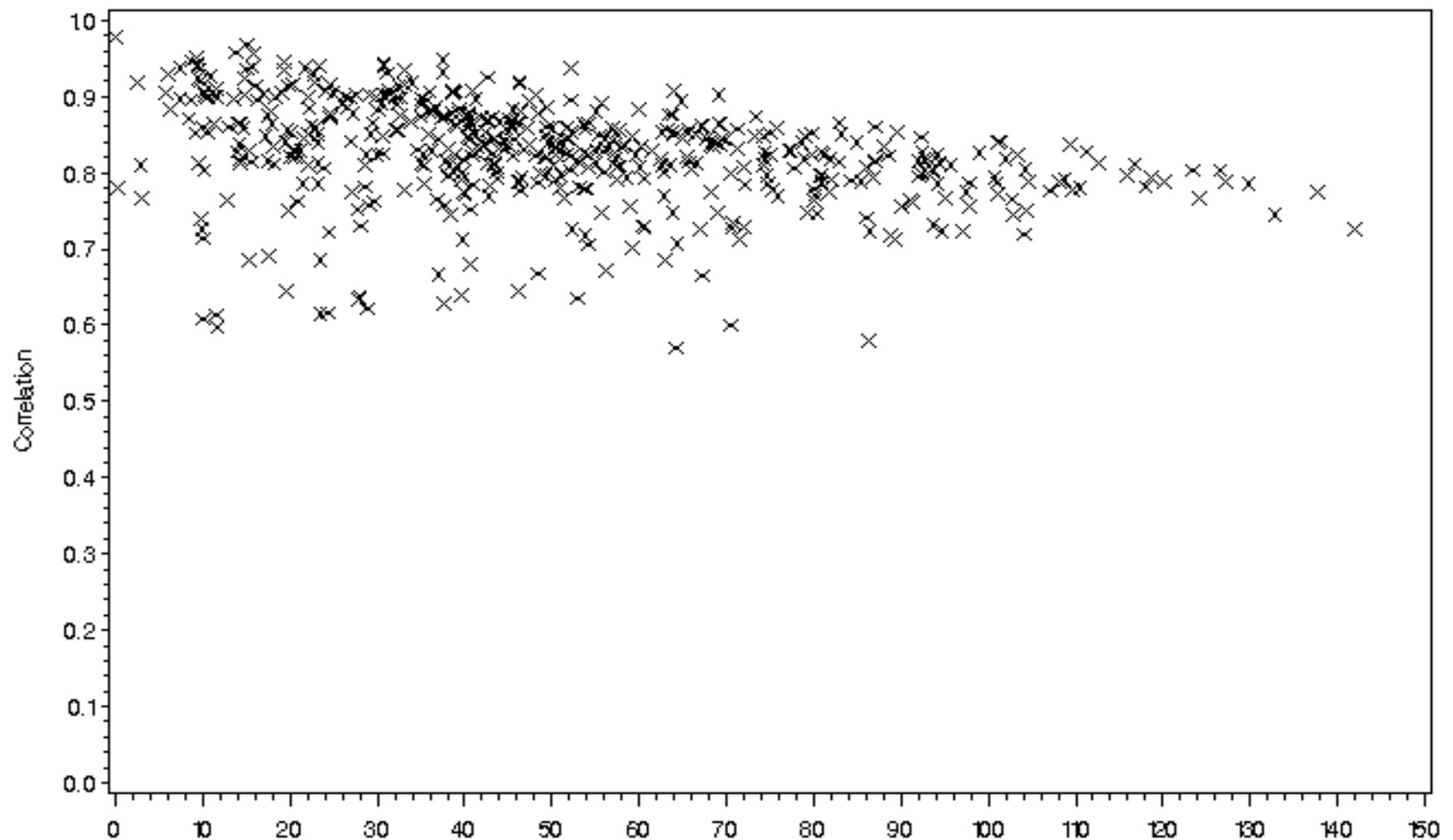
- Determine "redundant" monitoring sites
- Preserve "unique" sites
- Data
 - ◆ 1996-2000 8 hour daily maximum ozone concentration
 - ◆ IL, IN, OH, MI, MN, WI, IA, MO, KY, WV, PA, NY

■ Positive Matrix Factorization (PMF)

- Group monitors by spatial factors
 - ◆ Examine areas with similar ozone concentrations

Correlation Analysis

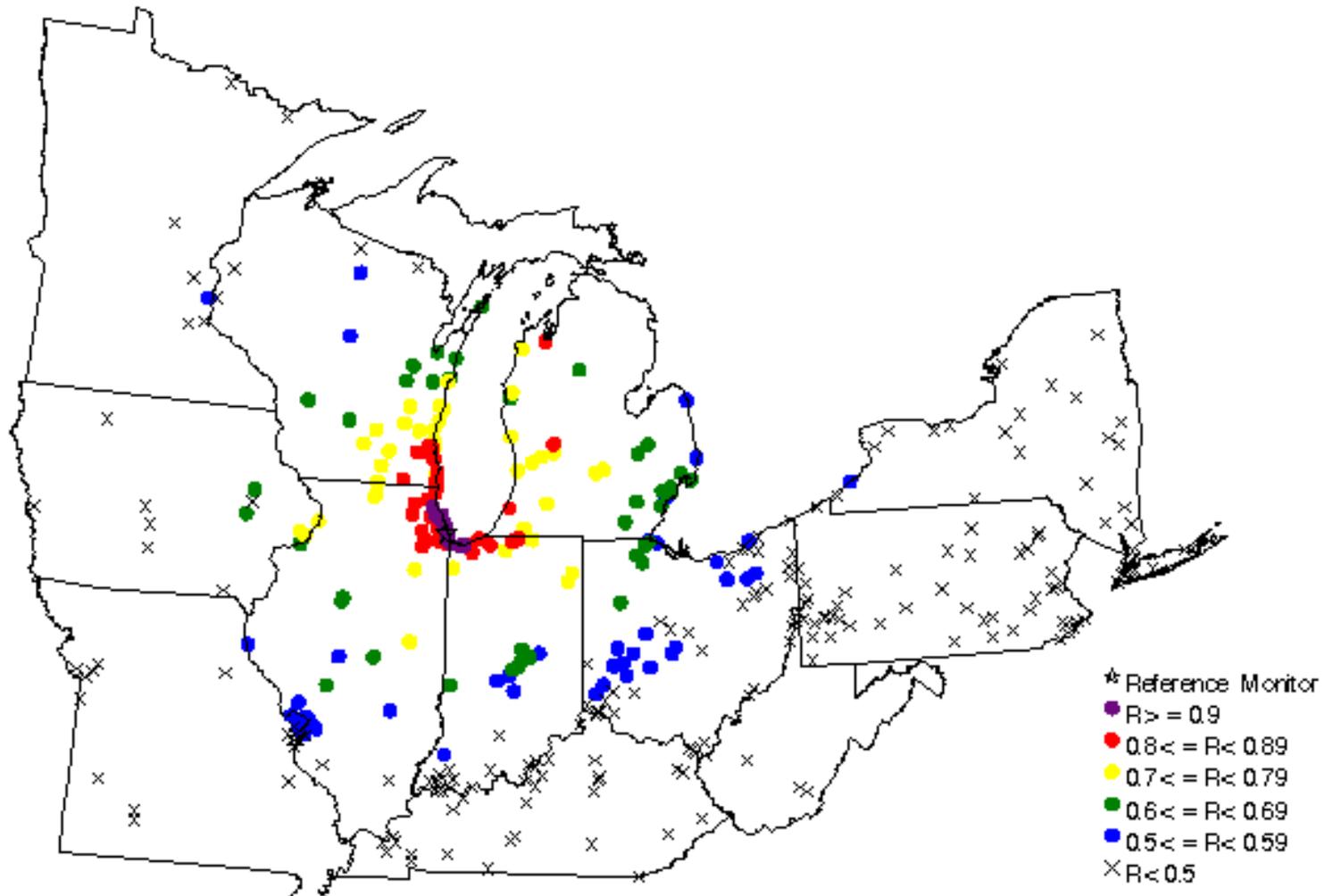
Ozone Correlogram for METROPOLITAN CHICAGO



Correlation Analysis

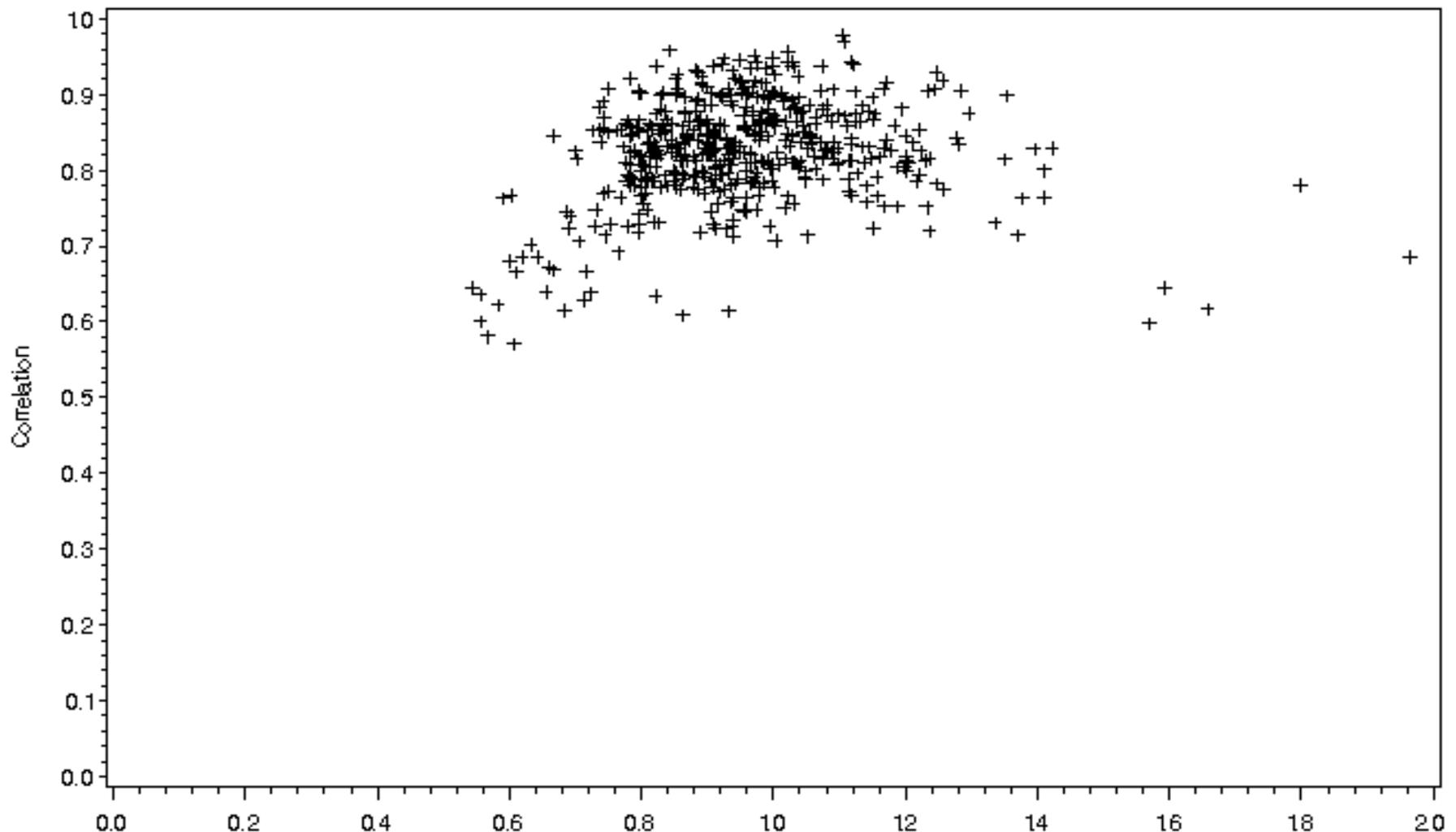
Ozone Correlation Map for a Monitor in METROPOLITAN CHICAGO

Site ID= 170310064442011



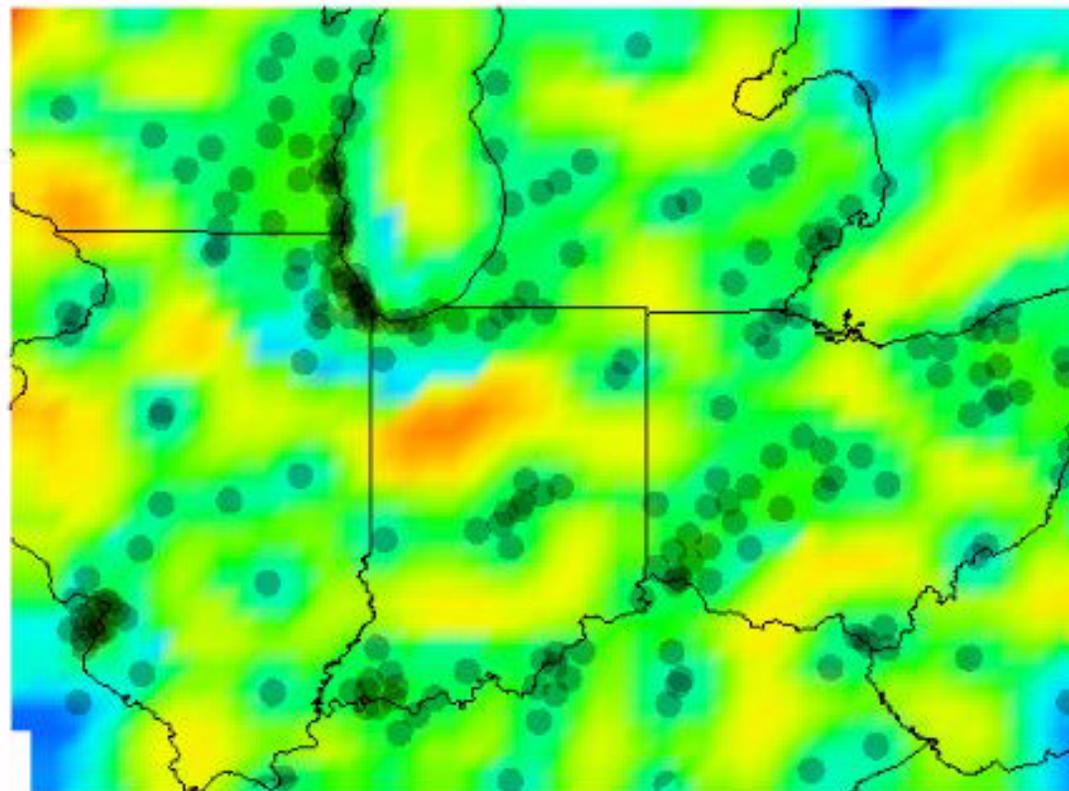
Correlation Analysis

Correlation vs. Ratio of Ozone Measurements for METROPOLITAN CHICAGO



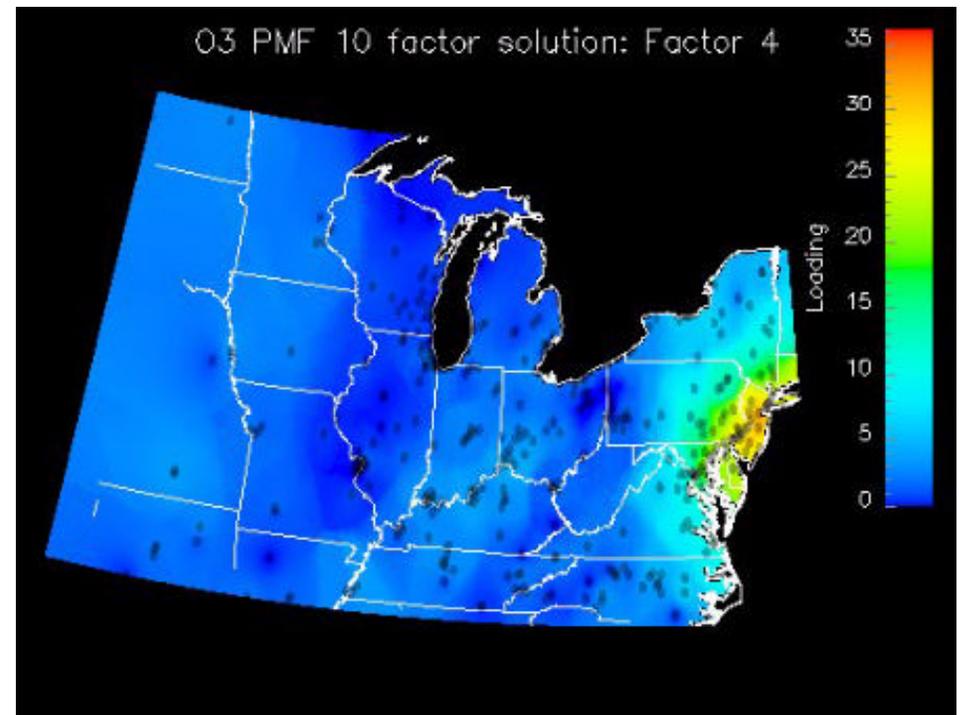
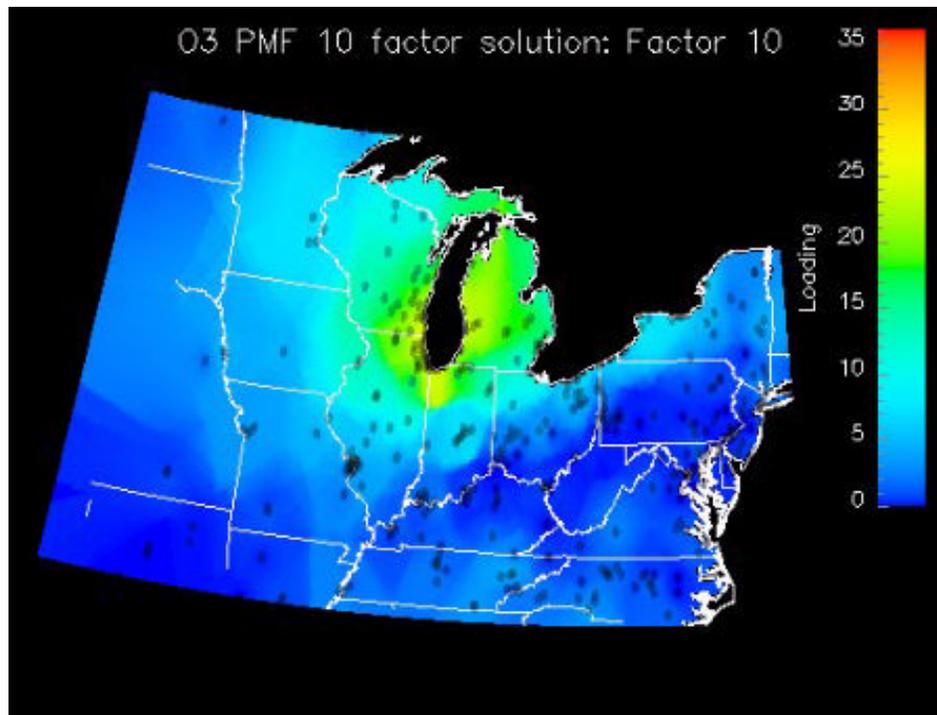
Kriging

CV of Std. Errors for Ozone: Summer 1999



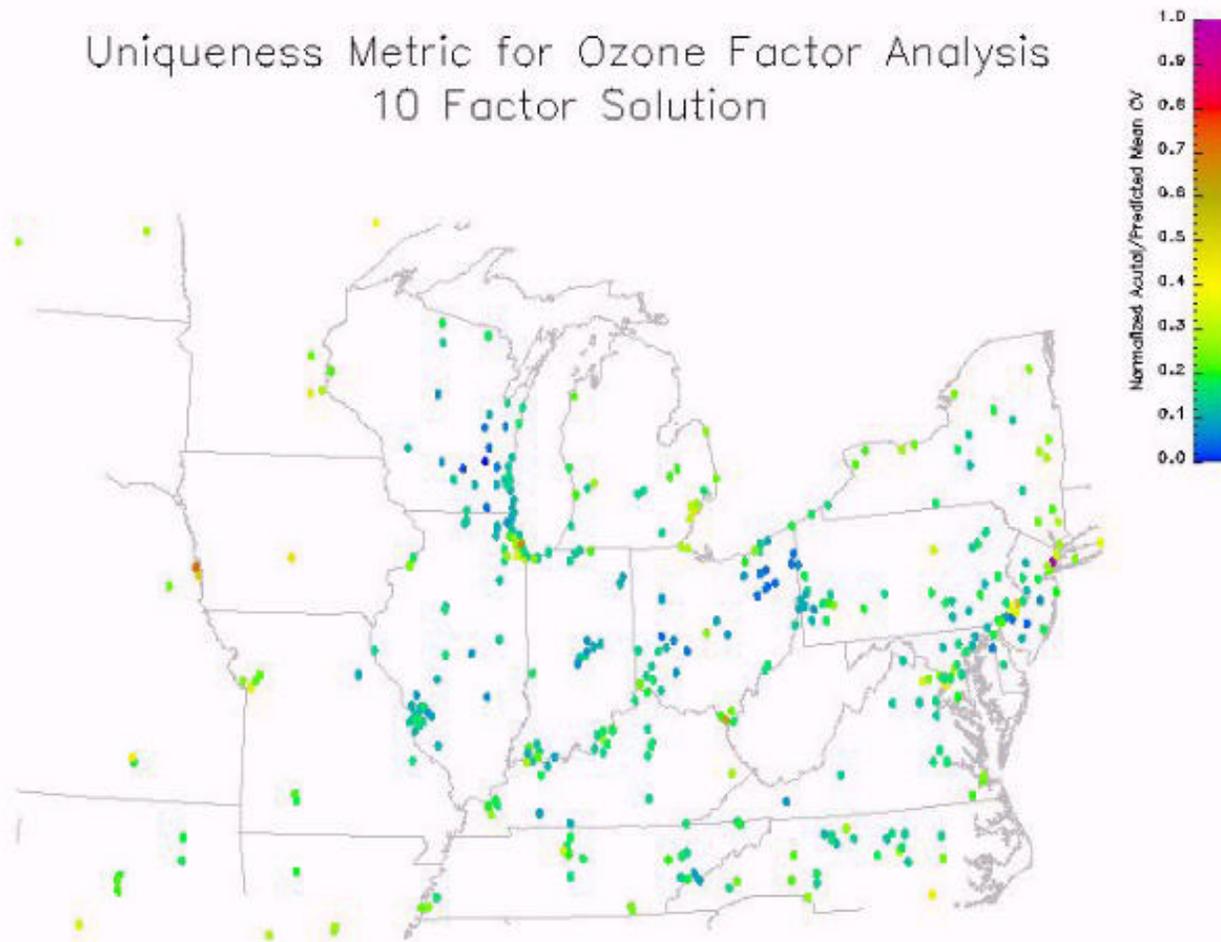
PMF

Examples of two spatial factors



PMF

Uniqueness Metric for Ozone Factor Analysis
10 Factor Solution



What was it all used for?

"Bottom-Up" Network Assessment

- Create networks "from scratch"
 - States established set of criteria
 - Analyses used to aid in decision process



"Top-Down" and "Bottom-Up" meet in the middle

Where We Are Now

- Phase I: "Fine pruning" by States
COMPLETE
- Phase II: Thorough assessment of networks resulting in initial revisions
COMPLETE
- Phase III: Review by technical and regulatory staffs at both Regional and State level to see if data needs met
IN PROGRESS