

US EPA ARCHIVE DOCUMENT

Environmental and Health Indicators: Overview

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Overview

- EPA's interest in indicators
- Indicator uses and selection
- Issues and challenges
- Two important environmental public health indicator programs
 - Council of State and Territorial Epidemiologists (CSTE), State Environmental Health Indicator Collaborative (SEHIC)
 - CDC's Environmental Public Health Tracking Program (EPHT)

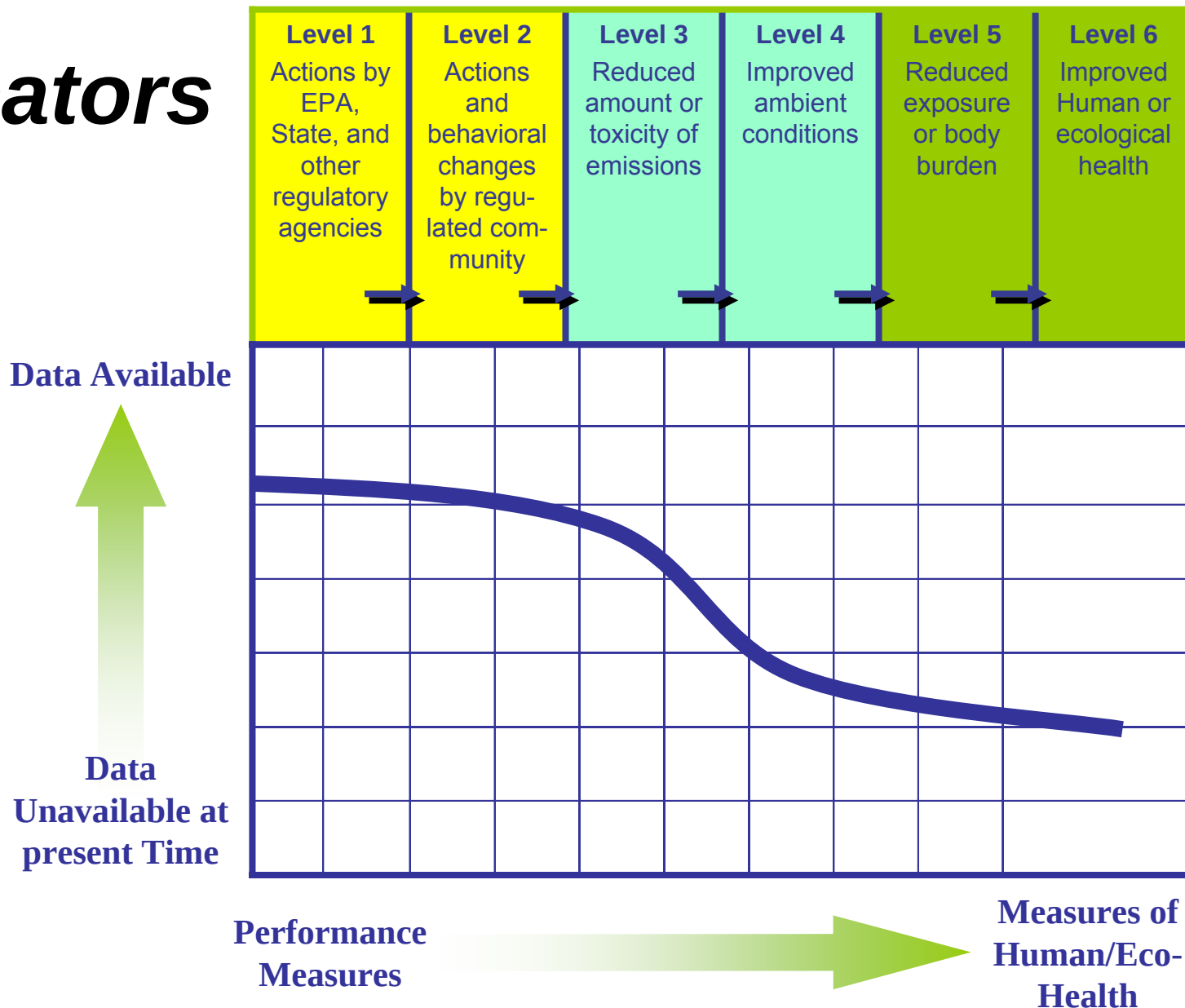


EPA's Mission

- “To protect human health and to safeguard the natural environment — air, water, and land — upon which life depends.”
- How do we measure our effectiveness?

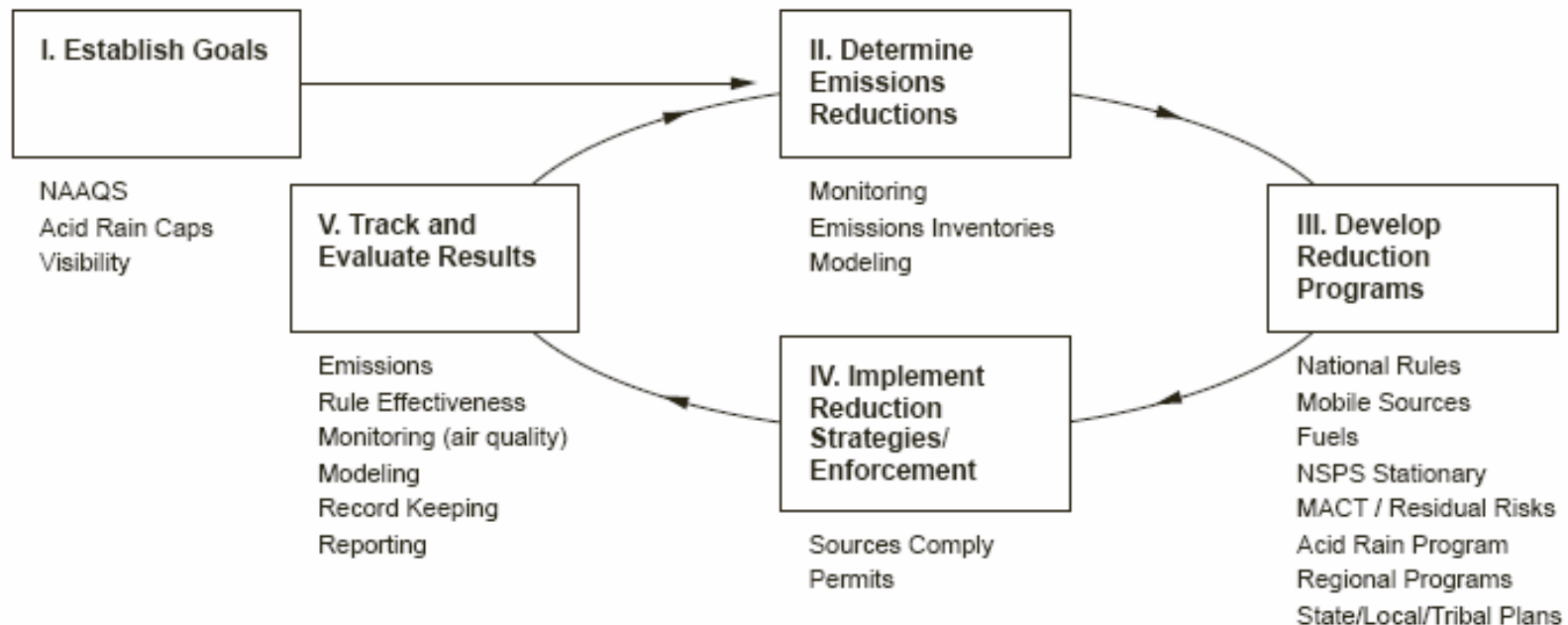


Indicators



CAAAC AQM Workgroup Recommendations

- Air quality management should be an iterative process
 - Establish goals and determine emissions reductions
 - Develop and implement reduction strategies
 - Evaluate results, and then
 - Revise emission reduction programs accordingly



Environmental Public Health Indicators

- Environmental public health indicators: descriptive summary measures that can be used to enhance environmental health practice by improving the accessibility, availability and distribution of information for decision-making
- Purpose and goals of environmental public health indicators
 - Summary measures that **describe** elements of **environmental sources, hazards, exposures, health effects, and intervention and prevention activities**, which may stand alone or be combined to describe their interaction.
 - Used to **assess** positive and negative environmental determinants of health
 - Serve as **communication tools** for making environmental health information available to stakeholders including environmental health partners, policy makers and the general public.
 - **Identify** areas for intervention and prevention and **evaluate** the outcomes of specific policies or programs aimed at improving environmental public health.

Approach for Selecting Indicators

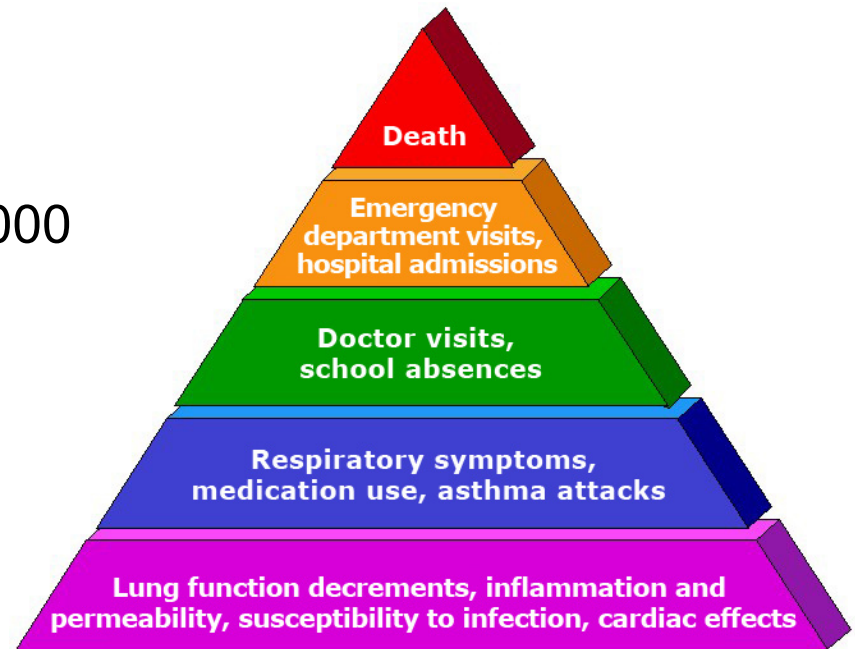
- Classify the link between proposed indicator and public health issue
 - preference given to direct measures
- Determine the public health impact of using the proposed measure
- Evaluate the feasibility of proposed indicator
- Assess the ability to incorporate the proposed indicator into interventions and environmental regulations
- Consider these criteria for determining priority:
 - Environmental importance: strength of evidence; scientific validity; authoritative standard
 - Public health importance: magnitude, rarity, vulnerable sub-populations, exposure potential
 - Public concern: voluntary; controllable; equitable; natural or man-made; potentially catastrophic; impacts children
 - Feasibility: data and information quality; technical capacity; available; measureable; collectible; spatially and temporally scaled
 - Public health action: available; appropriate; cost effective; degree to which exposure can be avoided
 - Public health policy: understandable and applicable; grounded by political will or support; relevant and informative

Issues and Challenges

- Data availability – both health and environmental
- Data usefulness
 - Health data collected for billing purposes
 - Can be lack of uniformity in collection of health data
 - Other issues, for example hospital discharge data
- Confidentiality
 - HIPAA (Health Insurance Portability and Accountability Act of 1996)
 - FERPA (Family Educational Rights and Privacy Act)
- Need enough statistical power to find effects
- Health data – a two-year lag period in the availability of the data is typical

Example - Estimated Incidence Reductions from CAIR in 2015

- PM-related endpoints
 - Premature mortality - 17,000
 - Non-fatal MI - 22,000
 - Asthma exacerbations - 290,000
 - **Work loss days - 1,700,000**
- Ozone-related endpoints
 - Hospital admissions - 2,800
 - **School absence days - 510,000**

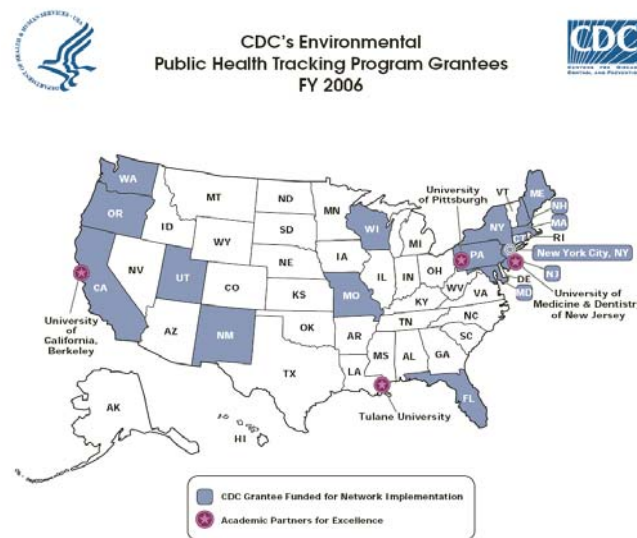


SEHIC Indicators

- Air quality indicators
 - Ambient concentration of pollutants – 3 measures
 - Exceedances of air quality indices and standards – 4 measures
 - Hazardous air pollutants – 2 measures
- Asthma - hospitalization and chronic lower respiratory disease mortality
 - Annual age-adjusted rate of asthma hospitalizations or CLRD deaths per 10,000 residents
- Climate change (under development)
 - Hazard indicators to detect trends in factors, such as increased temperatures and extreme weather events
 - Indicators of greenhouse gas emissions
 - Population vulnerability, including population age ≥ 65 ; number in nursing homes; proportion of households below poverty level; population within 5 km of coast with very high vulnerability to sea level rise
 - Health effects, including heat morbidity and mortality, injury morbidity and mortality related to ice storms, vector borne diseases
 - Intervention indicators, including preparedness, mitigation, adaptation and policy
- Also drinking water indicators

Environmental Public Health Tracking

- Web portal with health and environmental information
- Include information from non-tracking states
- Public portal will include de-identified data
- Portal will have initial, incomplete launch in fall
- More complete data in spring



Grantees – 17 states and NYC

Environmental Public Health Tracking

Example - asthma and myocardial infarction

Health information on public portal

- Annual number of hospitalizations, by age, gender, and geography
- Monthly average, maximum, and minimum daily number of hospitalizations by age, gender, and geography
- Annual unadjusted (crude) rate of hospitalizations for all ages, by gender and geography
- Annual age-specific rates of hospitalizations for all ages, by gender and geography
- Annual age-adjusted rate of hospitalizations for all ages, by gender and geography

Health information on secure portal

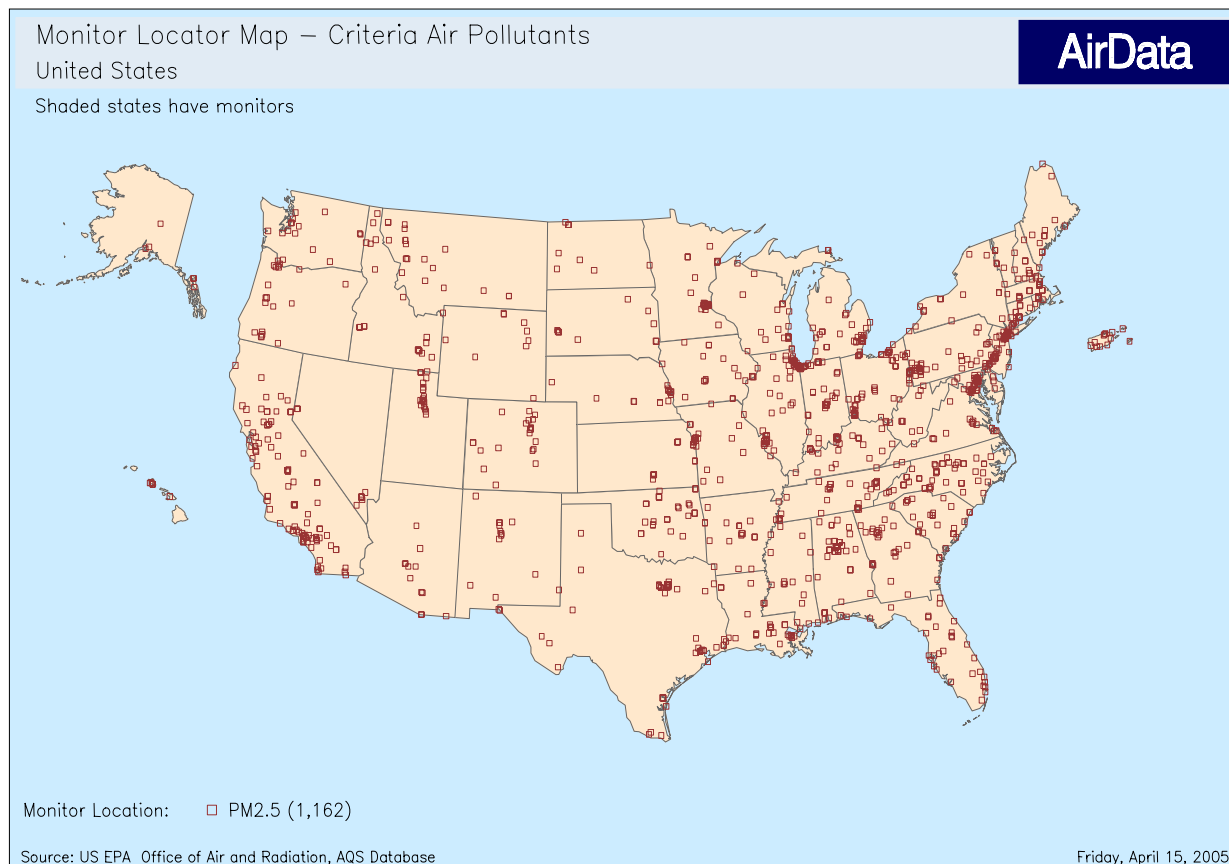
- Daily number of hospital admissions



Ambient Air Monitoring

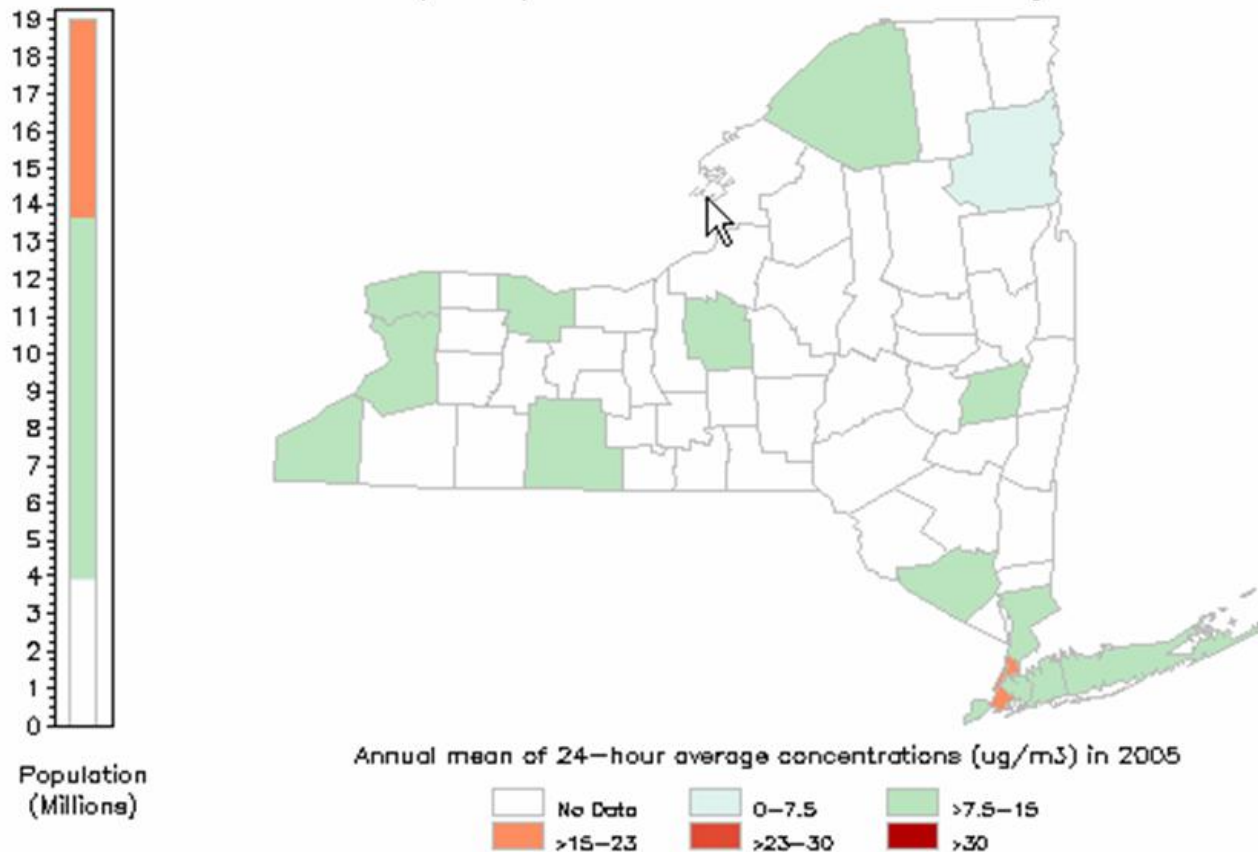
PM 2.5 Monitors

- “True” measure of air quality
- Spatial gaps - rural areas have few sites
- Temporal quality varies – hourly to weekly
- Routinely available information



PM_{2.5} Indicator

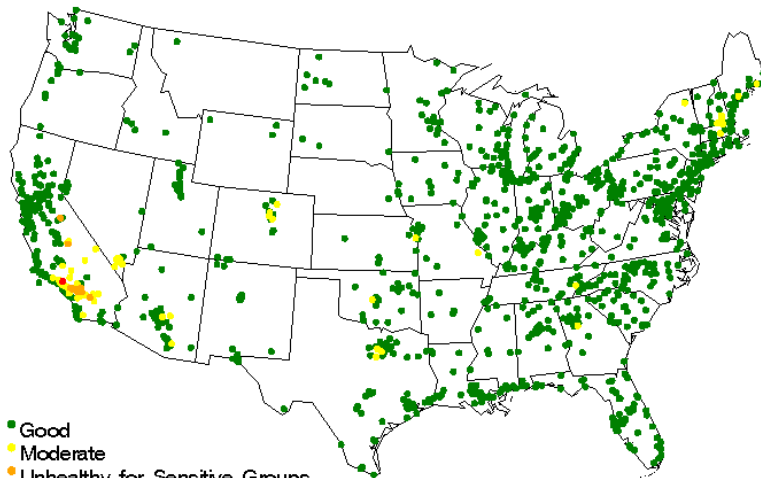
Annual average PM_{2.5} concentrations in New York State, 2005



From EPA AIRDATA website

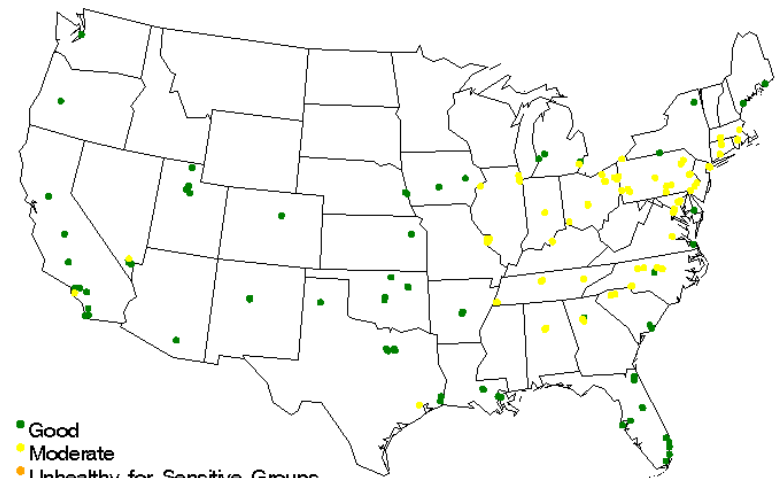
Example Ozone and PM Ambient Monitoring Data

Ozone AQI Values by site on 07/18/2004



Source: EPA's Air Explorer (<http://www.epa.gov/airexplorer/>)
Generated on: 15APR05

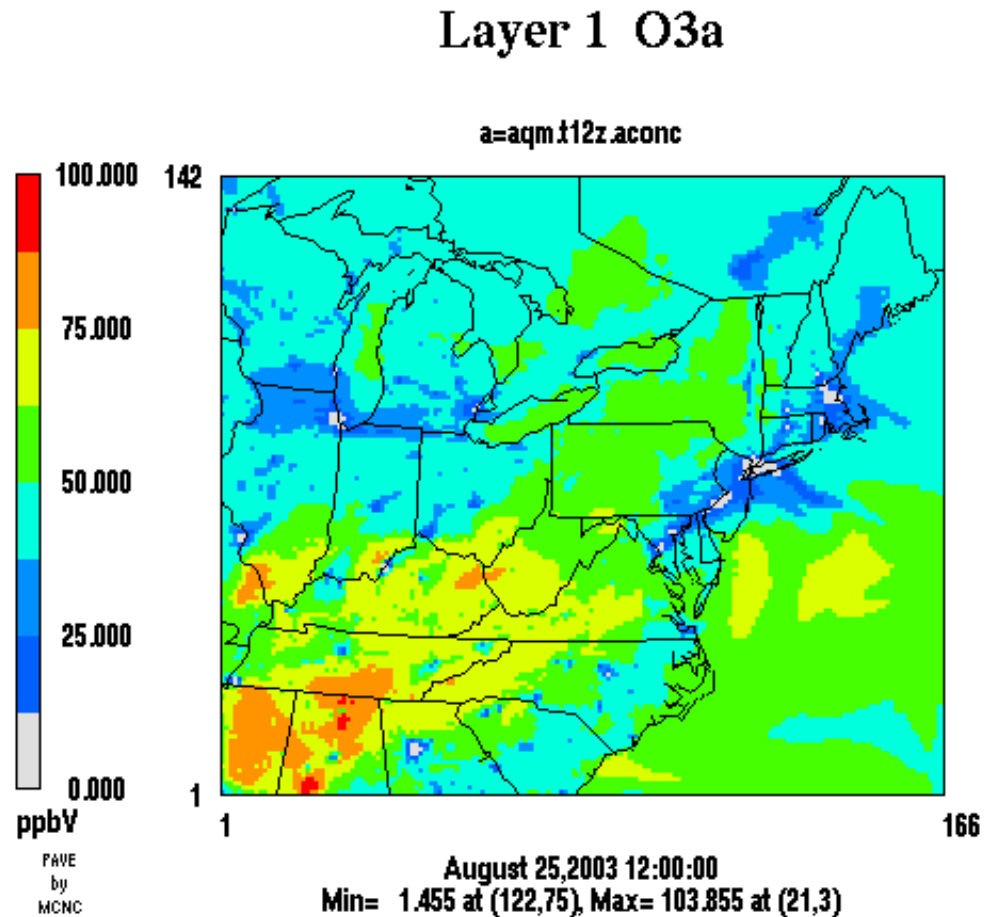
PM2.5 AQI Values by site on 07/18/2004



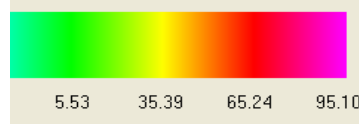
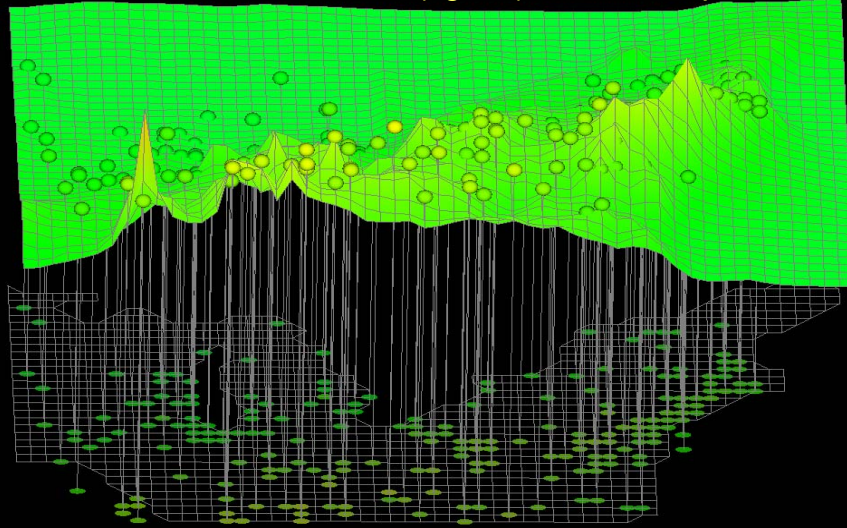
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Generated on: 15APR05

Air Quality Modeling

- Estimate of air quality
- Good spatial and temporal coverage
- Air Quality Forecasting
 - Emerging source of routine data



Separate FRM and CMAQ PM2.5 (ug/m3) Surface, Sept. 12, 2001



Provide improved AQ surface for locations without monitors

Fused Surfaces

Improve AQ surface by fusing measurements with CMAQ results



Combined PM2.5 (ug/m3) Surface, Sept. 12, 2001

