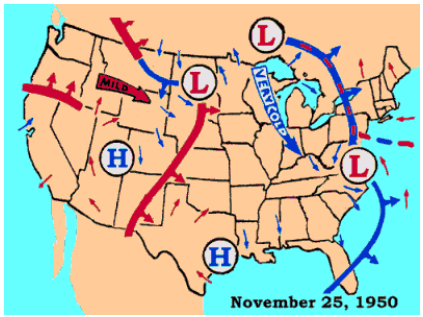
Integrating Climate Pollutants into Air Quality Programs

EPA Workshop – Impacts of Climate Change on Air Quality in the Pacific Southwest -- October 11, 2007

Projected Climate Change →

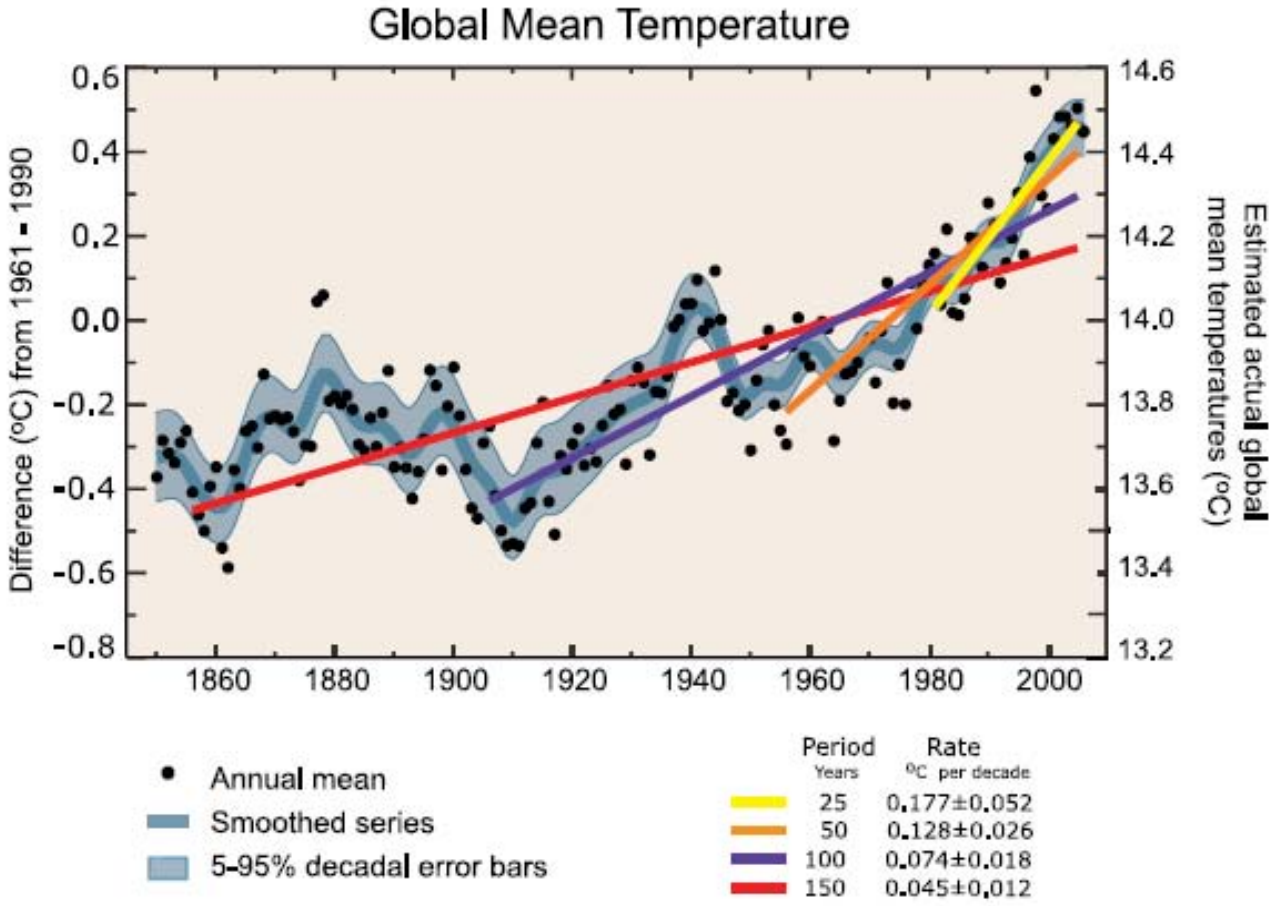


→ Impacts Related to PM and Ozone →

Lydia Wegman, Director
Health and Environmental Impacts Division
Office of Air Quality Planning & Standards

Warming climate impacts <u>global</u> air quality

[International Panel on Climate Change, 2007]



Virtual certainty of declining air quality in cities.

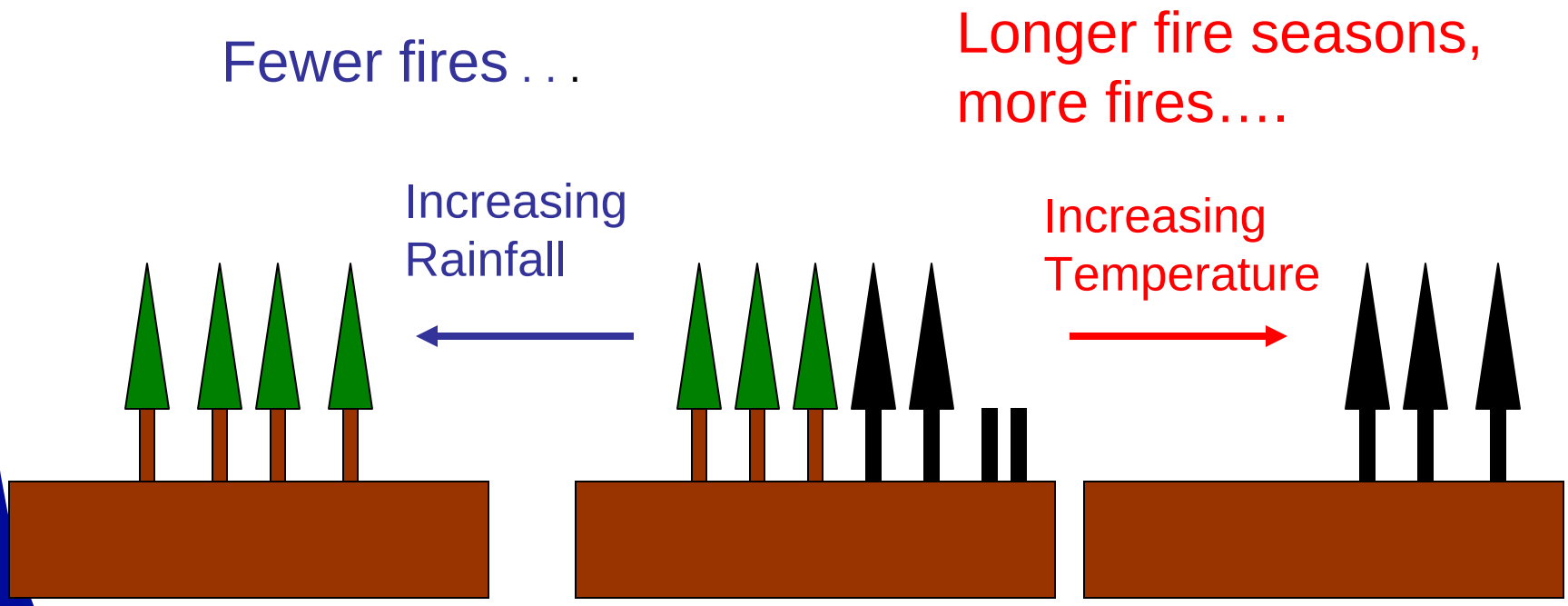
Warming and climate extremes are likely to increase respiratory illness, including exposure to ozone

Climate change impacts U.S. air quality

- Particulate Matter (PM) and visibility are projected to have mixed impacts from climate change; the net impact is unclear
- Ozone levels are projected to increase in many areas of the U. S. under future climate scenarios
- Research is needed in many areas, including:
  - In a changing climate, which areas of the US will find it harder or easier to meet the PM or ozone NAAQS?
  - What is the magnitude of the "climate penalty" related to controlling ozone?
  - What are the win-win scenarios for climate and air quality?
  - Which components of PM are most important for public health and/or climate impacts?

Climate change impacts PM and visibility

Changes in precipitation patterns are projected to vary geographically, as will associated air quality impacts



[Adapted from Spracklen presentation at AGU Fall meeting 2006]

Climate change impacts ozone

J.P. Dawson et al. / Atmospheric Environment 41 (2007) 1494–1511

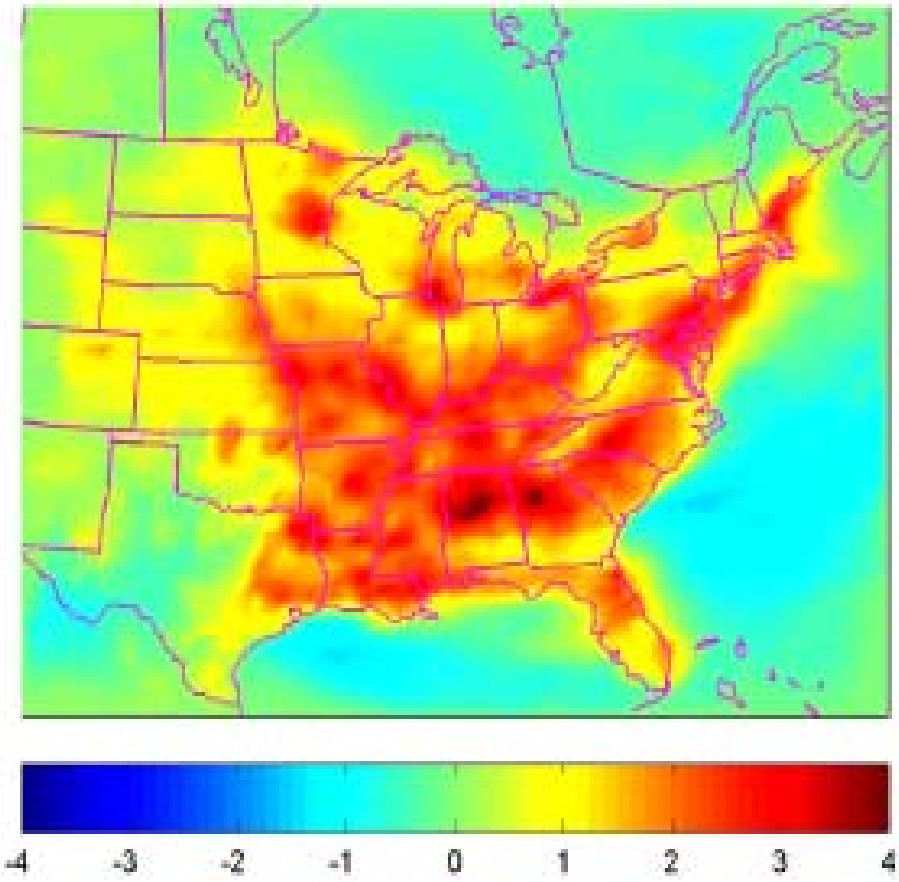
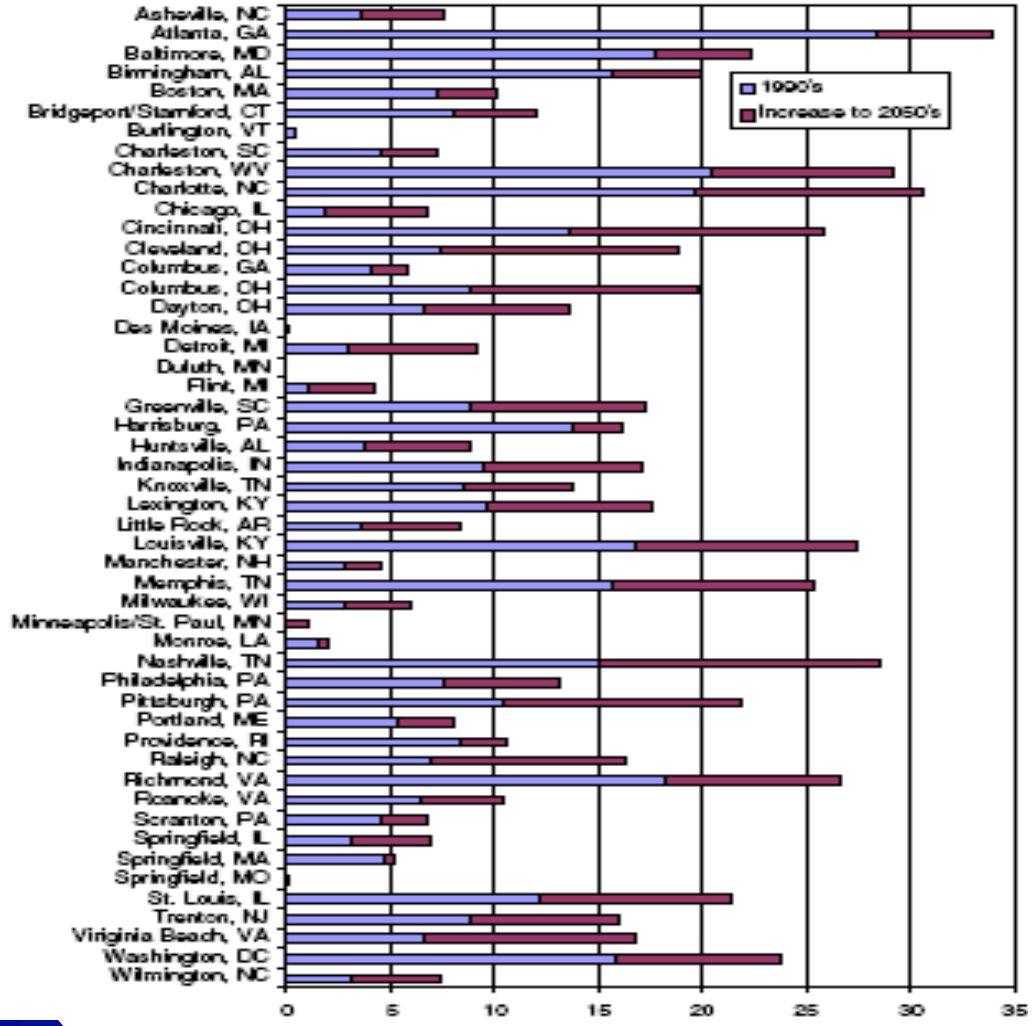


Fig. 5. Differences in average daily maximum 8h average O_3 concentration (ppb) between $T+2.5$K case and base case.

Modeling indicates climate change will make it harder to attain and maintain the ozone standard

Climate change impacts on ozone in 50 eastern cities (1990s-2050s)



Average 5.5 more 8-hour ozone exceedance days.

Ozone increases due to climate change are projected to cause:

- *Premature death
- *Hospital admissions
- *Emergency room visits
- *Ahthma
- *Decreased lung function

From Bell (2007)

Climate-AQ impacts on health

[Knowlton, 2004]

0.3-4.3 ppb increase in 1-hr ozone daily max.

Median 4.5% increase in ozone related mortality

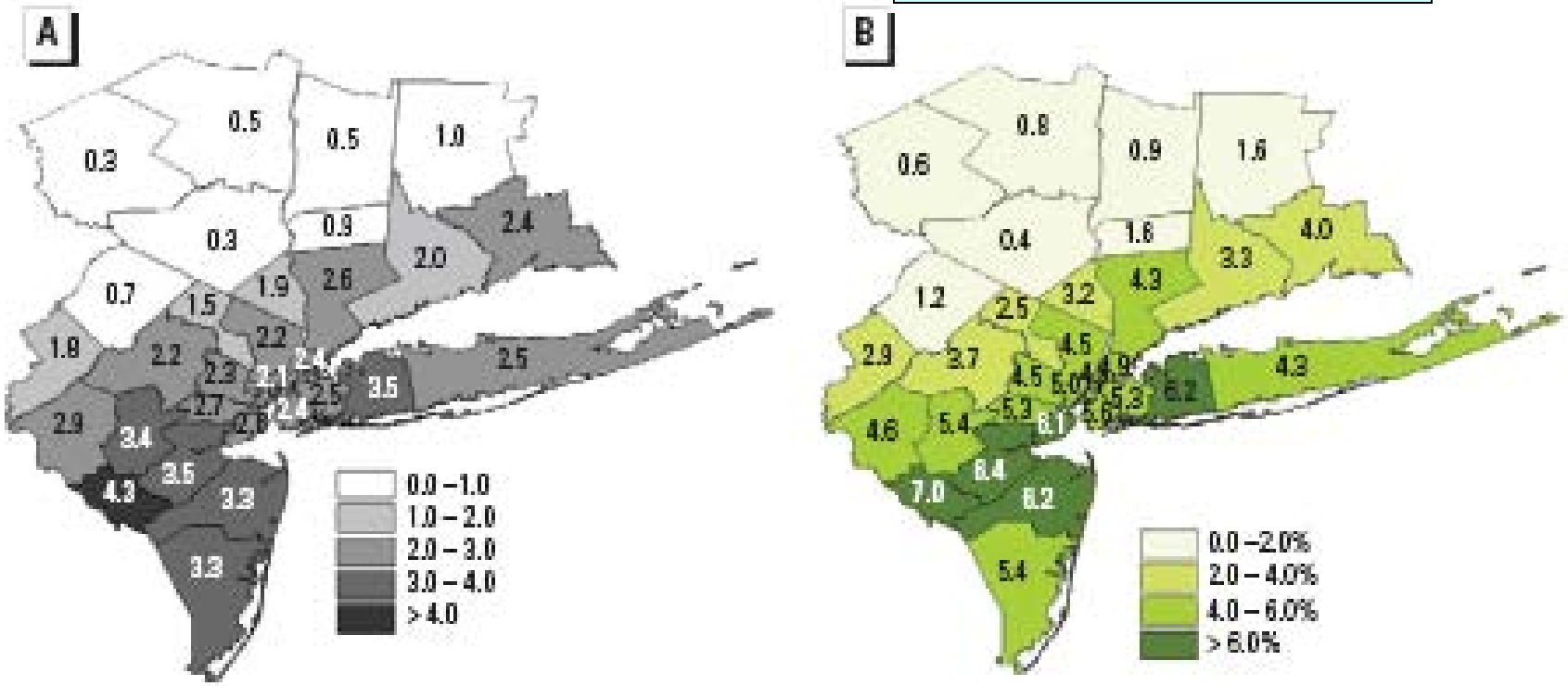


Figure 2. Estimated changes in O_3 and associated summertime mortality in the 2050s compared with those in the 1990s for M1, where climate change alone drives changes in air quality. (*A*) Changes in mean 1-hr daily maximum O_3 concentrations (ppb). (*B*) Percent changes in O_3-related mortality.

Ozone and PM have climate impacts

CO_2: + 1.66

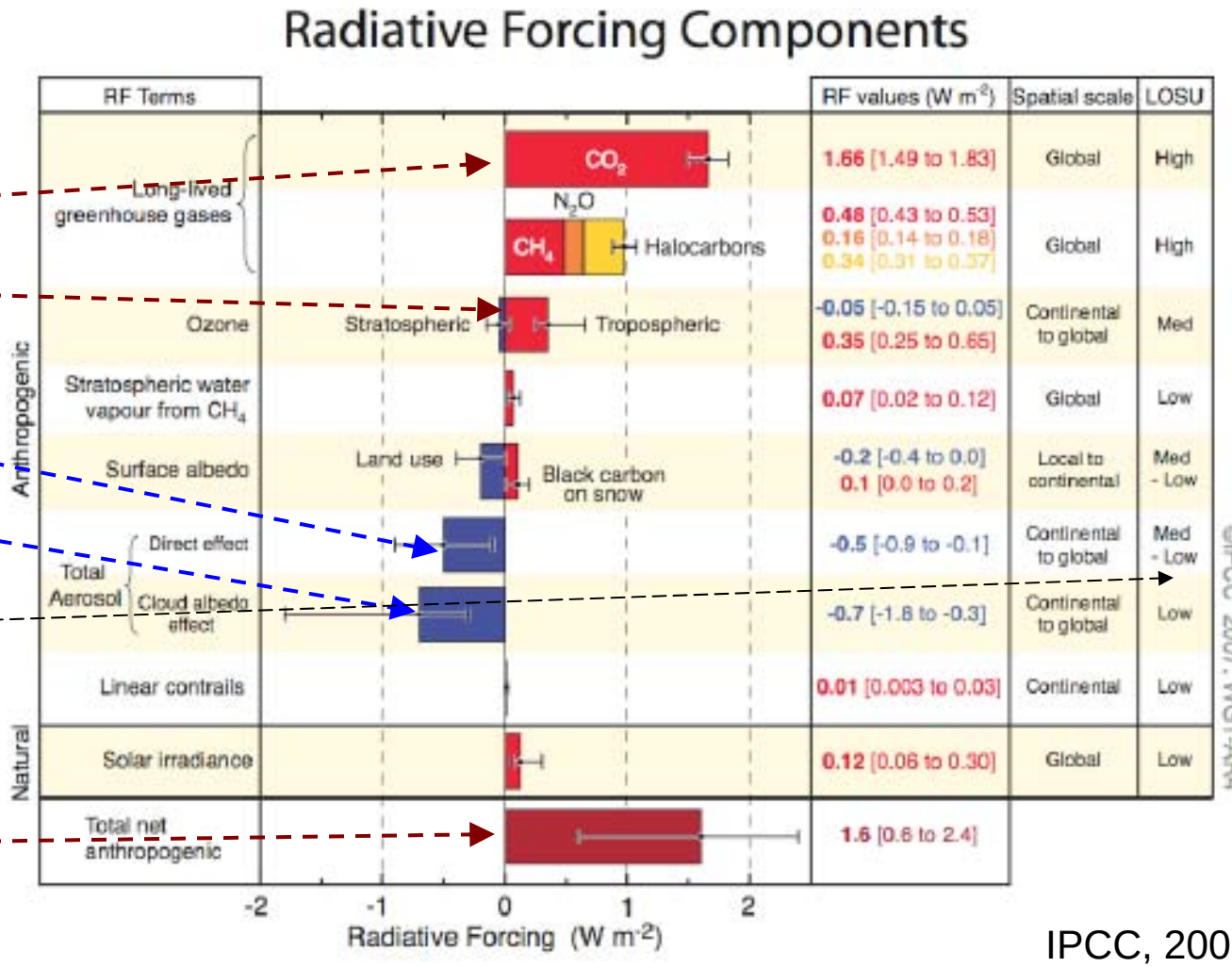
Ozone: + 0.35

PM (direct): - 0.5

PM (indirect): - 0.7

PM effects--low level of scientific understanding

Total net effect: 1.6



IPCC, 2007

Air quality-climate activities

- Regulatory
  - GHG fuel/vehicle rule and endangerment finding
  - Implications for stationary source programs (e.g., PSD)

- Health/welfare and climate impacts research
  - OAR works with ORD to help identify policy-relevant research projects related to both public health and climate
  - Which air pollution control scenarios are worth pursuing in a changing climate regardless of the uncertainties associated with various future scenarios?

Air quality-climate activities

- Voluntary programs
  - Air Emissions Reporting Rule for GHGs
  - Multipollutant Air Quality Management Plan pilots
  - Sustainable Skylines
  - Partnerships to implement GHG-reducing technologies, processes, and practices

- Multi-Pollutant Sector-Based Approaches
  - Integrating regulatory (toxic and criteria pollutant) control strategies with an eye towards potential GHG co-benefits in key sectors

Additional air quality-climate analytical tools

- Benefits Modeling and Analysis
  - BenMAP calculate benefits due to changes in air quality. We are investigating how to model the direct health impacts of changes in U.S. temperatures
- Control technologies
  - AirControlNet software – control cost optimization tool proven and used as foundation of NAAQS analysis, currently being upgraded
- Sector-level Economic Analysis
  - EMPAX model estimates economy-wide impacts of the costs of controls (e.g., CAIR analysis)

Air quality-climate: GHG rule

- April 2, 2007: Supreme Court ruled EPA must take action under the CAA regarding greenhouse gas emissions from motor vehicles
- May 14, 2007: President directed EPA with DOT, DOE & USDA to take first steps toward regulations based on "Twenty In Ten" that would cut gasoline consumption 20% by 2017
  - Fuels: 35 billion gallons of renewable/alternative fuels
  - Vehicles: improve cars & light-trucks efficiency by 4% per year (savings of 8.5 billion gallons)
- Schedule: Proposal by end of year; final rule by late 2008

Air quality-climate: GHG rule

- Endangerment finding
  - U.S. transportation's contribution to GHG emissions
  - Linkage between GHG emissions and climate change
  - Domestic climate change impacts
  - Determination regarding public health or welfare
- Fuels
  - Trading & implementation mechanisms
  - Energy security analysis
- Vehicles
  - Light-duty cars & light-trucks
  - Program structure
    - Basis/form of standard
    - Credit trading & implementation mechanisms
  - Technological feasibility assessment

Summary

- Important linkages exist between climate change and air quality programs
- Significant additional investment in research and analysis, internal and external to EPA, will be necessary to understand many of these linkages
- Multi-pollutant approaches are needed to address criteria and air toxic pollutants as well as climate.