EPA's Global Change Research Program:

Assessing the Consequences of Global Change for Air Quality in the United States

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Program Mission

Assess the potential consequences of *global change* – particularly climate variability and change -- in the U.S.

Areas of focus:

air quality, water quality, aquatic ecosystems, and human health

Provide timely and useful scientific information to **support decision making**

Focus on **adaptation** – to reduce risks and take advantage of opportunities presented by global change

The U.S. Climate Change Science Program (CCSP)

- EPA is part of a larger family of 13 federal agencies
- Established by Congress in 1990
- CCSP coordinates and integrates climate change research across the federal government
- All EPA program activities consistent with 2003 CCSP *Strategic Plan*
- EPA research leveraged with activities of other CCSP agencies

EPA is the only federal agency assessing the impacts of climate change on air quality in the United States.

Global Change & Air Quality

Long-term Goal

Enhance the ability of air quality managers to consider global change in their decisions through improved characterization of the potential impacts of global change on air quality.

- Major objectives:
  - Interim Assessment (FY 2007): Effects of **climate change** on air quality (**completed; in peer review**)
  - Final Assessment (FY 2012): Effects of **global change** on air quality

Unique within CCSP: Focus on the effects of climate change on air quality – rather than the effects of air quality on climate change

How We Conduct Our Air Quality Assessments: Integration of Intramural and Extramural Expertise

- Research, assessments, and development of decision support tools conducted in 4 ORD Labs/Centers
- Extramural research augments areas in which the program has expertise
- “Science to Achieve Results” (STAR) grants awarded through competitive process
- STAR grants provide ongoing, long-term support for selected topic areas
  - Air quality
  - Aquatic ecosystems
  - Human health

Major Commitment to Support Policy-Relevant Research in EPA Regions

1995 – 2007:

83 grants totaling $68,278,816

Region	Total Funding	Number of Projects
1	$6,988,977	8
2	$2,921,062	3
3	$12,012,401	14
4	$7,789,412	11
5	$12,130,400	16
6	$3,049,457	4
8	$7,503,865	7
9	**$9,153,483**	**11**
10	$6,729,759	9

Over 50 Publications on Climate Change & Air Quality by EPA Scientists (as of 2005)

[examples]

- Benjey, W.G., E.J. Cooter, A.B. Gilliland, A.E. Grambsch, E.L. Wright, C.D. Geron, C. Gage, and D.A. Winner. Creating an emission inventory for modeling global climate change effects on regional air quality. In The Twelfth International Emission Inventory Conference, San Diego, California, April 29-May 1, 2003. Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC, (2003) Available at http://www.epa.gov/ttn/chief/conference/ei12/index.html#ses-10
- Benjey, W.G. and E.J. Cooter. The inter-annual and seasonal variability of meteorologically influenced emissions. In The Fourteenth International Emission Inventory Conference, Las Vegas, Nevada, April 12-14, 2005. Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC, (2005). Available at http://www.epa.gov/ttn/chief/conference/ei14/index.html#ses11
- Godar, D.E., Wengraitis, S.P., Shreffler, J.H., and Sliney, D. Average annual solar UV dose of the continental US citizen. Presented at: 13th International Congress on Photobiology, San Francisco, CA, July 2-6, 2000.
- Godar, D.E., Wengraitis, S.P., Shreffler, J.H., and Sliney, D. UV Doses of Americans. Published in: Photochemistry and Photobiology, March 23, 2001.
- Yeh, S., Rubin, E.S., Taylor, M.R. and Hounshell, D.A. (2005) “Technology innovations and the experience curve for NOx control technology,” *Journal of the Air and Waste Management Association*, in press.

24 Publications by Grantees
(examples)

- Lynn, B. H., L. Druyan, C. Hogrefe, J. Dudhia, C. Rosenzweig, R. Goldberg, D. Rind, R. Healy, J. Rosenthal, and P. Kinney, Sensitivity of present and future surface temperatures to precipitation characteristics**,** *Climate Research* 28:53-65, 2005.
- Liang, X.-Z., L. Li, A. Dai, and K.E. Kunkel, 2004: Regional climate model simulation of summer precipitation diurnal cycle over the United States. *Geophys. Res. Lett.*, 31, L24208, doi:10.1029/2004GL021054.
- Solecki, W. D., and C. Oliveri, Downscaling climate change scenarios in an urban land use change model, *Journal of Environmental Management* 72:105-115, 2004.
- Joutz F, Crowley C. Seasonality and weather effects on electricity loads: modeling and forecasting. Energy Policy.
- Bell ML, Ellis JH. Sensitivity analysis of tropospheric ozone to modified biogenic emissions for the mid-Atlantic Region. Atmospheric Environment. Volume 38, Issue 13, April 2004, Pages 1879-1889.
- Hogrefe, C., B. Lynn, K. Civerolo, J.-Y. Ku, J. Rosenthal, C. Rosenzweig, R. Goldberg, S. Gaffin, K. Knowlton, and P. L. Kinney, Simulating changes in regional air pollution over the eastern United States due to changes in global and regional climate and emissions, *Journal of Geophysical Research - Atmospheres*109, D22301, (doi:10.1029/2004JD004690), 2004.
- Mickley, L.J., D.J. Jacob, B.D. Field, and D. Rind, Effects of future climate change on regional air pollution episodes in the United States, Geophys. Res. Let., 30, L24103, doi:10.1029/2004GL021216, 2004.
- Knowlton, K., J. E. Rosenthal, C. Hogrefe, B. Lynn, S. Gaffin, R. Goldberg, C. Rosenzweig, K. Civerolo, J.-Y. Ku, and P. L. Kinney, Assessing ozone-related health impacts under a changing climate, *Environmental Health Perspectives* 112: 1557-1563, 2004.

"What does it all add up to?"

"The Subcommittee concludes that the Program has provided substantial benefits to the nation and that it is on course to make significant further contributions to societal outcomes by informing and facilitating decisions by the public and private sector actors who must consider the prospects of global change."

- 2005 Peer Review
Board of Scientific Counselors

"Why This Workshop?"

Climate change will affect air quality in the Pacific Southwest

Supports program goal of providing **timely** and **useful** information to decision makers to help them understand and plan for climate change

Program's Interim Climate Change / Air Quality Assessment completed

Grantees' research coming to fruition

Supports EPA's mission to protect human health and the environment