

US EPA ARCHIVE DOCUMENT

*Uncertainty in the
US EPA Assessment of the
Impact of Global Change on US Air Quality*

Brooke L. Hemming and Chris P. Weaver
ORD/NCEA/Global Change Research Program
February 20, 2007

- **The Problem**
- **Our assessment strategy**
- **How to identify and quantify the uncertainties in our approach? (And other questions)**
- **A first step towards answering these questions: The workshop**
- **Status of our effort to date.**

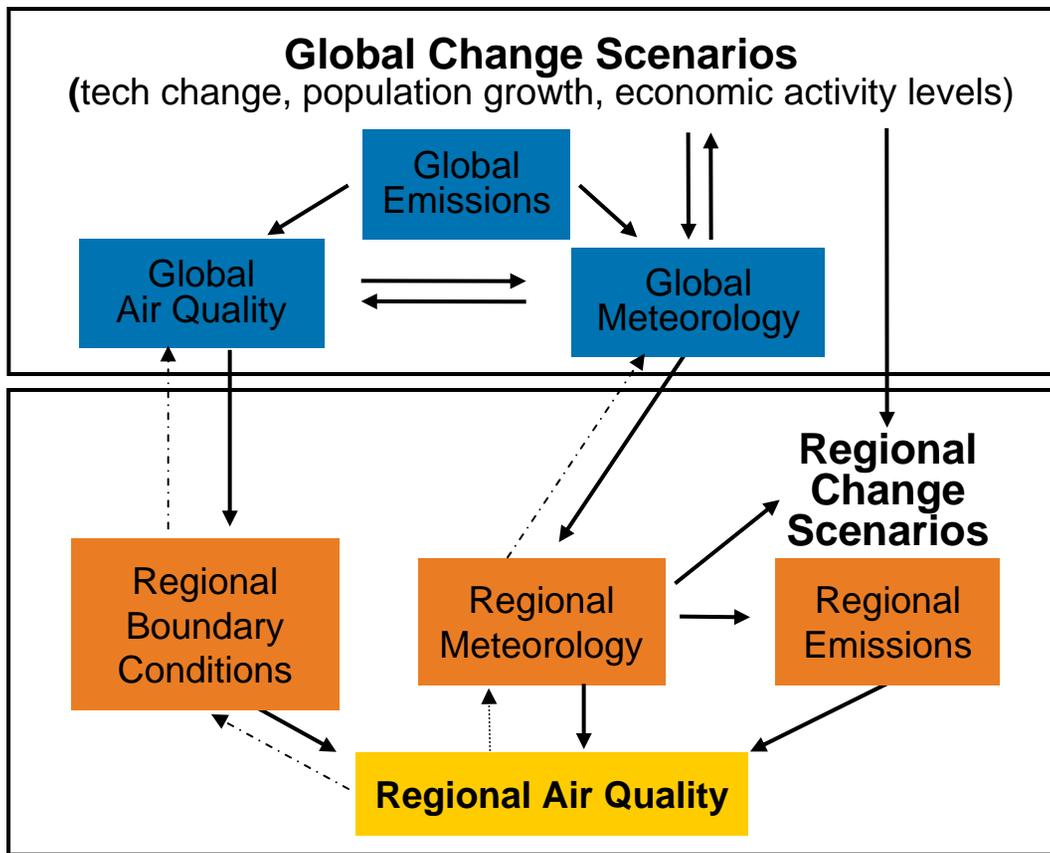


The Problem

- **Assessing the future impact of global change on air quality across a continent with a variety of climatological regimes**
- **Modeling scheme must capture:**
 - Global scale influences on regional climate and atmospheric chemistry
 - Regional scale climate/meteorological diversity
 - Current and future emissions as a function of location and temporal variability



Global Change – Air Quality Assessment



Global

Regional

Implemented via a cross-lab, modeling effort:

- NCEA: synthesis, assessment, and coordination
- NRMRL: technology change and emissions
- NERL: regional emissions and air quality modeling
- NCER: extramural research

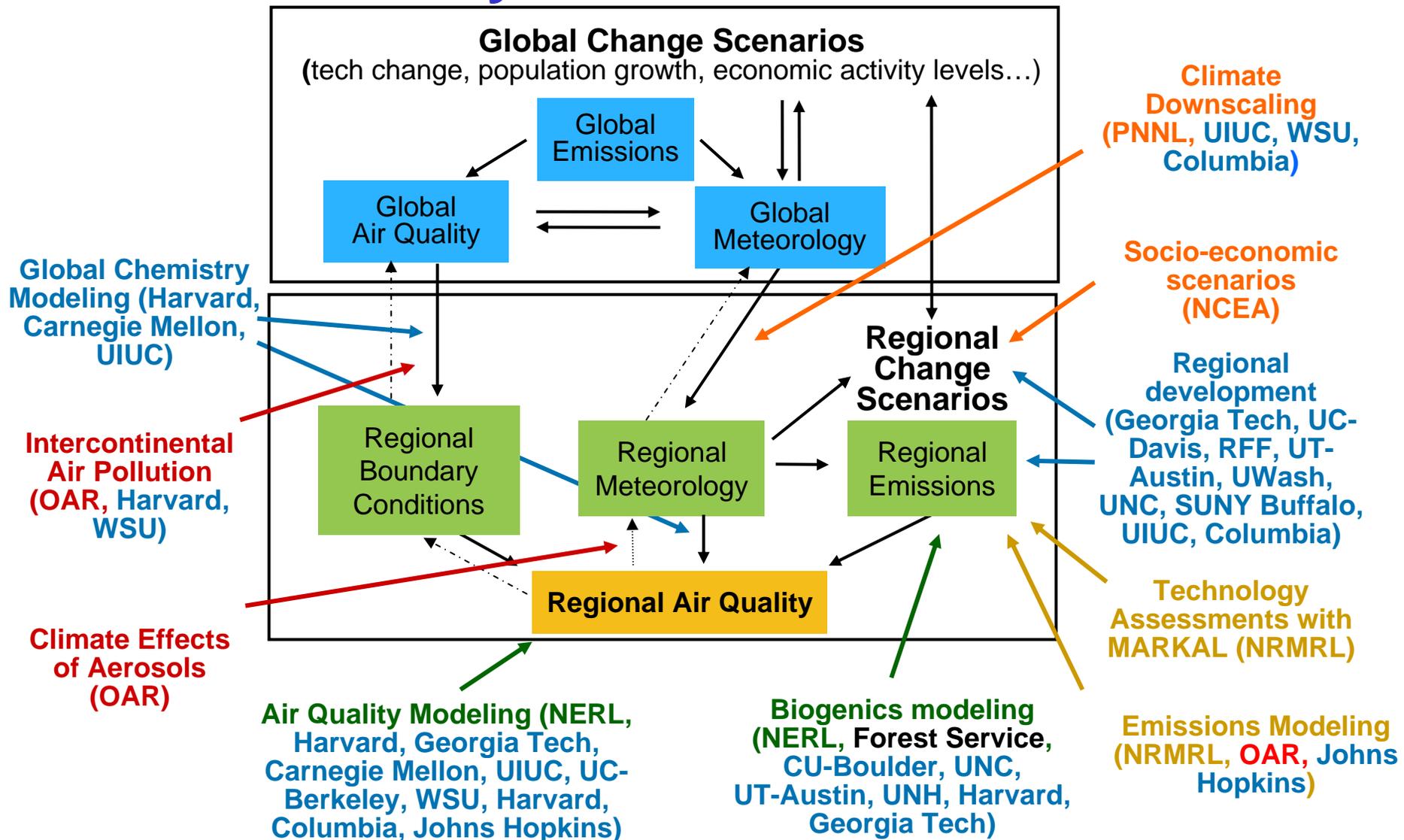
Anne Grambsch,
EPA ORD/NCEA



RESEARCH & DEVELOPMENT

Building a scientific foundation for sound environmental decisions

Air Quality Assessment Framework



Darrell Winner EPA/ORD/NCER



RESEARCH & DEVELOPMENT

Building a scientific foundation for sound environmental decisions

How to identify and quantify the uncertainties in our approach?

- **Necessary process**
 - **Good science and an our obligation to our clients**
 - **As a continuing assessment, we need to identify the aspects of the framework that may need strengthening**
- **So, we surveyed:**
 - **Our fellow members of the intramural assessment team**
 - **Multiple sources of uncertainty**
 - **The literature**
 - **No apparent list of “best practices” for quantifying uncertainty in complex, model-based assessments in the literature**

With the right group of experts, could we design a set of best practices for this (and other) complex impacts assessment(s)?



Another big question:

- **How do we effectively communicate the overall uncertainty to our clients** and stakeholders**?**
 - ...without losing our audience by overloading them with too much scientific detail.
 - ...without diminishing the value of our more robust findings.

**** EPA/Office of Air and Radiation; State and Local air quality managers**



Our approach (1)

- **Identify and bring together the appropriate cross-section of experts, stakeholders and clients who could contribute to devising:**
 - A set of guiding principles for tracking and quantifying uncertainty in complex, model-based assessments of global change impacts.
 - A set of guiding principles for communicating these uncertainties to stakeholders and clients.
 - A strategy for assessing/discussing the uncertainty in the findings of the GCAQ assessment at its current stage, i.e. for the 2007 interim report.



The Workshop Participants

- **Subject experts (e.g., climate modeling, atmospheric chemistry)**
- **Theory experts (e.g., quantifying and communicating uncertainty)**
- **The scientists doing the research upon which the assessment would be based**
- **The EPA clients/stakeholders**



Our Approach (2)

- **Provide a wide array of advance reading materials, including:**
 - Framing questions
 - A white paper developed for the workshop by Chris Weaver and Steve Hanna introducing the available methods for determining model-based uncertainties.
- **Formulate interdisciplinary teams, composed of assessment science experts, uncertainty experts, stakeholders and clients**
- **Equip each team with:**
 - A participants' guide that articulated the objectives for the working group – identical across all three groups
 - An expert in uncertainty to lead the group in achieving the objectives
 - A professional facilitator to assist the leader in keeping the group focused on the objectives.



Participants' Guide

- **Three discussion topics**
- **Goals for each discussion topic**
- **Introductory text**
- **Discussion questions**

Workshop agenda:

- **Initial plenary**
- **Two working group sessions**
- **Closing plenary and large group discussion**



Status of our effort

- **Workshop report is now complete.**
 - Record of the discussions prepared by ERG, the workshop contractor.
- **While consensus sets of guiding principles could not be formulated in the time frame available, numerous useful suggestions arose from the group effort.**
 - Recurring themes
- **The report will require analysis to resolve all of the common themes.**
- **This analysis will be presented as part of the GCAQ 2007 interim report, and elsewhere.**



Acknowledgements

Working Group Leaders

Bryan Hubbell
Chris Frey
Max Henrion

Plenary Speakers

Anne Grambsch
Lydia Wegman
Steve Hanna
Alice Gilliland
Bryan Hubbell

Experts

20 outside experts
12 STAR grant recipients
15 ORD/NERL colleagues
4 ORD/NRMRL colleagues

Client/Stakeholders

Nehzat Motallebi, CARB
Praveen Amar, NESCAUM
9 OAR colleagues

