



**Task Force on Hemispheric
Transport of Air Pollution**

HTAP2 Global and Regional Model Evaluation Workshop

Co-Chairs

Terry Keating, PhD

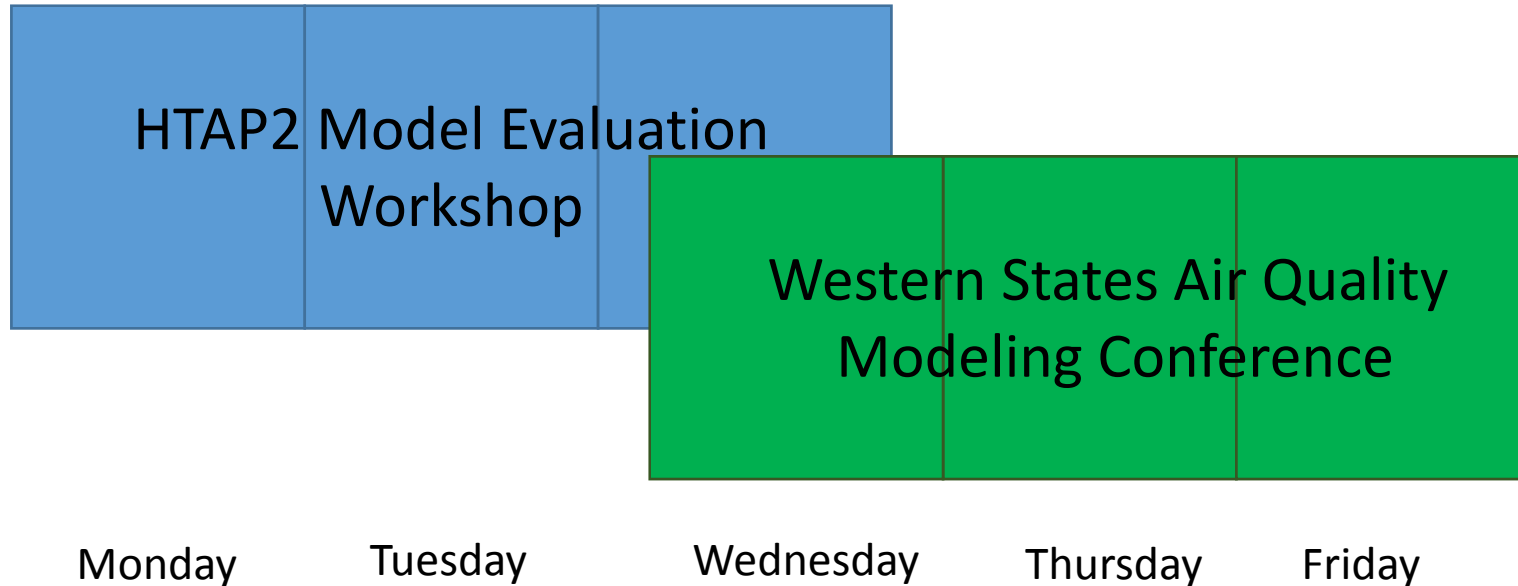
U.S. Environmental Protection Agency
Office of Air & Radiation

Frank Dentener, PhD

European Commission
Joint Research Centre

www.htap.org

“Modeling Air Quality from Global to Regional Scales”



Overlap is intended to provide opportunities for:

- Air Quality Managers to hear about HTAP2 and related activities
- HTAP2 participants to hear Air Quality Managers questions, which can help focus our analyses to be more policy-relevant

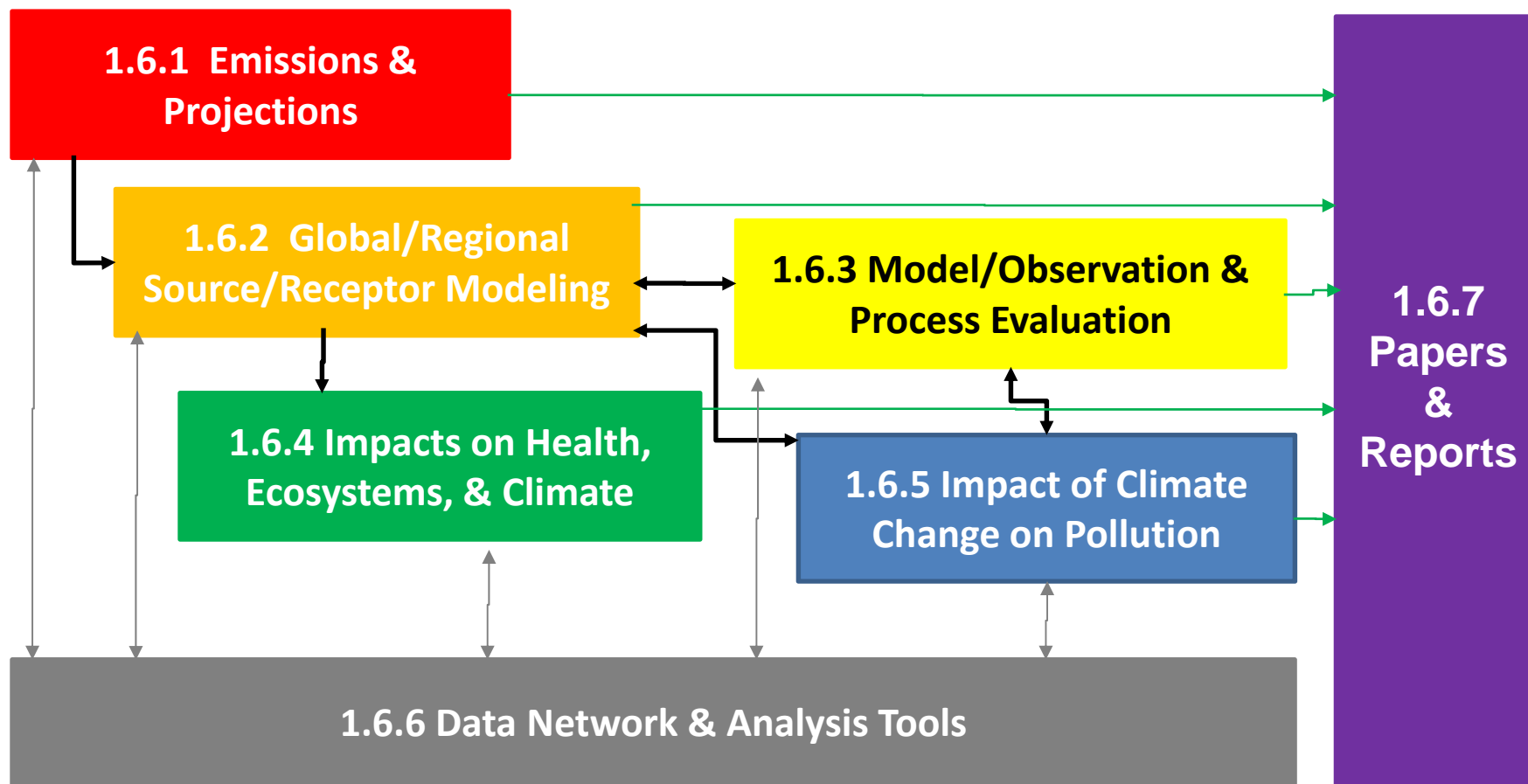
Objectives of TF HTAP's 2012-2016 Work Plan

1. **Deliver Policy Relevant Information to the LRTAP Convention, Other Multi-Lateral Forums, and National Governments**
 - a. What fraction of air pollution can be attributed to contemporary anthropogenic **regional** emissions sources **versus extra-regional**, non-anthropogenic, or legacy sources of pollution?
 - b. What is the contribution of each fraction to **impacts** on human health, ecosystems and climate change?
 - c. How **sensitive** are regional pollution levels and related impacts to changes in regional versus extra-regional emission sources?
 - d. How will the contributions of the fractions and their sensitivities **change in the future** as a result of expected air pollution abatement efforts or climate change?
 - e. How do the availability, costs and impacts of additional emission **abatement options** compare across different regions?
2. **Improve Our Scientific Understanding of Air Pollution at the Global to Hemispheric Scale**
3. **Build a Common Understanding by Engaging Experts Inside and Outside the LRTAP Convention**

2012-2016 Work Plan

Themes of Cooperative Activities Under TF HTAP

As Numbered in Convention Work Plan



Focus of this Workshop is on 1.6.2 Modeling, 1.6.3 Evaluation, and 1.6.6 Data Network & Tools

Status of Other Work Plan Elements

1.6.1 Emissions (2008,2010) and Scenarios (2010-2050)

- 2008 and 2010 global emissions mosaic completed and data is available
 - G. Janssens-Maenhout et al. HTAP_v2: a mosaic of regional and global emission gridmaps for 2008 and 2010 to study hemispheric transport of air pollution. The paper is now accessible and open for interactive public discussion until 24 Jun 2015 at: <http://www.atmos-chem-phys-discuss.net/15/12867/2015/>
- Workshop on global emissions scenarios conducted with TFIAM and CIAM (11-13 February 2015, Vienna), 2010-2050 global "benchmark" emissions scenarios mostly complete, publication in process

1.6.4 Health, Ecosystem, and Climate Impacts

- May 2014 Workshops on Health Impact Assessment Methods (Bonn) and Ecosystem Impact Assessment Methods (Beijing)
- Participate in workshop at World Expo "Sustainable food production and air pollution: reducing emissions generates many benefits" (10 July 2015, Milan)
- Workshop on initial impact assessment results anticipated for late 2015 or early 2016.
- Collaboration with Agricultural Modelling community (AgMIP) proposed at AgMIP plenary meeting. Joint meeting being considered for next year.

1.6.5 Impacts of Climate Change on Air Pollution

Status of Other Work Plan Elements

1.6.7 Communication of Findings

- *Atmospheric Chemistry and Physics* Special Issue, Now Open
Global and regional assessment of intercontinental transport of air pollution: results from HTAP, AQMEII and MICS

The special issue will be edited by

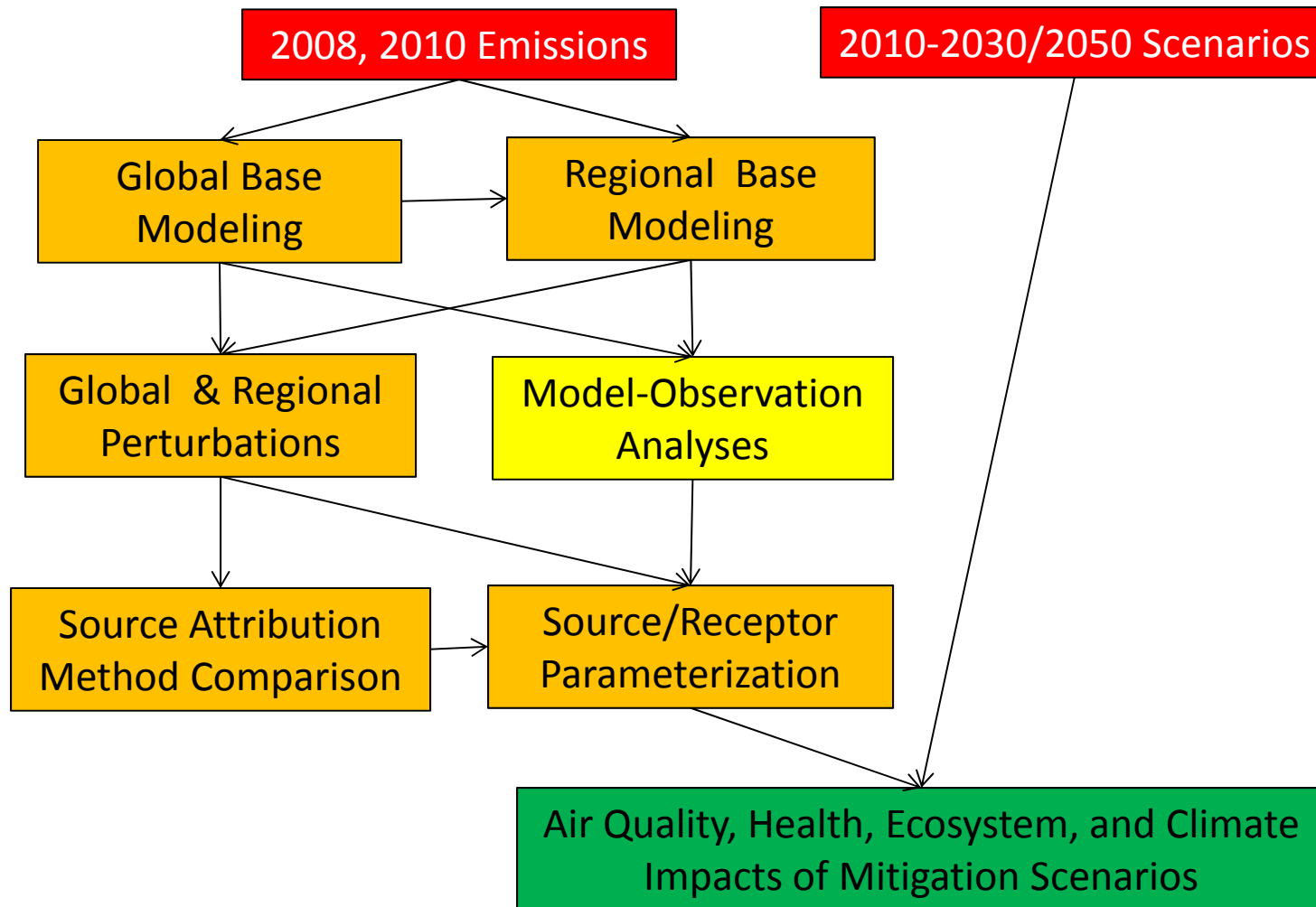
- Frank Dentener (frank.dentener@jrc.ec.europa.eu),
- Stefano Galmarini (stefano.galmarini@jrc.ec.europa.eu),
- Christian Hogrefe (Hogrefe.Christian@epa.gov),
- Gregory Carmichael (gcarmich@engineering.uiowa.edu), and
- Kathy Law (kathy.law@latmos.ipsl.fr).

Accepting submissions until 1 December 2016

Open to all publications related to the intercontinental transport of air pollution and providing answers to the “HTAP Science Questions”

- *Elementa: Science of the Anthropocene* Special Issue, Under Consideration to tell the HTAP story from emissions and future scenarios, through atmospheric fate and transport, to impacts on health, ecosystems, and climate.

Modeling Work Flow



Availability of Observational Data

EBAS Extract 2008 & 2010

- EMEP data and other sources of rural stations in the European domain considered representative of regional concentrations of air pollution

AQMEII Phase 2/3 Extract 2010

- Observational data for the European and North American domains of AQMEII. Note that these data include a wide range of sites from rural to urban locations, not all of which may be relevant for model evaluation, particularly for global models with relatively coarse resolution.

Data for Other Regions?

- South Asia
- East Asia

Seeking Recommendations for a “Benchmark” Set of Observations

- What stations and parameters do you find useful?
- For what purpose? E.g., global model evaluation vs. regional model evaluation
- What data is not useful? Why?
- Can we define a set of stations and parameters that can form a “benchmark” against which to compare model performance over time?

Previously Proposed Model-Observation Evaluations and Process Studies

Possible Themes

- North American Inflow
- S/R Methods Comparison
- Comparison to Satellite and Aircraft Observations
- Regional Budgets
- Vertical Profiles
- Ozone Deposition and Stomatal Flux
- Ozone Surface Observations
- Biomass Burning Sensitivity
- Black Carbon
- Sulfate/Nitrate Budgets
- Optical Properties
- Local Scale Sensitivities

Partner organisations

- AeroCom
- CCMI
- AQMEII
- MICS-Asia
- EuroDelta3
- POLMIP
- GMOS
- POPs
- South Asian Work Group

Questions for Discussion from AQ Managers

1. Evaluation of Model Performance

How well can current global and regional models quantify:

- a. Spatial patterns and temporal trends in
 - i. Surface ozone concentrations
 - ii. Fine particle concentrations
 - iii. Nitrogen deposition
- b. Elevated levels of ozone in urban and rural locations, including high elevation sites.

Questions for Discussion from AQ Managers

2. Evaluation of Source Attribution

How well can current global and regional models quantify:

- c. Contributions of local and regional anthropogenic sources as distinguished from
 - i. Anthropogenic sources outside the region (e.g. North America or the United States)
 - ii. Stratospheric intrusion
 - iii. Biogenic, wildfires, wind-blown dust, and other uncontrollable emissions

Questions for Discussion from AQ Managers

3. Standards for Model Evaluation

Are robust and generally acceptable model performance standards established and routinely applied in the global and regional modeling communities?

Questions for Discussion from AQ Managers

4. Establishing Regional Boundary Conditions

- a. In a nested system, how does global model performance affect regional model performance?
- b. How should future year regional boundary conditions (e.g. for western U.S. regional modeling) be determined or evaluated?

Overview of Agenda

Monday

- Status Reports from Contributing Modeling Groups

Tuesday

- Some Presentations about Model Evaluation
- Initial Discussion of Questions and Responses
 - Lunch
- Discussion of Analyses Needed to Improve Responses
- Next Steps for HTAP2 (Who is willing to do what, by when?)

Wednesday

- Present Overview, Initial Findings, and Future Plans (in the context of the Western States)