PA31A-0815 Producing Science to Inform Policy on Hemispheric Transport of Air Pollution

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The Task Force on Hemispheric Transport of Air Pollution

Task Force on Hemispheric Transport of Air Pollution

Chairs: Terry Keating (United States) and André Zuber (European Community)

Mission: To develop a fuller understanding of the hemispheric transport of air pollution to inform future negotiations under the Convention on Long Range Transboundary Air Pollution (CLRTAP).

Background: Evidence from both observational and modeling studies indicates that pollutant emissions from one continent (source) influence air quality over other continents (receptors). A lack of community-wide consistency in defining source-receptor regions and in reporting air quality metrics, however, hinders assessment of the policy implications of intercontinental transport.

Products: **2007 Interim Report** to inform the review of the CLRTAP Gothenburg Protocol to abate acidification, eutrophication, and tropospheric ozone.
2009 Assessment Report to inform the CLRTAP about hemispheric air pollution and source-receptor relationships for ozone, aerosols, mercury, and POPs.

Challenge: Balancing the limited time and resources of individual research groups available for a community-wide effort with the needs of the policy community.

Opportunity: Framework to move information from the science to the policy community fosters a rapid exchange of ideas, helping to identify research priorities and gain insights through collaboration.

Approach:
1. Define a set of focused, policy-relevant questions.
2. Engage the scientific community in designing a set of experiments to address these questions.
3. Translate science results into metrics that are directly relevant to air quality policy goals.
4. Maintain an open dialogue among participants via several communication avenues.

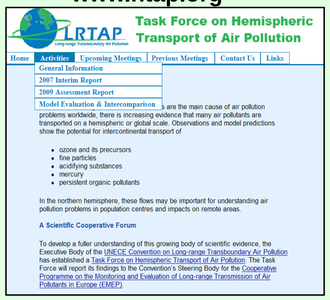
A Multi-model Assessment

Objectives: Quantify source-receptor relationships for HTAP regions (see top right) and assess uncertainties in these estimates.

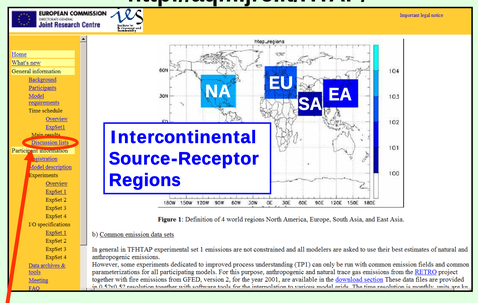
Methods:
1. Encourage participation of groups with global 3D tropospheric chemistry models (require horizontal resolution of 4°x5° or finer).
2. Specify base case simulation: 2001 meteorology; methane set to a uniform value of 1760 ppb; each group uses its best estimate for NO_x, NMVOC, CO emissions.
3. Conduct sensitivity simulations: 20% reductions of anthropogenic NO_x, NMVOC, and CO individually from each HTAP region, and a 20% reduction of CH_4 abundances to 1408 ppb (13 total simulations).
4. Require model output to comply with CF conventions (a version of the Climate Model Output Rewriter is available for this task).

Encouraging Dialogue: TF HTAP Communication Avenues

www.htap.org



http://aqm.jrc.it/HTAP/



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or send a blank email to subscribe-tfhtap@lists.epa.gov

Meetings and Workshops

Date	Title	Purpose	Location
JUN 1-3, 2005	First TF Meeting	Develop a work plan	Brussels, Belgium
JAN 30-31, 2006	Modeling Workshop	Organize multi-model assessment of HTAP and draft outline of 2007 interim report	Washington, D.C., U.S.A.
JUN 6-8, 2006	Second TF Meeting	Review science of mercury, POPs, and methane as an ozone precursor; agree on 2007 work plan	Moscow, Russia
OCT 18-20, 2006	Emissions Inventory and Future Projections Workshop	Evaluate current emission inventories and future projections	Beijing, China
JAN 24-26, 2007	Integrated Observations Workshop	Assess state of current observational networks; discuss how to fill gaps and produce common data bases	Geneva, Switzerland
JAN 27, 2007	Model Inter-comparison Meeting	Discuss initial analyses and priorities for 2007 interim report	Geneva, Switzerland
MAY 30 – JUN 1, 2007	Third TF Meeting	Accept the 2007 interim report; agree on 2008 workplan	London, U.K.

Assessment of Hemispheric Ozone Transport: Example Analysis of Results From One Model

Response of seasonal mean surface O_3 over the HTAP receptor regions to 20% reductions in:

Anthropogenic NO_x

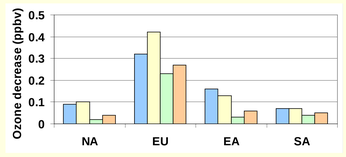
Source region

Receptor region	NA	EU	EA	SA
NA	-1.41	-0.06	-0.09	-0.03
EU	-0.02	-1.31	-0.05	-0.02
EA	-0.14	-0.15	-1.05	-0.09
SA	-0.13	-0.16	-0.09	-1.32

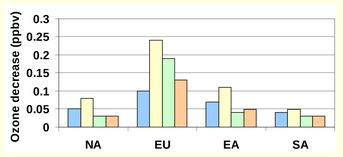
The table shows the change in seasonal mean O_3 (ppbv) resulting from a 20% reduction of anthropogenic NO_x emissions in the source regions for the season of maximum impact. Table cells with equivalent impacts in multiple seasons are colored white.

DJF
MAM
JJA
SON

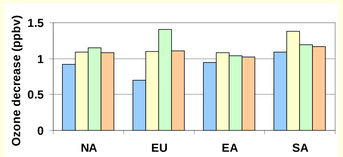
EU Anthropogenic NMVOC



EU Anthropogenic CO

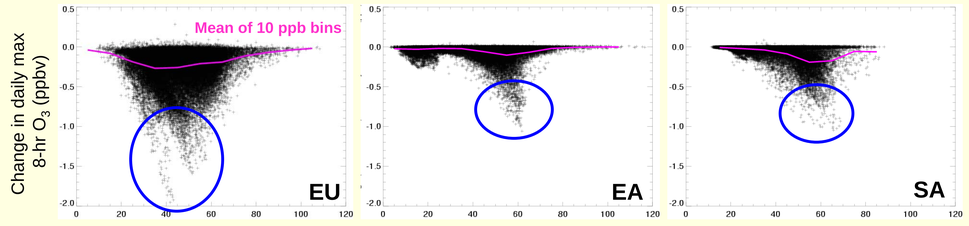


Methane



- **Intercontinental influence varies by season and region**
- **Maximum intercontinental influence does not always occur in season with highest base case seasonal mean O_3 in the receptor region (highest base case O_3 occurs in summer for EU; spring for EA and NA; winter for SA)**
- **In spring, European NO_x, CO, and NMVOC contribute similarly to O_3 over NA and EA; NO_x reductions are more effective over SA**
- **A 20% decrease in CH_4 lowers surface O_3 by ~1 ppbv in all HTAP regions, with EU subject to the largest seasonal variation**

Intercontinental impacts of a 20% decrease in North American anthropogenic NO_x in summer



Each point represents one daily maximum 8-hour average O_3 value in one model grid cell from June 1 to August 31

Intercontinental influence is typically largest near the middle of the overall O_3 distribution and smaller under the cleanest and most polluted conditions

Next steps

- **Distribute a visualization tool for modeling participants to examine and error-check results**
- **Analyze results from all participating models, plus new simulations (to be submitted by January 15, 2007) with NMVOC, CO, and all O_3 precursors simultaneously reduced from all HTAP regions**
- **Use cross-model range as an estimate of uncertainty**
- **Increase focus on metrics directly relevant to policy (e.g. 8-hr daily maximum O_3)**
- **Incorporate results into 2007 Interim Report**

All results shown here are from the GFDL MOZART-2 model

Organizations Contributing to The HTAP Modeling Effort

AMDAL/CRESS York University
ICG-II, Forschungszentrum Jülich
Laboratoire de Météorologie Dynamique
Service d'Aéronomie, CNRS
University of Maryland Baltimore County
CIEMAT
CNR-IIA
ECPL-UOC
EMEP/MSC-E
EMEP/MSC-W
Environment Canada
NOAA/GFDL
Harvard University
IIA-CNR
Italian Research Council
JRC-IES
Lamar University
LLNL
LSCE-CEA
NASA GISS
NASA GSFC
NCAR
NERI
UK Met Office
University of Cambridge
University of Edinburgh
University of Oslo

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