Status of TF HTAP Work Plan

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Emissions & Scenarios

Global/Regional Source/Receptor Modeling

Impacts on Health, Ecosystems, & Climate (1.1.4.2)

Model/Observation & Process Evaluation (1.1.4.1)

Impact of Climate Change on Pollution (1.1.4.4)

Data Network & Analysis Tools (1.1.4.3)

Papers & Reports (1.1.3.2, 1.5.2)

2012-2016 Work Plan

Modeling Work Flow

2008, 2010 Emissions

Global Base Modeling

Regional Base Modeling

Global & Regional Perturbations

Model-Observation Analyses

Source Attribution Method Comparison

Source/Receptor Parameterization

Air Quality, Health, Ecosystem, and Climate Impacts of Mitigation Scenarios

2010-2030/2050 Scenarios
# Accomplishments

| Emissions & Scenarios | • 2008, 2010 Global Anthropogenic Emissions Mosaic at 0.1° resolution  
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<th>• 3 “Benchmark” Scenarios to 2050 (based on ECLIPSEv5a)</th>
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<td>• Sparse Matrix of Sensitivity Studies for S/R Calculations</td>
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| Observation – Model Evaluation | • Several observational data collections (EBAS, AQMEII, ...)  
|                       | • Several targeted evaluation studies (region, observation) |
| Impacts Assessment | • Workshops on impact assessment methodologies with health and ecosystem communities |
| Impact of Climate Change |                                                                 |
| Data Network & Tools | • Data Formats and Tools  
|                       | • Data Archive and Visualization Tools |
| Papers & Reports | • Emissions Inventory Paper in ACP  
|                   | • Contribution to 2016 LRTAP Assessment Report |
**Expectations & Aspirations**

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<tr>
<th>Emissions &amp; Scenarios</th>
<th>• Alternative Scenarios related to Potential Policies</th>
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| Source/Receptor Modeling | • S/R Calculation Methods Comparison  
                          • Improved S/R Parameterizations |
| Observation – Model Evaluation | • Assessment of Global and Regional Model Performance  
                                 • Recommendations for “Benchmark” Observations for Global Model Evaluation |
| Impacts Assessment | • PM/O3 Human Health Impacts of Scenarios/Policies  
                       • O3 Vegetation Impacts of Scenarios/Policies |
| Impact of Climate Change | • Climate Change Impacts (RF, ... ) of Scenarios/Policies  
                              • Extended analysis of regional climate (emission metrics)  
                              • Review of Literature, workshop |
| Data Network & Tools | • HTAP-FASST Screening Tool |
| Papers & Reports | • ACP Special Issue: 8 publications+ca. 15 more expected.  
                      • Policy-Relevant Synthesis for LRTAP Convention |
Model success rate:
The frequency that a model is within +/- 20% of the co-sampled observations.

Gray lines in the lower panel indicate the global model values for comparison.
Global/Regional Source/Receptor Modeling

http://aerocom.met.no/cgi-bin/aerocom/surfobs_average.pl

Surface ozone reference simulations

Global/Regional Source/Receptor Modeling

http://aerocom.met.no/cgi-bin/aerocom/surfobs_annualrs.pl
O3 evaluation in Europe, all models are equal?

EMEP

IFSv2

Chaser

GeosChemAdjoint

CAMchem

OsloCTM3.v2

Jan Eiof Jonson, poster
Errors in regional models are determined by long-term and diurnal errors- and less by synoptic scale

Solazzo et al.
2010-2050 Benchmark Scenarios

- Developed by IIASA, leveraging EU-funded ECLIPSE Project
- 3 scenarios with explicit levels of air pollution control: No Further Control, Current Legislation, Maximum Technologically Feasible Reductions
- One additional scenario based on IEA 450 ppm climate mitigation measures in Energy sector

Policy Relevant Questions

NFC: What are the benefits of implementing current policies in terms of health, ecosystems, and climate impacts?

CLE: Given current policies, what are emissions likely to be in the future?

MFR: What technology and policy options will be available (at a reasonable cost) to further mitigate pollution problems in the future?
O$_3$ changes in Europe for HTAP global air pollution scenarios

HTAP2 scenarios:
- NFC No further control
- CLE Current Legislation
- MFR Maximum Feasible Reductions

For Europe:
- Regional controls can still bring down ozone further, but requires ambitious and expensive air pollution policy.
- Ambitious air pollution policy elsewhere may be beneficial for Europe, especially in the US. For the US it would be China, etc..
- Methane emission reductions are going to be crucial for reducing ozone.
- Methane is included in climate policies, but we will need to reduce it also for reducing ozone air pollution.
- Reducing methane will require strong collaboration with countries in Asia.
- A likely range for changes in ozone boundary conditions is therefore estimate to range between -4 and 3 ppb in 2030, and -4 and 5 ppb in 2050.
- Does not consider climate change, long-term variability.

O. Wild, Z. Klimont et al, EMEP Assessment Report
Special Issue of Atmospheric Chemistry and Physics

*Global and regional assessment of intercontinental transport of air pollution: results from HTAP, AQMEII and MICS*

Accepting submissions until 1 December 2016

Open to all publications related to the intercontinental transport of air pollution and providing answers to the HTAP policy-relevant science questions:

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?
Papers Already Appearing in ACP or ACPD Special Issue

• HTAP_v2.2: a mosaic of regional and global emission grid maps for 2008 and 2010 to study hemispheric transport of air pollution (Janssens-Maenhout, et al.)

• MIX: a mosaic Asian anthropogenic emission inventory for the MICS-Asia and the HTAP projects (Li, et al.)

• Error apportionment for atmospheric chemistry-transport models – a new approach to model evaluation (Solazzo, et al.)

• Response of winter fine particulate matter concentrations to emission and meteorology changes in North China (Gao et al.)

• Global and regional radiative forcing from 20% reductions in BC, OC and SO$_4$ – an HTAP2 multi-model study (Stern, et al.)

• Improving the deterministic skill of air quality ensembles (Kioutsioukis, et al.)

• Regional and global temperature response to anthropogenic SO$_2$ emissions from China in three climate models (Kasoar, et al.)

• Evaluation and Error Apportionment of an Ensemble of Atmospheric Chemistry Transport Modelling Systems: Multi-variable Temporal and Spatial Breakdown (Solazzo, et al.)
Assessing the Impacts of Future Global Air Pollution Scenarios: Implications for HTAP2, AMAP, and Global IAMs

17-19 February 2016
IASS Potsdam, Germany

- Potential for Cooperation with Arctic Monitoring and Assessment Program (AMAP)
  - Work Plan 1.3.1
  - Mercury, POPs, Black Carbon, Health and Ecosystem Impacts, Emissions Scenarios and Mitigation Strategies

- Potential for Cooperation with Other Efforts Quantifying Health, Ecosystem, and Climate Impacts of Air Pollution
  - AerchemMIP/CCMI, GBD, ISI-MIP, AgMIP
Challenges and Opportunities

• Co-Evolution with AQMEII and AeroCom?
  • Alignment with Objectives of Funding Institutions
  • Cooperation with MICS-Asia
  • Focus on Biosphere-Atmosphere Interaction? Deposition? ...

• Cooperation with Arctic Monitoring and Assessment Program (AMAP) Expert Groups (1.3.1)
  • Re-integration of Hg and POPs experts
    MSC-E has kept parallel work moving forward
  • Continuing discussions with TFIAM and CIAM
    Exploration of policy-relevant scenarios and costs (1.1.3.2)

• Cooperation with TFMM and EuroDelta
• COP-21 and IPCC AR6 driving regional analysis wrt air pollution-CC
• Future Meeting Logistics/visibility
  Side Meetings at Major Conferences (AGU, EGU, ...) vs. Dedicated Workshops
  Opportunities for Joint Meetings with other Task Forces and activities?
Additional material
2010-2050 Benchmark Scenarios

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