Task Force on Hemispheric Transport of Air Pollution

Status of TF HTAP Activities, Draft 2018-2019 Work Plan, and Updated Mandate

Co-Chairs

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13 September 2017

Task Force on Hemispheric Transport of Air Pollution

Our current work has two main themes:

1. The quantification of global influences on regional air quality
   - Driven by the needs of regional air quality planning
   - Working with AQMEII and MICS-Asia to link modeling at the global and regional scales
   - Developing a foundation for global model evaluation

2. The evaluation of air pollution control opportunities and their impacts at intercontinental to global scales
   - Informing the priorities for international cooperation on air pollution mitigation
   - Providing information on pollution control opportunities to complement available regional scale assessments

1.Quantification of Global Influences on Regional Air Quality

Global and Regional Modeling Experiments for 2008-2010

"Air Quality in a Changing World"; North Carolina, 3-5 April, 2017

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

- 16 articles published in ACP
- 9 articles in open review in ACPD
- 15 articles in development, more possible
- Open to all analyses relevant to quantifying extra-regional influences
- Submission deadline 1 December 2017

Synthesis Report in 2018 (Task 1.1.4.3)

2. Evaluation of Air Pollution Controls on Global Scales

2012, 2015 Scenarios Workshops at IIASA

- CLE, NFC, MFTR, Climate Policy (via ECLIPSE)

Assessing the Impacts of Future Global Air Pollution Scenarios:
Implications for HTAP2, AMAP, and Global IAMs,
17-19 February 2016, IASS, Potsdam, Germany

Joint Session with Task Force on Integrated Assessment Modeling,
2-3 May 2017, Paris

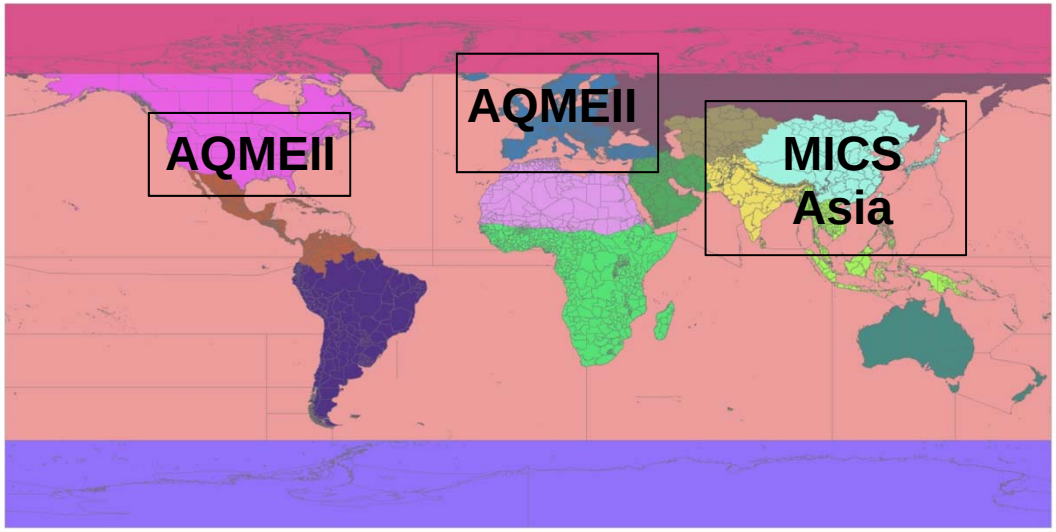
- Implications of new scenarios and health impact information
- Can we address specific sectoral measures (e.g. ag, aviation, shipping, …)?
- Integration of O_3, PM, Hg, POPs, N, and GHGs

Update of Parameterized S/R Relationships from HTAP1

Development of FASST-HTAP, a screening model for global scenarios

HTAP2 Global & Regional Source/Receptor Modeling

- **Overall Approach:** Use **global** and **regional** simulations of 2008-2010 to evaluate against observations and to contribute to the quantification of parameterized S/R relationships. Use parameterized S/R relationships to estimate impacts of future strategies.
- **World divided into 16 Regions (60 sub-regions)**



7 priority source regions:
North America, Europe, East Asia, South Asia, Russia/Belarus/Ukraine, Middle East

Nested Regional Simulations from AQMEII and MICS-Asia

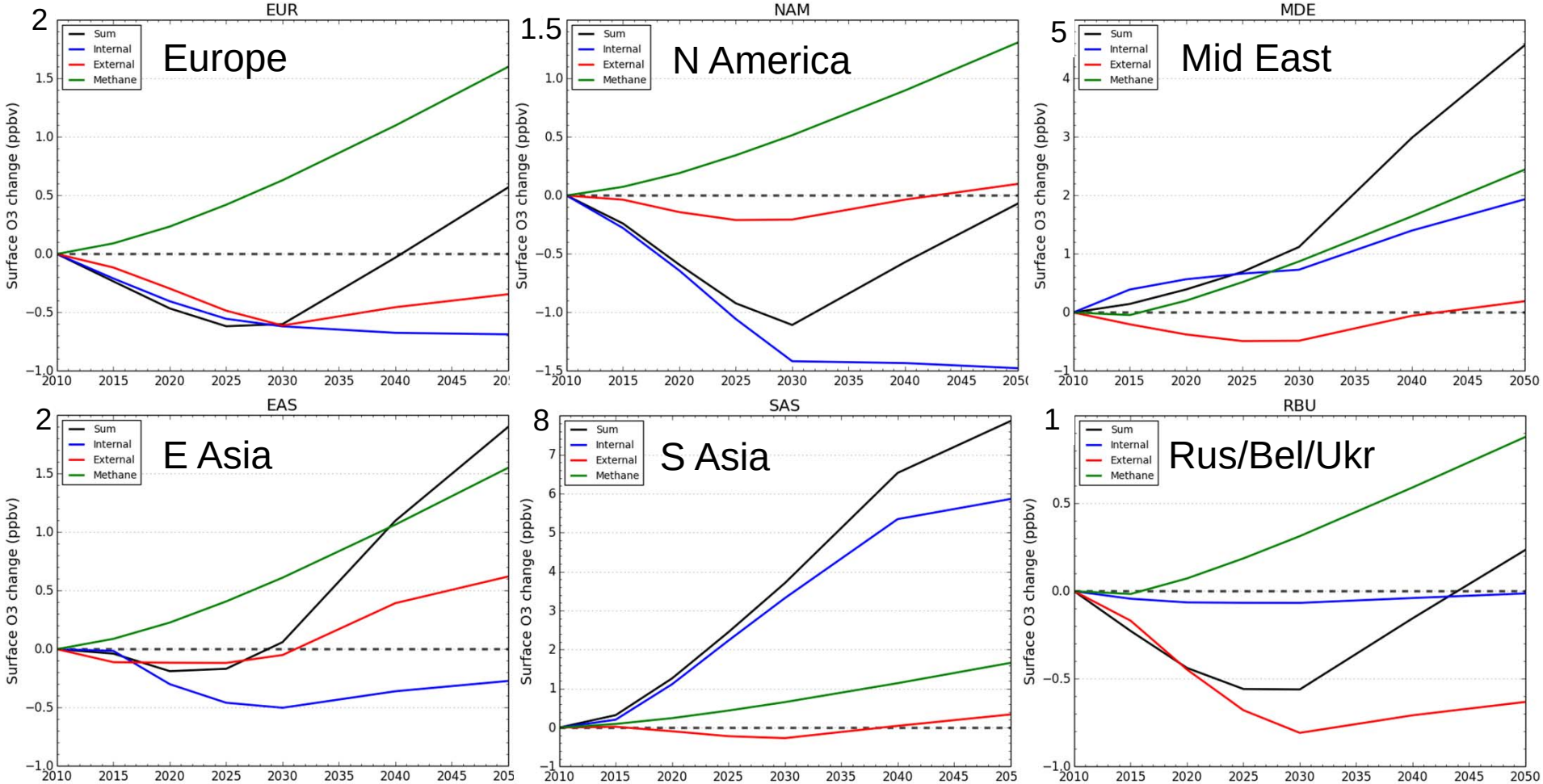
- **Sensitivity Experiments:**

Pollutants: CH_4, NOx, CO, VOC, aerosol-(precursor)
Sectors: Transport; Power/Industry; Residential; Other, Fires/Dust

Method	Strengths	Weaknesses
HTAP1 SRs- with new scenarios	Published- ca. 15 global models. CLRTAP 2016 report	Large-regions; 'old' and coarse resolution models
HTAP2 – scaling of HTAP1 results	New results (ensemble of ca. 5 models); more relevant regions; SR	Sparse matrix Matching HTAP1-HTAP2 regions
TM5-FASST with new scenarios	Widely used (UNEP, CCAC; SSPs) Direct translation in health/vegetation/climate metrics	'Old' model results Meteo year 2001. Only one model. Linear.
GEOS-Chem Adjoint with new scenarios	Adjoint allows a wide range of analyses (need to define receptor and metric). Used for CCAC.	One model; complicated- not many groups have an adjoint version of their models. Linear.
CAM-Chem colored tracer	O3 source attribution; different 'approach'- additional info	One model- expensive to run- few scenarios. Does not separate the effects of VOCs-CH4- CO
AQMEII regional ensemble	Consistency with global models; while higher resolution. Better representation of impact of local emissions.	Driven by single set of Boundary Conditions (ECWMF). Need to understand to what extend differences with global models are 'improvements'.

Parameterization of HTAP2 (+ HTAP1) Ensemble Results

Annual Mean O_3 Changes ECLIPSE CLE



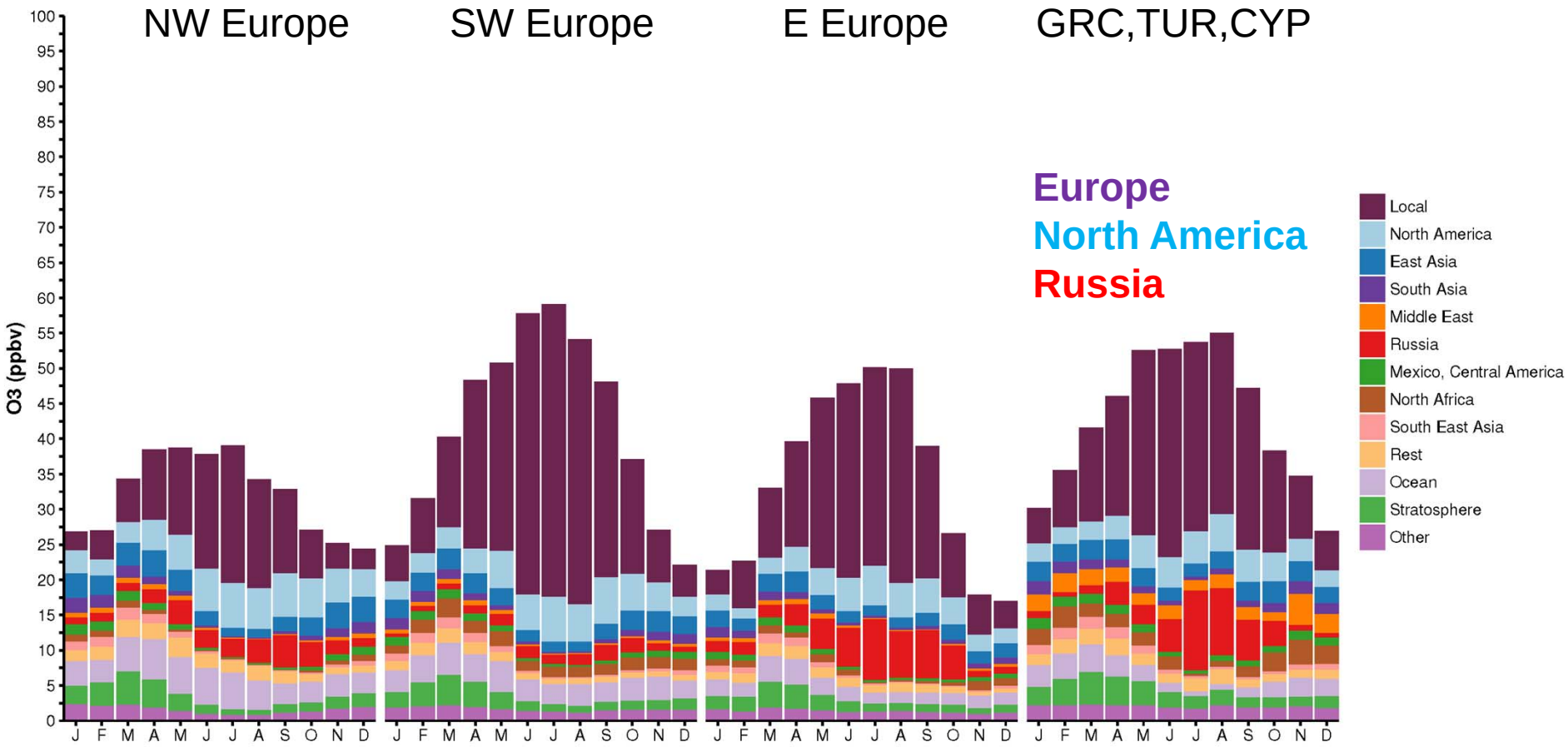
Steven Turnock and Oliver Wild

CAM-chem: Tagged tracer. ***Preliminary Results***

HTAP 2010 emissions

Assumes O3 production is NOx limited (implicitly factors in CO, CH4, VOCs)

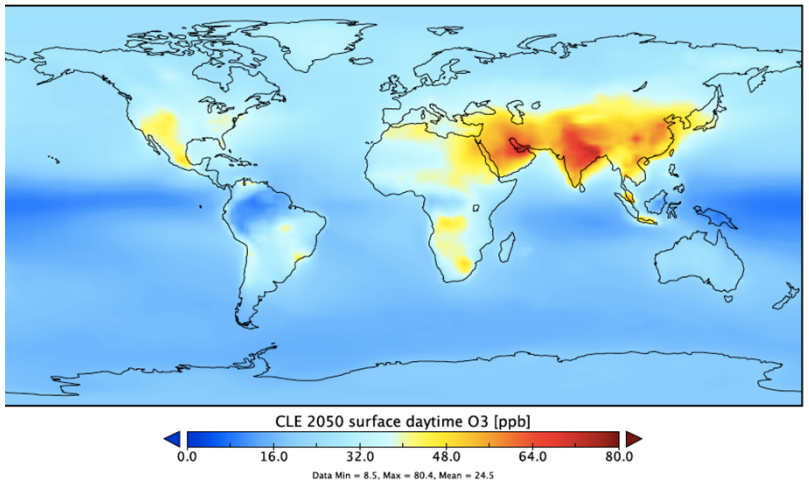
Source Attribution for European Monthly Average O3 for 2010



Extra-regional anthropogenic contribution varies from 30% to 80%.

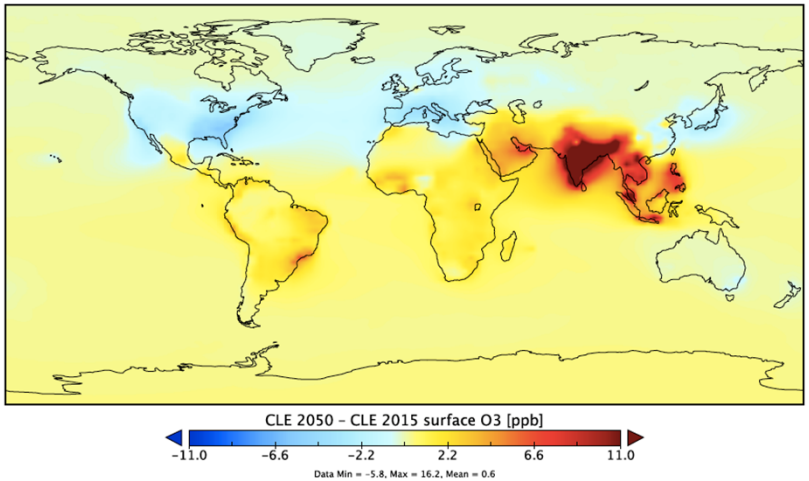
Tim Butler, IASS

2050 Results from GEOS-Chem Adjoint



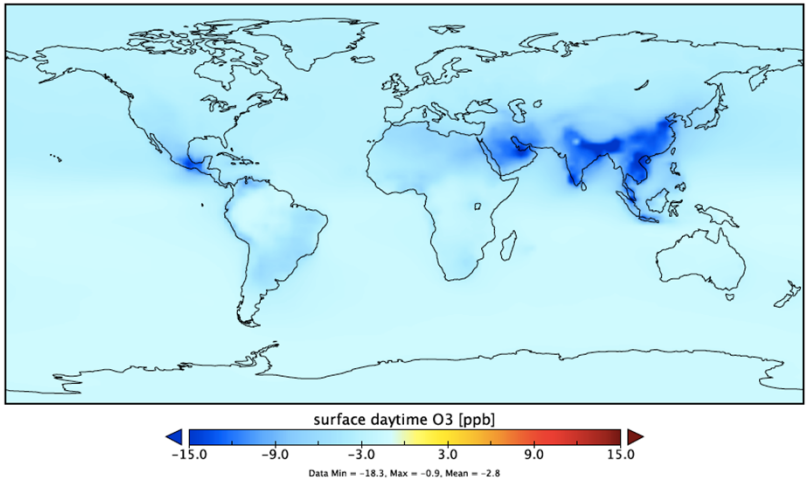
CLE 2050 Surface Daytime Ozone

- *30-40 ppb across Europe*



Difference between CLE 2050 and CLE 2015

- *Around 2-3 ppb decrease for most of W. Europe*
- *Little change in E. Europe and isolated spots in Benelux*
- *Similar to TM5-FASST)*



Difference between SLCP Mitigation 2050 and CLE 2050

- *Additional 3-4 ppb dec available from CH4 mitigation (HTAP1 -1.5 ppb; FASST -2 ppb)*

Model results from Daven Henze
Interpretation from T. Keating

Development of FASST-HTAP

- JRC's FASST Web Tool is now running at the University of Colorado, Boulder.
- A version of the tool that uses the HTAP2 ensemble of results is being developed with funding from U.S. EPA.
- We expect to continue to development and extension of the tool to enable quick exploration of the implications of long range transport and potential control scenarios.

Yanko Davila, Daven Henze, Rita vanDingenen, Luana Valentini

Draft 2018-2019 Work Plan Elements (Reorganized)

1.1.4 Tools to account for global-scale issues in air quality assessment

	Activity	*Product*	*Year*	*Lead*	*Partners*
1.1.4.1	Global-Regional Modeling and Evaluation	O3 and PM Report	2018	TFHTAP	TFMM, MSC-W
		Deposition Workshop (S, N, O3, Hg, POPs)	2019	TFHTAP	TFMM, MSC-E, MSC-W, ICP Veg, WMO
1.1.4.2	Intercontinental transport of Hg and POPs	Contribution to UNEP GMA	2018	MSC-E	TFHTAP, TFMM, MSC-E, Minamata, Stockholm
		Model Evaluation Report	2019	MSC-E	
		Next Steps Workshop	2019	TFHTAP	
1.1.4.3	Sectoral opportunities to mitigate intercontinental transport (shipping, road transport, agriculture, power, industry, residential, …)	Scoping Workshop	2018	TFHTAP	TFIAM, AMAP, CCAC
		Shipping Report	2018	MSC-W	TFHTAP, CAMS, Envisum, IMO
		Sectors Report	2019	TFHTAP	TFIAM, AMAP, CCAC

Draft 2018-2019 Work Plan Elements

1.3 Cooperation with other projects and bodies

1.3.2 CCAC

1.3.3 Arctic Council/AMAP

1.3.4 Stockholm Convention

1.3.5 ICP Vegetation (Ozone Risks in NH)

1.3.6 Global Burden of Disease & WHO

Draft Revised Mandate

Para 6. The functions of the Task Force will be:

a) Focus

b) Scope (Pollutants)

c) Coordination, Cooperation, Collaboration

d) Outreach

e) Other Tasks Assigned by EB

Draft Revised Mandate

Para 6. The functions of the Task Force will be:

a) Focus

- Impact of emissions from the Parties on human health, ecosystems, and climate change outside of the UNECE
- Impact of emissions outside the UNECE on environmental objectives of the Convention and its protocols
- Impacts of emission reduction opportunities in the UNECE region and complementary measures that might be taken in other regions where mitigation may prove cost-effective.

Draft Revised Mandate

Para 6. The functions of the Task Force will be:

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b) Scope (Pollutants)

All of the pollutants and precursors addressed by the Convention,

with priority given to tropospheric ozone and aerosols.

Draft Revised Mandate

Para 6. The functions of the Task Force will be:

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b) Scope (Pollutants)

c) Coordination, Cooperation, Collaboration with

   a) Bodies Under the Convention (TFMM, TFEIP, TFIAM, TFEIP, ICPs)

   b) Stockholm and Minamata

   c) Other Regional Air Pollution Agreements

   d) Related International Organizations and Scientific Efforts (AMAP, UNEP, WMO, WHO, IPCC, CCAC)

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- Facilitate the dissemination of knowledge and methodologies developed within the Convention to other regions of the world,
- through cooperation with bodies inside and outside the Convention,
- to help build a common understanding of shared air pollution problems and improve the technical capacity to evaluate emission reduction opportunities.

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Task Force on Hemispheric Transport of Air Pollution

In 2018-19 we will strive to:

1. The quantification of global influences on regional air quality
   - Continue to mine the HTAP2/AQMEII3/MICS3 experiments for insights
   - Identify approaches and bases for model evaluation for O3 and PM
   - Re-engage Hg and POPs communities
   - Initiate experiments and analysis on deposition processes

2. The evaluation of air pollution control opportunities and their impacts at intercontinental to global scales
   - Initiate sectoral analyses, starting with shipping
   - Engage stakeholders in exploring future scenarios
   - Continue development of screening tools (FASST) and detailed assessments