

**Sub-task Number:** DA-09-02d

**Sub-task Title:** Atmospheric Model Evaluation Network

**Overarching Task:** Data Integration and Analysis

**Area:** DATA MANAGEMENT

**Relevant Committee:** ADC

**Related Targets:** (to be included in 2009)

**Sub-task Definition** (as given in the 2009-2011 Work Plan):

Demonstrate the use of web services to compare global and regional atmospheric models (including atmospheric chemistry/air quality models). Apply to a variety of Earth observations from distributed archives using standardized approaches to evaluate and improve model performance. Draw upon and contribute to the work of the Task Force on Hemispheric Transport of Air Pollution under the Convention on Long-range Transboundary Air Pollution, the IGAC-SPARC Atmospheric Chemistry and Climate Initiative, AeroCOM, and the Air Quality Model Evaluation International Initiative.

**Leads** (GEO Member or PO, Entity carrying out the work, Contact: e-mail):

USA (EPA), Point of Contact: Terry Keating, keating.terry@epa.gov

### **Motivation/Background**

Air pollution is a serious public health problem in many parts of the world. Air quality models are an essential tool for air quality management, however air quality models must be evaluated using various observations of atmospheric composition from surface monitors, sondes, aircraft, and satellites. Currently, there is little standardization of model evaluation procedures or benchmark observation sets, making comparisons between models difficult.

**Outputs** (e.g. products and services which result from the activities of the Task/sub-task; outlined in the form of deliverables with timelines)

#### Planned:

- Pilot Data Network and Evaluation Tools (2009): Building upon the work of the Task Force on Hemispheric Transport of Air Pollutants ([www.htap.org](http://www.htap.org)), this sub-task will create a pilot data network that will connect the HTAP modeling server at Forschungszentrum Jülich (FZJ), Germany, to Datafed ([datafed.net](http://datafed.net)), a web-based system that supports data sharing and processing for collaborative air quality management and atmospheric science research developed by the Center for Air Pollution Impact and Trend Analysis (CAPITA) at Washington University, St. Louis, USA. Connections will then be sought to other nodes supporting HTAP analysis:
  - EBAS-HTAP for surface observations, at NILU, Norway
  - Aircraft Unified Database for aircraft field campaign data, NASA Langley, USA
  - GIOVANNI-HTAP for satellite observation, NASA Goddard, USA
  - EDGAR-HTAP for emissions information, JRC/IES, Italy
  - AEROCOM for aerosol related information, LSCE, France

Web-based tools will be developed for comparing model estimates and observations, drawing upon the algorithms of the Atmospheric Model Evaluation Tool (AMET), developed by the U.S. EPA and University of North Carolina. Progress will be documented and discussed on the HTAP Wiki (<http://htap.icg.fz-juelich.de/data/>). Initial products will be demonstrated at an air quality applications side-event being planned for the GEO VI plenary.

- Expanded Data Network and Evaluation Tools (2010-11): Building on the pilot network, the data network and evaluation tools will be extended to support the work of the TF HTAP, the IGAC-SPARC Atmospheric Chemistry and Climate Initiative (AC&C), AeroCOM, the Air Quality Model Evaluation International Initiative (AQMEII), and the general air quality modeling community.

**Activities** (operations or work processes through which resources are mobilized to produce specific outputs; outlined in the form of milestones including timelines)

Planned:

The U.S. EPA is funding the development of the Pilot Data Network and Evaluation Tools being implemented by FZJ and CAPITA. Support for additional contributions to the pilot network will be provided through funded projects associated with the other nodes engaged in the TF HTAP.

**Resources** (indication of resources – e.g. financial, human – contributed by GEO Members or Participating Organizations to produce outputs)

The U.S. EPA has committed \$200000 to support the development of the pilot network and evaluation tools. Additional in-kind support is expected through funded projects associated with TF HTAP activities.

**Architecture and Data Component**

1) Please briefly describe any task-related Earth observation resources (data set, system, website/portal) and any related Web Service interfaces that are contributed to GEOSS. State whether these items are or will be registered with the GEOSS Component and Service Registry for access via the GEO Web Portals, and whether any associated standards or other interoperability arrangements will be registered in the Standards and Interoperability Registry.

An important product of this subtask is the development of a robust WCS 'wrapper' code that can be re-used for standardized netCDF-CF formatted data files. The code is open, portable to Windows/Linux and has been implemented at four servers.

2) Please also describe what data and information your activity/system needs that you would request to be accessible through the GEOSS Common Infrastructure.

**Capacity Building Component**

(capacity building is defined to include the development of capacity related to: (i) Infrastructure and technology transfer (Hardware, Software and other technology required to develop, access and use EO); (ii) Individuals (education and training of individuals to be aware of, access, use and develop EO) and (iii) Institutions – building policies, programs & organizational structures to enhance the value of EO data and products).

1) In accordance with the above definition does this Task have a capacity-building component? If so, please provide a short description of this component including a description of end users.

This sub-task will primarily involve the development of infrastructure (hardware and software) and methodologies and the dissemination of that technology and standard methods to providers of relevant earth observations and to a specific user community, regional and global air quality modelers. The potential to incorporate the use of the data network and tools into training courses sponsored by WMO and other organizations is being explored.

2) Have any additional CB needs for this Task been identified? Please provide a short description.

**User Engagement Component**

(please briefly describe to what extent end users are engaged in this Task and influence the nature of the outputs produced)

The primary end users of the outputs of this sub-task are regional and global air quality modelers involved in air quality research and management. By working through existing international cooperative air quality modeling activities (TF HTAP, AC&C, AQMEII), this sub-task will engage the user community throughout the process of development. Feedback will be sought through the HTAP wiki and through workshops associated with these existing activities.

**Science and Technology (S&T) Component**

1) Please briefly describe the elements of scientific research or technological development contained in this Task.

The main science contributions of this subtask will come in the later stages of the work when comparisons between model estimates and observations will help to provide insights into how well the models are representing important atmospheric processes and what additional observations are needed to better characterize those processes.

2) In relation to the S&T component(s) of this task, please describe gaps, priorities, continuity needs, barriers, scientific expertise and additional resource needs (this information will be used for developing a gaps and needs assessment in Task ST-09-01)

**Members and POs' Contributions to Outputs and Activities above:**

(Input is optional. This section gives the chance to Members and POs to provide more details (3-5 lines) on their individual activities, making a clear connection with the Outputs and Activities outlined above).

**USA**

NOAA: At the University of Houston Daewon instituted real-time applications of HYSPLIT and the NOAA-EPA Community Multiscale Air Quality (CMAQ) model, collaborated with NOAA in the 2006 Texas air quality study, reviewed NWS air quality forecasting plans, and consulted for ARL on transitioning air quality forecasting work from ASMD.

**Participation (Table to be filled in 2009):**

Type	Member or PO	Representing	Contact Name	EmailAddress
Lead(PoC)	USA	U.S. Environmental Protection Agency	Terry Keating	keating.terry@epa.gov
Lead				
Contributor	Germany	Forschungszentrum Jülich	Martin Schultz	m.schultz@fz-juelich.de
Contributor	USA	CAPITA, Washington University, St. Louis	Rudolf Husar	rhusar@me.wustl.edu
Contributor	USA	NASA, GSFC	Greg Leptoukh	gregory.leptoukh@nasa.gov
Contributor	USA	NOAA	Daewon Byun	daewon.byun@noaa.gov