

Sub-task Number: HE-09-02d

Sub-task Title: Global Monitoring Plan for Atmospheric Mercury

Overarching Task: Monitoring and Prediction Systems for Health

Area: HEALTH

Related Communities of Practice: Air Quality & Health, Atmospheric Chemistry (former IGACO)

Relevant Committee: (to be determined in 2009)

Related Targets: (to be included in 2009)

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

Develop a global monitoring network for mercury by harmonizing standard operating procedures for monitoring mercury and its compounds in air, atmospheric deposition, water, soil, sediments, vegetation and biota. The sharing of data from this network, allowing access to comparable and long-term data from a wide array of locations, will help understand temporal and spatial patterns of mercury transport and deposition to, and evasion from, terrestrial and aquatic ecosystems. The data produced will support the validation of regional and global atmospheric mercury models for use in evaluations of different policy options for reducing mercury pollution impacts on human health and ecosystems. Build upon the contributions of, among others, the UNEP Mercury Programme, the Hemispheric Transport of Air Pollutants Task Force (TF HTAP), and the European Monitoring and Evaluation Program (EMEP). Moreover, this sub-task will build upon the US MercNet initiative and international monitoring and modelling efforts undertaken by Italy, Japan and South Africa.

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

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Motivation/Background

This sub-task will support the achievement of the overarching objectives of Task HE-09-02 in establishing a coordinated forecasting and alerting system for health-related problems, and specifically with reference to those related to the exposure of human populations to mercury. The development of a coordinated mercury monitoring network and the possibility of performing the validation of global scale atmospheric models will provide a valuable input to GEOSS, and will benefit from national and international programs that focus to identify cost-effective strategies for reducing the impact on human health and ecosystems caused by the releases of mercury to aquatic and terrestrial ecosystems. The limitation of current forecasting system for atmospheric mercury are primarily related to the lack of a coordinated monitoring network able to assure high quality observations of mercury concentrations in biotic and abiotic compartments of terrestrial and aquatic ecosystems.

Outputs and Deliverables

- Standard operating procedures (SOPs) for monitoring mercury and its compounds in air, atmospheric deposition, water, soil, sediments, vegetation and biota relevant to public health.
- Promote a Global Atmospheric Mercury Monitoring Programme (GAMMP) based, in part, upon ongoing national and international monitoring programs.
- Develop a unified data base of monitoring data that will be made available for the validation of atmospheric mercury models and human exposure and risk models.
- Validate regional and global scale atmospheric mercury models on the basis of the data produced by the GAMMP.
- Develop an interoperable system to allow the sharing of information produced by the sub-task that will represent the core of the forecasting and alerting system for health professionals.
- Maps of mercury concentrations and deposition fluxes of mercury in different regions/continents.

- Promote the development of projects that aim to connect most relevant parties, thereby strengthening collaborative research at international and national level.
- A report of recommendations for mechanisms for alerting health professionals of the output from these monitoring and modelling activities.

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

Planned:

- Promote a workshop to assess the state-of-the-art in monitoring mercury concentrations in air, water, soil, vegetation and biological samples and highlight on-going national and international mercury monitoring programs. The outcome of the meeting will be the publication of a technical report that provides SOPs for monitoring mercury in different environmental matrixes.
- Promote a joint meeting involving relevant on-going national and international programs (i.e., UNEP Global Partnership for Mercury Air Transport and Fate Research (UNEP-MFTP), UNECE-EMEP (including TF HTAP), AMAP, US MercNet) that focus on atmospheric mercury monitoring and modelling to discuss possible concerted actions aiming to form a GAMMP as main input to the overarching goals of GEOSS.
- Promote initiatives aiming to secure funding for supporting the development of activities that may contribute to the achievement of objectives set in this sub-task.

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

The Leading and Participating Organisations of this sub-task are already very active in several national and international programs (i.e., UNEP Mercury program, UNECE-LRTAP/EMEP (TF MM and TF HTAP), US MercNet) and well integrated in the GEO community, therefore they will secure funding to support the activities proposed in this sub-task. Funding options (e.g. for travel to workshops or joint meetings) will be included in project proposals to be submitted for achieving the objectives set in this sub-task.

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.*

The development of a coordinated GAMMP requires a high capacity and willingness to transfer knowledge and technology in order to assure the implementation of SOPs to monitor mercury in different environmental compartments. The partners involved in this sub-task have a consolidated experience in promoting infrastructure and technology transfer, education and training programs on monitoring techniques and procedures, and in supporting national and international programs and conventions (i.e., UNEP, UNECE-LRTAP, EU Mercury Strategy) in developing policy tools for forecasting the evolution of mercury pollution on regional and global scales with changing meteorological conditions and mercury emissions to the atmosphere. The experience of the partners will be used to develop capacity of individuals and in institutions where mercury expertise is limited/absent. For example, capacity building related to the operation of infrastructure for mercury monitoring will be addressed by way of training workshops at institutions/countries where mercury expertise is limited/absent. Major end-users are governmental and non-governmental organizations involved in the policy making process as well as in the implementation of legislative and technological measures aiming to monitor and possibly reduce the impact of mercury contamination on human health and ecosystems.

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

None at this stage.

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 activity of the sub-task builds upon on-going national and international programs in which a close relationship with end-users is established in order to assure the development of products that can form the basis of the decision making process aiming to reduce the impact of anthropogenic activities on human health and ecosystems. The overall goal of these activities, which are of interest of a large number of governmental and non-governmental organisations, are those listed in the Outputs and Deliverables section of this document.

Science and Technology (S&T) Component

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

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).

Greece

Atmospheric Modeling and Weather Forecasting Group (AM&WFG), University of Athens: The group is involved with the development and simulation of mercury physicochemical processes using the RAMS and SKIRON/Eta atmospheric modelling systems (<http://forecast.uoa.gr>)

Italy

The integration of observations, atmospheric modeling, forecast and analysis is the basis of a modern strategy for regional and global air quality monitoring which is a fundamental component of the earth observation system. The capacity building is an important component of the integration and may help countries to develop their own strategies in accordance with goals and objectives set at regional and international level. Italy has developed tools and expertise in these domains, its activity and leadership within major national, European and international programs will be the basis of its contributions to the achievement of objectives of the sub-task.

ISPRA:

- a) Contribution on measurement procedures (M. Belli)
- b) Analysis and Validation of Data on Mercury Concentration in the atmosphere and related data bases (A.M Caricchia)
- c) Mercury Impact on depositions on other environmental matrix (P. Bonanni).

Japan

NIES: Providing the monitoring data for mercury at Hateruma Developing the global atmospheric mercury model for use in evaluations of different policy options for reducing mercury pollution impacts on human health and ecosystems contributing to develop the mercury monitoring network in Asia.

Norway

Norwegian Institute for Air Research: Chemical Coordinating Centre of EMAP.

Portugal

CESAM- Centre for Environmental and Marine Studies, University of Aveiro: Analysis of mercury emissions from natural sources in Portugal: Several recent studies have demonstrated that in some regions natural emission sources may contribute significantly to the atmospheric levels of mercury. Our contribution within the HE-09-02d subtask will be focused on the development of an emission model to quantify mercury from natural sources, including vegetation, soil and water for Portugal. The model will be implemented in GIS and use detailed information on the land cover. The effects of temperature, solar radiation and water stress will be taken into account. Some local measurements will be used to characterise Hg concentration in the water and soil to define the emission flux. A possibility to integrate EO data into the calculation algorithm will be investigated. Spatial and temporal variations of the estimated Hg emissions will be analysed. The results obtained in this work will be used as input data to the atmospheric models and contribute to elaboration of maps of mercury concentrations and deposition fluxes.

South Africa

South Africa has recently starting focusing on mercury monitoring at a national level. All compartments of the mercury cycle (i.e. air, water, terrestrial, biota) are currently being monitored. The results of the mercury monitoring will be used to develop an integrated Bayesian Network model that aims to simulate mercury cycling under local South African conditions. The expertise developed and the information collected through the ongoing monitoring of mercury in all systems forms the basis of South Africa's contributions towards the achievement of the sub-task.

USA

The sub-task will build upon and extend the experience of MercNet, an emerging network of speciated atmospheric mercury monitors funded by a number of different organizations using common standard operating procedures and data sharing policies.

Participation (Table to be filled in 2009):

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