

The UNEP Fate And Transport Partnership Area: an overview of seven years activity and future plans

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Abstract. The United Nations Environment Programme Mercury Air Transport and Fate Research Partnership Area (UNEP F&T) started its activity in 2005 and since then have provided a valuable contribution to the UNEP Mercury Programme and established a close cooperation with other international programs (i.e., GEO Task HE-09-02d / GEOSS) and conventions (UNECE-Task Force on Hemispheric Transport of Air Pollution). The UNEP F&T aims to improve the global understanding of international mercury emission sources, fate and transport and to encourage collaborative research activities on different aspects of atmospheric mercury cycling at local, hemispheric and global scales. This paper provides an overview of major recent and future activities carried out by the Mercury Air Transport and Fate Research Partnership Area in the framework of the UNEP Mercury Programme and the ongoing negotiation process for developing a global legally binding instrument on mercury.

Key words: mercury pollution, UNEP Mercury Programme, UNEP Global Mercury Partnership, UNEP Mercury Air Transport and Fate Research.

Introduction

The UNEP Mercury Programme and the Global Mercury Partnership

During the last decade the importance of environmental issues related to mercury has gained growing attention for its significant negative effect on human health and ecosystems. Mercury pollution is now recognized as an environmental and global concern due to its long-range transport in the atmosphere, its persistence in the environment and its ability to bioaccumulate.

Our current estimate of global mercury emissions suggests that the overall contribution from natural processes and anthropogenic sources is nearly 7500 Mega grams (Mg) on an annual basis. Natural processes, include the contribution of re-emission processes from water and terrestrial ecosystems of previously deposited mercury and primary emissions (i.e., volcanoes, calderas). On annual basis these contributions account for about two third (ca. 3200 Mg yr⁻¹) whereas anthropogenic sources account for one third (ca. 2.250 Mg yr⁻¹) of the total emissions (Pirrone et al., 2010a).

In this framework UNEP Mercury Programme started in 2003 a process to assess to what extent contamination by mercury released both from anthropogenic and natural sources may affect human health and ecosystems. In 2005 the Governing Council of the United Nations Environment Programme called (Decision 23/9 IV) for mercury partnerships between governments and other stakeholders as one approach to reduce risks to human health and the environment from the release of mercury and its compounds to the environment (UNEP, 2005).

In response to UNEP Governing Council Decision 23/9, five Partnership Areas were identified in 2005: mercury release from coal combustion, artisanal and small scale gold mining, mercury cell chlor-alkali production, mercury in products, and mercury air transport and fate research.

In 2009 the Governing Council of UNEP agreed on the need to develop a global legally binding instrument on mercury and the 25/5 Governing Council decision specified the UNEP Global Mercury Partnership as one of the main mechanisms for the delivery of immediate actions on mercury during the negotiation process (UNEP, 2009a).

The overall goal of the UNEP Global Mercury Partnership is to protect human health and the global environment from the release of mercury and its compounds by minimizing and, where feasible, ultimately eliminating global, anthropogenic mercury releases to air, water and land (UNEP, 2009b).

The UNEP Global Mercury Partnership currently has seven identified Partnership areas (identified also as Priorities for Action) that are reflective of the major source categories of mercury and its compounds.

The UNEP Global Mercury Partnership represents an helpful input to understand the whole mercury pollution issues in deep and the outcomes of the seven partnership areas are contributing in the negotiation process to establish a new comprehensive treaty on mercury.

The Negotiation process on the global mercury agreement

The work to prepare the global legally binding instrument on mercury has been undertaken from 2009, when the Governing Council of UNEP agreed on the need to develop a global treaty on mercury, by an intergovernmental negotiating committee (INC) supported by the Chemicals Branch of the UNEP as secretariat. At its first session, held in Sweden from 7 to 11 June 2010, the intergovernmental negotiating committee requested the secretariat to prepare an analysis of possible options for using partnerships to help achieve the goals of the future instrument on mercury, including the option of integrating partnerships into the instrument. Such analysis was discussed at the second meeting of the INC, held in Japan from 24 to 28 January 2011, and it has been recognized that partnerships are a technical and delivery tool that could contribute to reduce the use of mercury and mercury releases at all levels of society and support parties in their implementation of the future instrument.

In particular, the UNEP Mercury Air Transport and Fate Research Partnership could contribute to define the elements of the treaty on research, development and monitoring, which have an important role to establish the provisions on effectiveness evaluation of the measures contained in the global instrument.

The goal of the INC is to complete the negotiations before the twenty-seventh regular session of the Governing Council/Global Ministerial Environment Forum in 2013.

UNEP Fate And Transport Partnership Area: Objectives and Partners

A discussion paper titled “*Global Partnership for Mercury Air Transport and Fate Research*” prepared by the U.S. EPA in October 2005 listed some proposed goals, objectives and initial actions for a Mercury Air Transport and Fate Research Partnership. In this context,

the UNEP F&T started its activity in 2005 aiming to improve the global understanding of international mercury emission sources, fate and transport and to encourage collaborative research activities on different aspects of atmospheric mercury cycling at local, hemispheric and global scales.

At the beginning of 2006, Italy offered to lead the UNEP F&T in close cooperation with other interested partners.

Today, Italy, USA, Canada, Japan, Slovenia South Africa and other countries are part of the UNEP F&T together with representatives of nongovernmental organizations such as the BioDiversity Research Institute, the Artisanal Gold Council, the Electric Power Research Institute (EPRI), etc.

The specific objectives of the Partnership are to support the Decisions of the UNEP Governing Council and specifically the activity of the UNEP Global Mercury Partnership by:

- Accelerating the development of sound scientific information to address uncertainties and data gaps in global mercury cycling and its patterns (e.g., air concentrations and deposition rates, source-receptor relationships, hemispheric-global air transport/transformation, emission sources);
- Enhancing compilation and sharing of such information among scientists and between them and policymakers;
- Providing technical assistance and training, where possible, to support the development of critical information;
- Enhancing the development of a globally-coordinated mercury observation system to monitor the concentrations of mercury species into the air and water ecosystems in cooperation with the GEO Task HE-09-02d “Global Observation Network for Mercury” as part of GEOSS 2012-2015 work plan;
- Enhancing the exchange of information and cooperation with the Task Force on Hemispheric Transport of Air Pollutants (TF HTAP) of the UNECE-LRTAP Convention.

At present, considering the importance of an integrated evaluation of mercury impacts on the whole environment, the scope of the Partnership’s research activities is being extended to include aquatic transport and fate of methylmercury to biota as well as human exposure.

Overview of past, current and future partnership activities

The major activities carried out by the UNEP F&T Partnership Area include:

- The publication in 2005 of the report titled “Dynamics of mercury pollution on regional and global scales”, edited by Nicola Pirrone and Kathryn Mahaffey,

that has brought together authors with expertise in a wide range of fields and has provided an overview of the most important problems relating to mercury (Pirrone et al., 2005);

- The publication in 2009 of the report titled “Mercury Fate and Transport in the Global Atmosphere: Emissions, Measurements and Models”,. The book prepared thanks to the contribution of over than 70 scientists from leading universities and research institutions, highlights major issues related to the interactions of mercury with terrestrial and aquatic ecosystems and evaluates the relative contribution of anthropogenic and natural sources to the global atmospheric mercury budget (Pirrone et al., 2009);

- The Cooperation with the Task Force on Hemispheric Transport of Air Pollution (TF HTAP) of United Nations Economic Commission for Europe Convention on Long-range Transboundary Air Pollution (UNECE-CLRTAP) that led in 2010 to the publication of the Report “Part-B: Mercury” . The objective of HTAP 2010 assessment is not limited to informing the LRTAP Convention but, in a wider context, to provide data and information on issues of long-range and intercontinental transport of air pollution and to serve as a basis for future cooperative research and policy action (Pirrone et al., 2010b);

- The definition of a global, coordinated network of measurements for assessing levels of mercury and its species in the atmosphere and water, improving the comparability among measurements and observations.

The major current and future activities of the UNEP F&T Partnership Area are:

- To contribute to update the UNEP 2008 report entitled “Global Atmospheric Mercury Assessment: Sources, Emissions and Transport (UNEP, 2008). The update of the report was requested to UNEP by the UNEP Governing Council in its twenty-six session (2009) in consultation with Governments, for consideration by the Governing Council/Global Ministerial Environment Forum at its twenty-seventh session” in 2013.

- To develop within the Global Mercury Observation System (GMOS) project, funded by the European Commission (2010-2015), a global, coordinated network of measurements for assessing levels of mercury and its species in the atmosphere and water;

- To revise atmospheric emissions from major anthropogenic and natural sources, within GMOS in cooperation with other GMOS partners including NILU and partners of F&T, by filling current gaps in geographic and source coverage which includes information on regions not yet accounted for and on sources not yet accounted for in currently used databases, e.g. biomass burning, artisanal gold mining, coal-bed fires and natural sources;

- To prepare Maps of spatial and temporal distribution patterns of mercury species with state-of-the-art atmospheric mercury modeling systems;

- To develop interoperable systems to made available relevant outcomes of UNEP F &T activities to all

scientists, policy makers and stakeholders;

- To further involve F&T partners in several International Conference such as the 16th International Conference on Heavy Metals to be held in Rome in 23-27 September 2012 and the 11th International Conference on Mercury as a Global Pollutant to be held in Edinburg, UK in 2013.

In order to evaluate in deep the mercury pollution entity and distribution it has been established the GMOS project, which is aimed to set up a worldwide observation system for the measurement of atmospheric mercury in ambient air and precipitation samples. It is a five year project (2010-2015), funded by the European Commission and coordinated by Nicola Pirrone, Director of the Institute of Atmospheric Pollution Research of the National Research Council of Italy (CNR-IRA).

GMOS includes ground-based monitoring stations, shipboard measurements over Oceans and major Seas, as well as aircraft-based measurements in the Upper Troposphere and Lower Stratosphere – this impressive data base will provide continuous information on mercury concentrations and fluxes in and between the atmospheric, marine, freshwater and terrestrial ecosystems.

Final Remarks

The UNEP Mercury Air Transport and Fate Research Partnership Area plays an important role within the negotiation process on the global mercury agreement. The F&T Partnership activity can in fact contribute to set priorities and to develop cost-effective policies at global, regional and local scales by improving the understanding of principal mechanisms governing mercury dispersion and cycling in the environment.

Conclusion

An improved understanding of mercury emission sources, fate and transport is of crucial importance in:

- (a) setting priorities at the national, regional and global levels,
- (b) developing and implementing policies and strategies, and
- (c) establishing baselines to monitor and assess progress on mercury reductions.

Utilizing extensive monitoring data produced within the UNEP F&T projects in combination with application of the contemporary global mercury models will facilitate further understanding of principal mechanisms governing mercury dispersion and cycling in the environment and will support the development of cost-effective policies and strategies on mercury at national, regional and global levels.

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