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Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe

Working Group on Effects

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Progress in activities of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe in 2020 and future work: hemispheric transport of air pollution

Hemispheric transport of air pollution

Report prepared by the Co-Chairs of the Task Force on Hemispheric Transport of Air Pollution

Summary

The Task Force on Hemispheric Transport of Air Pollution under the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe carries out the activities specified in its revised mandate (Executive Body decision 2019/9). During the reporting period, it was also tasked with carrying out the activities assigned to it in the 2020–2021 workplan for the implementation of the Convention on Long-range Transboundary Air Pollution (ECE/EB.AIR/144/Add.2, items 1.1.4.3–1.1.4.7) approved by the Executive Body at its thirty-ninth session (Geneva, 9–13 December 2019).

In accordance with the Convention workplan, the Task Force is requested to present an annual report on its work to the Steering Body of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe. The present report details the progress made by the Task Force since its previous report and provides an overview of upcoming activities through 2020.

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I. Progress in implementation of the 2020–2021 workplan

1. The 2020–2021 workplan for the implementation of the Convention (ECE/EB.AIR/144/Add.2) identifies five primary sets of activities and expected outcomes or deliverables for the Task Force on Hemispheric Transport of Air Pollution. These sets of activities are listed below, and their status is discussed in the following paragraphs:

(a) Attribution of long-term changes of mercury (Hg) and persistent organic pollutant (POP) pollution to regional and extraregional (global, secondary) sources (workplan item 1.1.4.3);

(b) Investigations on global scenarios and assessment of global sectoral mitigation measures (workplan item 1.1.4.4);

(c) Organization of the development of an updated global emissions mosaic to support future modelling efforts to quantify extraregional contributions to air quality and deposition (workplan item 1.1.4.5);

(d) Continued development of the FAst Scenario Screening Tool (open-FASST) tool for screening analysis of future scenarios and implications of global and regional model uncertainties (workplan item 1.1.4.6);

(e) Organization of analysis and model improvements needed to improve the estimation of the health and environmental benefits of decreasing ozone through mitigation of methane emissions (workplan item 1.1.4.7).

2. With respect to the attribution of long-term changes in Hg and POP pollution to regional and extraregional (global, secondary) sources (workplan item 1.1.4.3), the Meteorological Synthesizing Centre-East (MSC-E) has continued its work on model development, evaluation and application, contributing to the Global Mercury Assessment and to discussions under the Minamata Convention on Mercury and the Stockholm Convention on Persistent Organic Pollutants. The Task Force is planning to organize a virtual meeting in late 2020 to take stock of recent relevant research on Hg and POPs in other forums and to facilitate engagement of a broader community of experts in efforts led by MSC-E (see paragraph 11 below).

3. A discussion between the Working Group on Strategies and Review and the Task Force was initiated to identify policy-relevant science questions that could be investigated using the global air quality modelling scenarios available from Hemispheric Transport of Air Pollution (HTAP)1,[1] HTAP2[2] and the upcoming HTAP3 work. The intent is to foster a dialogue between the two groups in order to assess the potential impact of global sectoral mitigation measures on air quality (workplan item 1.1.4.4). Furthermore, the Task Force hosted a workshop (online, 22–24 and 30 April 2020) to identify near-term (within two years) opportunities and longer-term research needs to improve the scientific basis for assessing the impact of methane mitigation measures on tropospheric ozone levels on regional and global scales; and, the impact of tropospheric ozone on human health and ecosystem damage on regional and global scales. This meeting examined current work and/or efforts both within the Convention and throughout the international science community aimed at addressing these issues, and identified areas where new cooperative efforts under the Task Force could be most impactful. During the meeting, participants explored potential synergies with the Task Force on Integrated Assessment Modelling, the Task Force on Measurements and Modelling, the International Cooperative Programme on the Effects of Air Pollution on

[1] *Hemispheric Transport of Air Pollution 2010, Part A: Ozone and Particulate Matter*, Air Pollution Studies No. 17 (United Nations publication, Sales No. E.11.II.E.7); *Hemispheric Transport of Air Pollution 2010, Part B: Mercury*, Air Pollution Studies No. 18 (United Nations publication, Sales No. E.11.II.E.8); *Hemispheric Transport of Air Pollution 2010, Part C: Persistent Organic Pollutants*, Air Pollution Studies No. 19 (United Nations publication, Sales No. E.11.II.E.9); and *Hemispheric Transport of Air Pollution 2010, Part D: Answers to Policy-Relevant Science Questions*, Air Pollution Studies No. 20 (United Nations publication, Sales No. E.11.II.E.10).

[2] Frank Dentener and others, eds., "Global and regional assessment of intercontinental transport of air pollution: results from HTAP, AQMEII and MICS", *Atmospheric Chemistry and Physics*, special issue, 2019. Available at www.atmos-chem-phys.net/special_issue390.html.

Natural Vegetation and Crops (ICP Vegetation), and the International Cooperative Programme on Assessment and Monitoring of Air Pollution on Forests (ICP Forests), as well as the Tropospheric Ozone Assessment Report (TOAR), the Climate and Clean Air Coalition to Reduce Short-lived Climate Pollutants (CCAC), the Arctic Monitoring and Assessment Programme (AMAP), the Air Quality Model Evaluation International Initiative (AQMEII), the Model Intercomparison Study - Asia (MICS-Asia), the Aerosol Chemistry Climate Model Intercomparison Project (AerChemMIP), the Chemistry-Climate Model Initiative (CCMI) and other relevant efforts, with the goal of improving the scientific basis for considering these issues should they arise in future international policy negotiations in the upcoming years (workplan item 1.1.4.4).

4. The development of an updated global emissions mosaic (HTAP v3; workplan item 1.1.4.5) to support future modelling efforts to quantify extraregional contributions to air quality and deposition was initiated in March 2020 when emissions experts from around the globe were invited to participate. The overall plan for the effort was presented in cooperation with experts at the European Union Joint Research Centre (JRC) at the virtual Task Force workshop 22-24 and 30 April 2020.

5. A web conference was held on 15 November 2019 to discuss the potential for collaborative development of the open-FASST tool for screening analysis of future scenarios and implications of global and regional model uncertainties (workplan item 1.1.4.6). Thirteen individuals participated, representing five different applications or implementations of the original code of JRC. The participants expressed a willingness to work together to add new data and functionality to the existing tools.

6. The virtual Task Force workshop (22–24 and 30 April 2020) laid the foundations for the organization of analysis and model improvements needed to improve the estimation of the health and environmental benefits of decreasing ozone through mitigation of methane emissions (workplan item 1.1.4.7). Workshop participants identified near-term (within two years) opportunities and longer-term research needs to improve the scientific basis for assessing the impact of methane mitigation measures on tropospheric ozone levels on regional and global scales; and, the impact of tropospheric ozone on human health and ecosystem damage on regional and global scales. These near- and longer-term opportunities were prioritized in accordance with the revised mandate of the Task Force (Executive Body decision 2019/9) and needs of the Convention. Follow-up activities were planned to identify available methane mitigation scenarios and to evaluate regional ozone concentration responses to global changes in methane using recent modelling results. The Task Force also invited experts to contribute analyses of trends in extraregional contributions to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) domain, the intercontinental scale impact of shipping emission controls, and comparisons of source attribution methods. Finally, the Task Force identified potential areas of collaboration to be explored with other international cooperative scientific efforts, including AerChemMIP, CCMI, TOAR, and AQMEII.

II. Activities during the remainder of 2020

7. In cooperation with JRC, the Co-Chairs will organize a virtual meeting of emissions inventory experts to discuss the development of an updated global emissions data set for use in future analyses, including an assessment of recent trends in extraregional influences.

8. The Task Force will create and maintain an online forum for the policy and science communities to discuss and address policy-relevant science questions that fall within the Task Force's mandate. This living document will form the basis of ongoing science advice to the Working Group on Strategies and Review throughout the review of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol), as amended in 2012 (Executive Body decision 2019/4)[3] and its ongoing implementation.

9. The Task Force will host a meeting with experts identified at the April 2020 workshop to examine the utility of other global modelling results for developing source-receptor

[3] Available at www.unece.org/env/lrtap/executivebody/eb_decision.html.

relationships that can be used in the openFASST framework for examining the relationship between various emission reduction scenarios and hemispheric transport of air pollutants.

10. The Task Force will continue to support the development of the open-FASST framework with funding from the United States Environmental Protection Agency. The priority objective will be to enable non-expert users to explore the implications of using different global models to attribute historical trends to regional or extraregional emissions changes and to estimate the impacts of future Centre for Integrated Assessment Modelling-developed scenarios.

11. The Task Force will work with MSC-E to organize a forum in late 2020 with experts from AMAP and the Minamata and Stockholm Conventions to communicate the status and results of recent assessments of POPs and mercury and to identify opportunities for broader expert engagement in MSC-E efforts to apportion historical trends in POPs and Hg to regional and extraregional sources.