Agenda item 4

Enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol (Decision XXXIII/4)

Update by the Ozone Secretariat

OEWG44
BANGKOK
11-16 JULY 2022

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Background information *(1)*

- The 2018 scientific findings of the unexpected increase in global emissions of CFC-11 (Montzka et al.) led to extensive discussions by the parties in 2018 and subsequent years
- Decisions XXX/3 (2018) and XXXI/3 (2019) requested the Scientific Assessment Panel (SAP) and the Technology and Economic Panel (TEAP) to provide reports addressing the atmospheric monitoring and modelling of CFC-11 emissions and their potential sources
- In response to those decisions, the Panels provided the requested reports and information in 2019, 2020 and 2021
- In accordance with decision XXXI/3, the 11th meeting of the Ozone Research Managers (ORM11) considered a white paper prepared by the SAP and experts in atmospheric monitoring, entitled:

"Closing the gaps in top-down regional emissions quantification: Needs and action plan"

Background information *(2)*

- Based on the white paper, a European Union-funded 3-year pilot project was developed by the Ozone Secretariat entitled:

"Regional quantification of emissions
of substances controlled under the Montreal Protocol"

- Further consideration of this issue, led to the adoption of decision XXXIII/4: Enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol

Decision XXXIII/4: Enhancing the global and regional atmospheric monitoring of substances controlled by the Montreal Protocol

Requested the Ozone Secretariat, in consultation with relevant experts from the SAP, the TEAP and the ORM, to report to the parties on:

(a) Options for the regional monitoring of atmospheric concentrations of controlled substances

(b) Identification of suitable locations for possible high-frequency measurements and flask sampling for regions not, or not sufficiently, covered by existing atmospheric monitoring

(c) Options for means of establishing new monitoring capacity and related costs, taking into account existing monitoring infrastructure

The Secretariat was requested to provide a progress report to the parties at the OEWG44 and a final report at the OEWG45 in 2023

The EU-funded pilot project *(1)*

Overall objective

To begin the process of closing the gaps in the global coverage of atmospheric monitoring of controlled substances

The three phases of the pilot project

Phase 1: Identification of suitable locations and countries for flask measurements and high-frequency in-situ stations

Phase 2: Implementation of flask sampling measurement programmes in one or two developing countries

Phase 3: Development and implementation of a collaboration plan for continuing observations, calibrations, data sharing and modelling

The EU-funded pilot project *(2)*

- The project is managed by the Ozone Secretariat and overseen by a Steering Committee with current members:

  A.R. Ravishankara *(Colorado State University)*
  Ray F. Weiss *(Scripps Institution of Oceanography)*
  Paul A. Newman *(NASA, SAP co-chair)*
  Cornelius Rhein *(European Commission)*
  Sophia Mylona *(Ozone Secretariat)*

- On 16 March 2022, the Steering Committee organized a 3-hour virtual discussion forum to share the latest information from the scientific community on the development of an improved monitoring network and discuss ideas with a wider audience

Virtual discussion forum: Issues discussed *(1)*

- Regions where the highest levels of production and consumption of controlled substances have occurred including the evolution of banks
- Approaches to assess emission regions
  - Economic modelling
  - Trade data analysis
  - Manufacturing locations and capabilities
  - Use of nightlight satellite data with artificial intelligence
- Principal measurement techniques for regional emission quantification and associated costs:
  - In situ high-frequency measurements
  - Flask measurements

Virtual discussion forum: Issues discussed *(2)*

- Best locations for new stations to monitor controlled substances using scientific analyses: Observing System Simulation Experiments (OSSE)
- Calibration standards and metrology issues
- The impact of various factors on uncertainties in emissions derived from inverse modelling (e.g., measurement frequency, sampling period, atmospheric transport, site location)

Virtual discussion forum: Key outcomes

Consistent with the pilot project, the discussion reaffirmed that:

(a) Assessing emission locations in the coming decades is critical in the setup of new measurement sites

(b) Focus for the establishment of new stations should be on regions currently lacking coverage, e.g., southern and eastern Asia, the Middle East, southern America and eastern Europe

(c) Although high-frequency sampling will likely be needed in the longer run, starting with flask sampling from a few identified locations for a year or two is an effective and less costly first step to better assess the feasibility and efficacy of these sites

In addition:

OSSE analyses identified some locations which can detect regional emissions, including sites in Asia, the Middle East and Europe.
Prof. Prinn (MIT), with support from NASA, is carrying out these analyses

Virtual discussion forum: Approach

The discussion highlighted the importance of:

(a) TEAP's continued work in assessing emission sources

(b) Initiating flask sampling at one or more collection sites, and quantification of controlled gases from the flasks at one or two central established laboratories

(c) Continuing to examine the suitability of sampling locations proposed by the scientific community, the parties or the Steering Committee using OSSE analyses

(d) In the near term, using the AGAGE and NOAA networks standards, and encouraging the metrology community to undertake calibration scale establishment and maintenance in the longer term

(e) Archiving data from the initial flask sampling sites to ensure their inclusion in global analyses and enabling regional emission estimates

(f) Working to enhance sampling sites and expand sampling locations

Current status of the pilot project

- The first phase of the pilot project, focusing on multiple possible sampling locations derived from OSSE analyses, will be concluded soon
- The Steering Committee has identified a potential institution to carry out flask measurements and the associated quantification; discussions are underway on the details of this undertaking
- The Secretariat will provide updated information on the implementation of the project in its report to OEWG45 in 2023, as requested in decision XXXIII/4

Thank you

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