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**EXECUTIVE BODY FOR THE CONVENTION ON LONG-RANGE
TRANSBOUNDARY AIR POLLUTION**

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

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Item 5 (e) of the provisional agenda

PROGRESS IN ACTIVITIES IN 2008 AND FUTURE WORK

MEASUREMENTS AND MODELLING

Report by the Co-Chairs of the Task Force on Measurements and Modelling

1. This report presents the results of the ninth meeting of the Task Force on Measurements and Modelling, held from 23 to 25 April 2008 in Bordeaux, France, in accordance with item 2.2 of the workplan approved by the Executive Body at its twenty-fifth session (ECE/EB.AIR/91/Add.2). It describes progress in the EMEP field campaigns, in the development of a new EMEP monitoring strategy, and in modelling. The presentations made during the meeting and the reports presented can be accessed online at:
<http://www.nilu.no/projects/ccc/tfmm/>.

2. Fifty-five experts from the following Parties to the Convention attended the meeting of the Task Force: Austria, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Latvia, The Netherlands, Norway, Portugal, Slovak

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Republic, Spain, Sweden, Switzerland and the United Kingdom of Great Britain and Northern Ireland. Also present were representatives from the Chemical Coordinating Centre (CCC), Meteorological Synthesizing Centre-East (MSC-E), Meteorological Synthesizing Centre-West (MSC-W) and the European Commission's Joint Research Centre (DG-JCR).

3. Ms. L. Jalkanen (World Meteorological Organization, (WMO)) and Ms. L. Rouil (France) co-chaired the meeting, which was hosted by the French Agency of Environment and Energy Management (ADEME) and the National Institute for Environmental Technology and Hazards (INERIS).

I. FIELD MEASUREMENT CAMPAIGNS

A. Presentations

4. Mr. M. Vieno (Centre for Ecology and Hydrology, Edinburgh), Ms. S. Tsyro (MSC-W), Ms. H. Fagerli (MSC-W) and Ms. W. Aas (CCC) summarized the experience gained from the first EMEP measurement campaigns carried out in 2006 and 2007. They stressed that the data obtained had been useful in identifying strengths and limitations in the present understanding of the gas-to-particle partitioning and the chemical composition of the aerosol.

5. Mr. R. Gehring (Switzerland) presented an evaluation of the DELTA mini-denuders recommended under the EMEP strategy for ammonia/ammonium (NH_3/NH_4) and nitric acid/nitrate (HNO_3/NO_3) measurements at level 1 stations. The evaluation seemed to indicate that the DELTA mini-denuders might underestimate particulate matter as compared to filter methods. It was recommended that other laboratories carried out evaluation of the DELTA-denuders, in view of the relevance of the results for the revision of the EMEP monitoring strategy.

6. The first field campaigns provided interesting high temporal resolution data that allowed investigation of diurnal cycles in the gas-to-particle partitioning for ammonium and nitrate. Furthermore, the preliminary results had indicated that while the diurnal for nitrate and nitric acid was well reproduced by the EMEP model, the diurnal cycle for ammonia during the summer was not well represented. This seemed to be a common feature for most models. Although this behaviour was difficult to explain, it might be related to the present understanding of the equilibrium chemistry and/or the diurnal variation of ammonia emissions.

7. In addition, the campaigns had provided concurrent and collocated information of particulate matter (PM) mass and its chemical components, in particular organic carbon (OC), elemental carbon (EC) and secondary inorganics. The interpretation of these data was at present

limited by the comparability of the data compiled in different sites and by the artefacts of the data.

B. Conclusions by the Task Force

8. The Task Force found that the information from the intensive field campaigns throughout the Europe was interesting from the view point of obtaining new parameters for a better characterization of pollution patterns. It estimated that the field campaigns should ideally be designed as part of the monitoring strategy, and should help evaluating and calibrating the models, in particular as respect to PM-related issues.

9. The Task Force acknowledged the relevance of coupling this activity with those of the research community (in particular with the European Union (EU) European Supersites for Atmospheric Aerosol Research (EUSAAR) project and European Integrated Project on Aerosol Cloud Climate Air Quality Interactions (EUCAARI) campaigns). Moreover, national experts were willing to participate in the 2008/2009 field campaigns to strengthen the equipment implemented at some EMEP sites. CCC, which coordinated the field campaigns, highlighted the need for more information about the national contributions that were planned in this context, e.g. with respect to participating sites and equipment.

10. The Task Force noted that the implementation of ambitious field campaigns within the time frame defined (between September-October 2008 and February-March 2009) would require a considerable effort from all those involved, especially from the national technical bodies. It requested for technical recommendations and specifications concerning the type of measurement, to facilitate the determination of the speciated compounds, devices, methodologies, etc. In addition, it expressed the need for guidelines to ensure that the measurement data would comply with the EMEP requirements, e.g. in relation to quality assurance, documentation about the methods and the artefacts, choice and representativeness of the measurement sites and choice of the measured compounds. The Task Force emphasized that such guidance was necessary for obtaining funding from the national authorities to participate in the EMEP campaigns as well as to plan the contributions.

11. The Task Force invited participants in the EMEP field campaign to check their results against the reference data from the EUSAAR project on measurement method intercomparisons. This project has provided for references and methodological recommendations that can be used for measuring specific atmospheric compounds.

12. The Task Force concluded that the know-how gained from the previous field campaigns should be made use of to improve the 2008/2009 campaigns. Furthermore, efforts should be

made to: (a) compile the measurement database in a more consistent way (e.g. using same units, consistent names), (b) to promote the definition of reference laboratories for chemical analyses, (c) to ensure that the data are comparable and useful for modelling purpose, and (d) to ensure their timely availability for the modelling teams and the Task Force. Meeting such requirements would be a prerequisite for further promoting the field campaigns within the revised EMEP monitoring strategy.

13. The Task Force welcomed the offer from CCC to prepare and make available detailed guidance documentation on the above questions (by the end of May 2008), once the Parties would have formally expressed their interest in participating to the field campaigns (by mid-May 2008).

II. ISSUES RELATED TO A NEW EMEP MONITORING STRATEGY

A. Presentations on the ground level network

14. Mr. J-P. Putaud (DG-JRC) provided an update on the EUSAAR project and on the European Cooperation in the field of Scientific and Technical Research (COST) action 633 (on Particulate matter: Properties related to health effects) for defining reference methods for measuring particulate OC and EC, involving the creation of an “EUSAAR prototype” and its successful testing in the EUSAAR sites. Its denuder system allowed limiting the positive artefacts that are generally introduced by the sampling method; whereas for the negative artefacts linked to OC measurement, although the results were promising, more research would still be needed. Regarding the analysis of EC/OC compounds, the analytical protocol elaborated under the EUSAAR project guaranteed limited discrepancies. Nevertheless, further investigations were needed for carbonate rich samples.

15. Mr. H. Pfeiffer (Germany) presented work for assessing the representativeness of the air pollution network implemented by the German Federal Environmental Agency. Each of the six German EMEP stations had been studied and characterised regarding their location, the measured compounds and the methods, the meteorological influences (considering backward trajectories) and the potential influences of remote local sources (considering modelling results, NO/NO₂ ratios). The assessment was globally positive. The measurement routinely made could be assigned to EMEP level 2. The diagnostic highlighted the need for two more stations to fill in the spatial gaps and to cover the 500 m height level.

16. Mr. K. E. Yttri (Norway) presented scientific investigations for source apportionment of carbonaceous aerosol in the Scandinavian environment. Tracers (14C and organic) had been measured and analysed for that purpose (SORGA project). Two field campaigns allowed to

estimate the contribution of biogenic and anthropogenic compounds in primary and secondary particulate matter (PM), in rural and urban environments for different size fractions (PM₁ and PM₁₀). The study demonstrated the major contribution of biogenic secondary aerosols in summer regardless the site and the size fraction, while in winter the major part of the carbonaceous fraction is due to biomass burning. In all cases, contribution of combustion of fossil fuel in elemental carbon concentrations was predominant.

B. Presentations on the potential use of satellite data

17. Ms. Tsyro presented a preliminary study where aerosol optical depth (AOD) issued from satellite measurements were used for the evaluation of the EMEP PM model. AOD was expected to provide a relevant indication of PM_{2.5} concentrations. Different modelling formulations have been tested in the EMEP model for simulating retrieved AOD from MODIS data. The best one showed important underestimation of AOD in summer and a rather poor spatial correlation (especially over seas and oceans areas) when the temporal correlation was adequate.

18. Mr. B. Bessagnet (France) presented a set of examples demonstrating the usefulness of satellite information for detecting and interpreting large scale PM episodes. Dust events in the Ukraine in March 2007, ammonium nitrate episodes in Western Europe in spring 2007 and the influence of the Portuguese forest fires in summer 2003 had been analysed through satellite information and compared with model results, with promising results.

19. Mr. J. Orphal (France) provided a historical overview of the available satellite information in the field of air quality monitoring and illustrated the interest and the current limits of satellite measurements of atmospheric compounds. In addition, he informed about the inputs provided relating to future spatial missions likely to be designed by European space agencies.

20. Ms. Rouil gave a presentation on behalf of the EU's Global Monitoring for Environment and Security (GMES) Bureau of the European Commission (DG ENTR) about the future GMES Atmospheric Service (GAS) that was likely to be implemented in Europe by 2012. This initiative aimed at providing routinely forecasts, analyses and re-analyses of atmospheric pollutant concentration fields throughout Europe. The GAS would be a core service supported by the European Commission and the European Union. Therefore, this information would be freely available for all interested users. Ms. Rouil stressed that GMES was the European component of the GEOSS (Global Earth Observation System of Systems) initiative, to which the Convention bodies had agreed to contribute, and therefore the potential links between the GAS and the Task Force would be further investigated in the future.

21. Ms L. Tarrason (MSC-W) gave an overview of the MACC project (Monitoring Atmospheric Change and Climate), currently negotiated as an answer to the EU's seventh Framework Programme for Research and Technological Development (FP7) space call and expected to be launched in 2009. The project, coordinated by the European Centre for Medium-range Weather Forecasts (ECWMF), aimed at designing and running a pre-operational GAS system. Ms. Tarrason pointed out the benefits of this initiative for the EMEP programme, including the availability of new data and forecasting experiments.

C. Presentation on the revision of the EMEP monitoring strategy

22. Mr. Torseth presented the status and the achievements of the current EMEP monitoring strategy, drawing attention to the successful outcomes that included the geographical extension of the network, the implementation of the level approach, the development of relationships with national networks and research teams, and the increased interest of the scientific community. He stressed that, in the future, further progress was expected as regards to: (a) improving the EMEP network in EECCA countries and in the Mediterranean region; (b) measuring more atmospheric compounds (e.g. chemical speciation of PM, persistent organic pollutants (POPs)); and (c) developing level 2 sites.

23. According to Mr. Torseth, the revised strategy EMEP should focus on fundamental issues, such as: (a) assessment of spatial and temporal trend's in atmospheric composition, (b) understanding of the physico-chemical processes (including the links with other environmental compartments), and (c) source apportionment. In addition, in the revised strategy, synergies with other policy issues (e.g. climate change, nitrogen cycle, GMES programme) should be enhanced and additional capacities (e.g. satellite, aircrafts, lidars) for atmospheric composition monitoring considered. To these ends, CCC would recommend adjusting the current strategy, rather than undertaking an in-depth revision.

24. Mr. Torseth pointed out that the revision of the EMEP monitoring strategy should take account of other related initiatives e.g. by the European Environment Agency (EEA) and WMO, which aim at elaborating air quality databases and processing efficient dataflows. The EMEP monitoring strategy should benefit and draw from these initiatives and complement them. The process related to the EMEP datasets, resulting from more than 100 data originators, was based on a high level of quality checking and therefore required a long time (almost two years) before the data could be made available. It was highly recommended that the revision of the monitoring strategy could allow this process to be improved as well as formal links with other databases developed. Finally, new concepts, such as "near real-time "availability (NRT) or "rapid delivery" (RD), should be further discussed.

D. Conclusions of the Task Force

25. The Task Force acknowledged the work done by CCC and the national experts for implementing a relevant and successful monitoring strategy for EMEP.

26. Following its discussion on the future EMEP monitoring strategy, the Task Force concluded that:

(a) Future measurement priorities should focus on PM chemical speciation, EC/OC measurement, gas/particle partitioning both for model evaluation, and improvement of our understanding of the physics and the chemistry. This would mean developing level 2 (and level 3) sites even if size of the network was reduced (i.e. less stations). The recommendation of the Task Force being at least one level 2 sites per country. In addition, this conclusion would imply establishing of tight links with the research community that manages level 3 sites for ensuring their sustainability;

(b) Field campaigns should become a component of the measurement strategy, and complementary to the ground level network;

(c) Measurement strategy for components like CH₄, CO, CO₂ that allow to investigation of the links with other issues (such as climate) and for 3D profiles (lidar) expected by the modellers, should be based on cooperation with other existing networks (in particular, the WMO Global Atmospheric Watch);

(d) Links with the space community should be developed with a view to using satellite data in the future strategy, in spite of the current difficulties related to use it in the projects (for PM) or to its insufficient resolution in time and space (e.g. columns, clouds). The new strategy should provide for exchanges with the space community as well as with decision makers, with a view to developing space missions that are dedicated to air quality. Holding of a stakeholder status in GEOSS was seen helpful to this end as well as contributions to and involvement of the EMEP Centres and Parties in the GMES related programmes;

(e) The time frame for making the EMEP measurement data available should be reduced, while maintaining the level of quality assurance (this being the EMEP trademark). The Task Force agreed on a following time schedule, for Parties and EMEP Centres to apply (starting from 2008, on an experimental basis):

(i) Parties should deliver their measurement data by 30 June 2008;

(ii) CCC should deliver analysed data to the EMEP modelling centres by 30 September 2008;

(iii) Data would be made available for the Task Force by 30 December 2008 for discussion at the spring meeting of the Task Force;

(f) Quality checking and NRT delivery were not yet compatible, as demonstrated by the EUSAAR results. Although NRT did not fall within the mandated work under EMEP, cooperation in this field should be promoted to allow NRT projects implemented elsewhere (notably the projects implemented by the EEA the GMES Atmospheric Service) benefit from the experience of CCC in this field;

(g) Parties should be encouraged to issue “preliminary data” to CCC as soon as it becomes available;

III. MODELLING ISSUES

A. Presentations

27. Mr. P. Bultjes (TNO¹), reported on the outcomes of the joint workshop by the Task Force and the Task Force on Emission Inventories and Projections (TFEIP) on uncertainties in inventories and atmospheric models that he had co-chaired (Dublin, 22 October 2007). The workshop had focused on three case studies on ozone, PM and heavy metals. A summary of the workshop outcomes is available in the annex to ECE/EB.AIR/GE.1/2008/6. The presentations made during the workshop and detailed minutes of the workshop are available on the TFEIP website: <http://tfeip-secretariat.org/unece.htm>.

28. Mr. A. Gusev (MSC-E) described the joint work by MSC-E and MSC-W in relation to the global EMEP model, including the preparation of a workplan extending until 2012, the first stage of unification of the input data (land cover, meteorological pre-processor), and first results from the intercomparison exercises within the Task Force on Hemispheric Transport of Air Pollution (TFHTAP). A joint report on the results of this work would be made available, once finalized.

29. Ms. A. Todorova (Bulgaria) presented numerical studies on the simulation of dispersion and transformation process of road emissions.

¹ Dutch research institute

B. Conclusions by the Task Force

30. The Task Force on Measurement and Modelling agreed that it should work on “scales” in the future, given the importance for policy development of bridging the scales in modelling global, regional and urban air pollution. Understanding and modelling the pathways or links between regional and urban scales was essential for conceiving relevant and complementary local and regional emission control strategies. Bridging global and regional scales was important not only for drawing up strategies on ozone and methane that take account of the baseline level trends, but also for those striving for combining air quality and climate change policies.

31. To fulfil these objectives, the Task Force and the other Convention bodies should establish more ties with the relevant national experts and research community. In addition, cooperation with TFHTAP should be intensified, including through the organization of joint meetings.

32. Acknowledging that that the Task Force and the EMEP Centres should focus on policy-oriented work, the Task Force agreed to organize a workshop in fall 2008 to discuss the concept of modelling scale bridging in the light of the questions and needs of policymakers ;

33. The Task Force agreed to investigate further on PM speciation, in particular with a view to improving the EC/OC aspects in relation to emissions and measurement and modelling, those aspects being considered as important sources of uncertainties for defining PM control strategies.

IV. FUTURE WORK

34. Following discussion on the activities to be reflected in the 2009 workplan of the EMEP Steering Body, the Task Force agreed to:

(a) Define and analyse indicators to assess the work accomplished by the Task Force for the implementation of the current EMEP monitoring strategy, contributing to the revision of the EMEP monitoring strategy as well as to the definition of future work of the Task Force;

(b) Pursue activities for promoting the full implementation of the EMEP monitoring strategy; explore options to reduce the timeline of the observation data submission; and investigate of possible caveats in the recommended standard methods;

(c) Report to the EMEP Steering Body at its thirty-third session (2009) on the implementation of a new procedure for measurement data reporting that should improve the data availability deadlines;

(d) Prepare a synthesis of the data and evaluate the results from the intensive measurement campaigns made in September 2008 (involving the Parties to the Convention, CCC and MSC-W);

(e) Prepare a draft strategy based on emission inventories, and measurement and modelling data available in the Parties to the Convention, for better accounting for urban scale contribution in air pollution patterns;

(f) Organize a joint meeting with TFHTAP, tentatively in May 2009 in Paris, focusing on global to regional modelling and climate interaction;

(g) Hold its tenth meeting in spring 2009 (date and venue to be specified).
