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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

Working Group on Effects

First joint session*
Geneva, 14–18 September 2015
Item 5 (a) of the provisional agenda
Progress in activities of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe in 2015 and future work: measurements and modelling

Measurements and modelling**

Report of the sixteenth meeting of the Task Force on Measurements and Modelling

Summary

The present document contains the annual report of the Task Force on Measurements and Modelling to the Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), in accordance with the mandate set out in the 2014–2015 workplan for the implementation of the Convention on Long-range Transboundary Air Pollution

* The Executive Body to the Convention agreed that, as of 2015, the Working Group on Effects and the Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe should meet jointly, to achieve enhanced integration and cooperation between the Convention's two scientific subsidiary bodies (ECE/EB.AIR/122, para. 47 (b)).

** The present document is being issued without formal editing.

(ECE/EB.AIR/122/Add.2, item 1.1.9). The report presents the results of the activities of the Task Force for the period September 2014–June 2015, and of its sixteenth meeting, held from 5 to 8 May 2015 in Krakow, Poland. It reflects the status of implementation of the work activities of the Task Force as set out in the Convention's workplan (ibid., items 1.1.4, 1.1.8, 1.1.9 and 1.3.11).

Contents

I. Introduction

1. The present report presents the results of the sixteenth meeting of the Task Force on Measurements and Modelling (TFMM), held from 5 to 8 May 2015 in Krakow, Poland, and some activities that have been undertaken since September 2014. It describes progress in the implementation of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) monitoring strategy (ECE/EB.AIR/2009/16/Rev.1) (including Intensive observation periods - IOP), in the Trend Assessment initiated in 2014, in ongoing modelling activities (including the EURODELTA3[1] model inter-comparison project) and in the heavy metals pilot study.

2. Sixty-two experts from the following Parties to the Convention on Long-range Transboundary Air Pollution attended the Task Force meeting: Belarus, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Netherlands, Norway, Poland, Russian Federation, Slovakia, Spain, Sweden, Switzerland and the United Kingdom of Great Britain and Northern Ireland. Also present were representatives from three of the EMEP centres — the Chemical Coordinating Centre (CCC), the Meteorological Synthesizing Centre-East (MSC-E) and the Meteorological Synthesizing Centre-West (MSC-W) — as well as from the European Environment Agency (EEA), the European Commission Joint Research Centre (JRC), secretariat of the United Nations Economic Commission for Europe (UNECE), and the World Meteorological Organization (WMO). Remote participation was offered to participants unable to join physically.

3. Mr. A. Colette (France) and Ms. O. Tarasova (WMO) chaired the meeting. They welcomed the participants, presenting the agenda of the meeting, with a special emphasis on the TFMM Assessment Report to be published before the 2016 TFMM meeting and other potential contributions of the TFMM community into assessments in preparations by the Convention.

4. Ms. Laurence Rouïl, Chair of the EMEP Steering Body, gave her perspective on the key challenges that EMEP is facing. She insisted on the importance to build upon the well-recognized quality of measurements and modelling work performed under EMEP. The leadership of EMEP should however not be taken for granted, and there remains a risk to see a degradation of the quality assurance in measurement, a stagnation in the implementation of the monitoring strategy (cf. the index for implementation of the EMEP monitoring strategy is provided in figure 1), or inconsistencies between emission/measurement/model results. To support the high standards of EMEP, there is a need to work on its visibility by strengthening the role of national experts, working in close collaboration with other Task Forces, and work with other Conventions, Bodies, or International Programmes. She also asked the Task Force to propose an ambitious but realistic workplan for 2016–2017 which includes outreach activities as one of the important elements. She also stressed the importance of communications and diversity of tools that can be used for this purpose.

5. The representative of the Convention secretariat updated the Task Force on the decisions taken by the Executive Body to the Convention at its thirty-third session in December 2014, mentioning the work undertaken by the Working Group on Effects (WGE), and the Task Force on Reactive Nitrogen, as well as the adjustment procedure under the Gothenburg protocol. A special emphasis was put on the flagship 2016 Assessment report to be published before the 8th Environment for Europe Ministerial

[1] See http://www.psi.ch/lac/eurodelta3.

Conference to be held in Batumi, Georgia, in June 2016 and prepare the follow-up Actions for Clean Air Initiative. In general, there is a strong need to work on outreach and visibility to support the well-established position of the Convention as a central tool to tackle air pollution in a context where new initiatives are emerging, and national funding is limited. The recent Ministerial Meeting of the Arctic Council (AC) was also mentioned as it appears that AC and the Convention have strong mutually supportive mandates on air quality especially with respect to black carbon. Strong connection was identified with the Stockholm Convention on POPs as well. The UNECE secretariat discussed potential collaboration with the World Health Organization (WHO) and United Nations Environment Programme (UNEP) on the complementary mandates.

II. Implementation of the monitoring strategy

A. Progress in the implementation of the monitoring strategy

6. A representative of CCC gave a presentation on the status and perspective of the EMEP monitoring network. He highlighted the specific challenge of maintaining such a network over the long-term, even though the value of EMEP measurement is praised in the scientific community with over 10,000 articles citing EMEP according to Web of Science. Following up on the earlier presentation by the EMEP Chair and the secretariat representative, he stressed the need to raise the profile of EMEP, which suffers from the attraction of innovative observation initiatives supported by various Research Programmes, whereas the sustainability of regular EMEP monitoring is crucial to assess the effectiveness of environmental policies.

7. The CCC representative also updated the Task Force on the links with other existing observations related initiatives, programmes and projects such as under the Convention for the Protection of the marine Environment of the North-East Atlantic (OSPAR), the Baltic Marine Environment Protection Commission - Helsinki Commission (HELCOM), Global Atmosphere Watch (GAW), the Arctic Monitoring and Assessment Programme (AMAP), Copernicus, Aerosols, Clouds, and Trace gases Research Infrastructure Network (ACTRIS). He also mentioned the specific case where part of, or the whole, EMEP database can be shared with other projects and subsequently made available to end-users. It would be appropriate to design specific Memoranda of Understanding for such data exchanges, in order to ensure that the visibility of EMEP is duly acknowledged.

8. It was agreed during the meeting that the issue of strengthening the funding of the level 1 EMEP observation should be brought to the attention of the EMEP Steering Body. In order to emphasise the gap that needs to be bridged for the full implementation of EMEP at level 1 stations (the compliance index is illustrated in figure 1). It was also decided to organise a workshop in 2015 open to national experts to address the risk of a degradation of observation quality that the EMEP network is facing.

9. An expert from the host country presented the history and present status of EMEP observation in Poland. The first monitoring site was opened as early as 1975, and four EMEP stations are now in operation in the country, in addition to a number of urban air quality monitoring sites. There are still problems with air quality in Poland related to traffic and use of low quality fuels for individual heating which require further actions relate to this economic sectors.

10. An expert from Spain gave a presentation on the source apportionment measurement of particulate matter in five cities in the South of Europe (Barcelona, Athens, Porto, Florence, and Milan) that allowed pointing out the main sources of pollution. The relevance of results of this study in the context of the Convention made the Task Force discuss the

review of existing urban sites that are twinned with EMEP sites to assess the contribution of long-range transport to urban particulate pollution.

11. An expert from Hungary presented the observed trend in secondary inorganic aerosol and compared it with results of the EMEP model. Sulphate is a specific concern in Hungary, and it appears to have been reduced substantially since 1990s. On the other side, downward nitrate trends are not as pronounced as expected according to ammonia (NH_3) emission reductions.

12. The Task Force expressed a need to strengthen the links with the Working Group on Effects (WGE). Their use of passive samplers for persistent organic pollutants observation can be complementary to the EMEP temporally resolved measurements. The choice of WGE to move away from use of Accumulated Ozone exposure over a Threshold (AOT) and to the photosynthetic ozone dose (POD) to quantify adverse ozone impacts on vegetation is a concern given that POD cannot be directly derived from atmospheric ozone observations, and can therefore not be compared to EMEP data. Last, health effects within WGE are evaluated on the basis of urban measurements which do not fall within EMEP observation strategy. Hence, the proposed twinning between urban and EMEP stations can help to identify the proportion of the urban pollution which is attributable to transport from outside of the urban area.

B. Intensive observation periods

13. Further valorisation of past Intensive observation periods (IOPs) can still be planned, in particular with the finalisation of the Eurodelta 3 model intercomparison exercise (see paragraph 25).

14. Persistent organic pollutants (POPs) are considered as an interesting topic for the Task Force. Further framing is needed to define the expected outcomes for the Task Force and articulation with work on POPs undertaken by the WGE or under the Stockholm Convention.

15. Future IOPs should be organised in close collaboration with ongoing coordinated research projects. In particular, ACTRIS offers some opportunity of joining efforts on+ such an initiative. With the start of ACTRIS 2 in May 2015, this discussion was left for a future meeting after ACTRIS 2 has kicked off its activities.

III. The heavy metal and persistent organic pollutant case studies

16. A representative of MSC-E presented the rationale and the progress in the heavy metal test-case studies launched in 2010 for an in-depth investigation of the inconsistencies between heavy metal emission inventories, measurements and modelling results in several European countries. Following earlier studies in the Czech Republic, Croatia, and the Netherlands the focus has now moved to Belarus, and will soon start for Poland. Using a combination of emissions, modelling and measurements in the air and in the soil, it is expected to further reduce uncertainties in heavy metals exposure.

17. The results for Belarus indicate a very high spatial variability for deposition. Atmospheric concentrations are more uniform and underestimated in the model compared to observation. The results are to be further confirmed as the sites used for the model-observation comparison did not participate in CCC intercomparison exercises which are carried out to ensure the quality and compatibility of the measurements. Back trajectories indicate that higher heavy metal loads are correlated with air masses originating from the Russian Federation.

18. The Task Force acknowledged good progress in the heavy metals activities and confirmed the expectations towards reducing corresponding uncertainties. The finalisation of the Belarus case study was encouraged, and work should be initiated for Poland.

19. A representative of Germany presented the network of passive samplers for heavy metals and POPs in forests. Spatial maps of polycyclic aromatic hydrocarbons (PAHs) at various soil depths illustrate well the migration of these species over time. Therefore, local concentrations and total loads can differ, showing the importance of addressing total budgets. The proposal for Germany as a future candidate for a case study to be initiated in 2016 was welcomed by the Task Force.

IV. Modelling issues

A. Progress in EMEP models

20. Representatives of both MSC-W and MSC-E gave presentations on development of the EMEP models and available model products in support of the implementation of the Convention's protocols.

21. A representative of MSC-W reported on new developments related to resolved aerosol representation in the model. Such approach is expected to improve modelling of very fine particles that have adverse impacts on health, although little indication exists with regards to quantitative dose-response relationships. Comparison with satellite products showed improved agreement between retrievals and model results, although further fine tuning is needed as the nucleation rate of the model remains high compared to in situ measurements. The Task Force came to the conclusion that better communication is needed with WHO as the parameters selected for monitoring of health effects ($PM_{2.5}$) are not the most efficient ones for such purpose. The Task Force stressed that EMEP can offer better parameters for such assessments.

22. A representative of MSC-W gave a presentation on black carbon modelling and how to relate it to observational data. The results of the recent ECLIPSE project on short-lived climate pollutants were presented to the Task Force emphasising that while the cooling effect of sulphate is concerned, the warming effect of black carbon was not as large as expected. The recent delivery of black carbon emission data distributed by the Centre on Emission Inventories and Projections (CEIP) was welcomed, although such data have not been used in models so far. Further work is needed to implement such improved emission data in the model and strengthen the comparison with measurements. The community also stressed that the focus of EMEP should remain on air quality and its effects on health and ecosystems, while climate effects of pollutants are rather secondary for the Convention.

23. A representative of MSC-E presented the recent developments of the EMEP multi-media modelling system (GLEMOS) with respect to heavy metals and POPs from the global to the regional scale. The model includes the possibility to track the original activity sector responsible for the emission of mercury in various states of oxidation. It can also differentiate direct and multi-hop transport (that involves deposition and re-emission), as such secondary sources can be very significant (up to 50 per cent of PCL-153 concentrations).

24. GLEMOS is used in international coordinated exercises, such as Global Mercury Observation System (GMOS), which will prove valuable feedback for further model improvements.

B. EURODELTA project and national model experiments

25. A representative of France presented the results of the regional model inter-comparison EURODELTA3 project. Seven modelling teams in Europe had participated in the first phase, which had focused on the evaluation of models' parameterizations, assessing their performances against data from the EMEP field campaigns. The added value of EURODELA3 compared to other – less stringent – model intercomparison exercises was that model results were obtained with similar input data (meteorology, emissions and boundary conditions). Therefore, the model results could be compared to evaluate their internal parameterizations, considering a set of relevant indicators measured during the EMEP IOPs.

26. In 2014, an MSC-W report[2] on results of comparison was published, as outlined in the 2014–2015 workplan for EMEP. Several scientific papers are expected to be published on the basis of the high-quality modelling material produced in this exercise. The rather good performance of the EMEP model, for all the variables considered, was appreciated by Task Force members. Comparison showed that further work is required to address secondary aerosol production. The results of models are quite similar over Western Europe for PM_{10}, but strong differences are found over Eastern Europe and Scandinavia because of different parameterisation of Biogenic Volatile Organic Compounds over those areas.

27. An expert from Spain presented an update of the initial deposition results from the EURODELTA3 exercise presented at the fifteenth TFMM meeting. Task Force members agreed that more deposition measurements are needed for proper model verification.

28. The Task Force acknowledged the huge amount of work that had been undertaken to obtain that extensive assessment of current models performances in Europe. The substantial involvement of the national experts who ran the models and participated to the inter-comparison analysis was stressed and welcomed. Scientific publication of these results would be very welcomed in order to improve the visibility of the Eurodelta exercise in the scientific community.

29. An expert from the Netherlands gave a presentation on how to improve the representation of the temporal and spatial variability of NH_3 emissions. Databases of manure transport in the Netherlands can be used to better prescribe daily variability as well as discarding emission in winter, on Sundays and in the case of high precipitation. The improvement in temporal correlation between model results and observations is substantial, whereas it has limited impact on annual average concentrations. Working on the daily cycle of emission to improve the representation of ammonia evaporation, including by discarding any night-time emission, is more promising.

30. An expert from Poland presented recent developments in the global multiscale chemical weather modelling system (GEM-AQ) model which was used to assess the respective contribution of national and transboundary sources on ozone in Poland based on model sensitivity runs. The results of simulations show that in 2012, the impact of national emissions was more important than in 2013 due to difference in meteorological conditions.

31. An expert from France presented various possibilities to strengthen the links between the TFMM and the Task Force on Emission Inventories and Projections (TFEIP). Besides national totals, models require several additional inputs that are poorly constrained to date such as: temporal variability, non-inventory emissions such as re-suspension of road dust, sector split for heavy metals and POPs. A very strong concern stems from the representation in emission inventories of condensable products of wood burning and road

[2] http://emep.int/publ/reports/2014/MSCW_technical_1_2014.pdf.

traffic in the absence of gas/particulate distribution for intermediary and semi-volatile organic compounds. The Task Force would like to see a small contact group set up to liaise with TFEIP and relevant scientific experts in order to define an agenda and priorities to work on condensable representations and other issues.

V. Trend analysis

A. General overview

32. A specific session was dedicated to trends analysis studies undertaken in the Centres and by national experts in preparation to the forthcoming TFMM Trend Assessment report in 2016. The Chairs of the Task Force reminded participants about the process which builds upon the first overviews provided by experts at the fifteenth TFMM meeting, the dedicated Workshop hosted by France on 17 and 18 November 2014, and the consensus methodology and final set of representative and robust EMEP sites agreed in March 2015. The TFMM Trend Assessment relies on a strong involvement of both the Centres – who prepare and make available the data and synthetic diagnostics – and national experts – who provide a critical review on these synthetic diagnostics accounting for local specificities. Interpretation of the observed or modelled trends is also within the responsibility of the national experts. Three writing teams were defined at the end of the meeting for three main chapters on ozone, heavy metals and POPs, and eutrophying and acidifying compounds. A first full draft is expected to be available by the end of 2015, for a publication of the report before the next TFMM meeting.

33. Representatives from CCC and MSC-W presented a synthesis report on trends in ozone, aerosols and deposition, comparing data submitted to EMEP data centre (EBAS)[3] and results of the MSC-W model:

(a) General remarks: the consensus methodology agreed by the TFMM consists in relying on the use of observation site with data coverage of at least 75 per cent each year, over 75 per cent of the years of the corresponding period, the latter being either 1990–2001, 2002–2012, or 1990–2012. Trends for annual means, as well as average over the four seasons should be calculated. The significance of the trend is assessed with a Mann-Kendall test (p-value of 0.05) and the actual trend value is that of the Sen-Theil slope. The significance of the trend is very sensitive to the length of the record and the presence of outstanding years during the selected period. The benchmark dataset was uploaded on the TFMM wiki,[4] and updated with the input of national experts. However, a number of datasets caused doubts and further input of national experts was requested by CCC to improve the quality of the benchmark dataset;

(b) Trends by season: the largest downward trends for PM_{10} and NH_4 in precipitation are found in summer, while they are smallest for SO_4 during that season. This feature, unreported before, carries interesting perspective for analysis and deserves further investigation;

(c) Modelled trends: MSC-W presented the results of a 20 year model reanalysis following a setup very similar but not identical to the Eurodelta3-Trends exercise (see paragraph 35). Modelled trends in sulphur components are very similar to the ones based on measurements even though the model tends to overestimate the downward trend, and can be used to point out local dubious observed records. Emission trends for ammonia are much

[3] See http://ebas.nilu.no/.

[4] https://wiki.met.no/emep/emep-experts/tfmmtrendmethods.

lower in magnitude, which can explain the non-significant trend in reduced nitrogen in some countries. Emission trends for nitrogen oxides are larger, which results in more substantial trends in NO_2, although it remains inconsistent with a few sites. For ozone, the model trends a slightly larger when the ones based on observations, with overall less important trends for mean ozone than for peaks. For total particulate matter, a negative trend is found for both model and observation despite local discrepancies. The downward trend is primarily attributed to secondary particulate matter.

Overall the comparison between model and observation points out a number of questions on the reliability of observations for trend assessment, which can only be answered by accounting for local specificity building upon the knowledge of national experts.

34. A representative from MSC-E discussed trends in heavy metals and POPs depositions. The time period had to be adapted to account for the scarcity of observation compared to other species. The statistical method for heavy metals and POPs trends value estimate differs from the one used for the other pollutants. It is based on fitting and exponential decay to the time series. Modelled seasonal variations are in very good agreement with observations, but offset in the concentration can be found over the first decade. The contribution of contemporary source has decreased in relative terms, so that today about half of concentrations are attributed to historical emissions, emphasising the need for high-quality historical emission inventories.

35. An expert from France presented the Eurodelta3-Trends multi-model exercise initiated in 2014. Seven modelling teams (including MSC-W) are now participating in the initiative that consists in several tiers of experiments, the first two of which will be based on three target years (1990, 2000, 2010) and the last tiers consist of a full 21-year simulation. The experiment is quite stringent when it comes to model setup (use of emissions, boundary conditions and meteorological driver) in order to facilitate analysis of the importance of non-linear chemical processes on air pollution trends. This dataset will also prove valuable for the community working on impacts and to benchmark integrated assessment models. The results of the exercise will be included in the TFMM Trend Assessment report. The community stressed that it is important that countries deliver high quality emissions for this kind of comparison as they ensure good air quality assessment.

36. A representative of the Joint Research Centre of the European Commission presented the common analysis tool (Delta-Trends) used for the analysis of the Eurodelta3-Trends exercise and the status of the database as well as an analysis of the preliminary model results.

37. A representative of the World Meteorological Organisation presented the Tropospheric Ozone Assessment Report (TOAR) project undertaken by the International Global Atmospheric Chemistry Programme. By involving 160 scientists from 33 nations, the ambition of TOAR is to update the current state and past trends of tropospheric ozone. Use of EMEP data is well acknowledged by the project. A global database of ozone indicators will ultimately be distributed by the project, together with the report to be published in 2016.

38. An expert of Switzerland gave an overview of the PM speciation data collected as part of the ACTRIS project and how such data could be used to inform multi-annual analysis, although most of the records are still too short for a trend analysis. He reminded the community that it is recommended to freeze the filters for future analysis when potential new measurement techniques come up.

39. A representative of EEA presented the Agency's activities in the field of air quality, and especially the AirBase database of observations collected in EU member States according to the respective European legislation. Acknowledging the questionable quality of some of the myriad of records in AirBase for a trend assessment, sophisticated data

screening procedures based on geostatistics have been implemented. Trend was analysis using TFMM methodology. Widespread decrease in PM_{10} is observed over 2002–2012, especially in summer. For NO_2 the downward trend was larger in the 1990s than in the 2000s. For ozone, it is during the later decade (2002–2012) that more downward trends are found for background stations, though in urban areas ozone is reported to increase locally.

B. National contributions

40. National experts presented specific trend analyses that are essential to further elaborate the high-level diagnostic presented earlier by the Centre or through pan-European assessments.

41. *Ozone and volatile organic compounds (VOCs)*: An expert from France presented the 15 years of VOC measurement which were analysed using a Positive Matrix Factorisation approach. This allows for tracking trends in emissions of individual activity sectors. In particular, a larger trend was found for combustion products and traffic exhaust emissions at some stations. An innovative modelling approach to represent such trends in VOC emissions was presented by an expert from the United Kingdom. This approach allows a quantification of uncertainties, leading to the conclusion that reductions of emissions in traffic and solvent use had an impact on reducing peak ozone. The high frequency of measurements at the site of Hohenpeissenberg, Germany, was presented as it allows for in-depth analysis including performance of source apportionment to track emission trends and assessment of the respective role of emission and meteorological variability.

42. *Particulate Matter*: An expert from Germany presented the records at the Melpitz site, where PM_{10} started in 1992. Trend analysis by wind sector allows for inferring potential contamination sources. Downward SO_4 trends are observed, especially in Eastern wind condition, whereas for nitrate little trends are found. Total PM_{10} decreased, except in the winter season for recent years. An expert from Spain presented trends of particulate matter source apportionment at the station of Monseny. Using exponential decay was preferred for some of the factors because of the non-linearity of the trend. The methods offer an interesting diagnostic in the evolution of emission sources.

43. *Ammonia emissions*: An expert from the United Kingdom presented activities at the network of nitrogen passive samplers which is used for assessment of national ammonia emissions. It was shown that variability in agricultural emissions is strongly correlated with meteorological conditions.

44. *Precipitation chemistry*: An expert from Sweden presented trends in the chemical composition of precipitations. Ammonia concentrations in precipitation do not decrease as much as for other compounds. The role of meteorology is also shown to be important as nitrogen components dilute more in the cases of more precipitation. An expert from Croatia presented trends in records of precipitation chemistry up to 35 years long pointing out that the downward trend was smaller over the 2000–2012 period than during the earlier period. A strong downward trend is found for sulphur in precipitation, which is not the case for ammonia, although there is a suspicion of contamination in the samples. An expert from Belarus presented trends at urban sites where strong reductions in acidifying compounds are found, so that the pH of precipitation increased from 5 to 6. An expert from Switzerland presented long term trends of precipitation chemical composition and atmospheric composition, showing declines for PM and nitrate compounds. The added value of using more elaborate statistical analysis to refine the diagnostic using the TFMM agreed methodology was presented and further documented by an expert from the Russian Federation.

45. *Heavy metals*: An expert from Russia presented trends in lead and cadmium over the past 20 years, showing substantial increases in concentration of these pollutants. Though mercury concentration decreased during 2002–2012, cadmium concentration are increasing during the same period. This shows that the problem with heavy metals is not resolved in all the countries. An expert from Belarus presented increasing trends of cadmium and lead, whereas total suspended particle decreased in urban areas. He emphasised that the spatial variability and inconsistencies between observed trends and reported emissions call for further work as part of the ongoing heavy metal case study. An expert from Italy presented observed and modelled trends in heavy metals using both the EMEP model and MINNI. For lead some increases in emissions might be attributed to artefact of emission data updated in time. Both models indicate an overall reduction in heavy metal exposure. For arsenic there are local increases in emissions, e.g. in the Veneto area, there they were compensated by the meteorological variability.

46. After the presentation of the trends assessment performed by the Centres and national contribution, three rapporteurs summarised their views on the key findings:

(a) *Ozone*: The contribution of background ozone and local production must be differentiated. Use of model tagging or trend assessment by season shows that summertime production has decreased more than the wintertime background. Such an exercise is made challenging by the fact that compensations occur, and the net ozone concentration is always a combination of production and loss processes. The relevance to include the few historical sites with the measurement in the 1980 was pointed out. There is also a need to include several ozone metrics to offer a comprehensive understanding of the evolution of ozone impacts in time;

(b) *Acidifying and eutrophying compounds, including particulate matter*: AirBase offers an interesting complementary dataset in addition to the EMEP network for its density of urban sites that allow for a comparison of urban and background trends. Alternatively source apportionment methods are promising, although more demanding to analysis on a large set of data. The situation is very different in the United States where a much denser network of source apportionment data is available. It appears that PM trends were influenced by a change in nitrate/sulphate partitioning resulting from the substantial mitigation of sulphur emission. The limited availability of long-term carbonaceous measurement is an important limitation for black carbon trend assessments;

(c) *Heavy metals and persistent organic pollutants*: whereas interesting trend analyses were presented for heavy metals, very little material is available for Persistent Organic Pollutants. The fast evolution of the monitoring network over the 1990s raises important methodological challenges for the assessment.

C. Conclusions

47. The Chairs of the Task Force defined the future steps in the work on trends analysis. The outline of the forthcoming TFMM Trend Assessment report was presented, which will consist of three main chapters on (i) ozone, (ii) acidifying and eutrophying compounds, including particulate matter, (iii) heavy metals and persistent organic pollutants. Details on monitoring, modelling, and statistical analyses will be presented in appendices. The length of the report will not exceed 50 pages. It will be supplemented by an executive summary. The report shall be published as a joint TFMM-GAW report. Drafting teams of 3 to 6 experts were identified and asked to report to the Chairs in June 2015 to propose a detailed outline for each chapter. This outline will be presented at the EMEP Steering Body in September 2015, and subsequently elaborated in order to propose a first full draft before the end of 2015. Final publication is expected before the next TFMM meeting to be held in Utrecht, Netherlands in the spring of 2016. Meanwhile, the TFMM Chairs will ensure that

the works of the TFMM are duly included in the other reports being prepared by the other bodies of the Convention, namely the CLRTAP Assessment Report, and the Trend report of the WGE.

VI. Future work

48. Following discussion on the activities undertaken as part of the 2014–2015 workplan, the Task Force agreed to propose the following workplan items for the 2016-2017 period:

(a) Improvement of EMEP tools and knowledge:

(i) Review the added value of existing twin urban & remote supersites to assess the contribution of long range transport to urban air pollution,

(ii) Liaise with the WGE by setting up a contact group to compare WGE exposure measurements and the EMEP observational strategy,

(iii) Publish and discuss lessons learned and ways forward based on the 2015 trend assessment,

(iv) Liaise with the TFEIP community to define collaboration on handling semi-volatile emissions (including condensable), but also on emission spatialisation and other important topics,

(v) Finalise the analysis of the Eurodelta3 exercise (both EMEP campaigns and Trend modelling);

(b) Continue cooperation with the Parties:

(i) Raising the profile of high-quality level 1 EMEP observations by assisting Parties in implementing the Revised Strategy for EMEP for 2010–2019 (EMEP monitoring strategy); strengthen activities in regions with inadequate monitoring activities,

(ii) Exchange views, experiences and suggestions on: (a) the quality, efficiency and sufficiency of EMEP measurements and data; and (b) performance and the need for improvements in models (EMEP models and those developed by the Parties) and in the scope of their application (such as for national assessments of air quality, assessment of transboundary fluxes and their influence on air quality at national levels, trend analyses, etc.),

(iii) Assessment of pollution levels of heavy metals in selected countries (possibly Poland and Germany),

(iv) Guidance on best practice in implementing CEIP black carbon inventories in models used by the Centres and state parties, and their subsequent validation with EMEP observations,

(v) Hold the seventeenth TFMM meeting in Netherlands, in April 2015, and to report on its outcomes to the EMEP Steering Body at its fortieth session in 2016;

(c) Cooperation with other projects and bodies (outreach issues):

(i) Ensure strong links with scientific groups involved in level II and level III measurement activities, and formulate a strategy for the implementation of intensive observation periods,

(ii) Review existing black carbon measurement/inventories/models that could be relevant to other bodies (Arctic Council, Climate and Clean Air Coalition - CCAC),

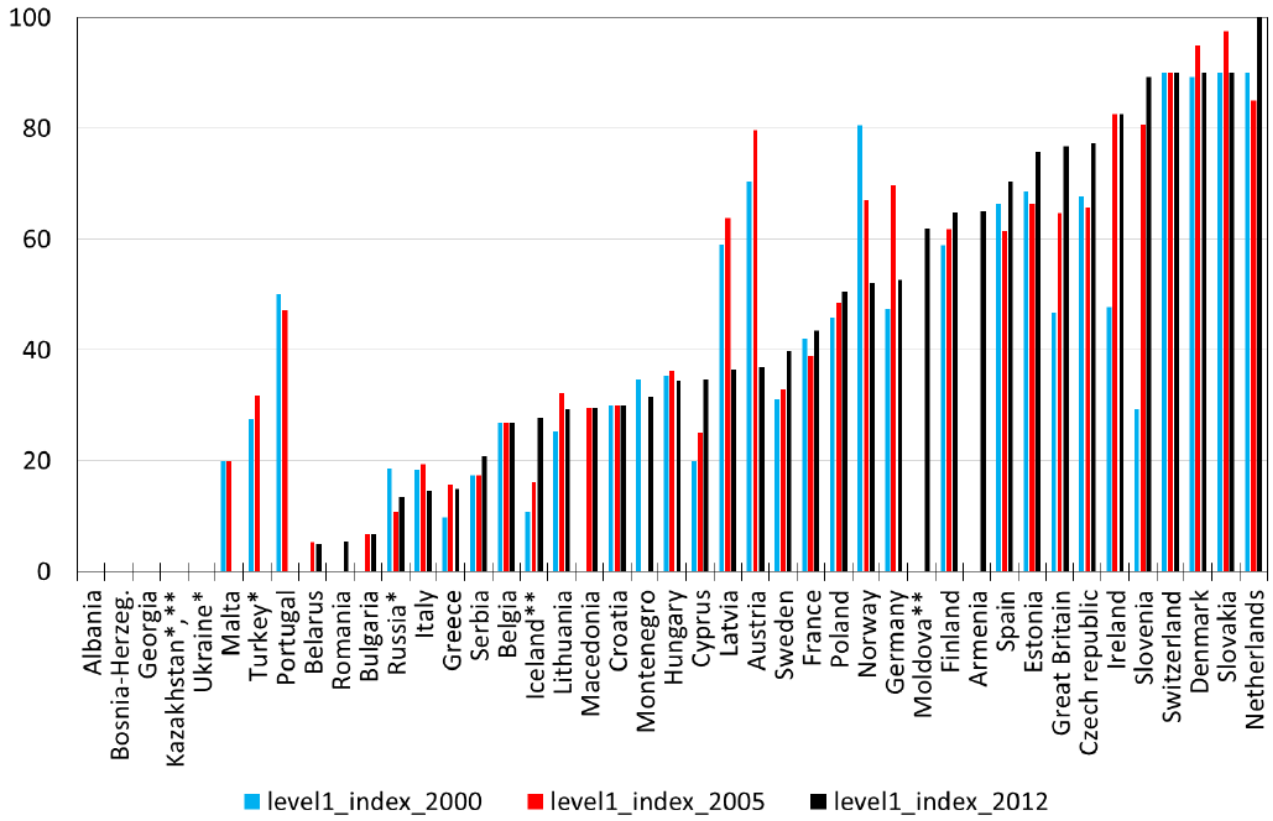
(iii) Improve collaboration with the WMO/GAW on the data exchange, measurement techniques harmonization and expertise exchange,

(iv) Strengthen the visibility of EMEP observational data distributed through other networks, such as Copernicus, Airbase, TOAR, etc,

(v) Liaise with Air Quality Modelling Evaluation International Initiative (AQMEII) and the Forum for Air quality Modelling (FAIRMODE) on regional model evaluation.

Figure 1

Index for implementation of the EMEP monitoring strategy, level 1 based on what has been reported for 2000, 2005 and 2012



Notes:

***** Means adjusted land area.

****** Parties to the LRTAP Convention, but not the EMEP Protocol (source: EMEP Status Report 1/2014).