Convention on Long Range Transboundary Air Pollution

emep

EMEP and the relations to the draft revised AQFD

Kjetil Tørseth and Wenche Aas, EMEP-CCC

The Climate and Environmental Research Institute NILU
A part of the research alliance NORIN

Convention on Long-range transboundary air pollution (1979->)

UNECE SUSTAINABLE DEVELOPMENT GOALS

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Air

Introduction

Air pollution impacts our health, environment and economy. Air pollutants come from multiple sources. It is therefore paramount that we take action together — across sectors and national boundaries.

To improve air quality, UNECE member States have been working successfully to reduce air pollution in the region through the Convention on Long-range Transboundary Air Pollution. Eight protocols identify specific measures to be taken by Parties to cut their emissions. The Convention provides access to emission, measurement and modelling data and information on the effects of air pollution on ecosystems, health, crops and materials. To learn more about the Convention, watch a video by clicking on the picture.

In focus

- Workplan 2022-2023
- Long-term strategy
- Rules of procedure
- Anniversary Declaration on Clean Air

EMEP - 47 Parties

Protocols

The Convention has been extended by eight protocols:

Title	Entry into force	Status of ratification
1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone and its 2012 amended version	17 May 2005 7 October 2019	Original protocol Amended version
1998 Protocol on Persistent Organic Pollutants (POPs) and its 2009 amended version	23 October 2003 20 January 2022	Original protocol Amended version, annexes I, II Amended version, annexes I, II, III, IV, VI, VIII
1998 Protocol on Heavy Metals and its 2012 amended version	29 December 2003 8 February 2022	Original protocol Amended version
1994 Protocol on Further Reduction of Sulphur Emissions	5 August 1998	Status
1991 Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes	29 September 1997	Status
1988 Protocol concerning the Control of Nitrogen Oxides or their Transboundary Fluxes	14 February 1991	Status
1985 Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent	2 September 1987	Status
1984 Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)	28 January 1988	Status

EMEP

The co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe (inofficially 'European Monitoring and Evaluation Programme' = EMEP) is a scientifically based and policy driven programme under the Convention on Long-range Transboundary Air Pollution (CLRTAP) for international co-operation to solve transboundary air pollution problems.

Five EMEP Centers and four Task Forces undertake efforts in support of the EMEP work plan. We refer to the respective websites for in-depth information:

CEIP Centre on Emission Inventories and Projections	Direct link to emission data
CCC Chemical Coordinating Centre	Direct link to measurement data
MSC-W Meteorological Synthesizing Centre - West	Direct link to model results (sulphur, nitrogen, ozone, and PM)
MSC-E Meteorological Synthesizing Centre - East	Direct link to model results (heavy metals and POPs)
CIAM Centre for Integrated Assessment Modelling	Direct link to GAINS-Europe

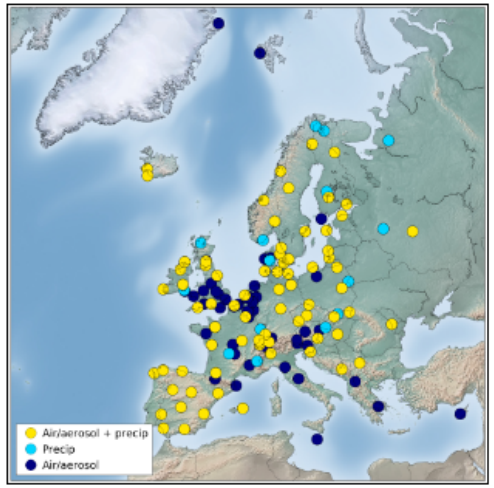
TFEIP
Task Force on
Emission Inventories and Projections

TFMM
Task Force on
Measurements and Modeling

TFIAM
Task Force on
Integrated Assessment Modeling

TFHTAP
Task Force on
Hemispheric Transport of Air Pollution

Chemical Co-ordinating Centre of EMEP (CCC)



Contact persons
EMEP Monitoring Strategy (2020-2029) (pdf)
Monitoring Strategy: Background documents

EBAS database online
Data submission

Measurement network
Site descriptions
Trajectories

EMEP reports
EMEP/CCC reports

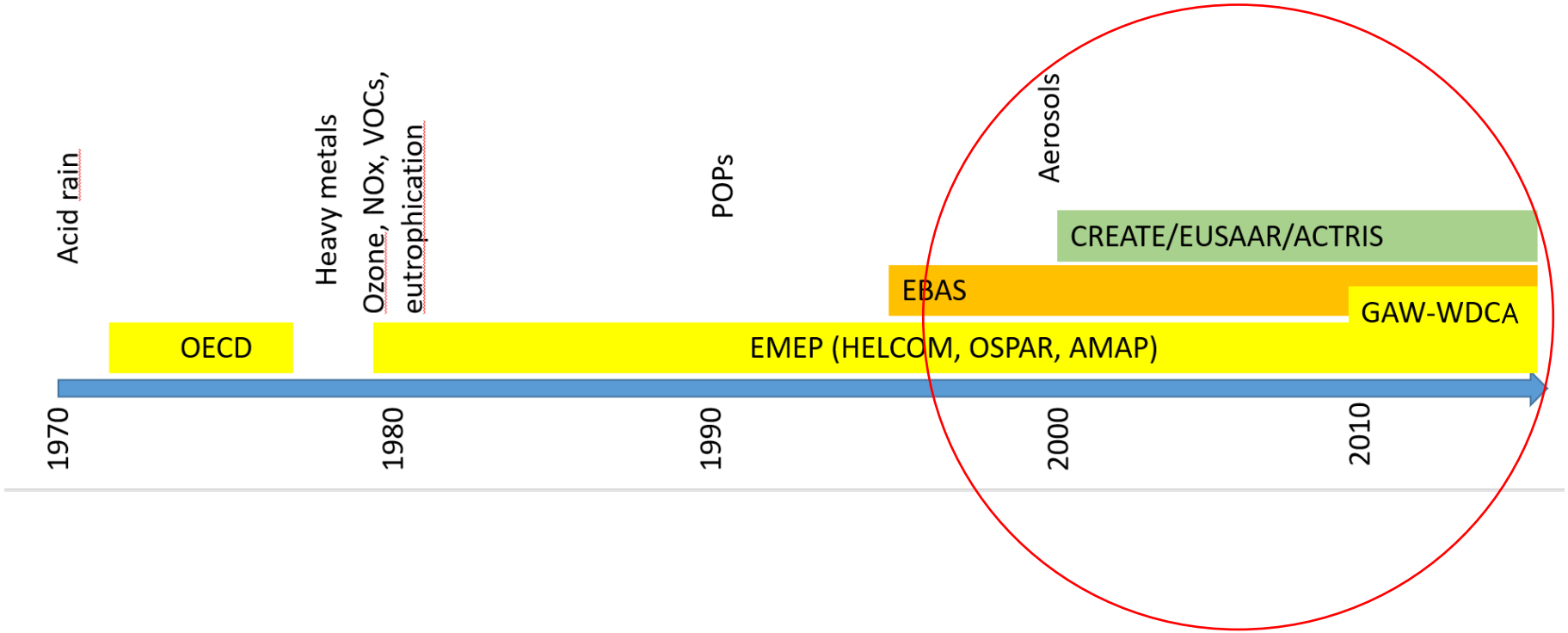
Standard Operating Procedures (SOPs and manuals)
EMEP laboratory intercomparisons
QA measure
Ion balance plots

TFMM
HTAP

EMEP Chemical Coordinating Centre (EMEP-CCC) – Terms of reference:

- **Develop and coordinate the observation activities** required to assess air pollution across the EMEP geographical domain
- **Secure and improve quality and representativeness** of observations
- **Quality assurance and quality control of data** submitted by Parties
- **Archival and dissemination of observation data** and associated meta-data.
- **Assessment of data** and provide information to stakeholders about results from monitoring activities
- **Serve the interest of EMEP monitoring activities** with respect to relevant activities under other frameworks to ensure harmonization, efficient use of resources and multiple usage of data.

Aerosols entered EMEP as focus area around yr 2000



1999

EMEP/CCC-Report 8/99

Long-range transport of Aerosol Particles

A Literature Review

Mihalis Lazaridis, Arne Semb and Øystein Hov

1 Introduction

The purpose of the current document is to present and review latest research findings in the area of atmospheric Particulate Matter (PM). In this document we summarize key information on the physico-chemical characteristics of PM, their monitoring, sampling and analyses methodology, their emissions and sources, their concentration in Europe and we provide background information on exposure aspects and related health effects. In addition we provide a summary on the effect of particulate matter on visibility, climate effects, material damage and acidification-eutrophication. The present document is aimed to serve as a scientific draft paper on the EMEP aerosol programme and provide information on the regional component of atmospheric particulate matter.

Long-range transport of gaseous air pollutants has been studied extensively in Europe the last decades under the framework of the European Monitoring and Evaluation Program (EMEP) (EMEP-WHO, 1997; Eliassen and Saltbones, 1983; Tarasson and Tsyro, 1998; Pacyna et al., 1991) and several national and international efforts (Berdowski et al., 1998; EPA, 1996a,b; EU, 1996, 1997; Quality of Urban Air Review Group, 1996; Position Paper on Particles, 1998). Emissions of pollutants rise up in the air due to buoyancy effects, advect downwind, and disperse horizontally and vertical due to turbulence field and prevailing meteorological patterns. The last years there is an extensive research focus on particulate matter (PM) (EPA, 1996; EU, 1996, 1997; EMEP-WHO, 1997, WHO, 1996) mainly because of serious public health risks for susceptible members of the population and risks to sensitive ecosystems. The transport of PM in the atmosphere is similar to that of gaseous pollutants for the fine particle fraction but deviates at larger sizes (coarse particles) due to deposition processes. Therefore, the long-range transport of PM contributes significantly in the background particle mass and number size distribution. However, there is still considerable debate among the scientific community regarding the vertical exchange processes involved and the spatial and temporal scales of atmospheric particle transport.

1999 – EMEP-WMO workshop

EMEP/CCC-Report 9/2000

EMEP-WMO Workshop on fine particles – emissions, modelling and measurements

Interlaken, Switzerland
22–25 November 1999

Edited by
Jan Erik Hanssen, Richard Ballaman and Robert Gehrig

https://projects.nilu.no/ccc/reports/cccr9-2000.pdf

2000 EMEP-TFMM (1st meeting)

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)

MEASUREMENTS AND MODELLING

Minutes of the first meeting of the Task Force

Introduction

1. The first meeting of the Task Force on Measurements and Modelling was held in Vienna on 23-25 October 2000. It drew up a proposal for its terms of reference and its work programme for the coming 3-5 years, including the preparation of an assessment report on the changes in the transboundary fluxes, depositions and concentrations. Furthermore, the Task Force discussed the measurement and modelling of fine particulate matter.

II. A MEASUREMENT STRATEGY FOR PARTICULATE MATTER

13. The subgroup was chaired by Robert GEHRIG (Switzerland) with Øystein HOV (CCC) as rapporteur. It reviewed the recommendations from the EMEP/WMO Workshop on emissions, measurements and modelling of fine particulates (EB.AIR/GE.1/2000/9) held in Interlaken, Switzerland, from 22 to 25 November 1999 for measurements (paragraphs 9-18 in the conclusions and recommendations, pp. 14-15 in the Report EMEP CCC R 9/2000, and modelling (paragraphs 19-28)).

14. The following EMEP reports on particulate matter (PM) were prepared since the Interlaken workshop:

- The EMEP/CCC-Report 8/99, Long-range transport of aerosol particles, a literature review, summarises the key information available on the physical and chemical characteristics of PM, their monitoring, sampling and analyses methodology, their emissions and sources and their concentrations over Europe. In addition it provides background information on exposure aspects and related health effects. The report also provides a summary on the effect of particulate matter on visibility, climate effects, material damage and acidification/eutrophication.

- The EMEP/CCC-Report 1/2000: Status report with respect to measurements of particulate matter in EMEP (http://www.nilu.no/projects/ccc/reports2000/cccr1-2000.pdf) concentrates on available measurement data for particulate matter in Europe, the EC (CEN) reference methods, other methodologies for chemical characterisation as well as providing some recommendations for future work.

https://projects.nilu.no/ccc/tfmm/vienna1/index.html

2000

NORWEGIAN INSTITUTE FOR AIR RESEARCH
P.O. BOX 100, N-2027 KJELLER, NORWAY

EMEP/CCC-Note 1/2000
DATE: MAY 2000

CO-OPERATIVE PROGRAMME FOR MONITORING AND EVALUATION
OF THE LONG-RANGE TRANSMISSION OF AIR POLLUTANTS
IN EUROPE (EMEP)

MEASUREMENT OF AEROSOL PARTICLE MASS AND CHEMICAL SPECIATION OF AEROSOL PARTICLES

Introduction

The full recommendations from the Interlaken workshop on aerosol particles will be distributed by the ECE Secretariat and CCC will print the Proceedings from the Workshop. With respect to the measurement of aerosol particle mass (PM_{10}), the workshop made a series of recommendations, some of which are summarized below:

⇒ Gravimetric determination of PM_{10} is recommended, because this gives the added advantage of determining the chemical components in the collected sample. In addition, this is in accordance with the EU Directive and CEN 12341. Results from measurements with other methods and instruments could also be collected, however.

⇒ Chemical speciation of PM_{10} should comprise sulphate, nitrate, ammonium and other water-soluble inorganic components which are readily determined by ion chromatography of aqueous extracts.

⇒ Carbon and organic compounds are the second most important group of compounds. It is relatively straightforward to determine total carbon, the differentiation between organic and elementary carbon by selective thermal volatilization and oxidation requires careful standardization. Reference laboratories for EC/OC should be therefore be established. Optical methods to determine black, or elementary carbon, are not satisfactory.

⇒ The full chemical mass closure requires also the determination of insoluble inorganic material, which has become a much less important component of the aerosol particle mass in Northern Europe during the most recent year. To account for the measured PM10 values it is also necessary to determine water of hydration remaining in the sample and the ratio of total organic mass to organic carbon. More detailed characterisation of the material associated with the EC/OC component will be an important research issue, to be pursued within the EUROTRAC aerosol research programme.

Measurement data within EMEP for assessment of the long-range transported part of the aerosol particulate mass in Europe are urgently needed. This includes measurement of particulate mass, preferably determined according to CEN12341, but chemical characterisation and speciation of the particulate material is also highly desirable.

The Interlaken workshop also indicated that it is of interest to carry out more detailed chemical speciations and measurements of particle size distributions, as well as other physical characterisation of ambient aerosol particles, such as deliquescence growth. For these purposes, a set of "super stations" is envisaged, which will function as EMEP or WMO GAW sites with a routine observation programme, and with an extended programme as outlined by WMO-GAW. At least 5 such sites will be desirable: one in Central Europe, one in Eastern Europe, one in Western Europe experiencing marine climate, one in the Mediterranean area experiencing arid conditions and Saharan dust, and one representing remote, Nordic conditions.

https://projects.nilu.no/ccc/reports/cccn1-2000.pdf

2000

NILU: EMEP/CCC-Report 1/2000
REFERENCE: O-98134
DATE: JULY 2000

EMEP Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe

Status report with respect to measurements of particulate matter in EMEP

Mihalis Lazaridis, Arne Semb, Steinar Larssen, Anne-Gunn Hjellbrekke, Øystein Hov, Jan Erik Hanssen, Jan Schaug, Leonor Tarrason*, Svetlana Tsyro*

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Norwegian Institute for Air Research
P.O. Box 100, N-2027 Kjeller, Norway

DNMI
Norwegian Meteorological Institute
P.O. Box 43 Blindern, N-0313 Oslo, Norway

https://projects.nilu.no/ccc/reports/cccr1-2000.pdf

2002-2003

Atmos. Chem. Phys., 7, 5711–5725, 2007
www.atmos-chem-phys.net/7/5711/2007/

Atmospheric Chemistry and Physics

Elemental and organic carbon in PM_{10}: a one year measurement campaign within the European Monitoring and Evaluation Programme EMEP

K. E. Yttri[1], W. Aas[1], A. Bjerke[1], J. N. Cape[7], F. Cavalli[6], D. Ceburnis[2], C. Dye[1], L. Emblico[3], M. C. Facchini[3], C. Forster[1], J. E. Hanssen[1], H. C. Hansson[4], S. G. Jennings[2], W. Maenhaut[5], J. P. Putaud[6], and K. Tørseth[1]

[1]Norwegian Institute for Air Research, P.O. Box 100, 2027 Kjeller, Norway

2004

ELSEVIER

AE International – Europe

Atmospheric Environment 38 (2004) 2561–2577

ATMOSPHERIC ENVIRONMENT

www.elsevier.com/locate/atmosenv

A European aerosol phenomenology—1: physical characteristics of particulate matter at kerbside, urban, rural and background sites in Europe

Rita Van Dingenen[a,*], Frank Raes[a], Jean-P. Putaud[a], Urs Baltensperger[b], Aurélie Charron[c], M.-Cristina Facchini[d], Stefano Decesari[d], Sandro Fuzzi[d], Robert Gehrig[e], Hans-C. Hansson[f], Roy M. Harrison[c], Cristoph Hüglin[e], Alan M. Jones[c], Paolo Laj[g], Gundi Lorbeer[h], Willy Maenhaut[i], Finn Palmgren[j], Xavier Querol[k], Sergio Rodriguez[k], Jürgen Schneider[h], Harry ten Brink[l], Peter Tunved[f], Kjetil Tørseth[m], Birgit Wehner[n], Ernest Weingartner[b], Alfred Wiedensohler[n], Peter Wåhlin[j]

ELSEVIER

AE International – Europe

Atmospheric Environment 38 (2004) 2579–2595

ATMOSPHERIC ENVIRONMENT

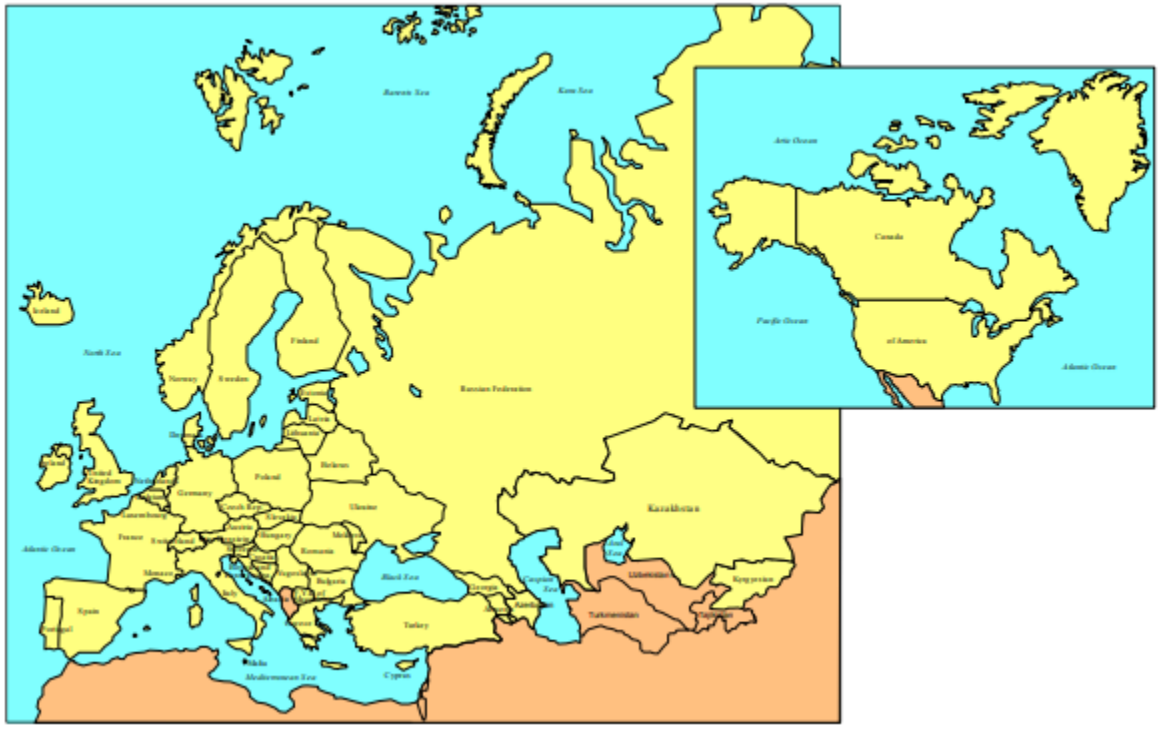
www.elsevier.com/locate/atmosenv

A European aerosol phenomenology—2: chemical characteristics of particulate matter at kerbside, urban, rural and background sites in Europe

Jean-P. Putaud[a,*], Frank Raes[a], Rita Van Dingenen[a], Erika Brüggemann[b], M.-Cristina Facchini[c], Stefano Decesari[c], Sandro Fuzzi[c], Robert Gehrig[d], Cristoph Hüglin[d], Paolo Laj[e], Gundi Lorbeer[f], Willy Maenhaut[g], Nikolaos Mihalopoulos[h], Konrad Müller[b], Xavier Querol[i], Sergio Rodriguez[i], Jürgen Schneider[f], Gerald Spindler[b], Harry ten Brink[j], Kjetil Tørseth[k], Alfred Wiedensohler[b]

2003

NILU : EMEP/CCC-Report 9/2003
REFERENCE : O-7726
DATE : AUGUST 2003



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PO Box 100, NO-2027 Kjeller, Norway
Chemical Co-ordinating Centre of EMEP (CCC)

Convention on Long-range Transboundary Air Pollution

Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)

The EMEP monitoring strategy 2004-2009

Background document with justification and specification of the EMEP monitoring programme 2004-2009

Edited by Kjetil Tørseth and Øystein Hov

EMEP supersites will be nominated according to topic and each site would not necessarily need to cover all topics. It is advised that countries cooperate for cost sharing purposes. A number of so called "Large scale facilities" funded by the EU already exists and these need further development to cover the whole range of advanced parameters relevant to EMEP. A close cooperation with GAW on this issue is essential and the establishment of joint supersites for particulate matter is currently being implemented.

Sites that represent regional or global concentrations are encouraged to develop into supersites. High quality EMEP stations are encouraged to become supersites by implementing extended measurement programmes or specialised programmes for a particular pollutant, documenting adequate quality and technical staff. The supersites also need to satisfy the Data Quality Objectives defined for EMEP.

2004

PERSPECTIVE

Requirements for developing a regional monitoring capacity for aerosols in Europe within EMEP†

Michael Kahnert,*[a] Mihalis Lazaridis,[b] Svetlana Tsyro[c] and Kjetil Tørseth[a]

[a]*Norwegian Institute for Air Research, P.O. Box 100, 2027 Kjeller, Norway,*
[b]*Technical University of Crete, Department of Environmental Engineering, 73100 Chania, Greece*
[c]*Norwegian Meteorological Institute, P.O. Box 43 Blindern, 0313 Oslo, Norway*

Received 24th November 2003, Accepted 8th March 2004
First published as an Advance Article on the web 22nd April 2004

The European Monitoring and Evaluation Programme (EMEP) has been established to provide information to Parties to the Convention on Long Range Transboundary Air Pollution on deposition and concentration of air

EMEP monitoring strategy 2019-2029

Levels 1 and 2 are mandatory. Information on reference methods is provided in the EMEP Manual for Sampling and Chemical Analysis and in the Quality assurance/Quality control section available on the EMEP Chemical Coordinating Centre website: www.emep.int; https://projects.nilu.no//ccc/index.html.

Level 1 - "variables to be measured at all basic EMEP sites"		*Recommended temporal resolution*
Inorganic compounds in precipitation	SO_4^{2-}, NO_3^-, NH_4^+, H^+ (pH), Na^+, K^+, Ca^{2+}, Mg^{2+}, Cl^-, precipitation amount	24 hours
Inorganic compounds in air	SO_2, SO_4^{2-}, NO_3^-, HNO_3, NH_4^+, NH_3, (sNO_3, sNH_4), HCl, Na^+, K^+, Ca_2^+, Mg_2+	24 hours
Elemental and Organic Carbon	EC and OC in $PM_{2.5}$	24 hours /7 days
Nitrogen dioxide	NO_2	1 hour/24 hours
Ozone	O_3	1 hour
PM mass concentration	$PM_{2.5}$, PM_{10}	24 hours
Heavy metals in precipitation	Cd, Pb (1st priority), Cu, Zn, As, Cr, Ni (2nd priority)	7 days
Meteorology	Precipitation amount (RR), temperature (T), wind direction (dd), wind speed (ff), relative humidity (rh), atmospheric pressure (pr)	24 hours (RR), others 1 hour

Level 2 - "additional variables to be measured at a subset of sites - EMEP level 2 sites"		*Recommended temporal resolution*
Mineral dust in PM_{10}	Si, Al, Fe, Ca	24 hours/7 days
Particle light absorption/equivalent black carbon	Light absorption coefficient, eBC	1 hour
Particle number concentration	dp >10nm	1 hour
Particle number size distribution	dN/dlogDp, (sub/supermicrometer)	1 hour
Particle light-scattering coefficients	Light-scattering coefficient, Light backscatter coefficients (multi-wavelengths)	1 hour
Particle chemistry speciation	Non-refractory organic and inorganic composition (ACSM, AMS)	1 hour
Aerosol Optical Depth	AOD at 550 nm	1 hour

http://www.unece.org/fileadmin/DAM/env/documents/2019/AIR/EB_Decisions/Decision_2019_1.pdf

In addition, Intensive Monitoring Periods are organized to study specific issues

- IMP Winter 2017/2018 on EC/OC, Absorption and tracers
- IMP Summer 2022 on VOCs, ozone and SOA

All the data are presented in data reports and are openly available

CCC reports 2021

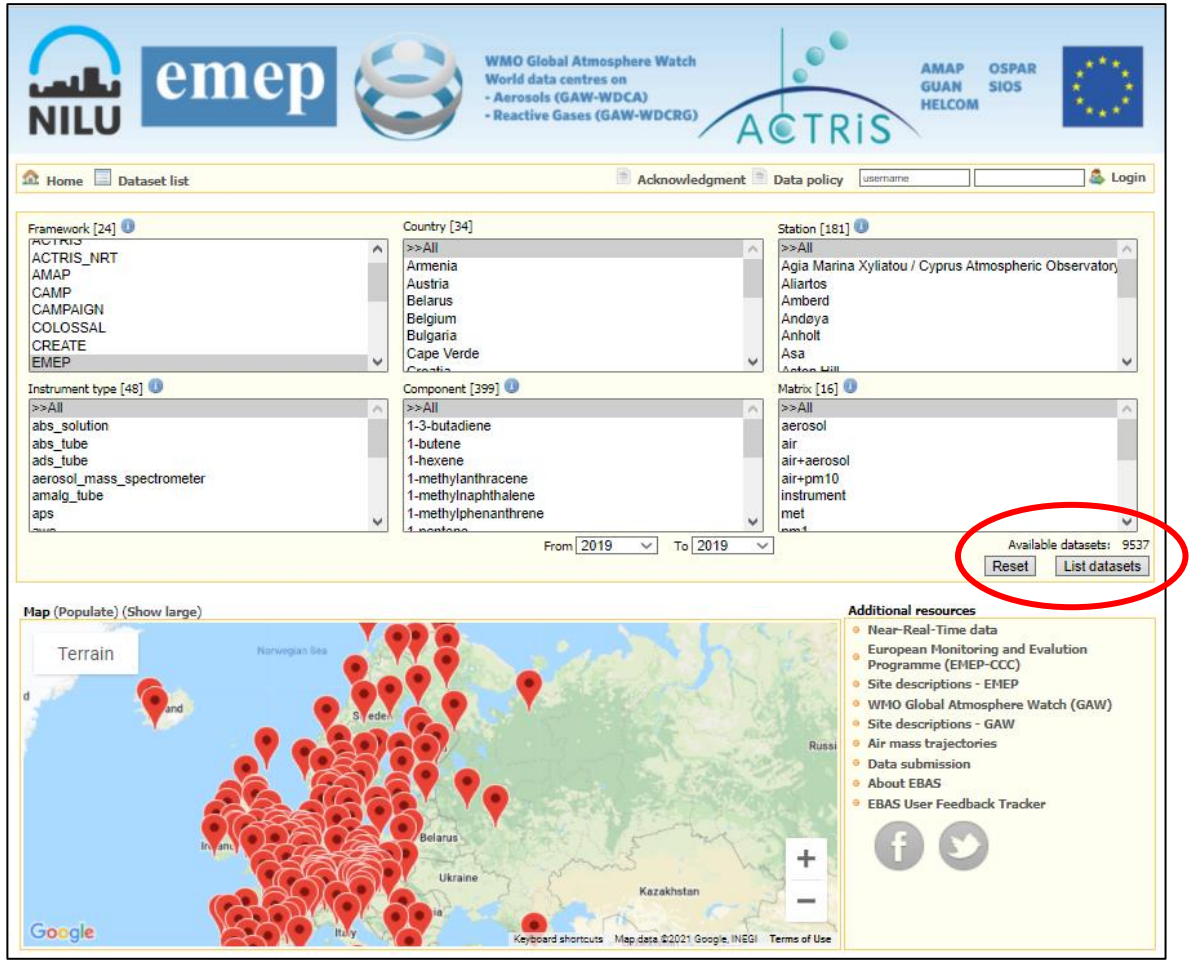
Data Report 2019 Particulate matter, carbonaceous and inorganic compounds
Anne-Gunn Hjellbrekke
EMEP/CCC-Report 1/2021: pdf

Ozone measurements 2019
Anne-Gunn Hjellbrekke and Sverre Solberg
EMEP/CCC-Report 2/2021

Heavy metals and POP measurements 2019
Wenche Aas and Pernilla Bohlin Nizzetto
EMEP/CCC-Report 3/2021

VOC measurements 2019
Sverre Solberg, Anja Claude, Stefan Reimann and Stéphane Sauvage
EMEP/CCC-Report 4/2021

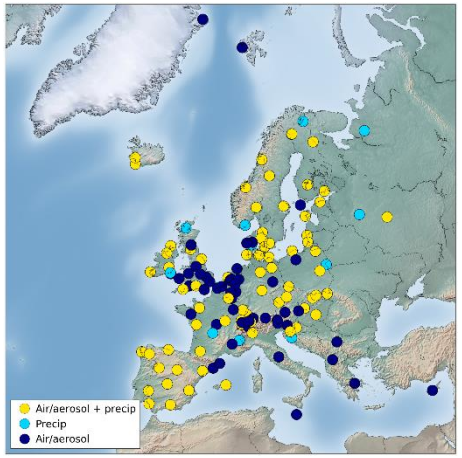
https://projects.nilu.no//ccc/reports.html



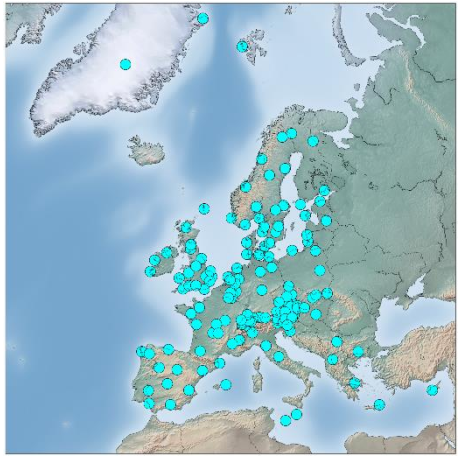
http://ebas.nilu.no/

Measurement sites in 2019

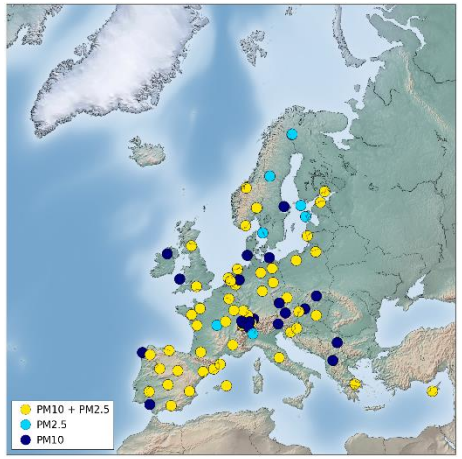
Inorg.:136 sites from 33 Parties



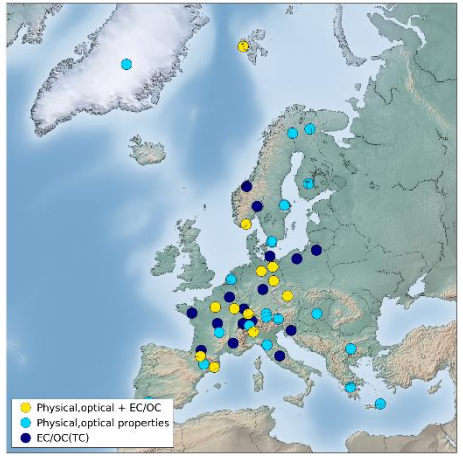
Ozone, 138 sites from 28 Parties



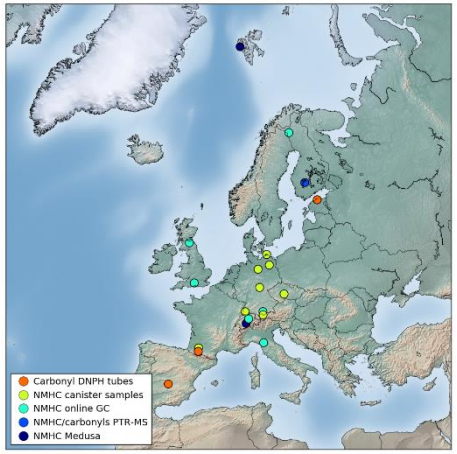
PM: 78 sites from 23 Parties



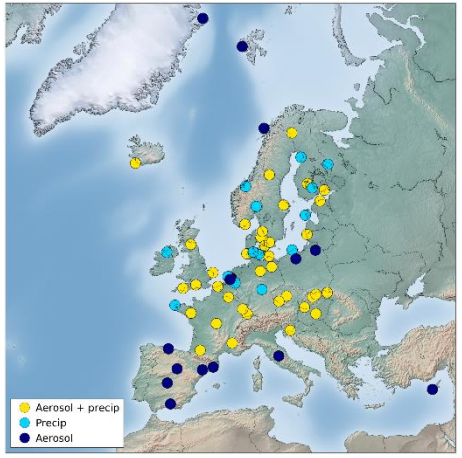
Aerosol prop: 50 sites from 17 Parties



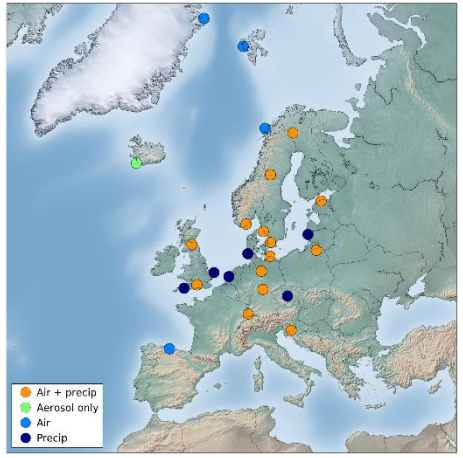
VOC: 19 sites from 10 Parties



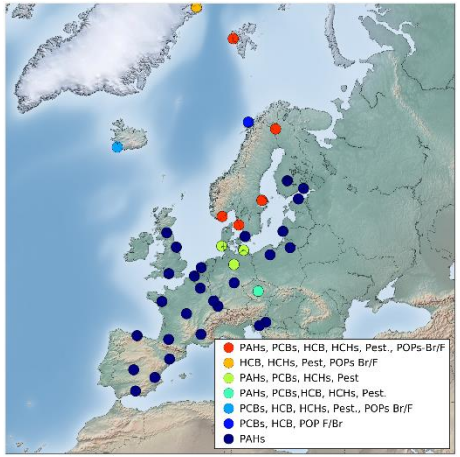
HM: 65 sites from 20 Parties



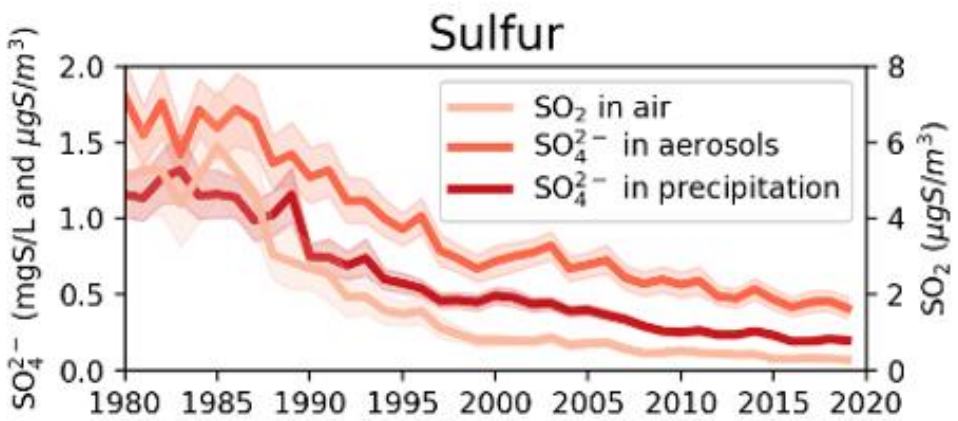
Hg: 25 sites from 13 Parties

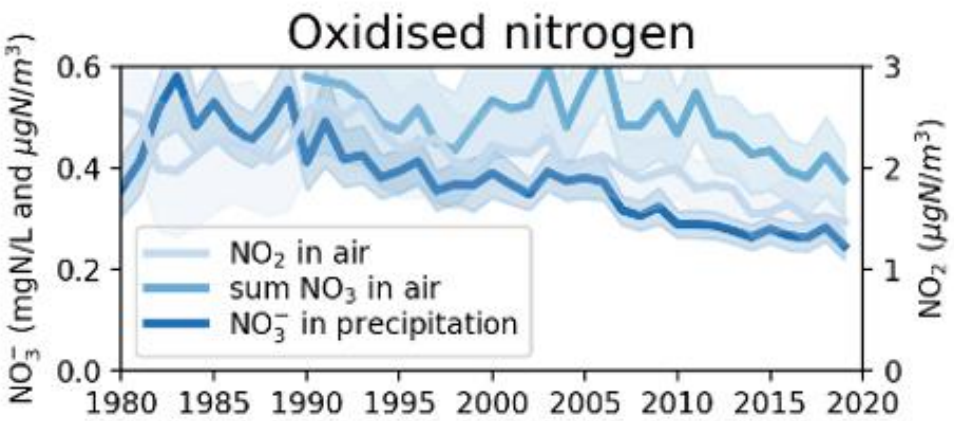


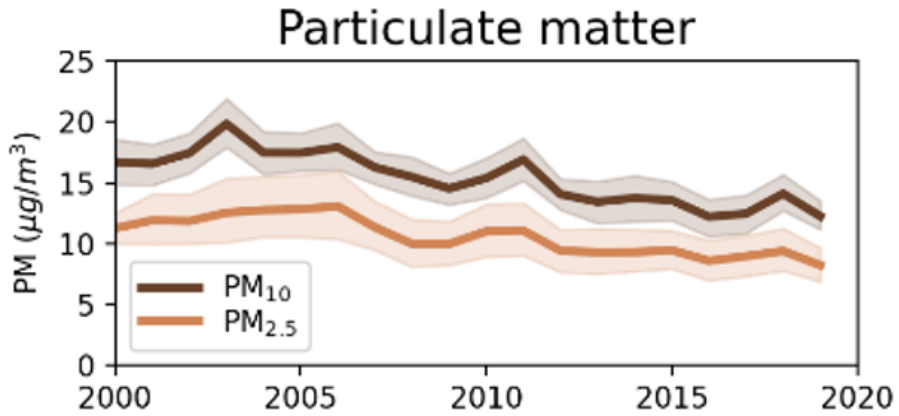
POPs: 39 sites from 17 Parties

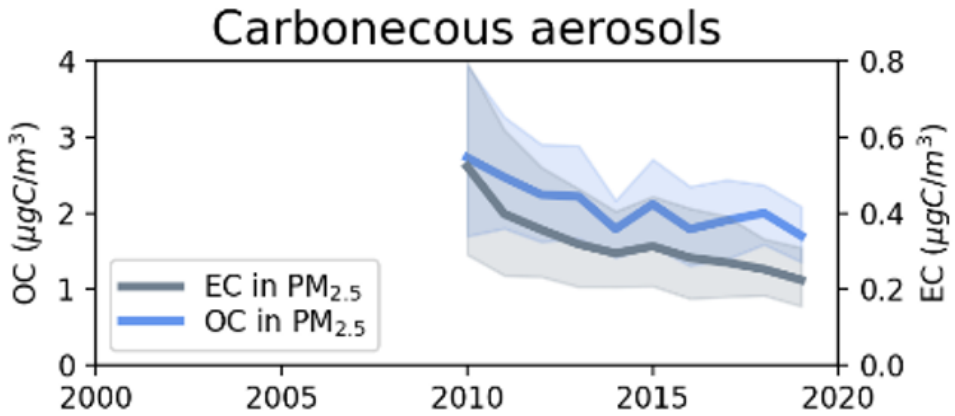


Trends


Sulfur
SO_4^{2-} (mgS/L and $\mu gS/m^3$)
SO_2 ($\mu gS/m^3$)
SO_2 in air
SO_4^{2-} in aerosols
SO_4^{2-} in precipitation
2.0
1.5
1.0
0.5
0.0
8
6
4
2
0
1980 1985 1990 1995 2000 2005 2010 2015 2020


Oxidised nitrogen
NO_3^- (mgN/L and $\mu gN/m^3$)
NO_2 ($\mu gN/m^3$)
NO_2 in air
sum NO_3 in air
NO_3^- in precipitation
0.6
0.4
0.2
0.0
3
2
1
0
1980 1985 1990 1995 2000 2005 2010 2015 2020


Particulate matter
PM ($\mu g/m^3$)
PM_{10}
$PM_{2.5}$
25
20
15
10
5
0
2000 2005 2010 2015 2020


Carbonecous aerosols
OC ($\mu gC/m^3$)
EC ($\mu gC/m^3$)
EC in $PM_{2.5}$
OC in $PM_{2.5}$
4
3
2
1
0
0.8
0.6
0.4
0.2
0.0
2000 2005 2010 2015 2020

Selected aspirations of the EMEP monitoring strategy:

(e) A level of ambition that is affordable for all Parties, while also taking advantage of scientific developments and emerging capabilities.

8. EMEP monitoring is the core framework for regional-scale monitoring of atmospheric constituents throughout the EMEP domain. Observations are made at remote and regional background sites and enable, in combination with other monitoring efforts within the ECE area, the evaluation and assessment of regional and transboundary contributions to local air pollution.

9. EMEP observations are also important for understanding the role of intercontinental and global scale transport of short- and long-lived species playing a role in air pollution and climate change processes. The measurement programme includes radiative forcing agents (also known as short-lived climate pollutants), for example, aerosols (including black carbon) and ozone and their precursors (including methane). EMEP monitoring supports, in an integrated way, information needs associated with coupling between atmospheric composition and deposition rates with the climate system and its variability, as well as the coupling between the carbon and nitrogen cycles.

11. The EMEP monitoring strategy aims to utilize new developments in observational methods, new technologies and techniques to integrate observations from measurement platforms (for example, in situ, profiles, satellite remote sensing and methods for integrating observational data with modelling through, for example, data assimilation and measurement model fusion approaches).

12. EMEP will, where relevant and appropriate, continue its efforts to increase the monitoring and reporting of parameters and data timelines, facilitating more rapid access to air pollution information ("Near Real Time" or "Real Real Time" data delivery). Such efforts will be based on voluntary contributions from Parties and will follow the guidance of the EMEP Steering Body.

14. Taking into account the complexity and costs of atmospheric composition monitoring, EMEP will, as far as possible, continue to harmonize with, and make use of relevant data compiled under, other conventions and frameworks. In particular, such data would include observations of local air quality, climate change, water quality and biodiversity. As a result, there is a significant overlap in technical infrastructures at national levels, i.e. most EMEP level 2 sites (see below) represent core infrastructures for observations supporting related initiatives. Within the Convention, there is close collaboration with the Working Group on Effects and the International Cooperative Programmes, with EMEP observations being used to derive pollution exposure data to assess impacts and effects.

15. At the European level, EMEP observations are fundamental in relation to the European Union Air Quality Directive[1] and the National Emission Ceilings Directive,[2] and there are close links between EMEP monitoring requirements and the Directives. Furthermore, EMEP observations are used as a part of European Environment Agency assessments of the air quality situation in Europe, and EMEP sites typically also deliver parts of their data to the European Environment Agency database.

16. There is close scientific and technical cooperation between EMEP and the World Meteorological Organization Global Atmosphere Watch Programme in Europe, comprised of harmonization of guidelines, observational practices, data quality control, quality assurance and data exchange. Through the efforts of Global Atmosphere Watch, EMEP observations are also harmonized with efforts in other parts of the world, and EMEP data contribute to Global Atmosphere Watch's services to society.

17. Examples of other initiatives and frameworks related to pollution include international programmes and conventions such as: the Arctic Monitoring and Assessment Programme; the Baltic Marine Environment Protection Commission; the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic; the United Nations Framework Convention on Climate Change; the Stockholm Convention on Persistent Organic Pollutants; and the Minamata Convention on Mercury under the United Nations Environment Programme.

18. EMEP observations are also made available to users and stakeholders though initiatives such as the Global Earth Observation System of Systems and the European Union's Earth Observation Programme (COPERNICUS).

29. For level 2 variables, all Parties with a land area greater than 50,000 km^2 should operate at least one site. As stated in paragraph 21 above, Parties have the possibility to choose and focus on variables reflecting their national priorities. Possibilities for regional collaboration on the operation of sites should be explored if there are obstacles to or financial constraints regarding the implementation of monitoring programmes. Most of the existing level 2 sites currently contribute to the Aerosol, Clouds and Trace Gases Research Infrastructure (ACTRIS).

E. Data quality and exchange

31. EMEP will maintain and further improve its quality assurance programme to make sure that observation data are of known quality and adequate for their intended use as defined in section II above. Field intercomparisons and laboratory ring tests are important, as is the maintenance of good communication between national data providers and the EMEP centres. These activities can be strengthened through collaboration with the central quality assurance facilities in the European Union (for example, the Network of Air Quality Reference Laboratories, the European Committee for Standardization, ACTRIS and the World Meteorological Organization Global Atmosphere Watch Programme. Close links to the services offered by the metrology community (European Association of National Metrology Institutes) are also important.

EMEP vs revised AQFD – remarks from EMEP-CCC

- Intro point 12 states that PM measurements should be made in a manner consistent with EMEP
- Article 10, section 8: recommends to coordinate with EMEP in relation to monitoring supersites
- The draft AQFD suggestion related to rural background supersites is corresponding reasonably well with ongoing EMEP efforts. E.g., Article 10, section 6. stipulates requirements for fixed measurements for PM2.5 and PM10 mass, NO2, O3, BC, NH3 and UFP at rural supersites.
- As relates to chemical speciation of PM2.5 (with reference to Annex VII), we would however like to point out that there are important differences between the draft AQFD and EMEP. In EMEP, only fixed measurements (not indicative) are accepted. Further, EMEP chemical speciation also includes the coarse aerosol fraction at its level 1 sites with sampling including both the fine and coarse fraction (TSP or PM10), with the exception of EC/OC which is to be measured in PM2,5.
- Moreover, chemistry in both PM2,5 and PM10 is recommended at EMEP level 2 supersites. In EMEP, we recommend that sample time resolution be sufficient to resolve individual atmospheric transport events (daily or shorter). Another difference between AQFD and EMEP relates to elemental carbon (EC) measurements. In EMEP, EC and Organic Carbon (OC) in PM2.5 is required at EMEP level 1 sites, while at EMEP aerosol supersites (level 2), measurements of aerosol absorption coefficient (black carbon) together with EC and OC in PM10 is required. Further particle number size distribution is also requested. Ammonia is in EMEP a level 1 requirement, while gas/partitioning of NH3 and NH4 using artefact free methods is a level 2 requirement, and high spatial/low temporal ammonia monitoring in emission areas is a level 3 activity.

- The proposed activities in the revised AQFD are partly activities defined as level 1 activities in EMEP and partly EMEP level 2 (supersite) activities. In practice, EMEP level 1 sites will fulfill most of the proposed directive supersite requirements, but except for aerosol absorption coefficient (black carbon) and UFP/aerosol number size distribution which are EMEP level 2 requirements). Additionally, EMEP level 2 aerosol supersites include variables not required in the proposed directive Thus, there is no correspondence between the definitions of supersites between the AQFD and EMEP

- One way to improve consensus between AQFD requirements and those of EMEP would be to increase the ambition level of Article 12, point 6b so that Annex XII variables are listed together with those listed in Article 12, point 6a.

- Finally, we find it important that any measurements made at urban supersites are harmonized with the regional scale rural monitoring.

Thanks you for your attention

www.emep.int

https://www.emep.int/emep_publications.html

https://projects.nilu.no/ccc/index.html