

ECRAN modelling workshop

Source: EMEP 2015, <http://copernicus.eu/main/atmosphere-monitoring>

Content

- EMEP
- MACC
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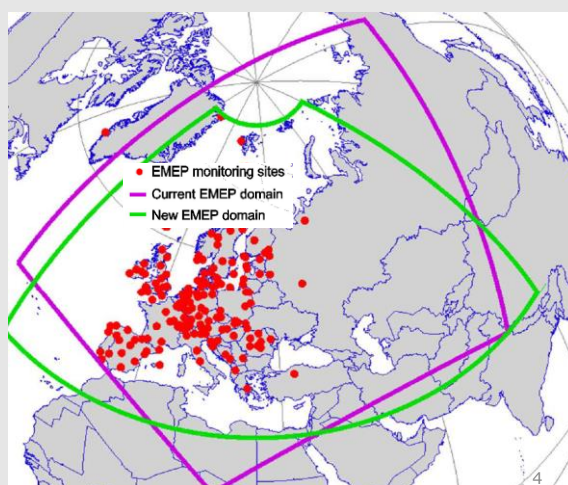
Unified EMEP model

- Targets laid down in EMEP protocol
 - Assessment of large-scale fluxes, deposition and concentration of pollutants
 - Assessment of the impact of emissions in a region/country on deposition or exposure in another region/country
 - Assessment of the impact of future emission scenarios on deposition and exposure

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New EMEP grid

- 0.1x0.1° resolution (about 9x11km²)
- Decided at EMEP SB (Decision 2012/13)



Source: EMEP presentation at EMEP SB Geneva September 2012

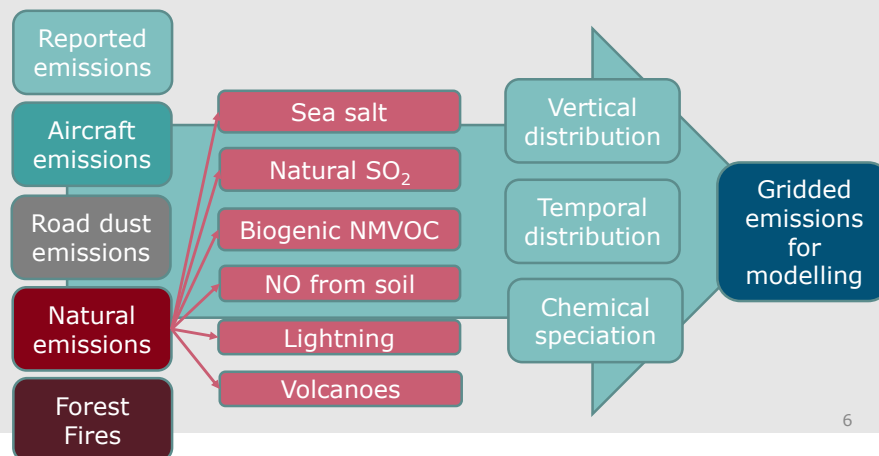
EMEP emissions

EMEP emissions are used for

- Unified EMEP model: concentration and deposition of air pollutants in EMEP domain
 - GAINS
 - Ecosystem damage
 - ...
- MACC emissions
- Further regional models (e.g. CHIMERE, ...)

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EMEP emissions



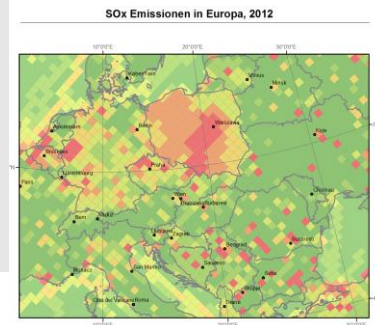
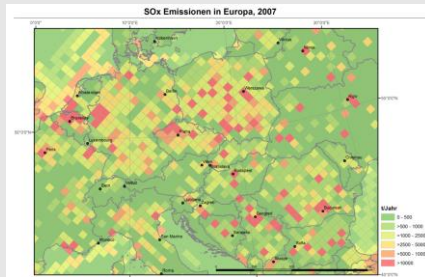
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Reported emissions

“Reported Emissions” are provided from national institutions

- Sectoral split
- Spatial distribution to grid

→ inconsistencies along national boundaries, different years possible

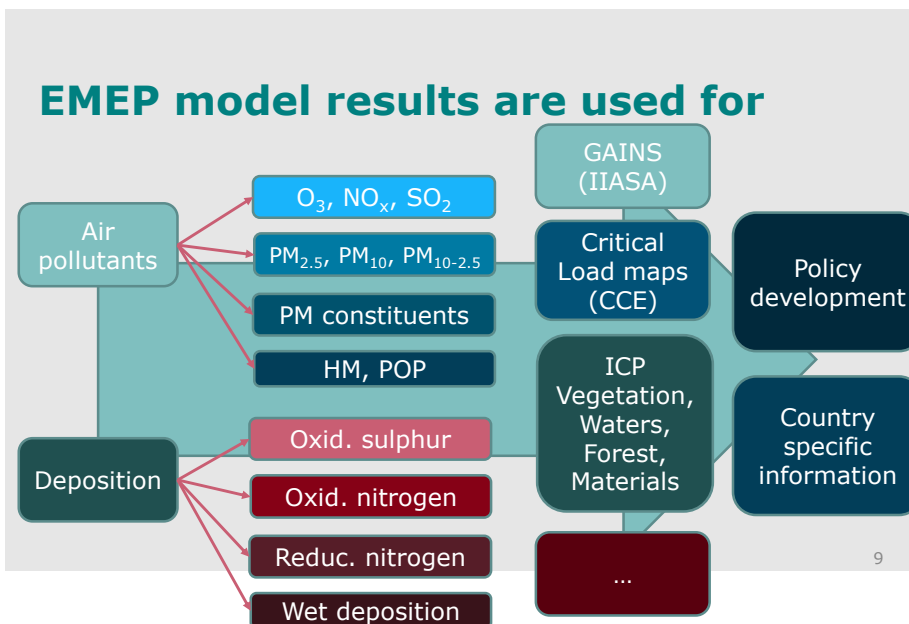


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What EMEP does with your emissions

- National totals and gridded emissions per sector supplied by national institutions
- Emissions used for modelling
- MSC-W publishes e.g. [annual status report](#) for all EMEP countries

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Health and ecosystem impacts

- Parameters for the assessment of health and ecosystem impacts on regional scale:
 - Average concentrations
 - Exposure of ecosystems (e.g. AOT40 for Ozone)
 - Deposition

Health and ecosystem impacts

- Ozone fluxes: predicted economic losses for different crops (+scenarios)
- Source-receptor relationships (conc. and depo. of different constituents)

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MACC – Monitoring atmospheric composition and climate

- Project (2009-2011) was part of the European Earth observation programme [Copernicus](#) (former [GMES](#))
- Objectives
 - Monitoring of greenhouse and reactive gases, aerosols
 - Prediction of regional air quality in Europe
 - Providing information to support European environmental policy

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MACC II



- Follow-up project of MACC since 2011
- Input data
 - Emission inventories
 - In-situ data (EEA - air quality data, CarboEurope, ICOS, IAGOS)
 - Satellite data
- Products
 - Global records of greenhouse and reactive gases, aerosols
 - Global forecasts of reactive gases, aerosols
 - Regional forecasting and assessment of air quality for Europe

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MACC – Monitoring Atmospheric Composition and Climate



Weather services



Atmospheric
environmental
services



Environmental agencies



provide data &
information on



Long-range pollutant
transport

European air quality

Dust outbreaks

Solar energy

UV radiation

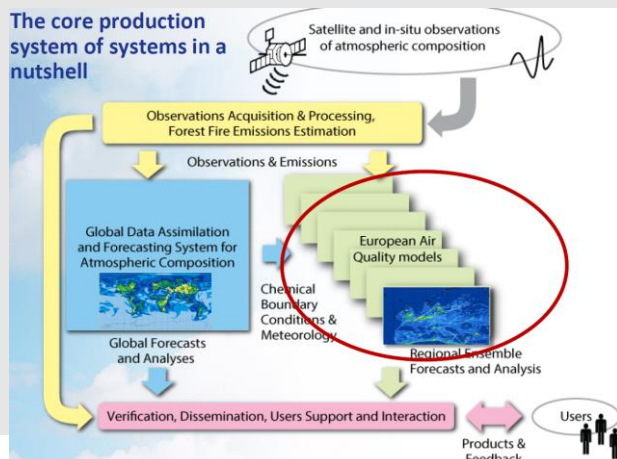
Climate forcing by gases
and aerosols

...

Source: <http://copernicus-atmosphere.eu/>

Copernicus ensemble modelling

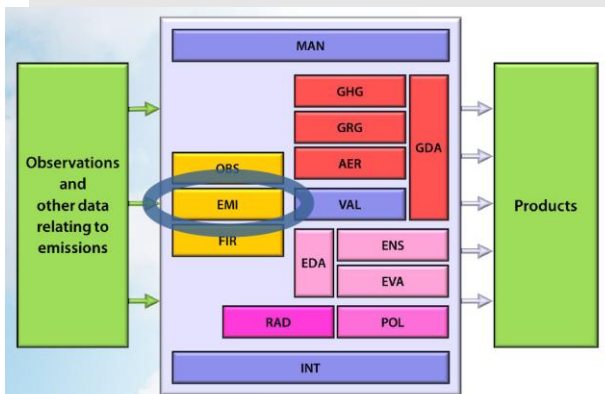
The core production system of systems in a nutshell



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Source: <http://copernicus-atmosphere.eu/>

TNO-MACC emissions as part of MACC structure



- Anthropogenic and natural emissions

Source: Tarrason 2012

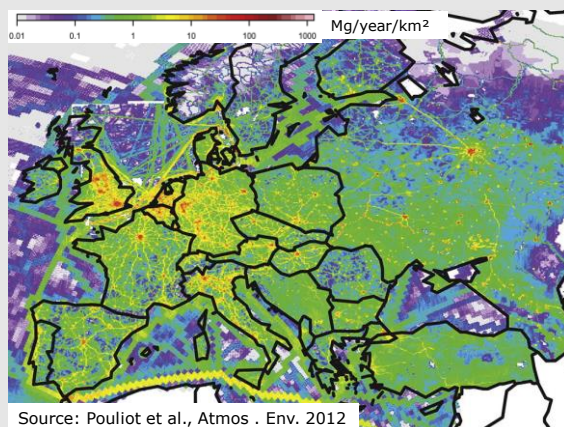
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TNO-MACC emissions

- Based on EMEP emissions for years 2003-2007
- Gridding by TNO (Netherlands)
- Further input from satellite data, E-PRTR
- Natural sources e.g. for NH_3 , mineral dust
- $0.125^\circ \times 0.0625^\circ$ lon-lat resolution for Europe ($\sim 7 \times 7$ km)

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TNO-MACC results – NO_x emissions



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FAIRMODE – Forum for Air Quality Modelling in Europe

- Set up by European Environment Agency (EEA) and the European Commission Joint Research Centre (JRC)
- International expert forum to develop quality standards
- <http://fairmode.ew.eea.europa.eu/>

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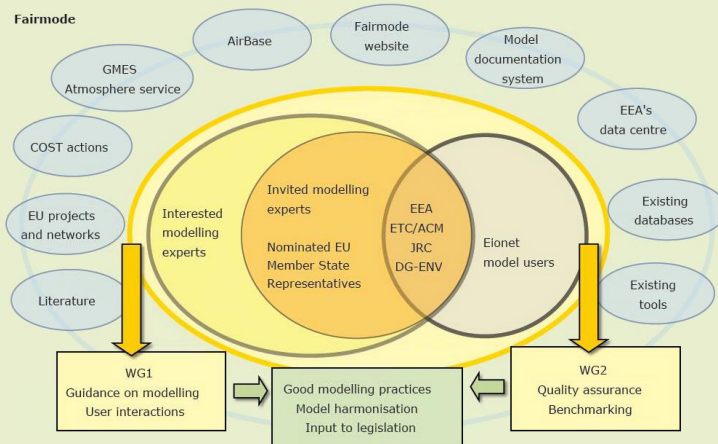
FAIRMODE – Objectives

- Providing a permanent European Forum for AQ modellers and model users
- Guidance on the use of AQ models
- Protocols and tools on the QA of AQ models
- Recommendations for further research

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FAIRMODE – Organisation

Box 1.1 Forum for Air Quality Modelling in Europe – Fairmode



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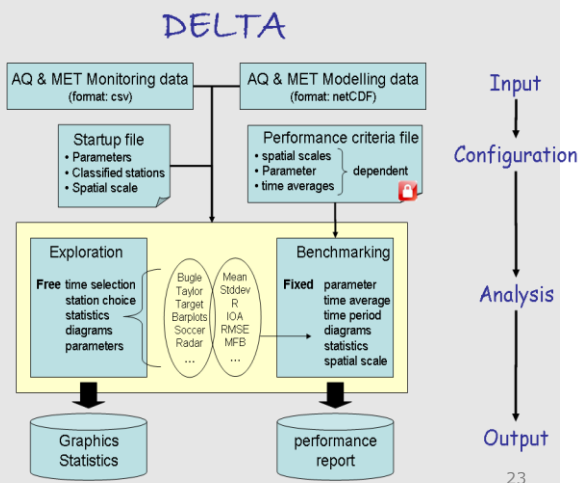
FAIRMODE results

- Understanding the AQ Directive in regard to modelling
- Application of models under the Air Quality Directive
- Reporting and public information when using models
- Model quality assurance and evaluation
- Application of models for AQ assessment
- Application of models for AQ management
- Guidance for NO₂, PM modelling
- European AQ modelling maps

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Model benchmarking – “Delta Tool”

- **DELTA** software
- Within framework procedure for benchmarking of Air Quality Directive modelling applications



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Contact & Information

Christian Nagl

+43-1-31304-5866, christian.nagl@umweltbundesamt.at

Umweltbundesamt
www.umweltbundesamt.at

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