TFEIP EIONET Annual Meeting 2014

Emissions and AQ modelling (some reflections)

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Why the need for spatial and temporal emissions data

Reported spatial and temporal emissions data are an input for models used to assess atmospheric concentrations and deposition, as the spatial location of emissions determines to a great extent their atmospheric dispersion patterns and impact area.

The results of model assessments inform national and international policies used to improve the environment and human health.

(From EMEP/EEA guidebook chapter on spatial mapping of emissions)
Is it important to move into a high resolution world?

EEA (2012)
Timeline on emissions and modelling activities (selection)

2007: Joint workshop TFMM/TFEIP on uncertainties in emission inventories and atmospheric models (Dublin)

2008: JRC-TFEIP Workshop Issues of scales in emission inventory special needs for global, regional and local emission inventories (Milan)

2011: Release E-PRTR diffuse emission maps (EC-EEA)

2011: Workshop on mapping/gridding of emissions at TFEIP Meeting (Stockholm)

2011: EEA/ETC/ACM workshop: GMES and emission inventories (Copenhagen)

2013: Release of the EMEP/EEA air pollutant emission inventory guidebook chapter on spatial mapping of emissions

2014: today
Workshop focus on $O_3$, PM and HM

There is a need to link between model and inventories on which parameters should be provided by which community such as (a) emission sources, (b) meteorological data needed for emission calculations (PM/NH3) and (c) speciation of compounds (VOC, EC/PM).

Non-inventory* emission sources are in several cases an important source of uncertainty (biomass burning, natural emissions, soil NOx emissions).
• Source categories not required to be reported in the EMEP frame-work.

Given the increasing demand for local air pollution studies, there is a strong requirement for improved and finer spatial and temporal resolution of inventory data.

In order to make significant progress in the scientific quality of heavy metal emission inventories an improvement in the detailed activity data and emission factors is essential.
We made progress (example: guidebook chapter)

Figure 3-1 General approach for compiling a spatial emission inventory
Providing detailed inventory data for modelling is not easy.

The methodology for the spatial distribution of national total emissions from road transport activities to a grid for each vehicle and road type is shown in Figure 3-3.

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**Figure 3-3**  Overview of the applied methodology for the spatial distribution of the road transport, Theloke *et al.* (2009).
Gridded emissions 1992 (4.5° lat. X 7.5° lon.)

| 180° | 165° | 150° | 135° | 120° | 105° | 90° | 75° | 60° | 45° | 30° | 15° | 0° | 15° | 30° | 45° | 60° | 75° | 90° | 105° | 120° | 135° | 150° | 165° | 180° |
|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 90N  |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 75N  |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 60N  |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 45N  |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 30N  |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 25N  |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 20N  |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 15N  |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 10N  |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 5N   |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 0N   |      |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

Table 1: Geographical distribution of NOx emissions from fossil fuel combustion for 1986.

EU Gridded emissions present day (5 km x 5 km resolution)

E-PRTR: NO\textsubscript{x} emissions from non-industrial combustion (ton/grid)
http://prtr.ec.europa.eu/DiffuseSourcesAir.aspx
Gridded emissions present day (5 km x 5 km resolution)

25 m² land use map of the Netherlands. Comparison of E-PRTR spatial allocation of diffuse emissions sources with high resolution national emission inventories; example The Netherlands, Wim van der Maas (RIVM, NL)

High resolution emission mapping in the UK linked to national reporting, Ioannis Tsagatakis (AEA, UK)
2011 GMES workshop (inventory, model and measurement experts)
### 2011 GMES workshop (recommendations)

“Develop Guidance for estimating emissions estimates with high
(i) Spatial (1x1km – 5x5km areas with vertical detail),
(ii) Temporal (hourly, daily, monthly)
(iii) Species (PMs, NMVOC, PAHs & HMs) resolution”.

“Improve consistency between emission inventory calculations and E-PRTR/EU-ETS/LCPD and other industrial data reported under national or EU legislation”

“Develop centralised Emissions Inventory Datasets such as speciation profiles, temporal profiles and EU wide spatial proxies (e.g. roads, agriculture, residential, industrial areas)”

“Continue to develop proxy datasets of value for mapping national emissions inventories at 5x5km and below.”

“Continue to evaluate and utilise methods to estimate emissions from natural and international source (e.g. shipping, forest fires, dust and volcano emissions).”
2014 What’s next?

To be discussed......