TFMM Trend Analyses

Process & Methodology

Joint EMEP SB & WGE, Geneva Sept 14-17th 2015

Convention on Long-range Transboundary Air Pollution
emep
Co - operative programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe

LRTAP
Long-range Transboundary Air Pollution

TFMM Trend Assessment

- Three main chapters
  - Ozone
  - Particulate matter, acidifying and europhying compounds
  - Heavy metals and POPs

- Time line
  - Nov 2014: workshop
  - Feb 2015: methodology
  - May 2015: writing teams
  - Sep 2015: first draft
  - Dec 2015: full draft
  - Spring 2016: publication

- Supporting data
  - EMEP records agreed methodology
  - EURODELTA3 numerical experimental plan

Trend methodology for observations

- Common approach
  - Workshop Nov 2014, consensus Mar. 2015.

- Specifications
  - Time periods: 1990-2012 / 1990-2001 / 2002-2012
  - Data completeness: 75% of annual coverage and 75% of years covered
  - Statistical analysis:
    - Concentrations and wet deposition fluxes of Pb, Cd, Hg and B[a]P + other POPs: bi-exponential on the basis of monthly values;
    - Ozone (avg & max 8hr), NO2, PM10, PM2.5, SO2, sulphate, nitrate and carbonaceous atmospheric concentration and sulfur and nitrogen deposition (as concentration in precipitations): Mann-Kendall and Sen-Theil slope on the basis of annual values & by season

- Process
  - Centralised analysis (Centres) published on wiki
  - Supplemented by national expert knowledge of
    - (i) data issues, (ii) need for filtering, (iii) non-linearity and changes of slopes in the record, (iv) additional compounds, (v) add or discard sites, (vi) changes in seasonal cycles, (vii) relation with local emission changes

EURODELTA-Trends

- 6 regional CTMs + MSC-W
- Common setup
  - Meteorology
  - Emissions
  - Boundary conditions
- 3 tiers of experiments
  - 1990/2000/2010 reference
  - Sensitivity (emissions & boundary conditions)
  - Full 20yr hindcast

EURODELTA-Trends

- Key Questions

Model validation	How do model compare with observations in 1990, 2000, and 2010 ? How do models capture the trend in observations ? Can we conclude on the uncertainties in emissions?
European policy effectiveness	What if no emission change occurred in Europe ? Did “potency” changed over the past 20yrs? Can we identify tipping points in SIA formation?
Non-European influence	What if no emission changed beyond Europe ? What is the uncertainty related to boundary conditions ?
Meteorological variability	Does meteorological variability contribute to the AQ trend over the past 20 yrs?
Impacts	Link with effect community (health & ecosystems) What model dynamical evaluation means for IAM?

EURODELTA-Trends

- Status of model production

Tier	Scope	Participants
0	2010 Reference	7
1	1990-2000-2010 Sensitivity to European Emissions	6
2	Sensitivity to Boundary conditions	3
3	Full 20-yr trend	1

- Analysis ongoing
  - EURODELTA Workshop, Nov 2015, Paris
  - TFMM Trend Assessment Report