Report on the Task Force on Modelling and measurement activity

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Main activities in 2013

- **Annual meeting held in Zagreb, Croatia (May 2013)**

- **Monitoring strategy** :
  - Intensive Observation Periods : last experiment set-up and analysis of available results (see CCC reports and publications)
  - Strong links with research infrastructures
- **Pilot studies on heavy metals**
  - Fruitful cooperation with national experts to investigate inconsistencies between emission, measurement and modelling data
- **Emission issues**
  - What are the key messages/needs from the modelling community
- **Modelling activities**
  - Grid transformation of EMEP models
  - EMEP models development and national expertise
  - EURODELTA 3 model intercomparison project

Implementation of the revised EMEP monitoring strategy

- **Time to assess the level of consistency between the EMEP strategy and the networks actually implemented in the Parties**
  - CCC looks for relevant indicators to check how far are the national EMEP networks from the strategy requirements
  - Funding issue remains a recurrent concern, as the sustainability of historical sites where long term time series are available
  - Need to define future priorities and to prepare/adapt the monitoring strategies (black carbon, VOCs, ….)
- **Use of the IOPs to improve knowledge and understanding**
- **Lack of coordination between the various research initiatives** which might be confusing for the policy makers who receive this information

Heavy metal pilot studies

- Launched in 2010 under the coordination of MSC-East : in-depth investigation of inconsistencies between heavy metals emissions, measurement and modelling
- Currently pilot studies involve 3 volunteer countries involved:
  - Croatia : achieved
  - the Czech republic: achieved
  - the Netherlands : on-going
- Successful initiatives which allowed to highlight country-specific issues for a better management of air pollution thanks to an n-depth involvement of national experts
- **A brochure has been published to illustrate the results obtained so far**
- TFMM recommended:
  - To extend such studies to other countries (Belarus ?) and for other pollutants (mercury)

Emission issues

- **Model results highly driven by emissions,**
- **What are the most sensitive parameters in emissions to improve model results :**
  - Need for gridded emissions : appropriate and reliable **spatial distribution** influences the quality of model results
  - Appropriate **spatial resolution** : should go with the improvement of model resolution. Optimum to be defined, especially in terms of cost-benefits
  - "**Non-inventoried** " emissions : biogenic emissions, forest fires, dusts, resuspension.... Need for recommendations on common practises to calculate them
  - When possible chemical composition by sectors (PM, VOCs, PAHs,...)
  - **Completeness** of emissions over the targeted domain
  - Historical sets of emissions : to learn from the past

TFMM contribution related to emissions issues

- It is possible to prioritize our needs : looking for the 3 most critical points....
- Conversely TFEIP and CEIP could express some needs to the TFMM

- Working together on 1 or 2 test cases (country) to analyse
  - the differences between gridded emissions reported to EMEP and national emissions
  - Their impact on modelling air pollution patterns in this country and their comparison to observations

- Feedback on use and quality of “scientific-oriented” gridded emissions inventories ?

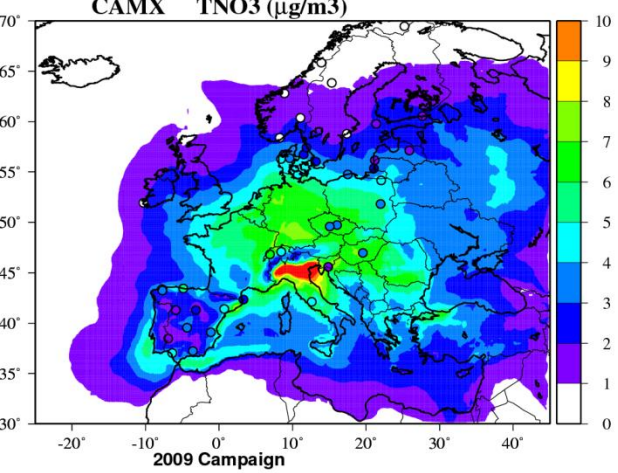
Modelling activities

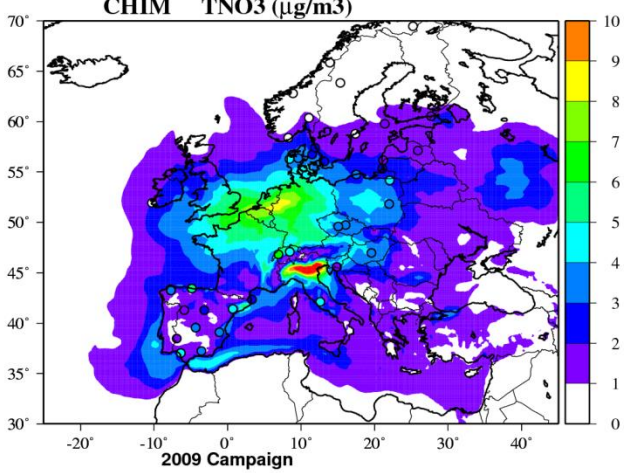
- **Grid transformation of the EMEP model**
  - Downscaling modelling exercise to assess the impact of finer resolution on model results
  - Report published

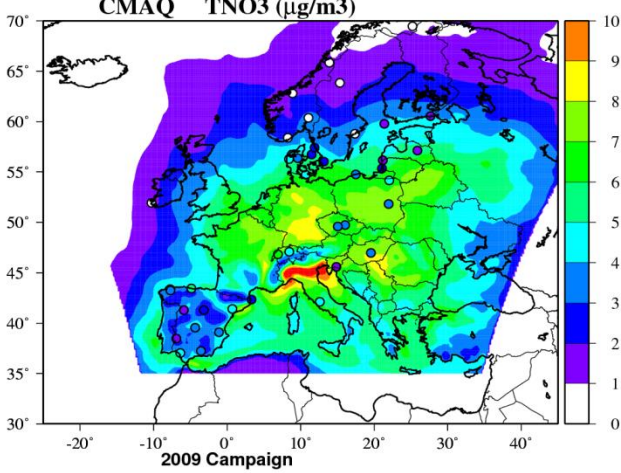
- **EURODELTA3 project**
  - Launched in spring 2012

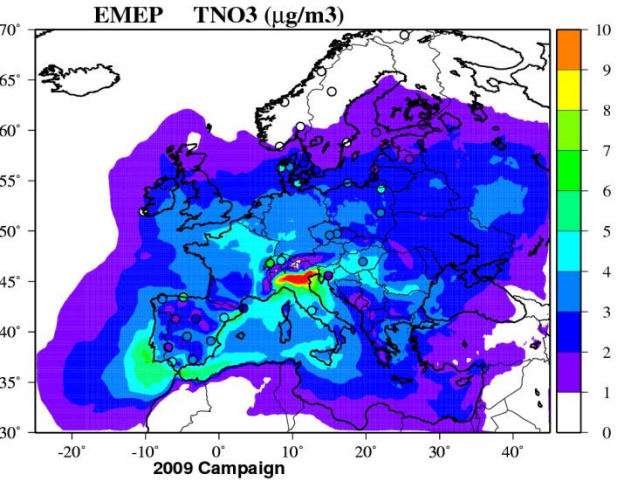
The Eurodelta III exercise

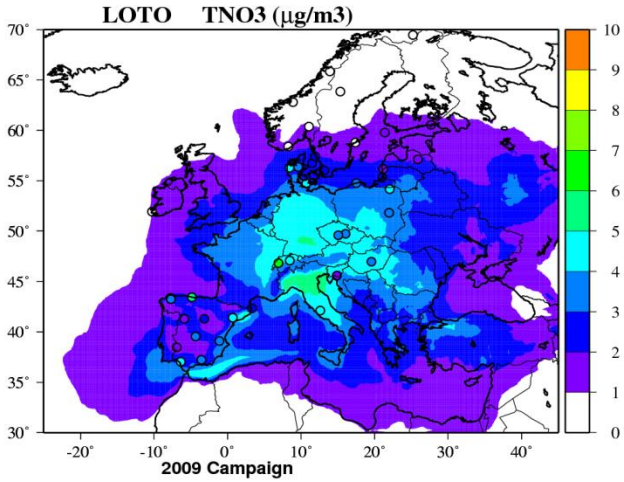
- **Two phases**:
  1. Simulation of EMEP IOPs (2009, 2008, 2007, 2006)
     - validation
  2. Retrospective analysis (2008, 1999, 1990)
     - Ability of models to reproduce the difference of concentrations for the three key years, how models work under different chemical regimes
- Common inputs for models : meteorology (IFS), emissions (EC4MACS dataset), boundary conditions (MACC), domain (except CMAQ)
- CAMx (**PSI/RSE**), CHIMERE (**INERIS**), CMAQ (**HZG**), EMEP (**Met.no**), LOTOS-EUROS (**TNO**), MINNI (**ENEA**), RCG (**FUB**)
- Others participants:
  - **DG JRC**, **CIEMAT**, **BSC**, **IPSL-CNRS**, **Univ of Brescia**, **NILU**
  - **TOTAL, CONCAWE, LWA**

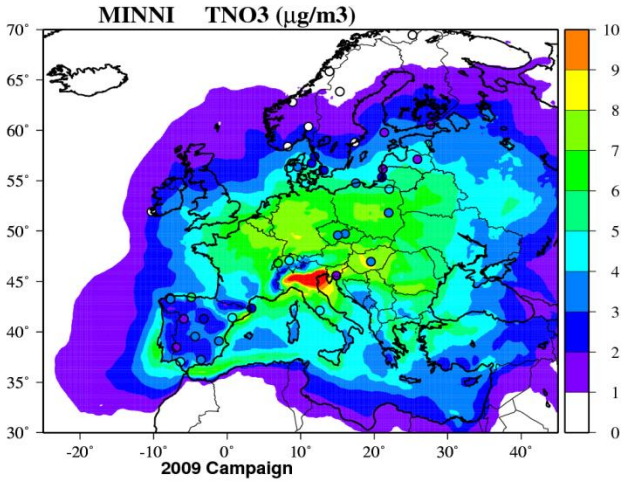


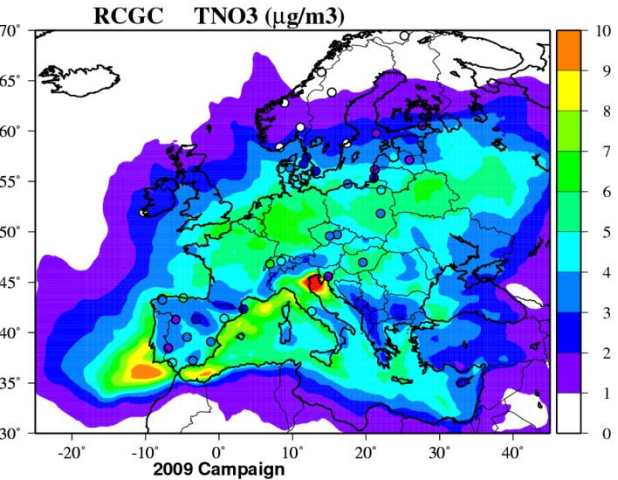










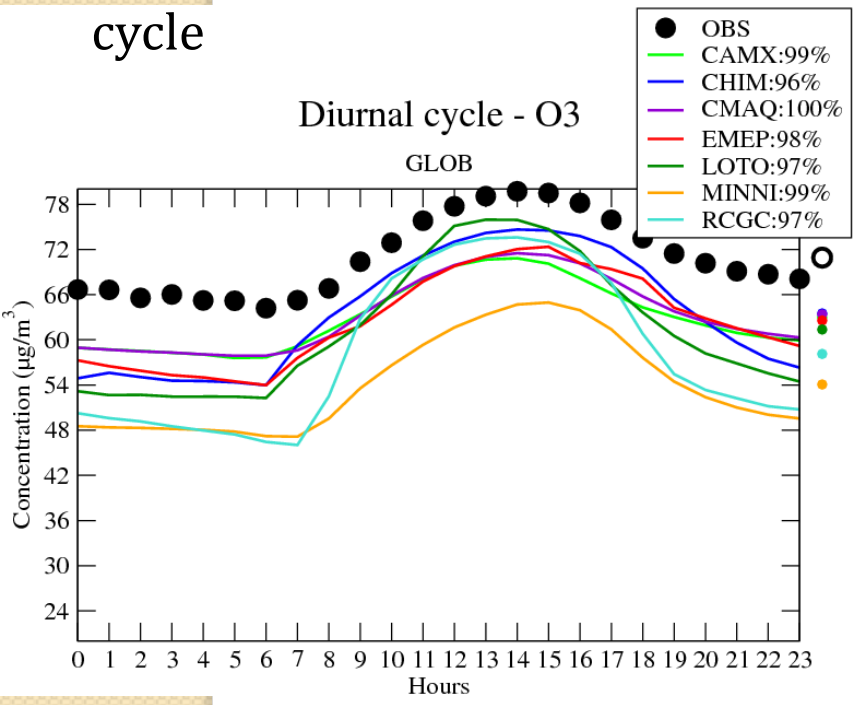


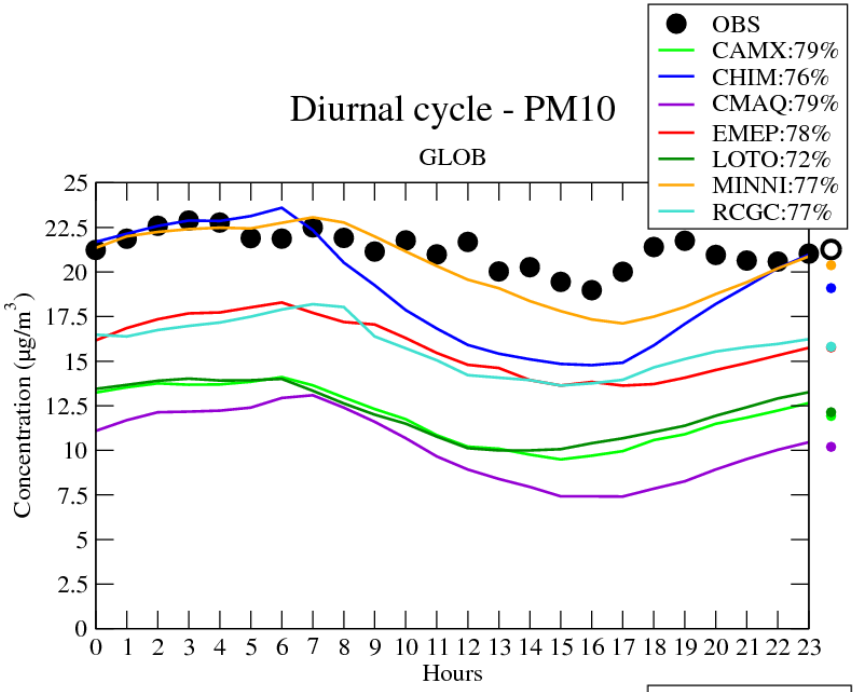
Total nitrate average concentrations

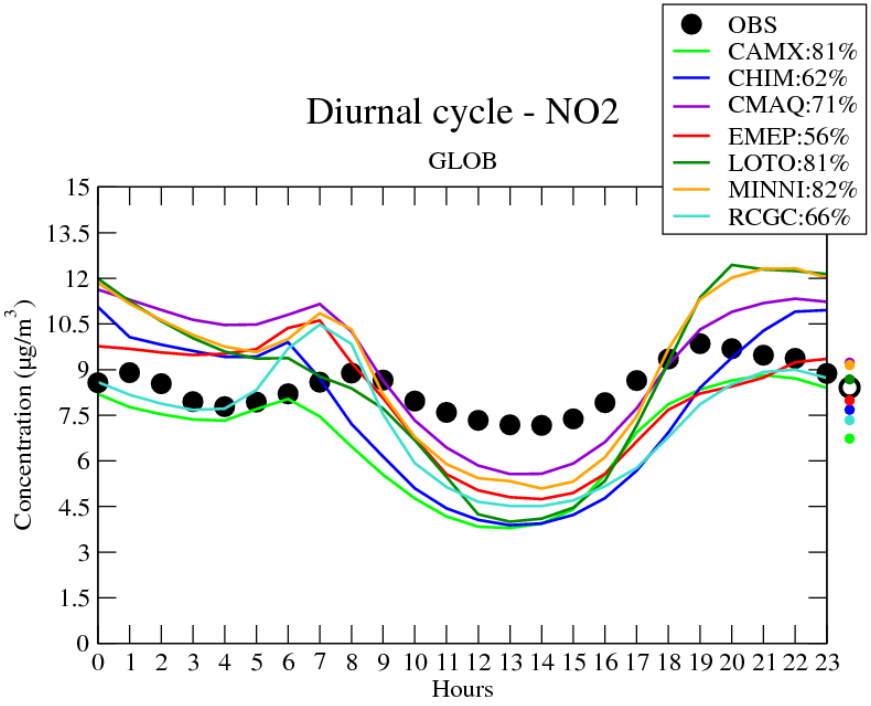
- CHIM has no coarse nitrate (too low in Spain)
- MINNI and CMAQ have too high concentrations
- Different pattern over the Po valley for LOTO and RCGC

Diurnal cycles

- **O3** : CMAQ, EMEP and CHIM have the lowest bias
- **NO2** : LOTO has the lowest bias, best diurnal cycle for MINNI
- **PM10**: MINNI has the best diurnal cycle







Best performances based on RMSE

Model ranking based on daily basis data three best models)

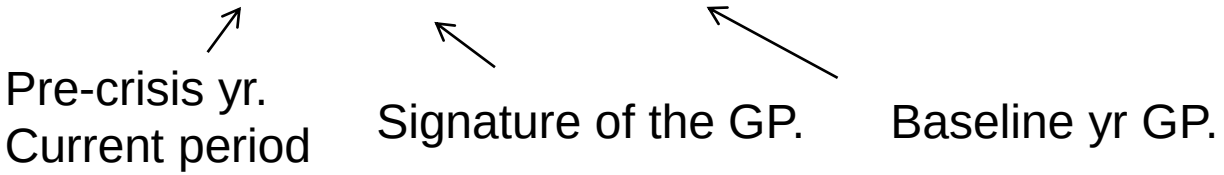
obs.	All daily obs.	10% highest obs.
O3	CHIM, CAMX, **EMEP**	CAMX, **EMEP**, CHIM
NO2	CAMX, CHIM, **EMEP**	**EMEP,** MINNI, LOTO
SO2	CHIM, LOTO, **EMEP**	**EMEP**, LOTO, CMAQ
PM10	**EMEP**, CHIM, MINNI	**EMEP**, MINNI, CHIM
PM25	CHIM, MINNI, **EMEP**	MINNI, CHIM, CAMX
SO4*	**EMEP**, CMAQ, LOTO	MINNI, CAMX, CHIM
NH4*	**EMEP**, LOTO, CHIM	CHIM, CMAQ, MINNI
NO3*	CHIM, **EMEP**, LOTO	CHIM, MINNI, RCGC
TOM*	CHIM, MINNI, RCGC	CAMX, CHIM, MINNI
EC*	**EMEP**, MINNI, LOTO	**EMEP**, MINNI, LOTO
DUST*	**EMEP**, LOTO, CAMX	RCGC, MINNI, CAMX
NA*	**EMEP**, LOTO, RCGC	**EMEP,** RCGC, CHIM

* $\phi < 10\ \mu m$

EURODELTA 3: next steps

- Publication of a common report on the simulation of the IOPs by the end of the year 2013

- Start the retrospective analaysis :
  - Capacity of current models to reproduce monitored changed in air quality
  - Retro. analysis 2008 → 1999 →1990



  - Response of models to sharp emission trend (**1990- 1999** – 2008)

- Link with the TFHTAP work plan , especially the intercomparison modelling exercise

TFMM Work plan for 2014–2015 (i)

- Follow and assist the Parties as far as possible, for the implementation of the monitoring strategy . Support the assessment phase (compliance with the EMEP monitoring strategy)
- Support the analysis of the EMEP IOPs data and help in their promotion. Encourage dissemination of results for national assessments and linkages with the modelling community
- Support for the heavy metals pilot studies ; contribute to their promotion; identify future studies
- Contribute as far as possible to emission inventories improvement

TFMM Work plan for 2014–2015 (ii)

- Coordination and promotion of the EURODELTA3 project follow-up (1st phase report and retrospective analysis)

- Trend analysis : a new task in the 2014-2015 TFMM work plan
  - Based on both meaurement and modelling data, available from the EMEP program and from national initiatives
  - Review of available material : EMEP centers, national trends analyses, scientific publications
  - Need for complementary data and new model runs ? specifications
  - Methodology to calculate and compare modelled and observed trends
  - Feedback to policy makers (within the Gothenburg assessment initiative ?)