



Regional AQ Model Evaluation in US and Europe

R. Vautard, P. Builtjes, S.T. Rao

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GLOREAM Meeting





Purpose

- About 15-20 major models are being used worldwide for air quality research and operational air quality management, requiring common basis for evaluation and intercomparison
- Need to coordinate international efforts on Air Quality model evaluation procedures for
 - Establishing metrics to be used for synthesizing model abilities for operational purposes (forecasts and scenarios)
 - Better understanding knowledge gaps in air quality processes
- Set up an agenda on US-EU actions



EU experience

- Single model evaluations (many)

Research-driven intercomparison

- EUROTRAC model intercomparisons
- Tilmes et al. (2002), forecast
- COST 728 (Heinke Schlünzen, for meteorology?)

Policy-driven intercomparisons

- Unified EMEP model review
- CityDelta (urban scale)
 - Vautard et al., 2007, AE
- EuroDelta (regional scale)
 - Van Loon et al., 2007, AE
 - Schaap et al., 2008, AE

Uncertainty evaluation

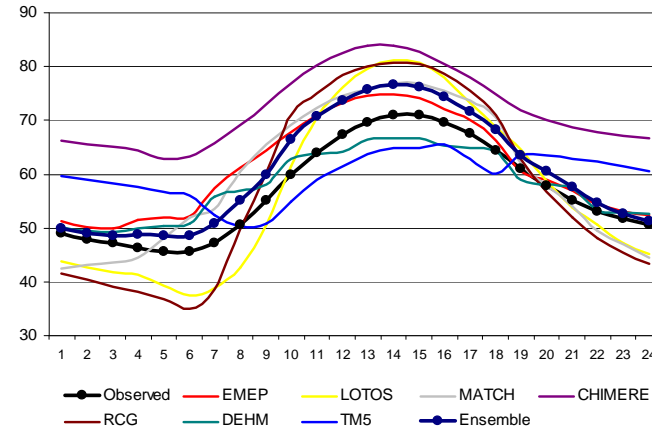
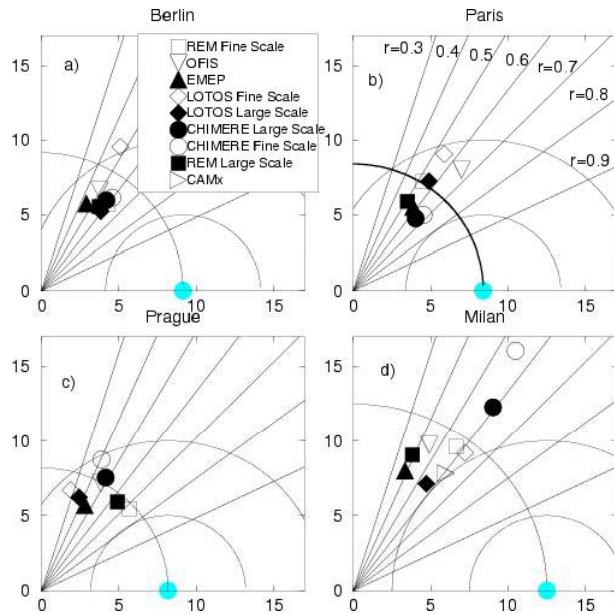
- Episode: Delle Monache et al. 2005, AE
- Long-term: Vautard et al., 2006, GRL



Main Results

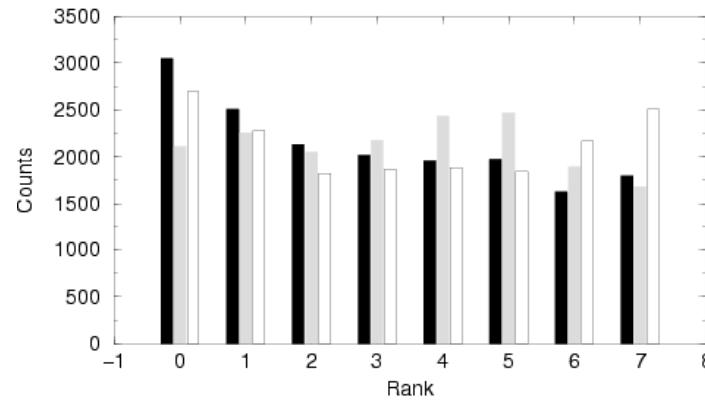
EuroDelta

Ozone



CityDelta

a) Rank Histogram of Summertime O3 max



Uncertainty Evaluation



Thessaloniki/Paris Meetings

Main purposes

- 1) Define the purpose of the model and of the evaluation (for example, peak ozone, or AOT?)
- 2) Identify the processes required in the model (for example, with or without aerosol scheme)
- 3) Define the horizontal and vertical resolution, and the time scales
- 4) Concerning the input data, decide which data should be fixed
- 5) Concerning observations, decide about QA/QC and spatial representativeness
- 6) Quality indicators should be defined, including threshold/targets
- 7) Sensitivity runs should be defined for key processes



US Triangle Park Workshop (Aug 2007)

- **Evaluation processes and Methods: main questions**
 - Representativeness
 - Measurement biases and errors
 - Time and spatial scale of evaluation
 - Significance of differences between models
 - Useful metrics? Rejection criteria?
 - How to evaluate model sensitivity to emissions?
 - What are the space/time scales models are able to simulate?
 - Probabilistic evaluation: using single models or model ensembles



US Triangle Park Workshop (Aug 2007)

- **Process evaluation**
 - Meteorological processes
 - Emission processes
 - Deposition processes
 - Chemical Transport processes

- **Data needs**

→ **Conclusion document being written**



Issues to be addressed in coordinated actions

- **Purpose:** policy? knowledge?
- **What to evaluate:** modelling systems? processes?
- **What time scales:** Episodic? Yearly? Decadal?
- **Spatial scales:** Hemispheric? Regional? Urban?



Actions to be coordinated

- **Review paper(s)**: Model evaluations (alltogether in one? Several papers in a Special AE issue?)
- **Common bed tests**: previous exercises? Extreme events (2003, 2006?)
- **International intercomparison project**: AQMIP?
- **Workshops**: EU in 2008+EU-US in 2009, with 2-year frequency
- **Fund raising for actions**