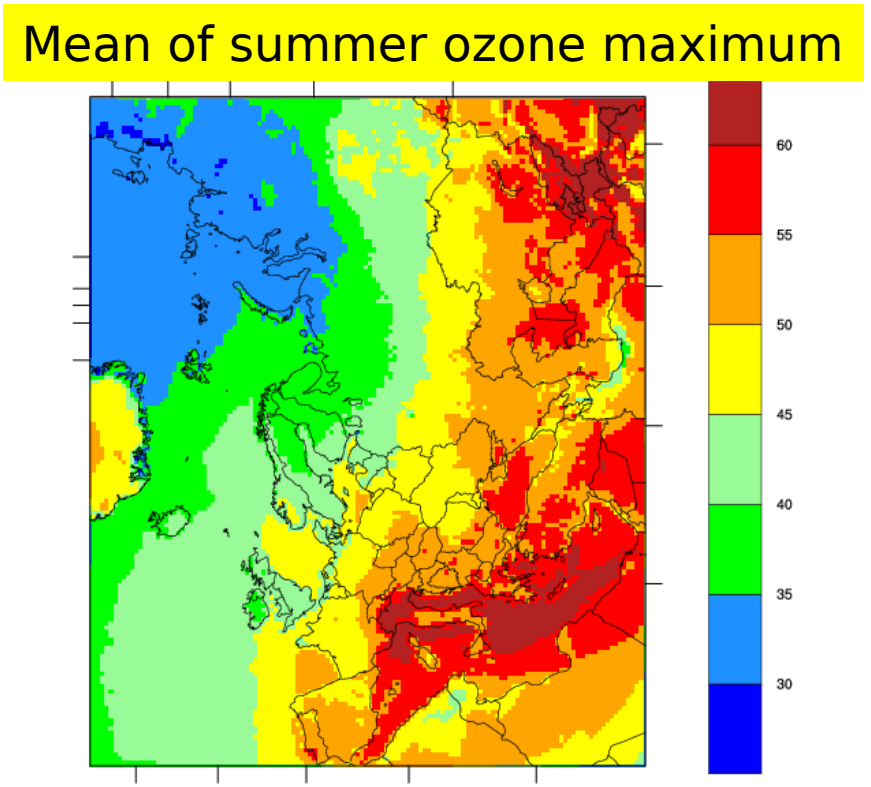
What has been achieved? Issues for the next workplan

EMEP/MSW-Activities

Yearly air pollution assessments (Status Reports, SR, Country Reports, Evaluation Report 1.1.4/1.3.2)

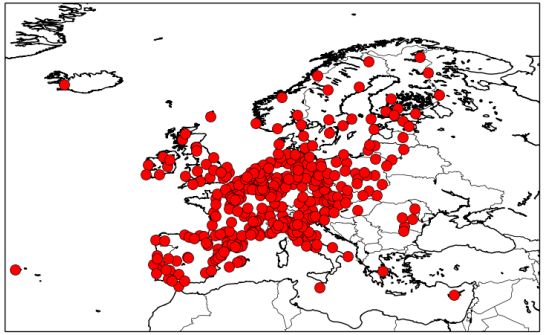
- Model calculations one year earlier (this year for 2014, using emissions for 2013)

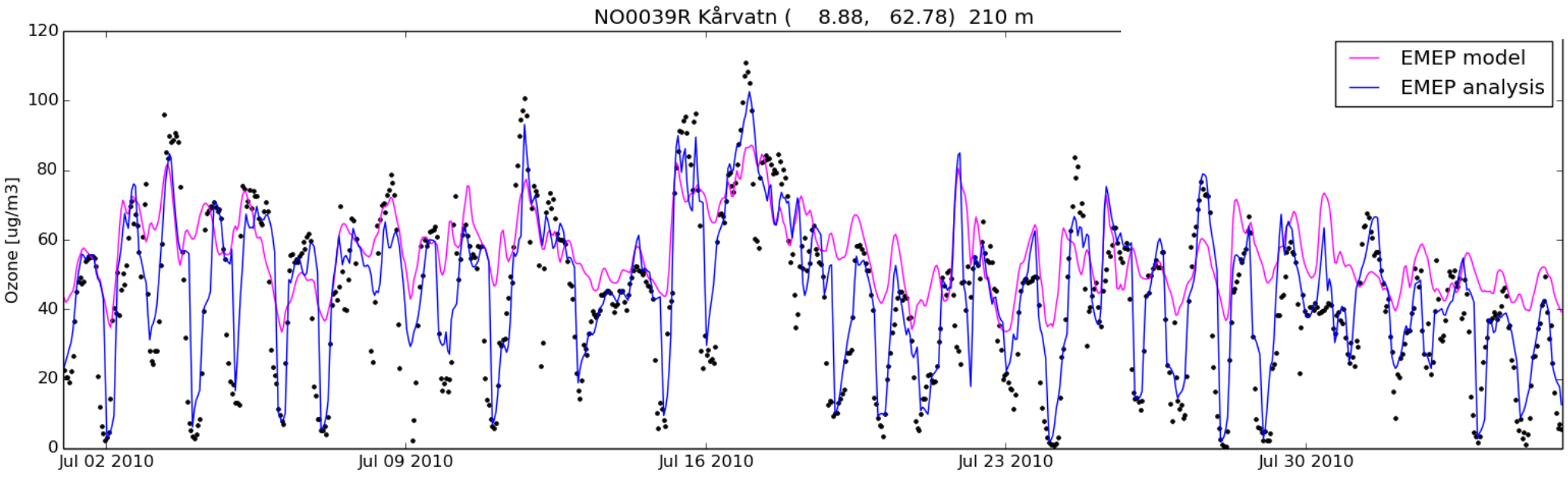


To be included in the workplan?

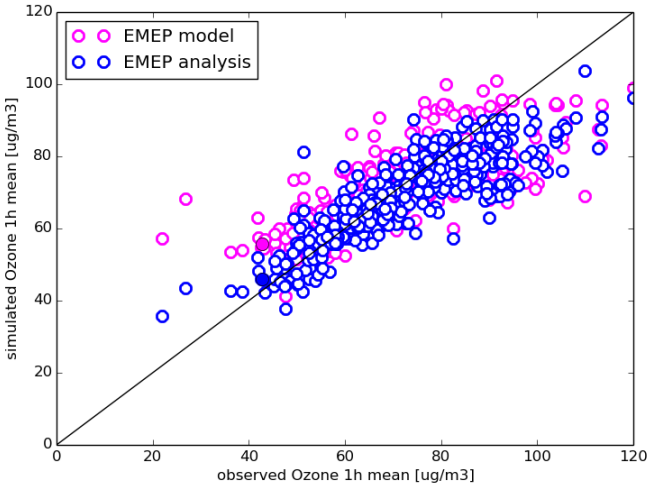
- Data assimilation of NO2, ozone, PM
- Use the 'EMEP setup'
- Include in an additional 'status run', not in SR
- Link/complementary to Copernicus

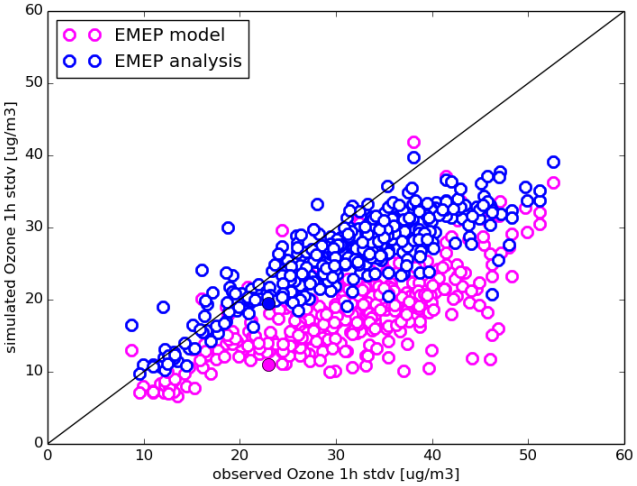
- Ozone results, summer of 2010
- Assimilation of NO2 ground, OMI NO2 trop.col., O3 ground





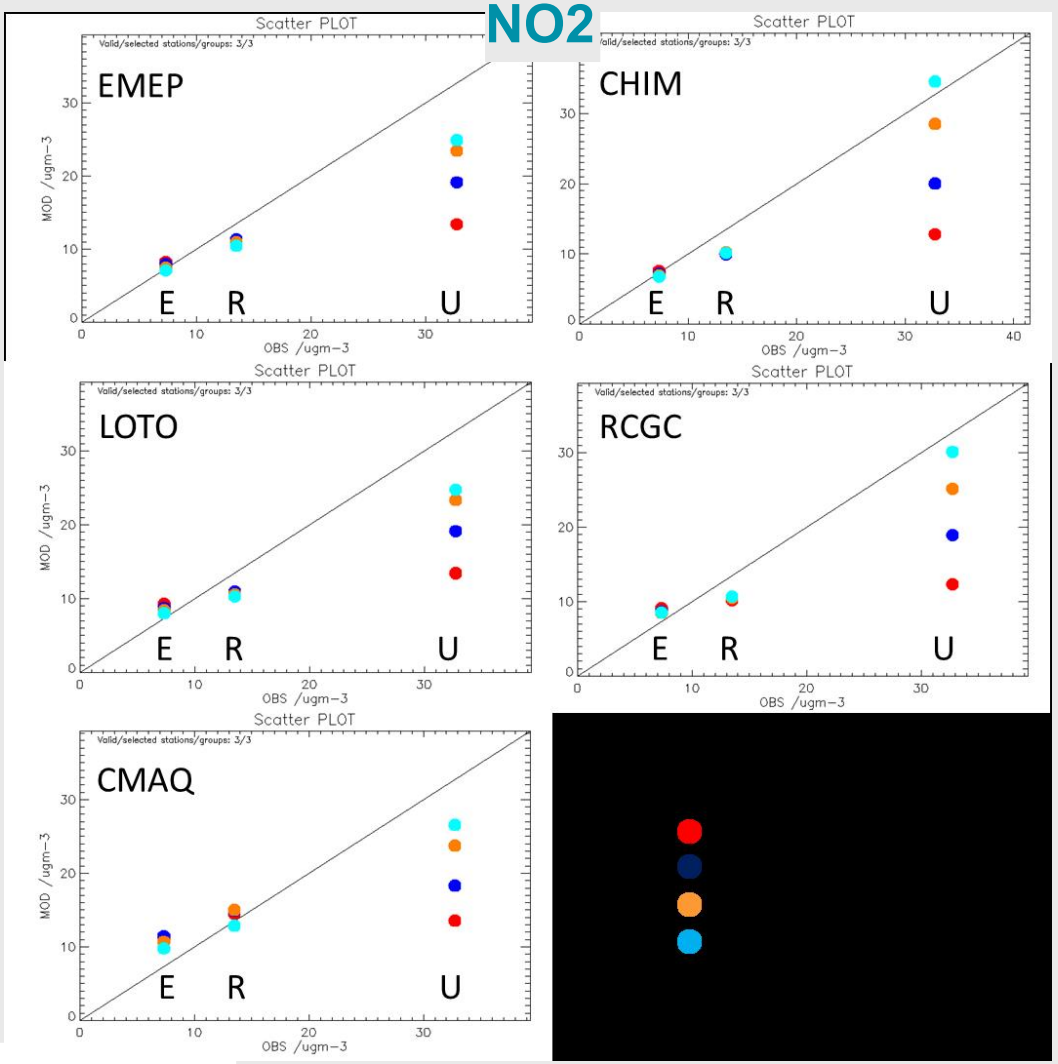
average and std.dev. per station:

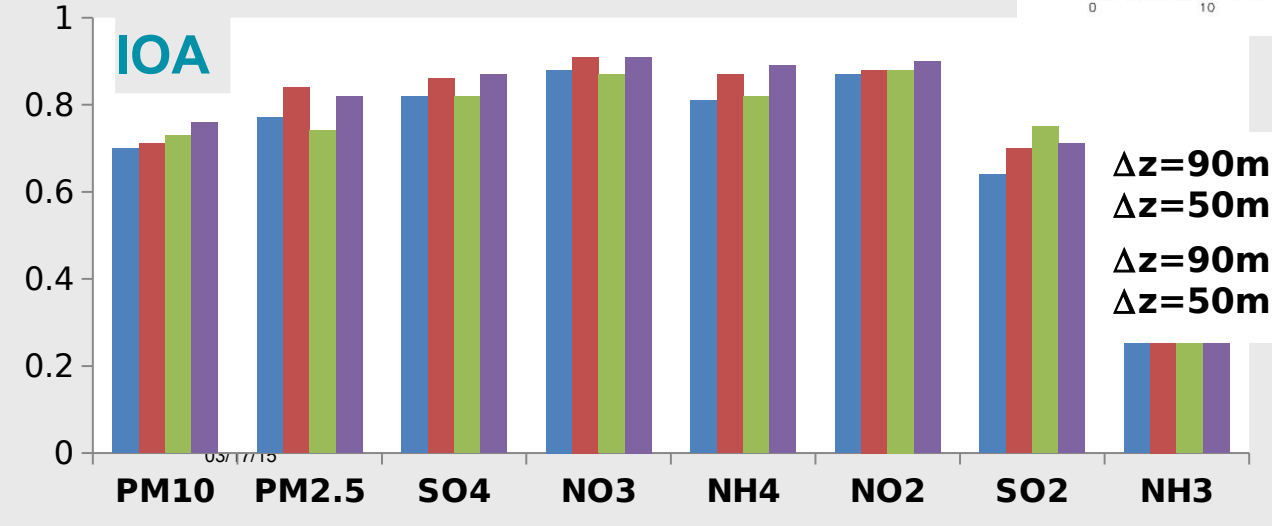




The new EMEP grid (1.3.4)

Demonstrated that the new EMEP grid will give better results



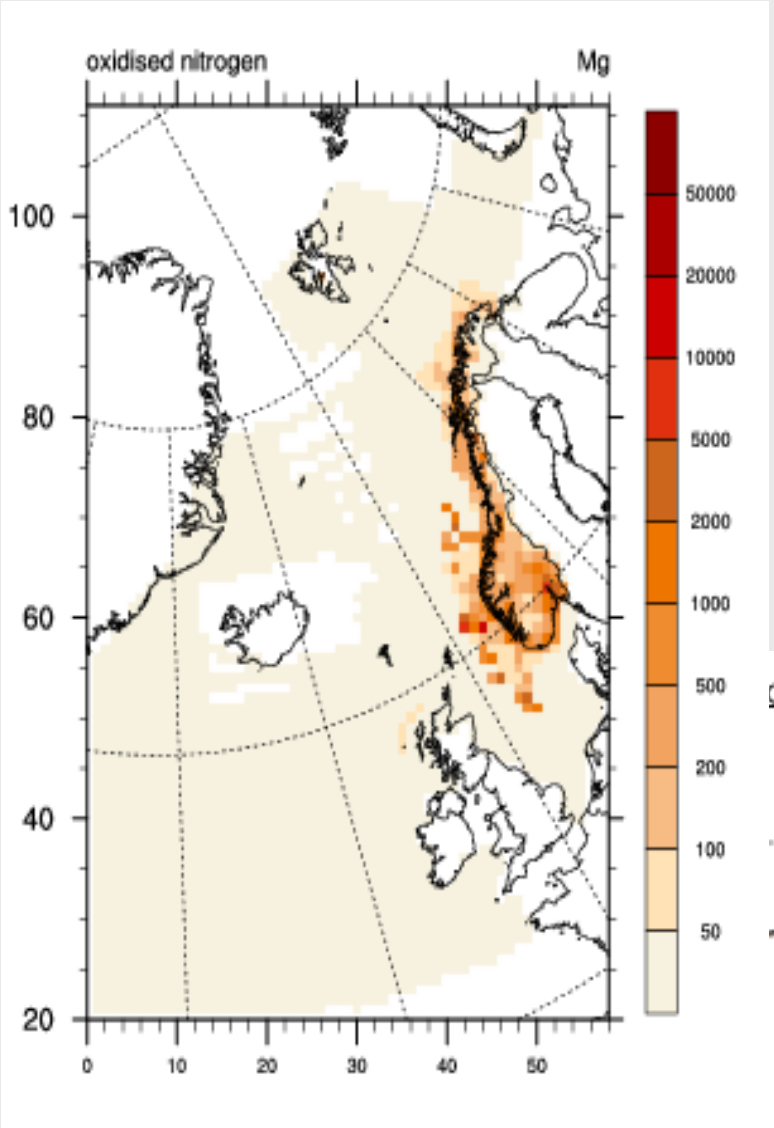


Δz=90m, 50km
Δz=50m, 50km

Δz=90m, 0.1 degree
Δz=50m, 0.1 degree

Issues for the next workplan wrt new EMEP grid

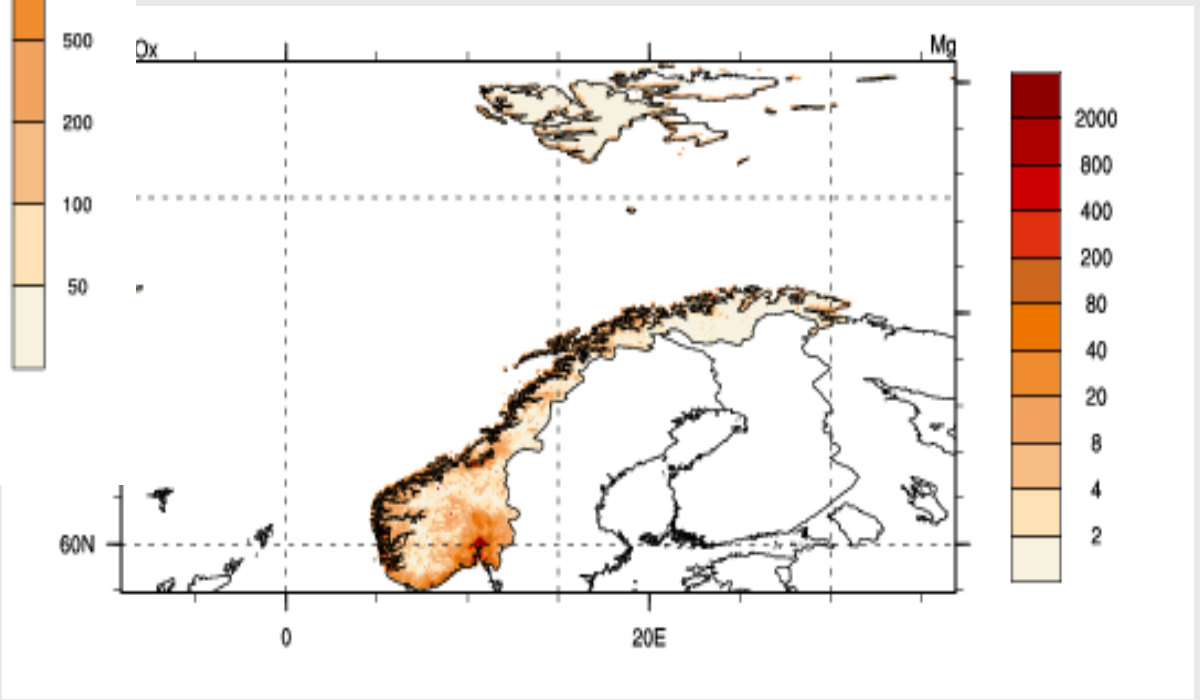
- Emissions: Comparing, evaluating and improving the emissions in the new EMEP grid with other available emission data set to ensure high quality
- Model development (emission vertical distribution, plume rise etc)



50x50km2

NORWAY

0.1 x 0.1 degree



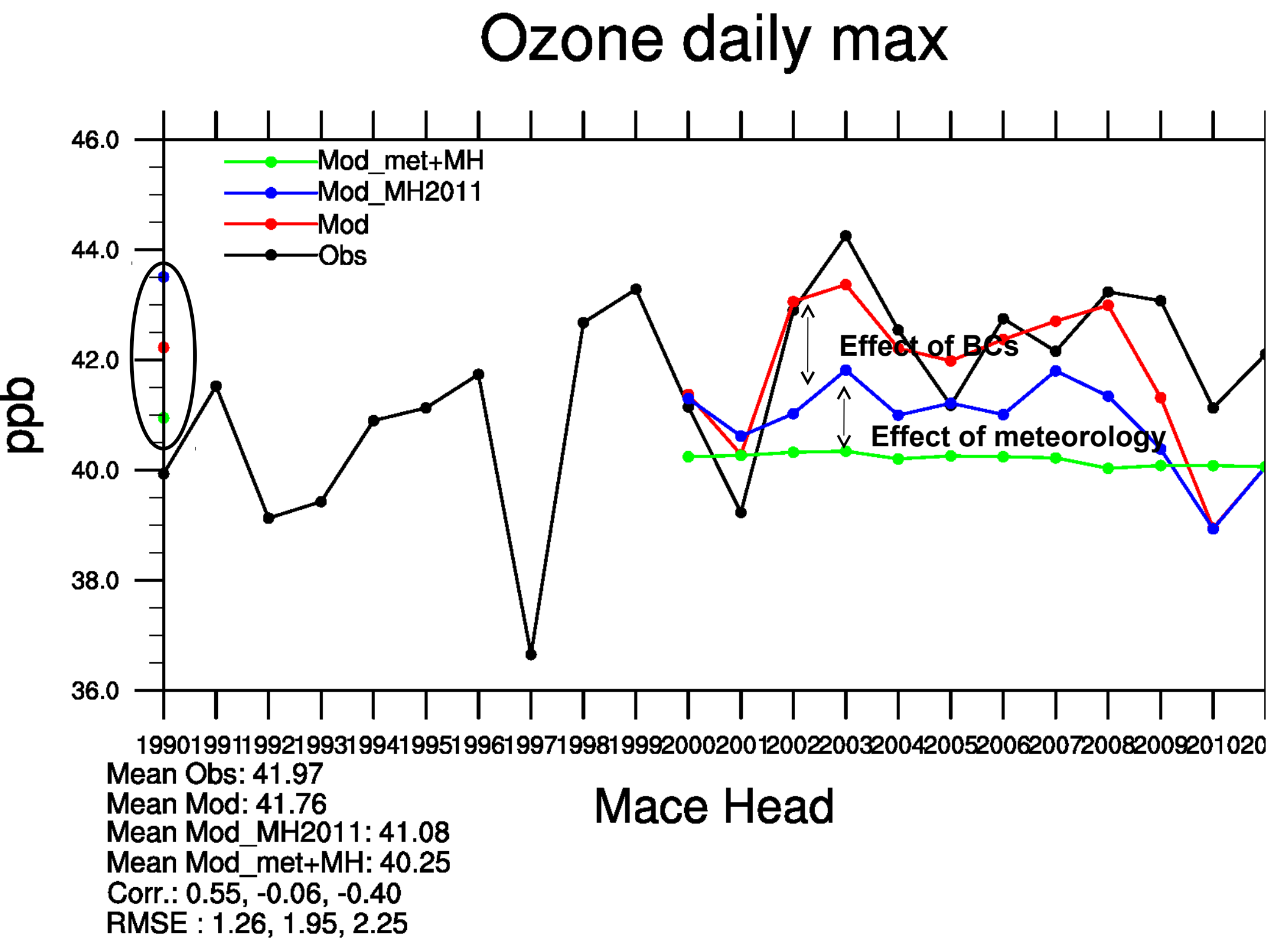
Trends

- EDIII
- EMEP/MSC-W study
- Remaining:

  Meteorology for full 1990-2014 period

  Consistent emission set (CEIP april 2015), incl ship emissions

  Sector contributions
- Analysis: including ICP forest data


Ozone daily max
Mod_met+MH
Mod_MH2011
Mod
Obs
Effect of BCs
Effect of meteorology
ppb
46.0
44.0
42.0
40.0
38.0
36.0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 20
Mean Obs: 41.97
Mean Mod: 41.76
Mean Mod_MH2011: 41.08
Mean Mod_met+MH: 40.25
Corr.: 0.55, -0.06, -0.40
RMSE : 1.26, 1.95, 2.25
Mace Head

Impacts of Climate change on emissions and air quality (1.3.8 a)

- Many studies have shown that for N (European scale at least), the main driver will be specific emission changes, not climate change effects (up to 2050)
- Significant reductions of ox. N, slightly increasing red. N
- BUT : increased T may induce additional NH3 emissions through increased evaporation
- Sutton et al. 2013: 42% increase of NH3 emissions for 5 degree warming

Include in the EMEP model: Dynamic ammonia emissions

Other N-activity: bi-directional exchange

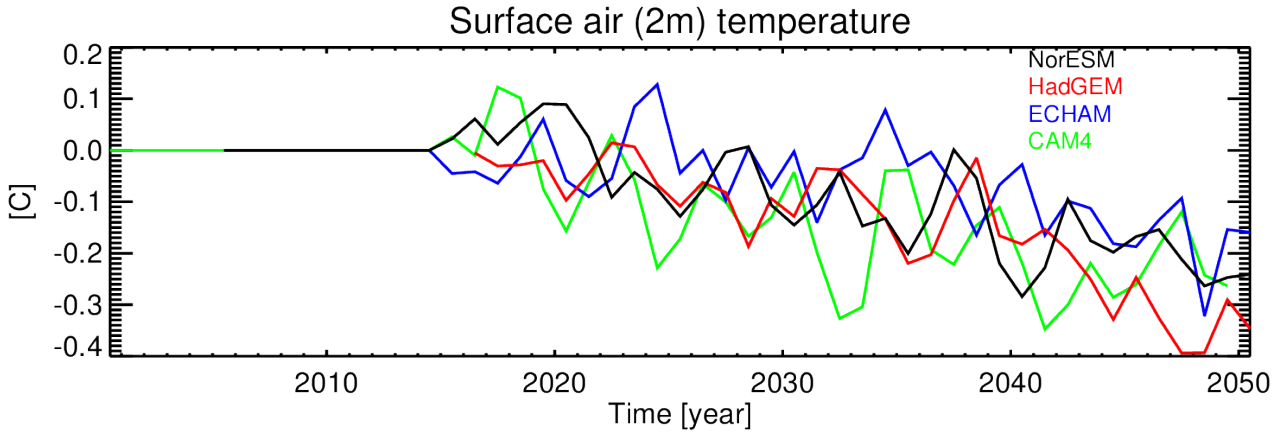
SLCF forcing and BC uncertainty(1.3.8 b)

- ECLIPSE: develop and assess effective emission abatement strategies for short-lived climate forcers in order to provide sound scientific advice on measures that mitigate climate change and improve air quality at the same time
- NFR-SLCF, Aerocom-P3

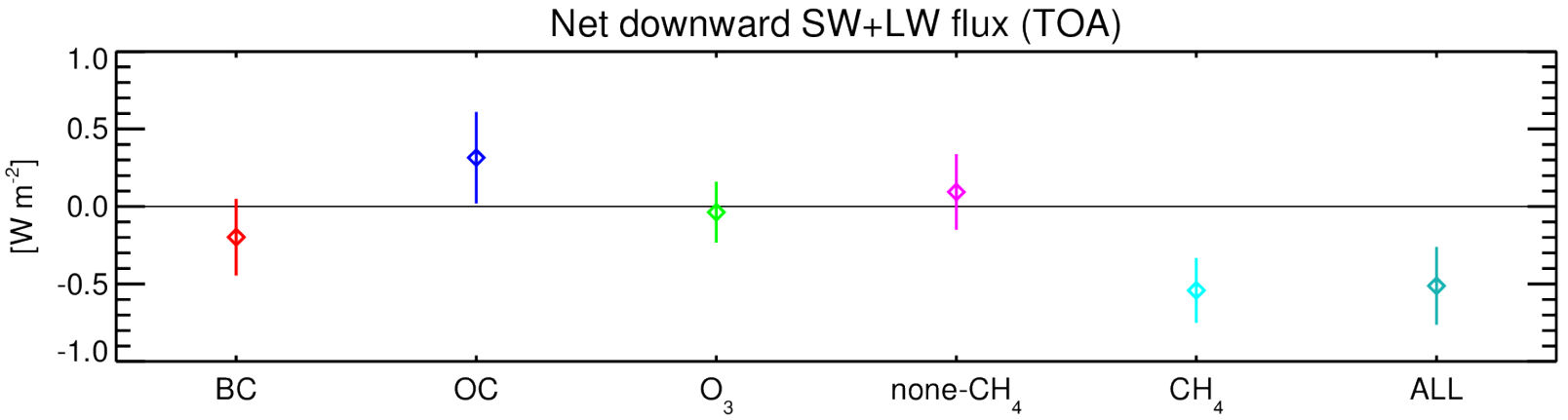
CLE and mitigation scenarios

CLE scenario : 0.8—1.2 K temperature increase over 2005-2050

Impact of mitigation on global mean temperature :



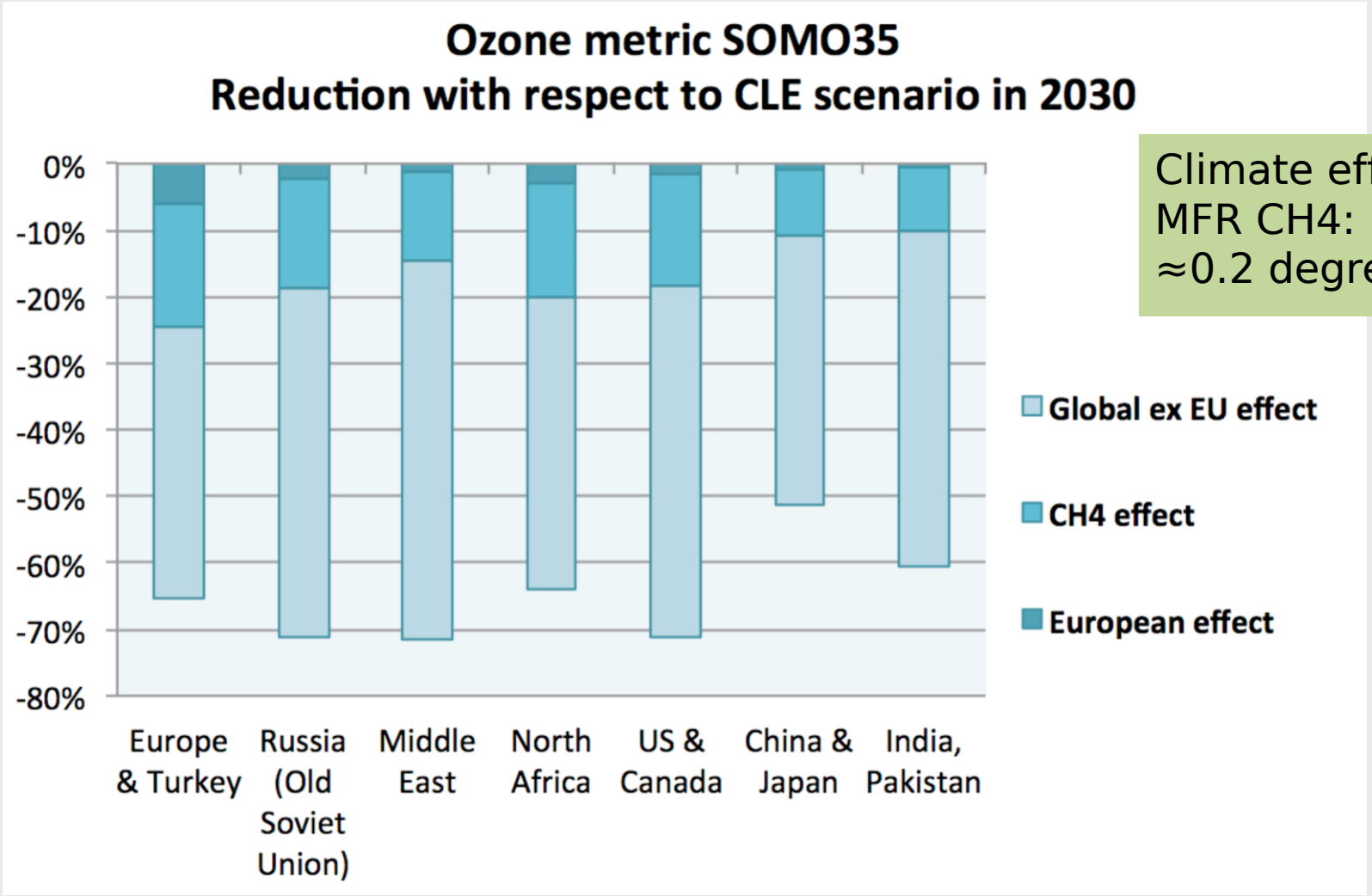
Radiative forcing difference in 2050 from NorESM:



AQ and climate co-benefits

- Uncertainty in aerosol or black carbon forcing has not decreased recently
- PM (incl. BC) reductions should be targeted for AQ improvement purposes – climate benefits of such policies are uncertain
- O_3 and CH_4 reduction policies have rather certain benefits and outcomes and are of win-win nature for climate and AQ protection

What can we achieve with global MFR reductions? (1.3.10)



Climate effect of MFR CH4:
≈0.2 degree

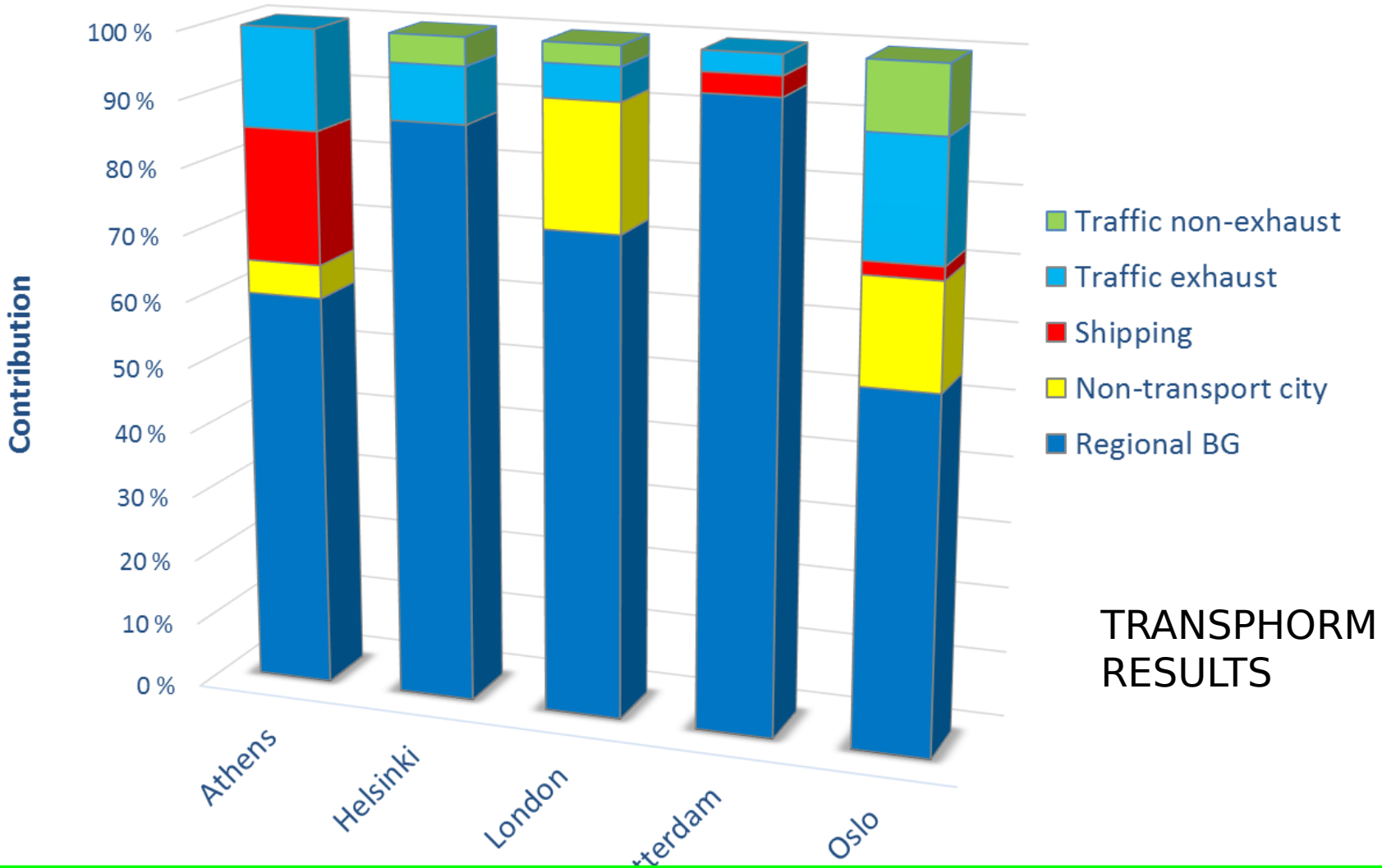
Should O3 and CH4 reduction strategies be pursued with priority – at least until the uncertainty about the BC mitigation potential is reduced?

New EMEP/MSC-W Activity: PDRMIP participation

- PDRMIP = Precipitation Driver and Response Model Intercomparison Project
- PDRMIP will compare the precipitation response to various climate drivers, across models. Analyses planned include a better understanding of the drivers' importance for inter-model differences in precipitation changes, energy budget analysis and extremes related to precipitation.
- PDRMIP is a new climate model intercomparison initiative, and was launched in Oslo in November 2013. Currently the PDRMIP simulations are run by seven climate modelling groups
- PDRMIP has applied to be a CMIP6-Endorsed MIP

New activity: LRT contribution to AQ in cities

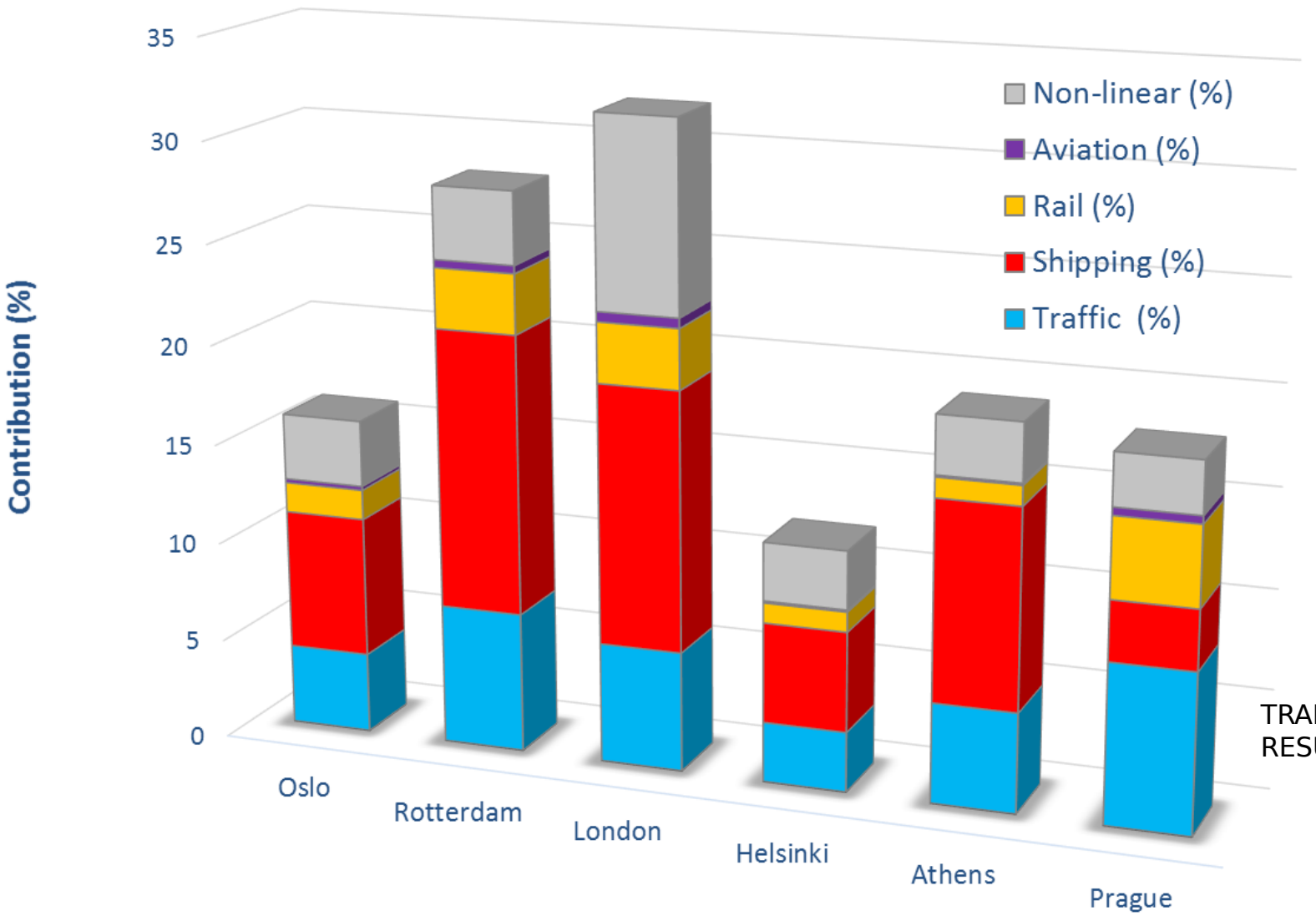
How important is LRT for air quality in cities?



TRANSPHORM RESULTS

Relative source contributions in the TRANSPHORM target cities for PM2.5 for the year 2008. Background calculated from a combination of EMEP model results and observations.

Regional background source contribution to PM2.5 at target cities

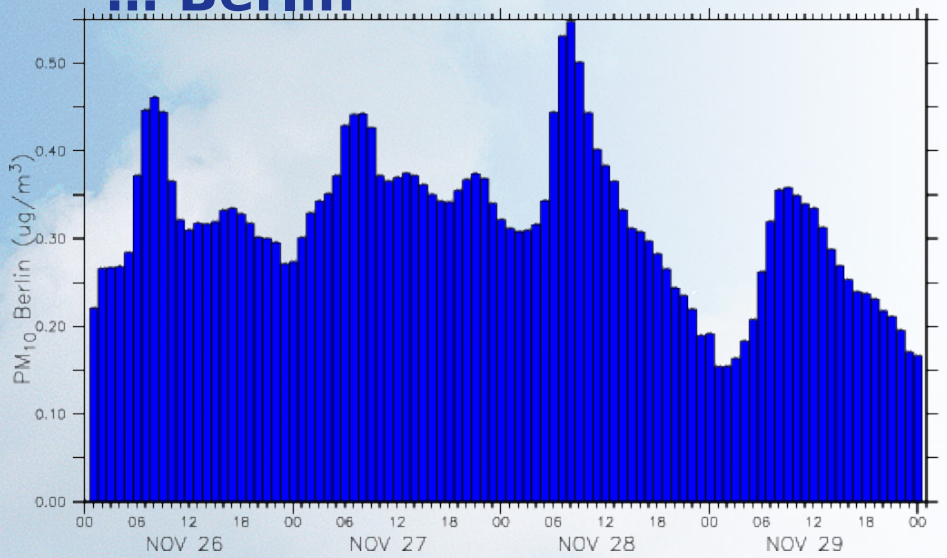


TRANSPHORM RESULTS

If PM2.5 concentrations are to be reduced in major cities in Europe, then local measures need to be accompanied with European wide measures in many sectors

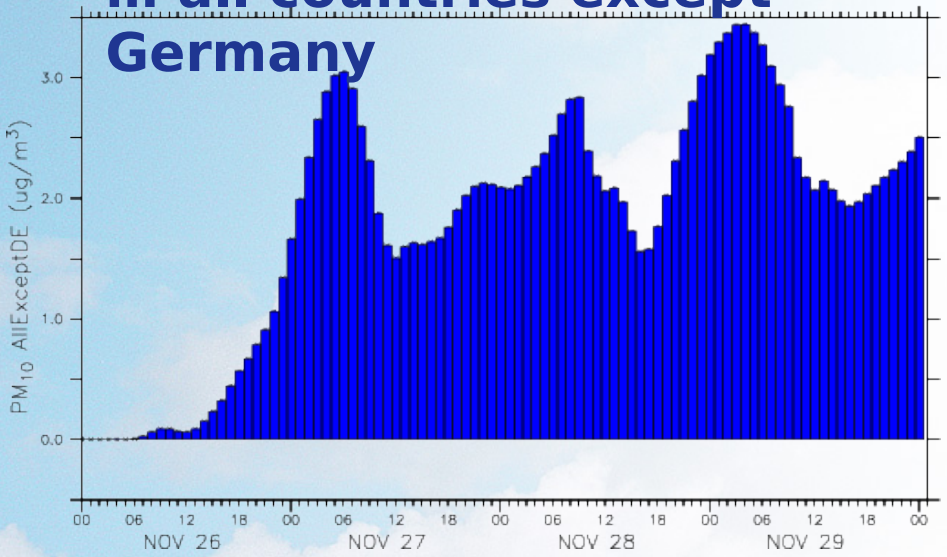
PM10 reductions in Berlin that can be achieved by a 15% reduction of all anthropogenic emissions in …

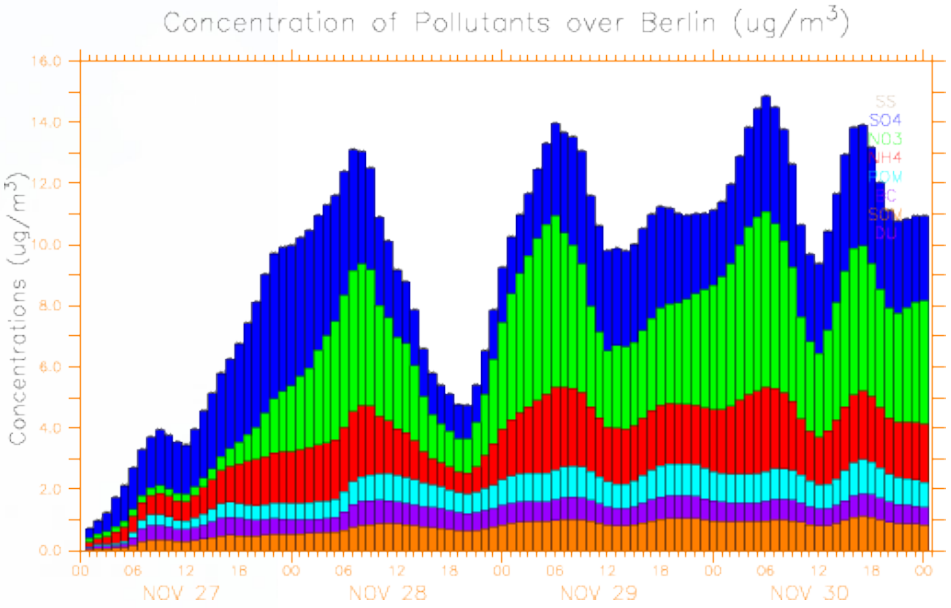
… Berlin



… all Germany except Berlin

… all countries except Germany





- 1.3.7: Facilitate the use of the EMEP model by Parties:
  - Annual release of open source EMEP/MSC-W model code
  - Training course (October this year)
- 1.6.6: Develop a distributed network of data repositories and web-enabled tools to facilitate broader participation in the assessment of intercontinental transport of air pollution
  - Provide information technology infrastructure to hold a harmonized HTAP database.
  - Create web-enabled tools to access, visualize, and analyse hemispheric transport of air pollution experiment results
- Contributions to TFMM and TFHTAP discussions/model intercomparisons
- 1.3.3/1.3.9 Hourly data on web/New web interface

'New' activities?

- LRT contributions to densely populated areas
- Data assimilation
- SLCF: climate 'effects' (precipitation, T) of (regional) reductions

Co-operation activities

- Projects:

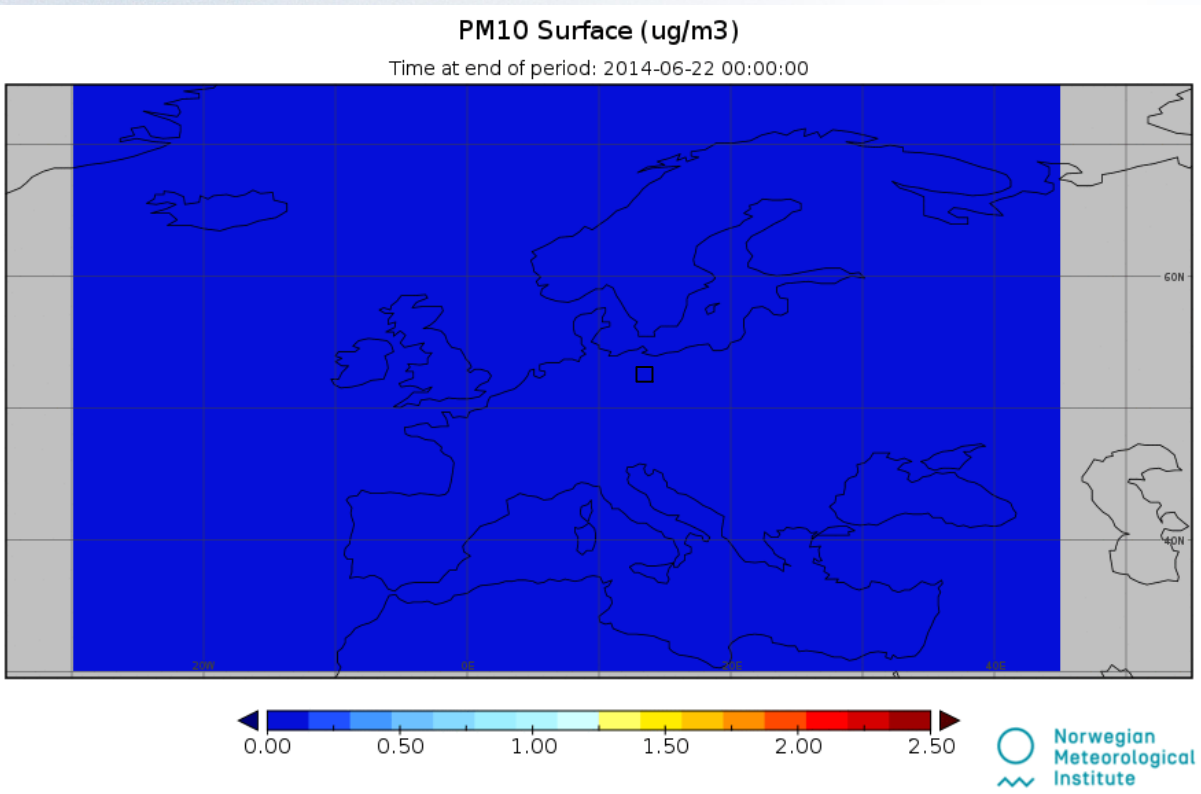
  the impact of ship emissions (HelCom, BSRInnoShip), emissions from other transport sectors (EU project TRANSPHORM), ozone and nitrogen fluxes to vegetation (EU project ECLAIRE), model and measurement comparisons (EU project ACTRISII, Norwegian funded PM-MACS and AeroCom P3) effect of climate change on air pollutants (EU project IMPACT2C, PEGASOS), effect of SLCP forcers on climate (EU project ECLIPSE, NFR-SLCF) and chemical weather forecasting (EU MACCIII and ‘Bedre Byluft’). Air pollution in India (CLIMATRANS) and China (PANDA), climate modelling (EVA, CRESCENDO,..)

- AMAP expert group on CH4 modelling, expert group on BC modelling
- HELCOM/OSPARCOM
- AeroCom, AerChemMIP, PDRMIP

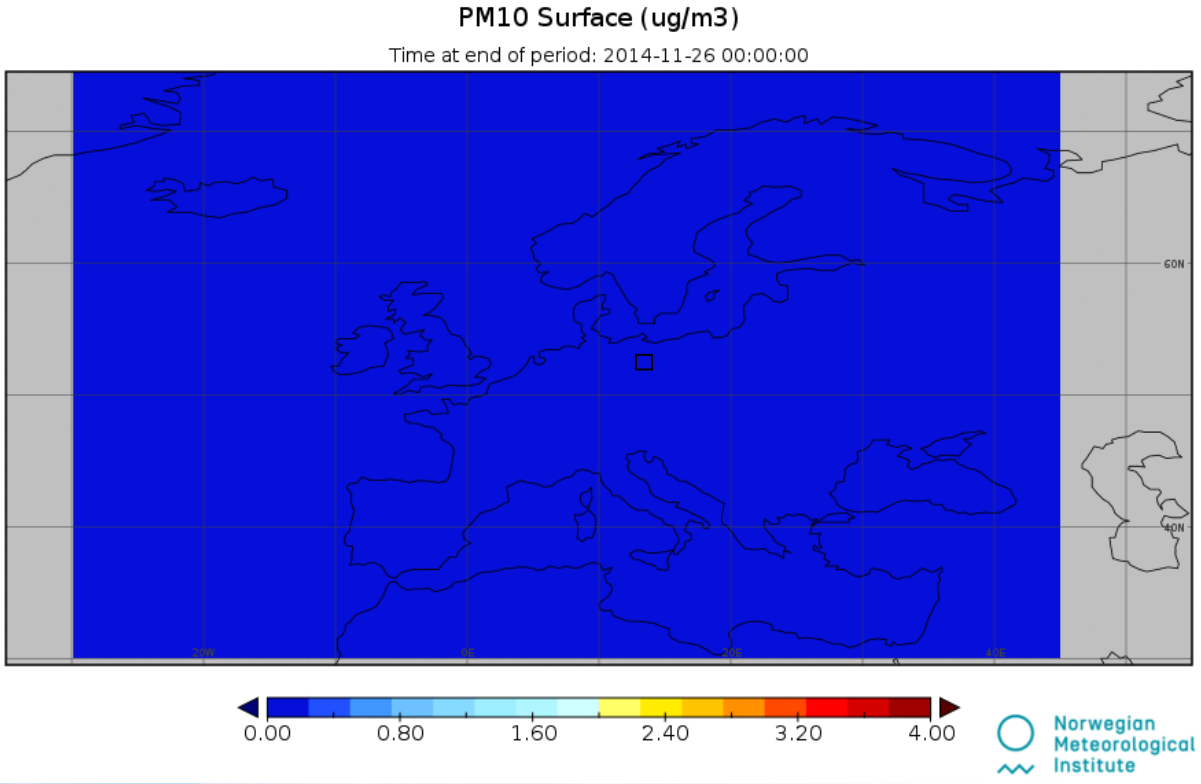
Co-operation with ICP Forest

- Throughfall and open field depositions from ICP forest Level II forest monitoring plots :11 year (1999-2010) trend (Waldner et al., 2014)

  Compare to modelled trends of depositions
- Comparison of ozone AOT/flux



June 2014



November 2014

The End

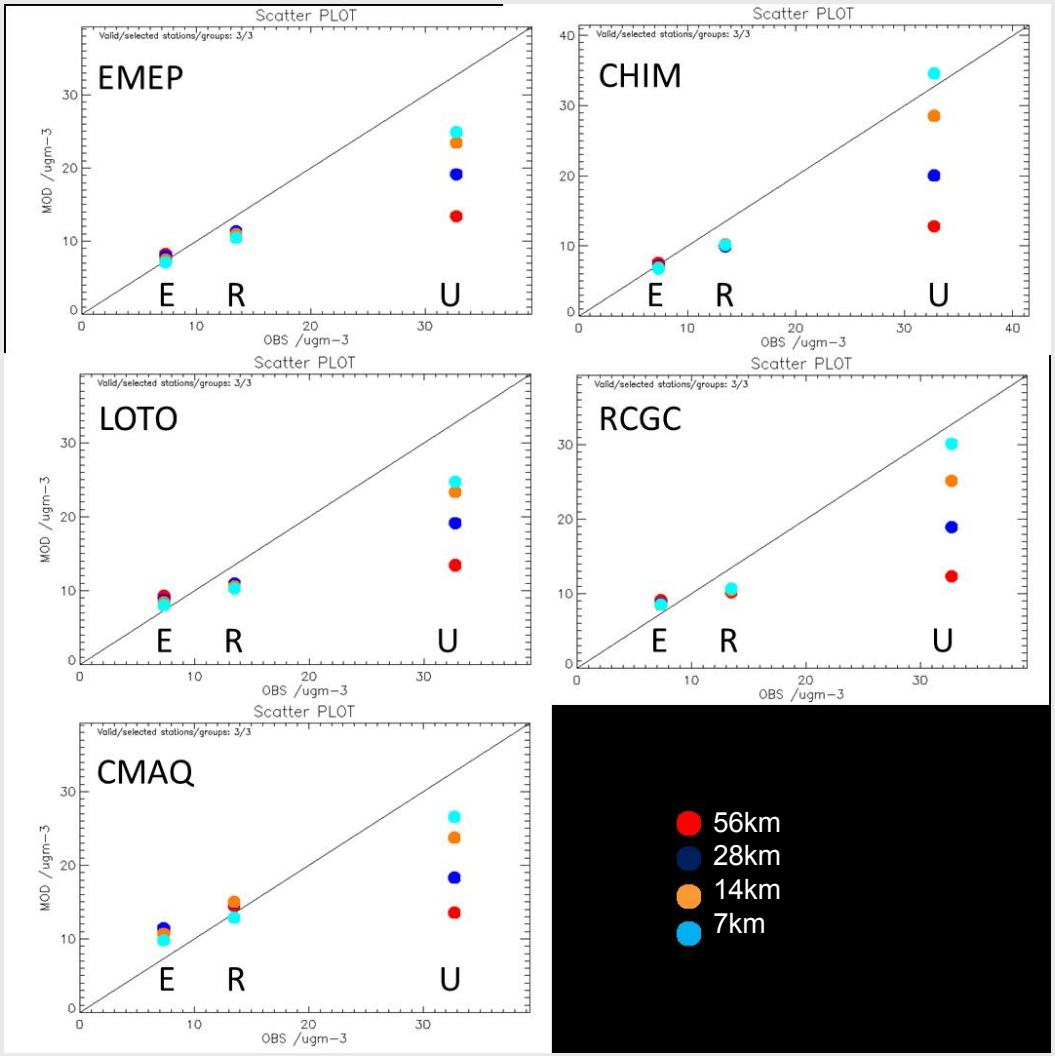
- Status runs
  - New EMEP grid (0.1*0.1 degree)
  - Additional product: Data assimilation of NO_2, ozone, PM

    (use also EMEP observations, investigate effect on depositions etc, timing)

Workshop on condensables

Global efforts

Annual average NO2 concentrations per station type.
E=EMEP, R=RURAL, U=URBAN



AQ & climate (impact2c)

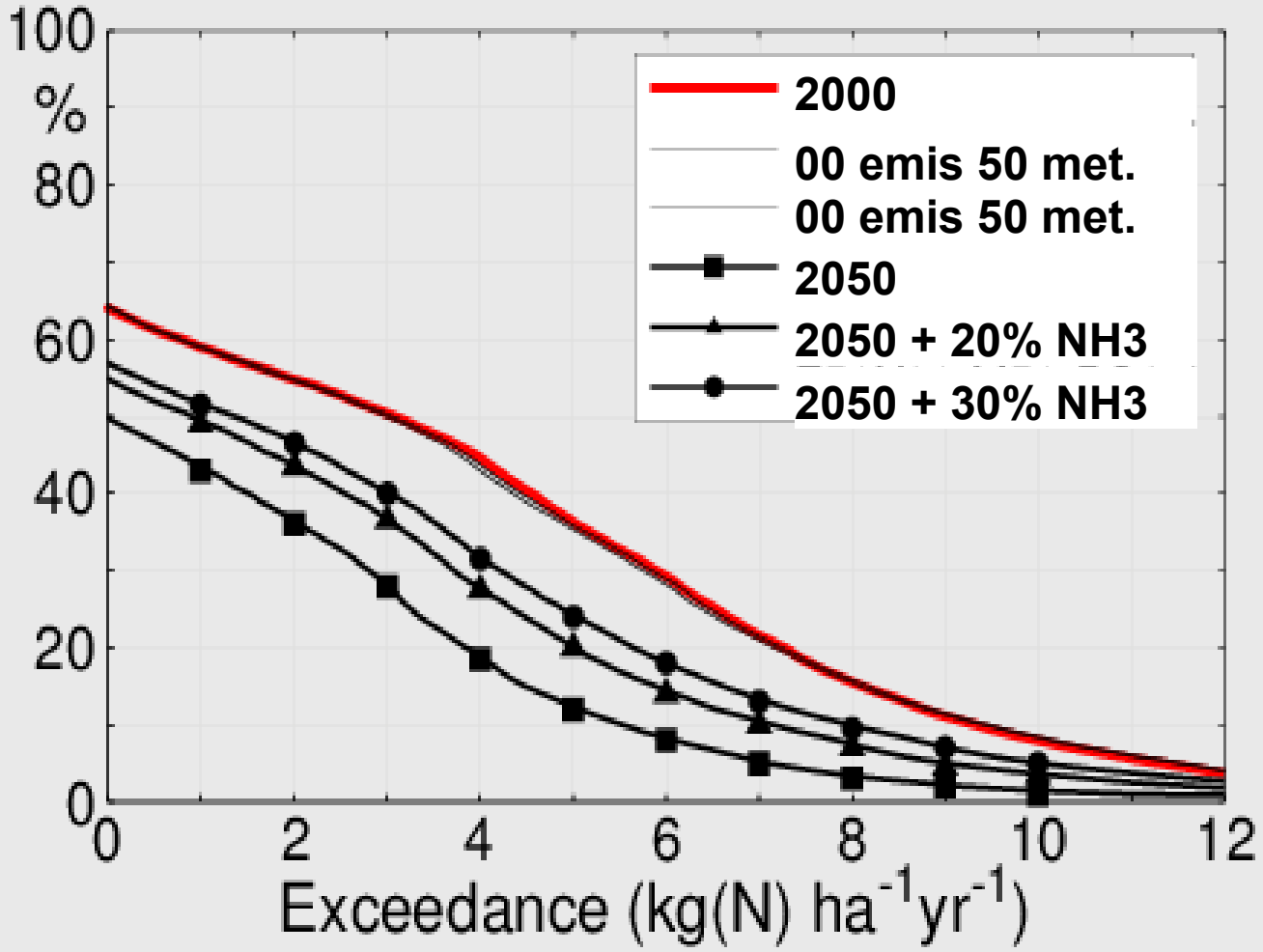
EMEP/MSC-W Activities

- Status runs and reports, including ' 1-year-delayed runs'
- Meetings and discussions related to EuroDelta3 (within TFMM); Trend studies
- TFHTAP: Hosting the data for TFHTAP intercomparison, including quicklooks etc (AeroCom)

25 peer reviewed articles and 1 book chapter in 2014

Model development

- Dynamic ammonia emissions (T,w)
- Bi-directional exchange of NH3
- 1-D ESX-model
- Global ozone (chemical scheme, growing seasons (POD), vertical exchange)
- Improved dust
- New EMEP grid (0.1x0.1 degree resolution, improvement of vertical resolution, etc)


100
%
80
60
40
20
0
0
2
4
6
8
10
12
Exceedance (kg(N) ha-1yr-1)
2000
00 emis 50 met.
00 emis 50 met.
2050
2050 + 20% NH3
2050 + 30% NH3