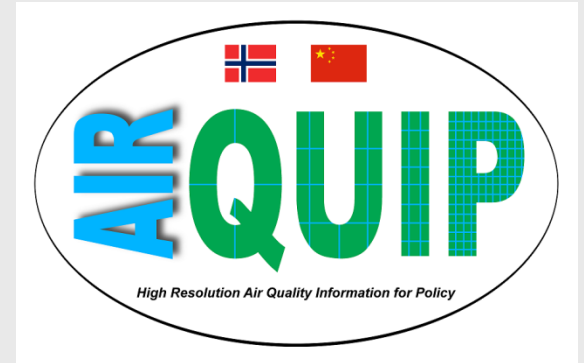




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Institute

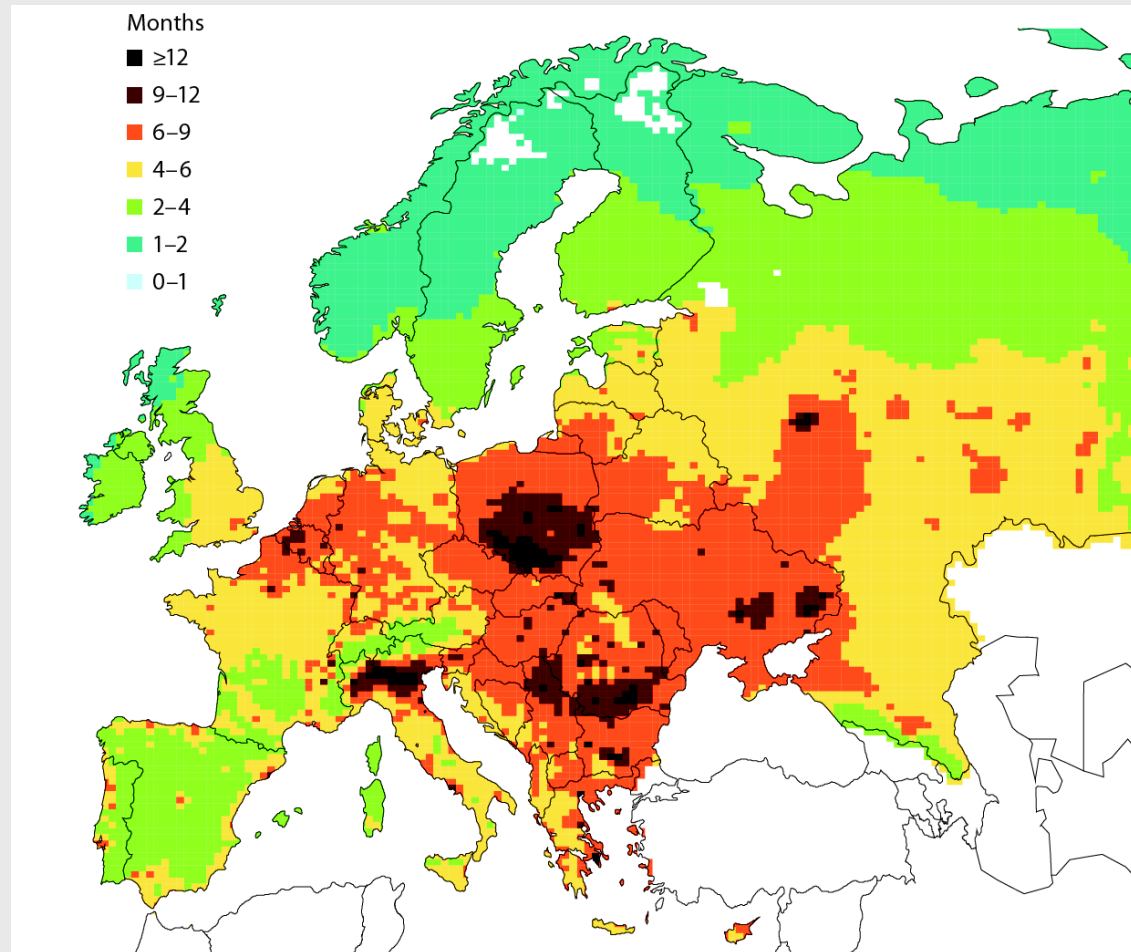


# Transboundary air pollution on regional scales

Hilde Fagerli

AIRQUIP Kick-off 19-20.4 2017

# Why are Norwegian scientists so engaged in air quality issues?



Loss of life expectancy due to PM<sub>2.5</sub>

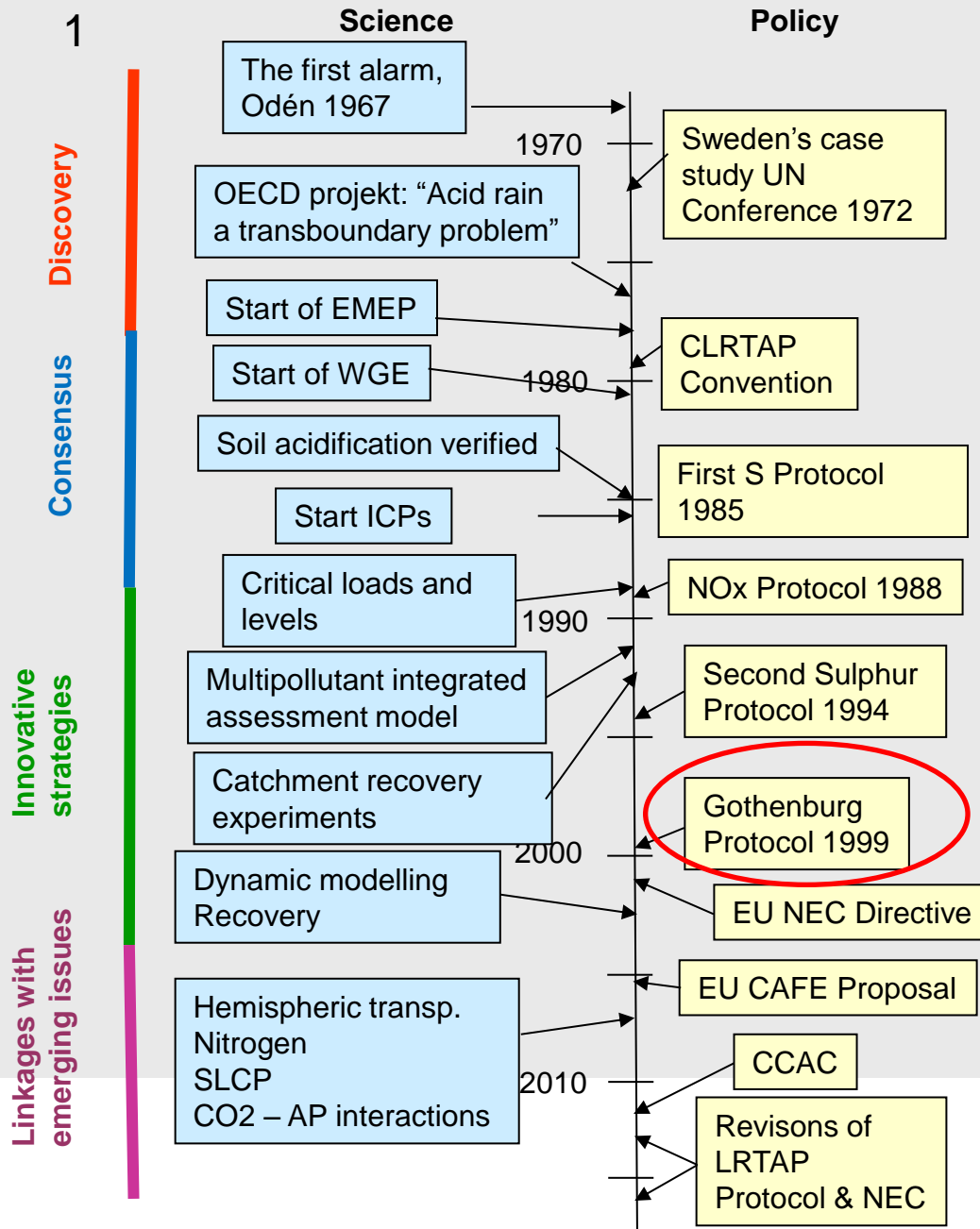
# Late 1960's : acid deposition



## 1979 UN Convention on Long-range Transboundary air pollution

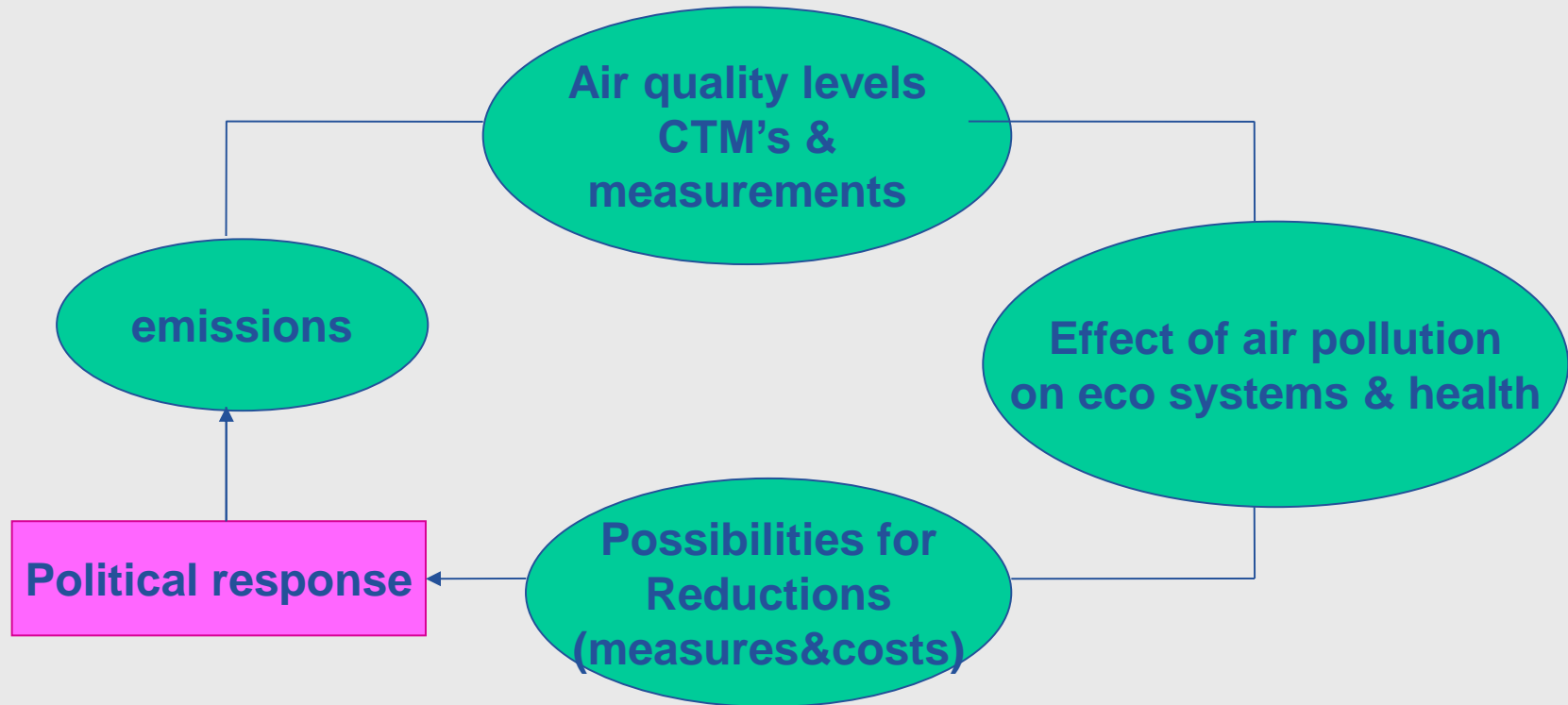
- protect against acid deposition (now also eutrophication, ozone, particulate matter)
- 3 centres established, 2 Norwegian (now 5), MSC-W is hosted at MET, CCC at NILU
- MSC-W: provide modelling of S, N, O<sub>3</sub>, PM, etc

1



MSC-W (MET) has been providing **EMEP model calculations** to underpin policies for all Protocols in CLRTAP and also EU Policies

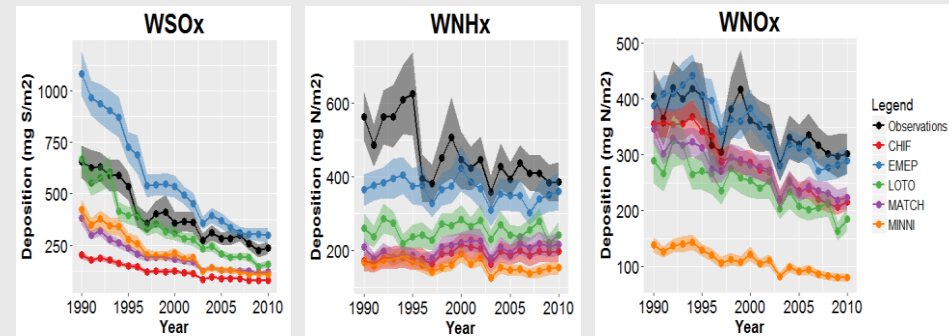
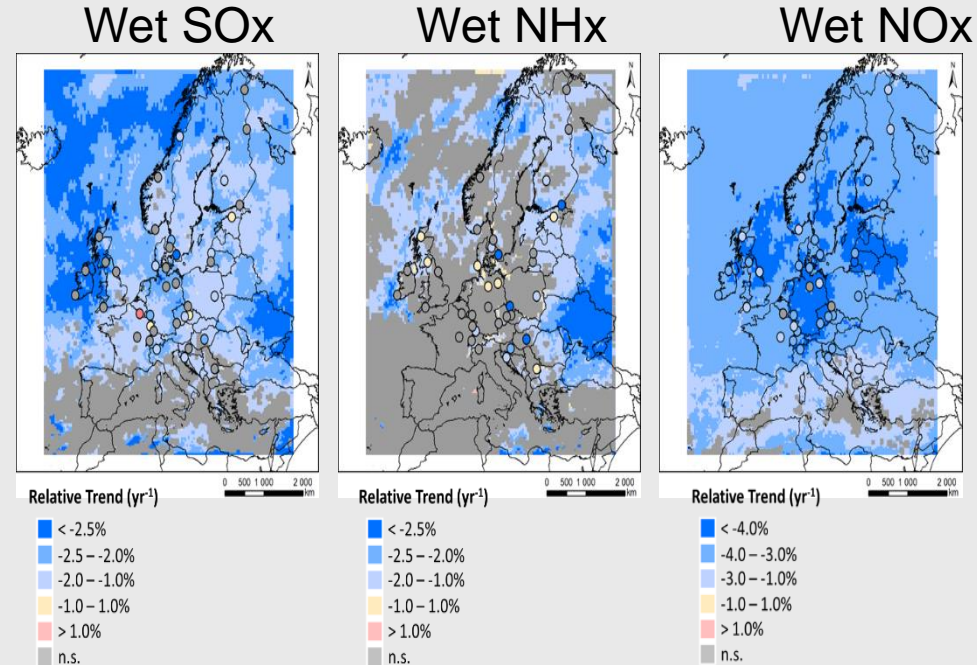
# The CLRTAP working philosophy



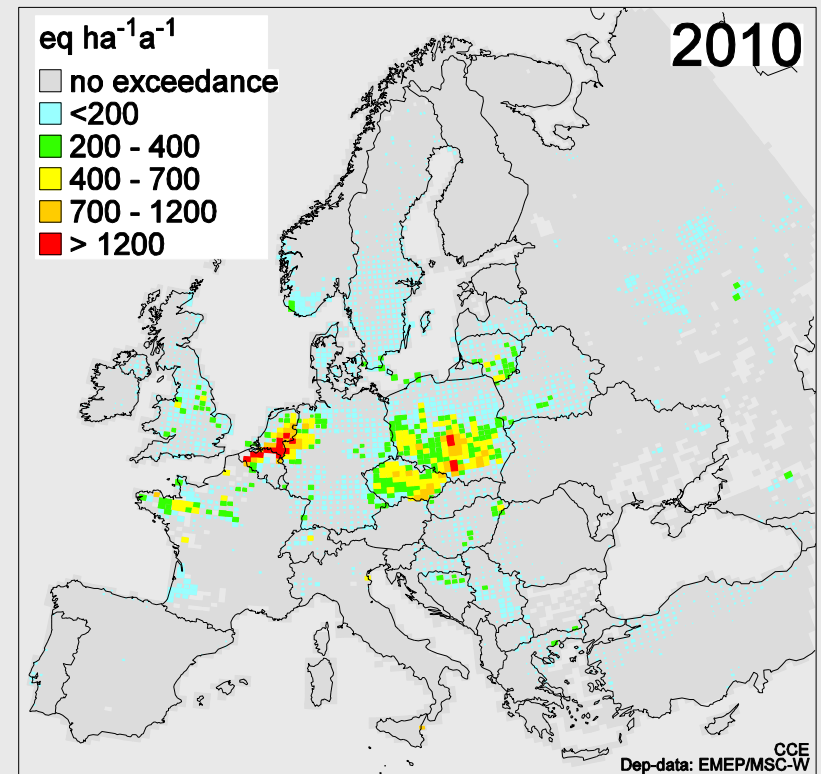
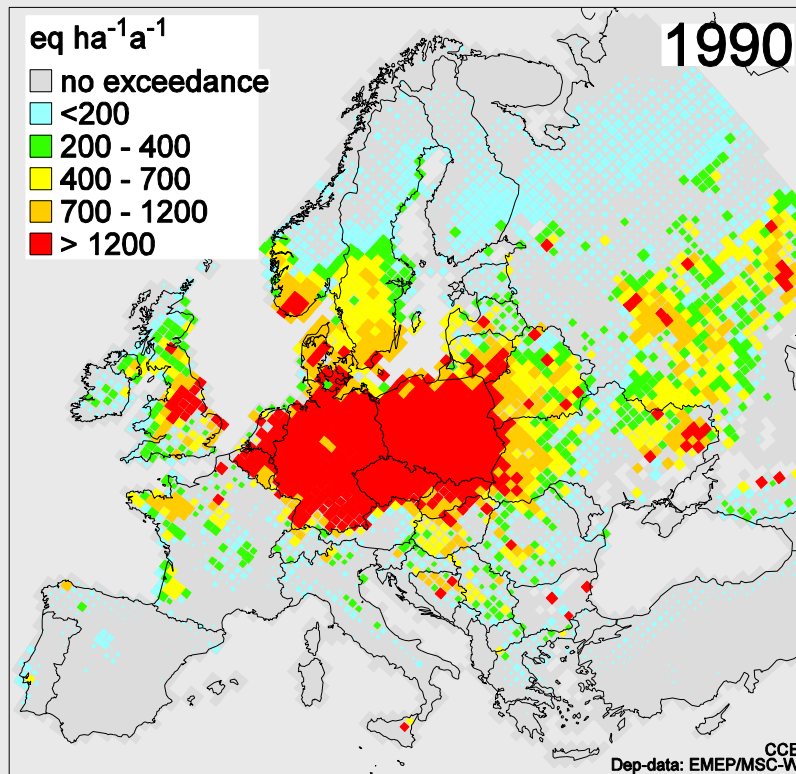
Construct strategies to gain maximum protection of the environment & health for minimum economic cost

# Model inter comparisons, e.g. EuroDelta Trends

- Focus on
  - Atmospheric concentration of secondary inorganic aerosols
  - Wet deposition
  - Dry deposition
- Main analyses
  - Ongoing evaluation of modelled deposition
  - Comparing models and measurements at EMEP sites
  - Exploring ensemble uncertainty



# Most of the GP targets were achieved



Exceedance of critical loads for acidification in Europe 1990 and 2010 (EMEP model calculations + CL from CCE)

**...but other issues are emerging...**

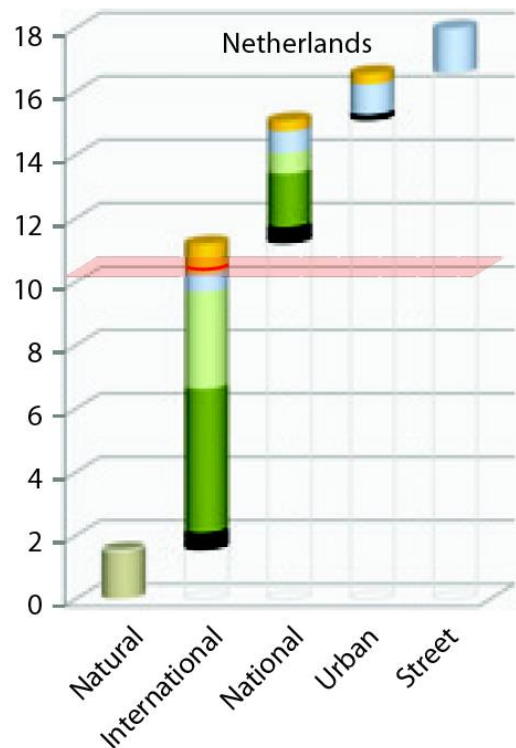
# Issues emerging over the last decade(s)

- Inter continental transport of air pollution. Source-receptor matrices for transport between continents
  - CH<sub>4</sub> vs. NO<sub>x</sub>/VOC
  - Will import of O<sub>3</sub> to Europe increase or decrease in the future?
- Short lived climate pollutants (SLCP)
  - Climate impact of the GP protocol
- Local versus LRT contributions to AQ in cities

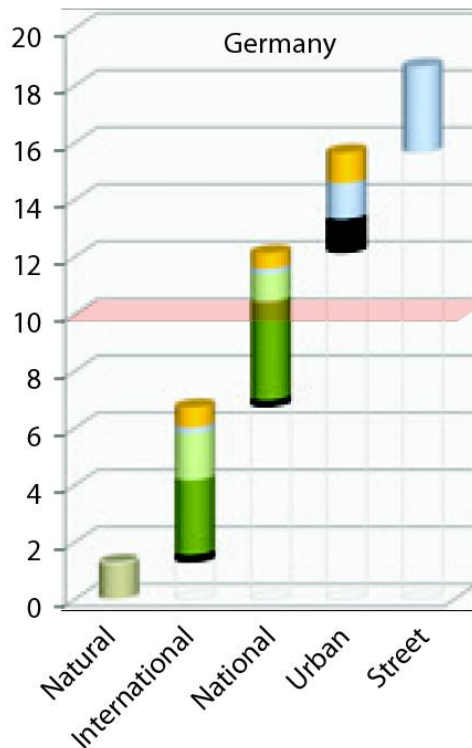


# Lokalt versus LRT bidrag

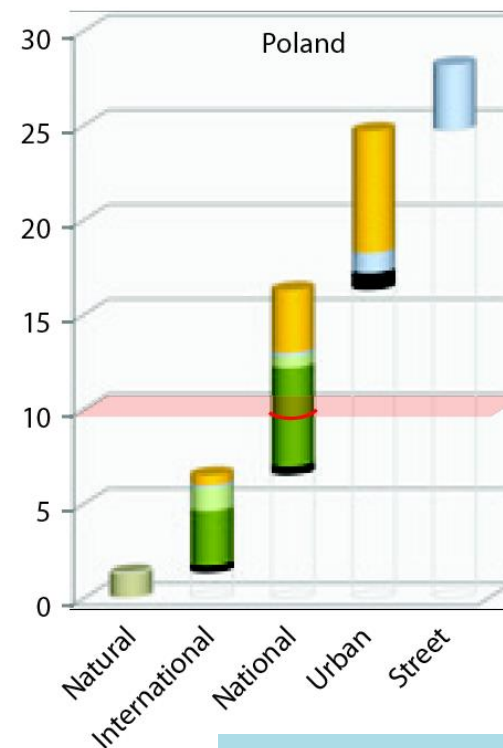
PM<sub>2.5</sub>, µg/m<sup>3</sup>



PM<sub>2.5</sub>, µg/m<sup>3</sup>



PM<sub>2.5</sub>, µg/m<sup>3</sup>



- Households
 ■ Primary PM: Traffic
■ Secondary PM: Traffic + Agriculture
- Secondary PM: Industry + Agriculture
 ■ Primary PM: Industry
■ Natural

EMEP model +  
CHIMERE+GAINS

Better air quality cannot be solved by local measures alone

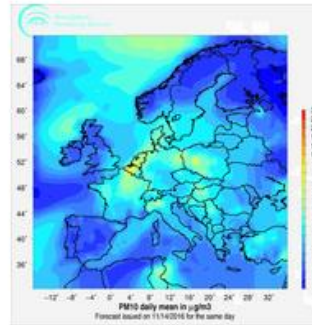
## CAMS71 Regions

+  
-



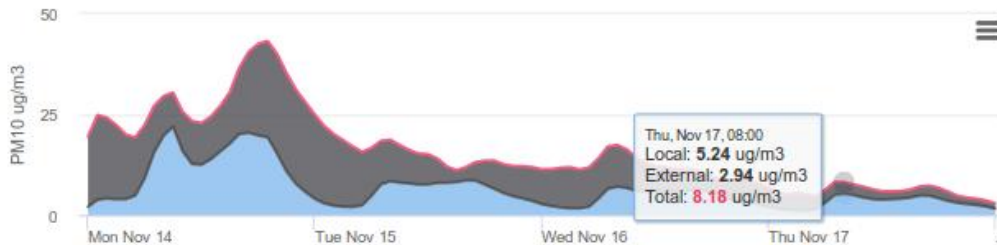
Highcharts.com © Natural Earth

City- Paris  
Pollutant- PM10



Attribution to External/Local PM10 sources

● Local ● External



## EMEP model calculations



Mon Nov 14

Tue Nov 15

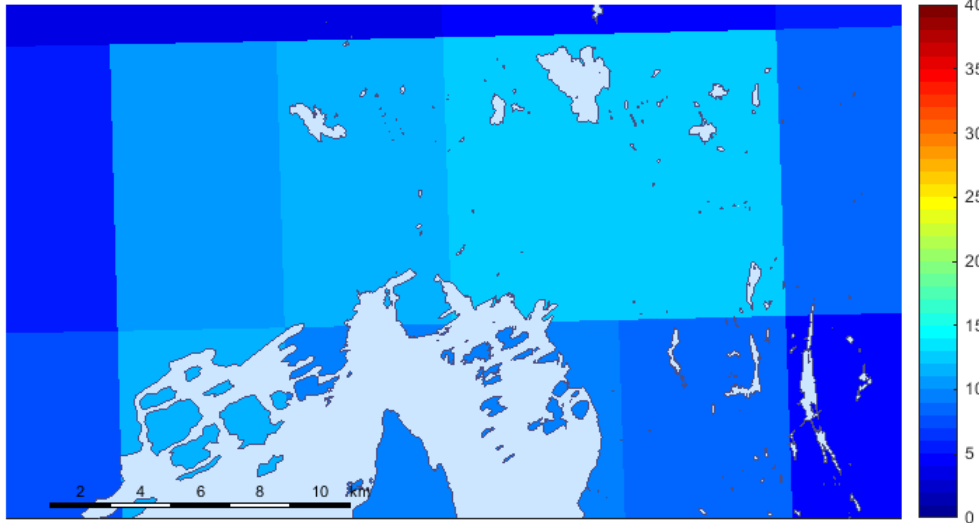
Wed Nov 16

Thu Nov 17

Focus on what can be done locally versus national/international scale also in Copernicus (CAMS)

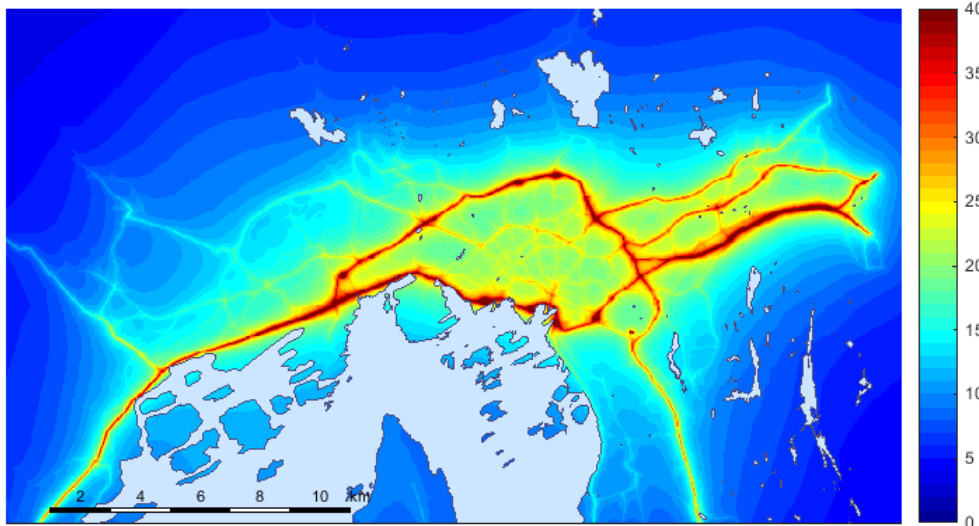
# Consistency from regional to local scale

Oslo EMEP annual mean  $\text{NO}_2$  ( $\mu\text{g}/\text{m}^3$ )



Oslo, ca 10kmx10km,  
EMEP model

Oslo redistributed annual mean  $\text{NO}_2$  ( $\mu\text{g}/\text{m}^3$ )



Oslo, ca 50x50m,  
uEMEP

# Summary

- MET Norway, as a centre in EMEP under the LRTAP Convention, has worked on air pollution for decades
- The EMEP model has been used to underpin European Policies on air pollution since the 1980's
- The EMEP model is extensively evaluated and has participated in a number of model inter comparisons. Runs on global to local scales
- Presently more focus on health effects, links to local scale, intercontinental transport, SLCPs, air quality forecast (CAMS, PANDA)

# **Towards Cleaner Air**

**Scientific Assessment Report 2016:  
Summary for Policymakers**

**Launch:  
31 May 2016  
Norway  
House  
Brussels**

# Enjoy AirQuip



Air pollution in Oslo. Photo: M. Gauss



Norwegian  
Meteorological  
Institute

23.05.2017