



Modelling Of Air Pollution From Regional To Urban Scale:

DMI -CAC

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Air Pollution Modeling At DMI

Aerosol Module

1. PSC aerosols
2. Tropospheric aerosols

Approaches:
Normal distribution,
Bin approach

- Physics:
1. Condensation
 2. Evaporation
 3. Emission
 4. Nucleation
 5. Deposition

Chemical Solvers

1. Gas Phase
2. Aqueous phase
3. Chemical equil.
4. Climate Modeling

Approaches:
RACM, CBIV,
ISORROPIA

UTLS Trans. Models

Eulerian transport 0..15
lat-lon grid,
3-D regional
scale

Lagrangian
transport, 3-D
regional scale

ECMWF

DMI-HIRLAM

Met. Models

Eulerian transport 0.2-0.05
lat-lon, 25-40
vert. layer,
3-D regional
scale

Stochastic
Lagrangian
transport,
3-D regional
scale

Tropo Trans. Models

Emergency Pre-
parednes & Risk Assess-
ment. DERMA

City-Scale Obstacle
Resolved Modelling
TSU-CORM

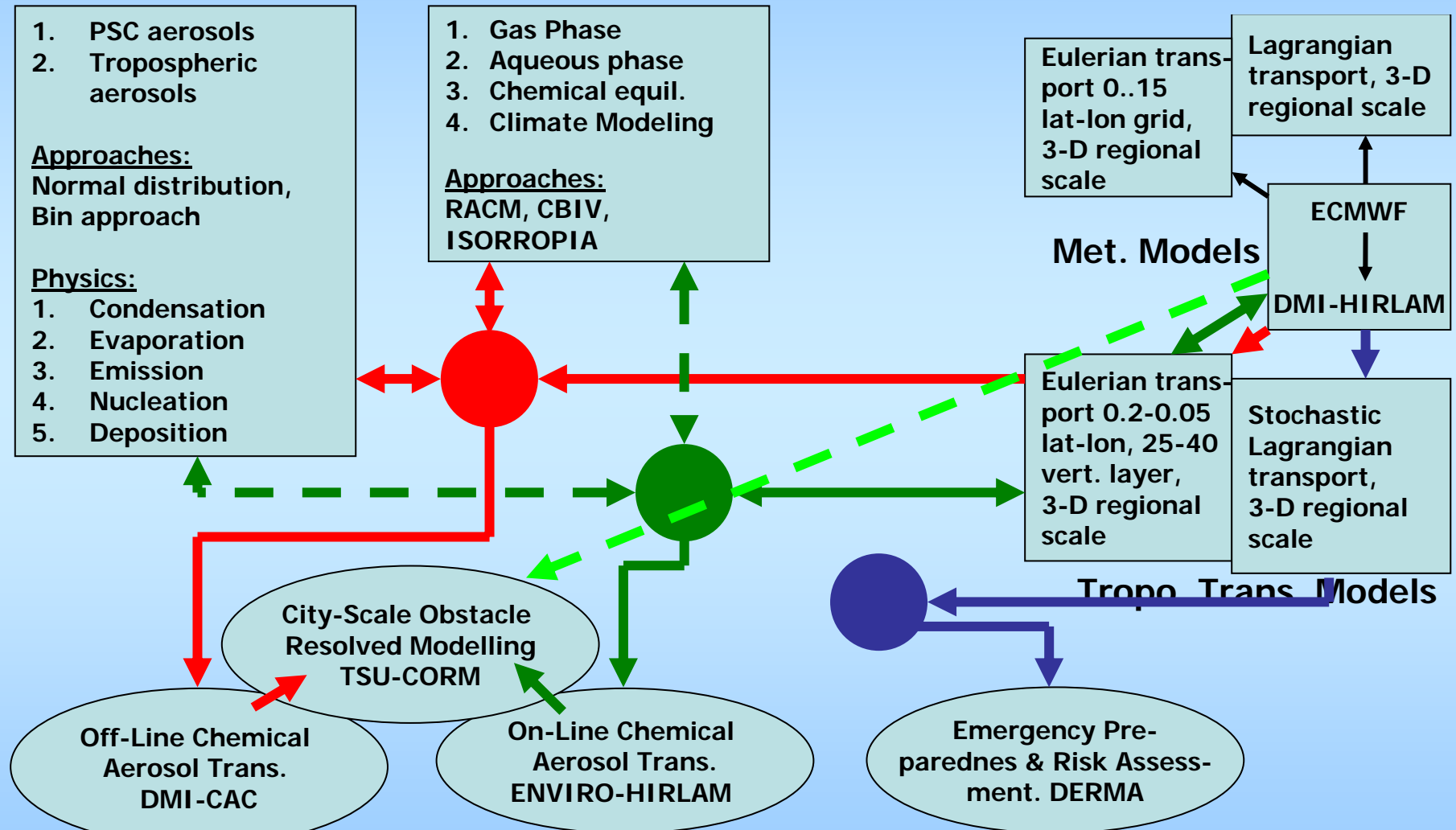
Off-Line Chemical
Aerosol Trans.
DMI-CAC

On-Line Chemical
Aerosol Trans.
ENVIRO-HIRLAM

Regional (European) to city
scale air pollution: smog
and ozone.

Regional (European) scale
air pollution: smog and
ozone, pollen.

Nuclear, veterinary and
chemical.



DMI-HIRLAM

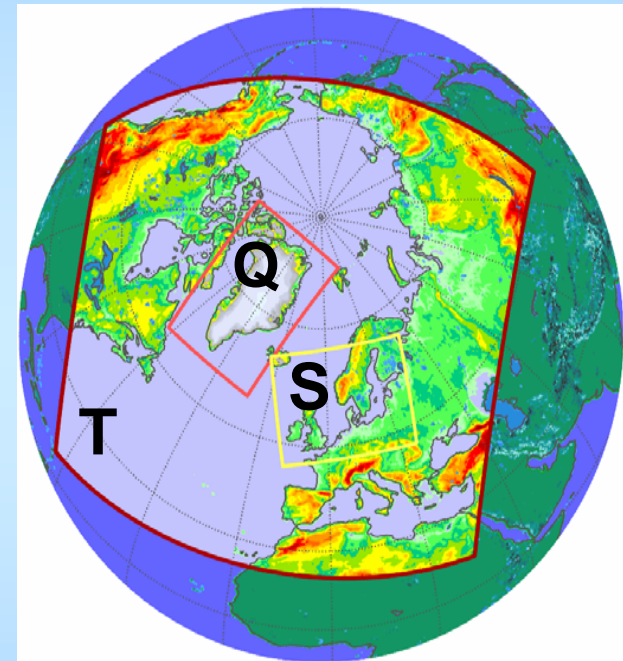


Currently nested versions of HIRLAM:

- T – 15x15 km², 40 vertical layers.
- S – 5x5 km², 40 vertical layers.
- Q – 5x5 km², 40 vertical layers.
- Test version of 1.5x1.5 km² of DK.

A forecast integration starts out by assimilation of meteorological observations whereby a 3-d state of the atmosphere is produced, which as well as possible is in accordance with the observations.

A numerical weather prediction system consists of pre-processing, climate file generation, data-assimilation and analysis, initialization, forecast, post-processing and verification.



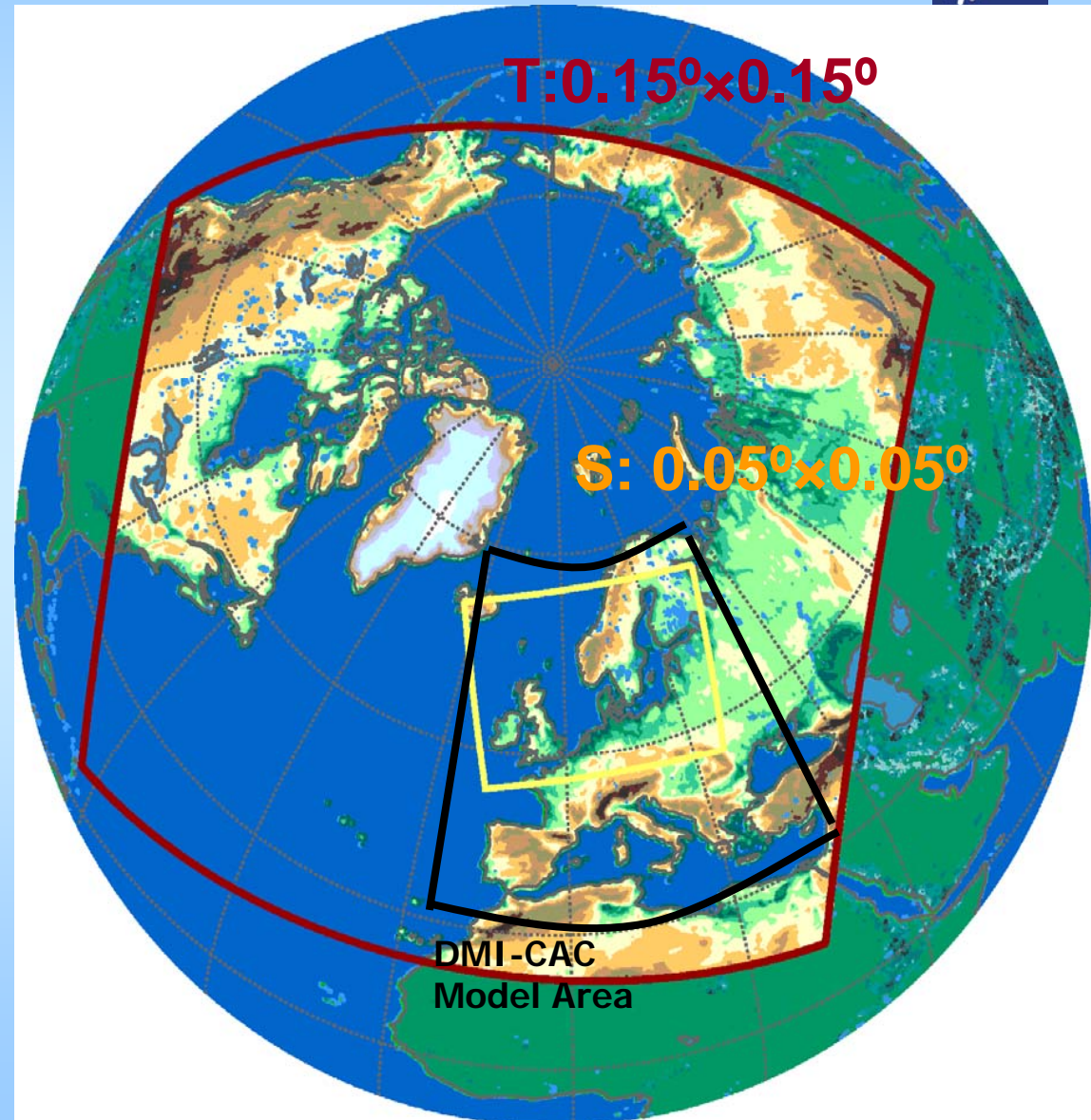
Off-Line modelling with DMI-CAC

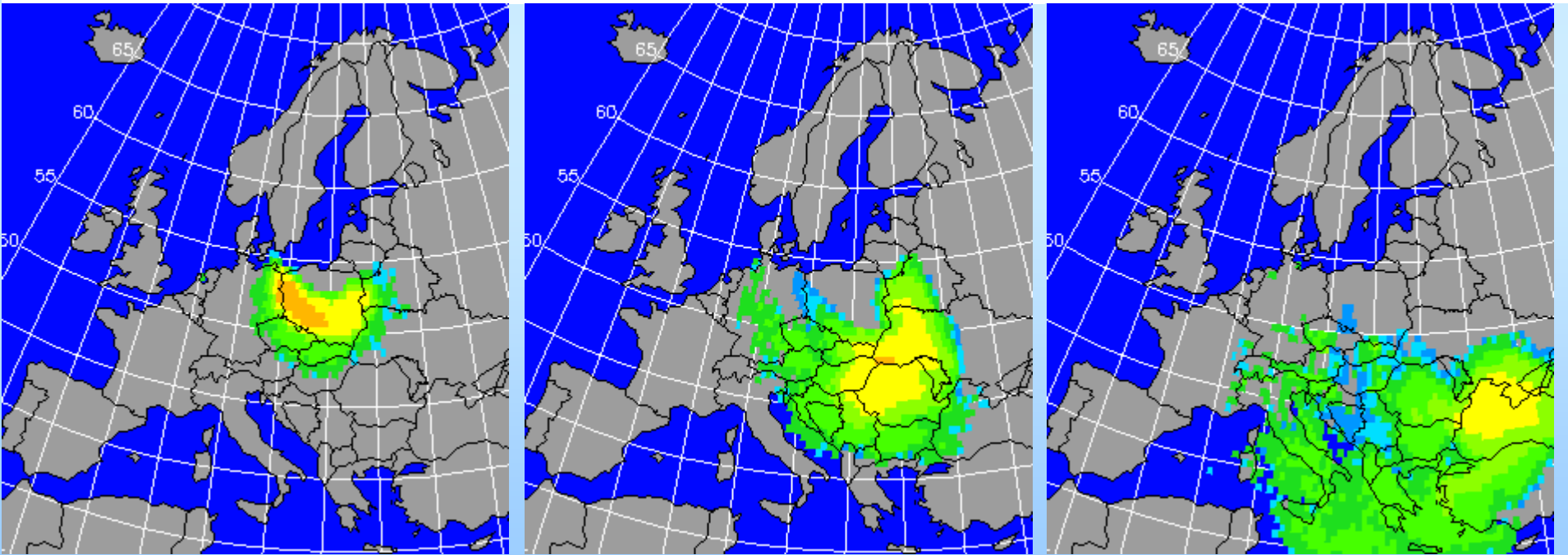
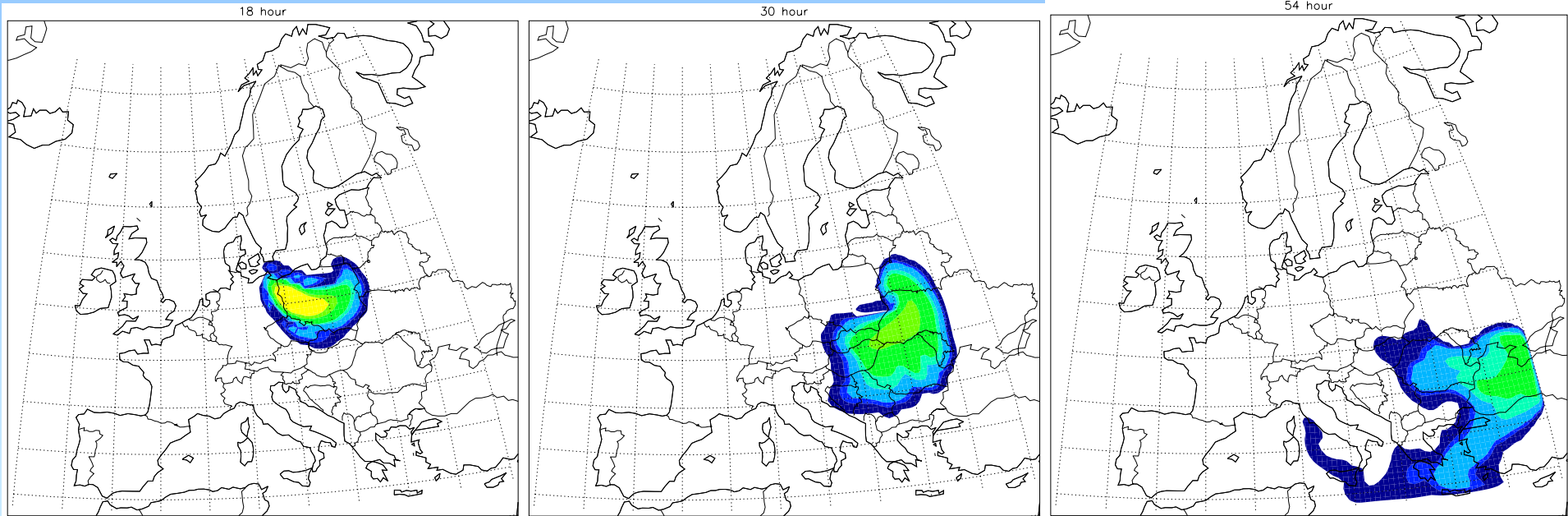


Simulation domain

Horizontal resolution

$0.2^\circ \times 0.2^\circ$.



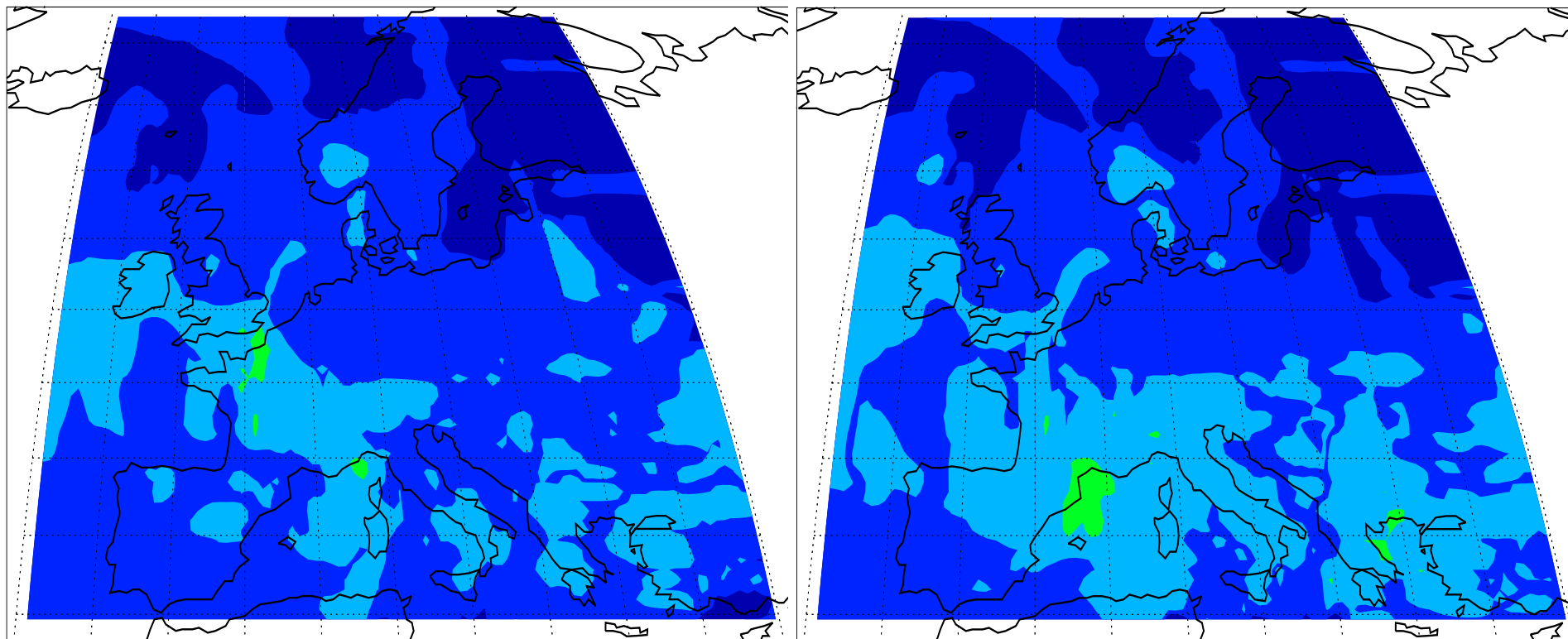


Ensemble: DK3, DE1, FR2, CA2

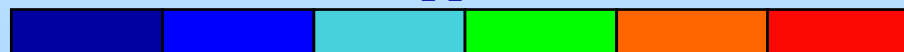
Ozone

36 hour forecast

48 hour forecast



ppbV



0 15 30 60 90 120 150

Pre-operational forecasts 4 times a day of
 O_3 , NO, NO₂, CO, SO₂, Rn, Pb, "PM2.5", "PM10".

City-Scale Obstacle-Resolved Modeling (TSU-CORM)



**Streamlines and
air pollution conc**

**3 d. fluid dynamic
air pollution model**

Resolution:

Horizontal: 1x1 m²

Vertical: from 1m

**Will be implemented
spring 2007 at DMI
and linked with DMI-
HIRLAM, CAC and /or
ENVIRO-HIRLAM.**

