

First Year Meeting

GEMS-RAQ, WP1 & WP2: Report From DMI

The DMI GEMS-RAQ Team

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DMI-CAC (Chemical Aerosol Cloud) Modeling System

Chemical Solver

- 1: Gas phase reac
- 2: Aqueous phase reac.
- 3: Chemical Equilibrium module.
- 4: Photolysis.
- 5: Heterogeneous proc.
- 6: Parameterized PSC model.

Met. Data

ECMWF

DMI-HIRLAM

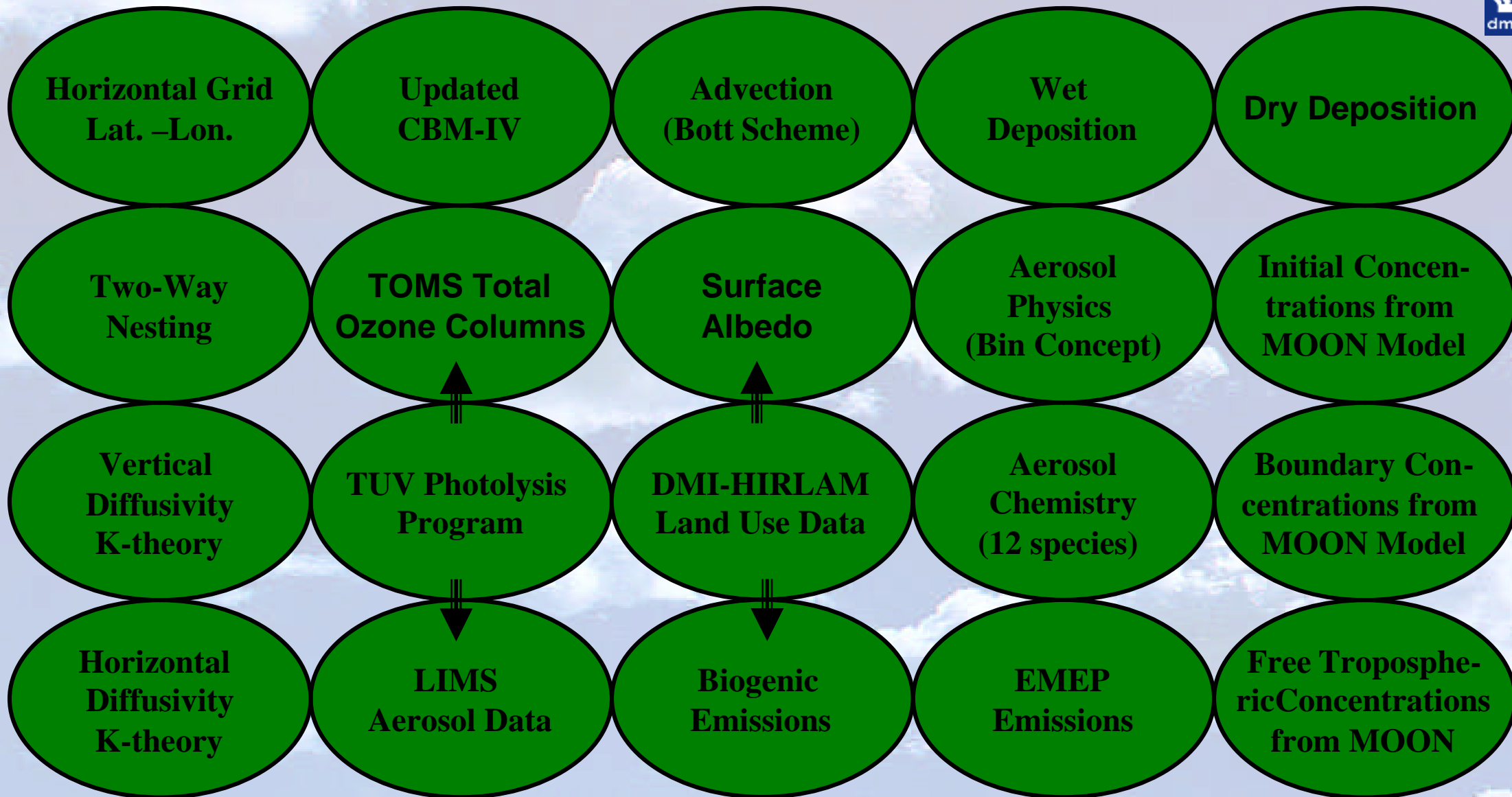
Eulerian transport 0.15° lat-lon grid, 3-D regional scale.

Tropo. Trans. Model

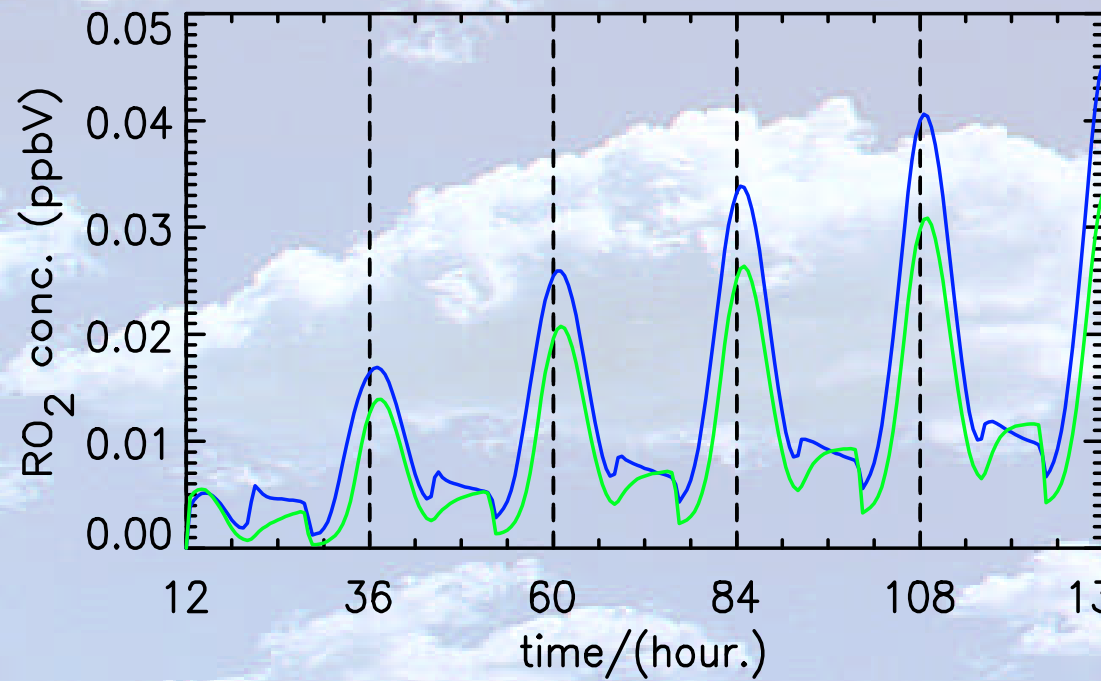
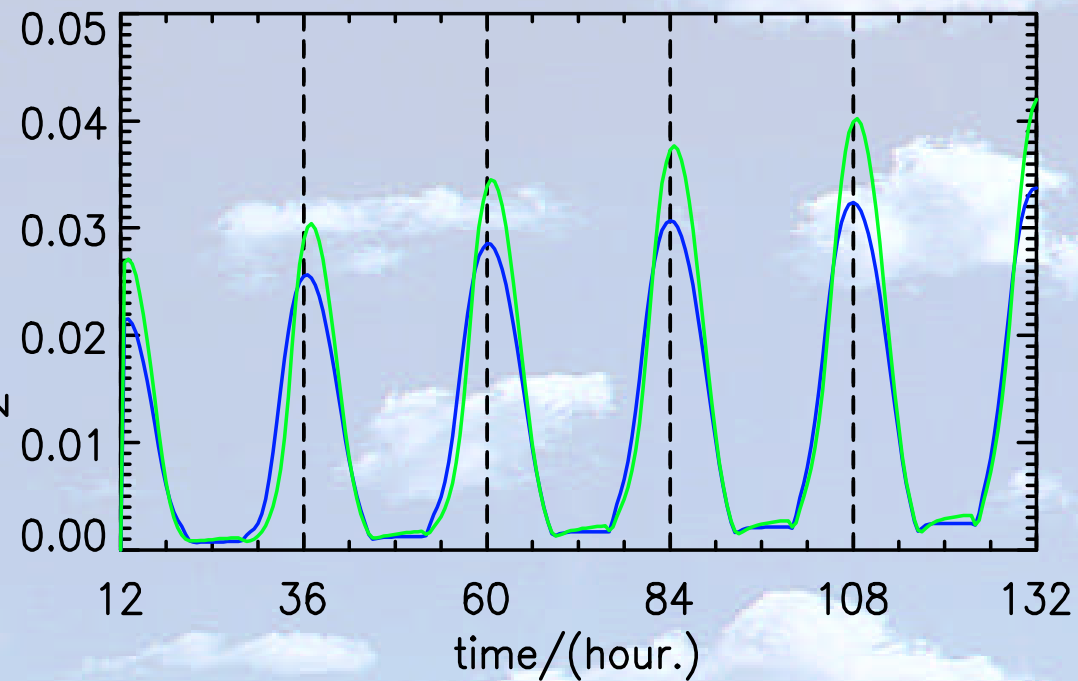
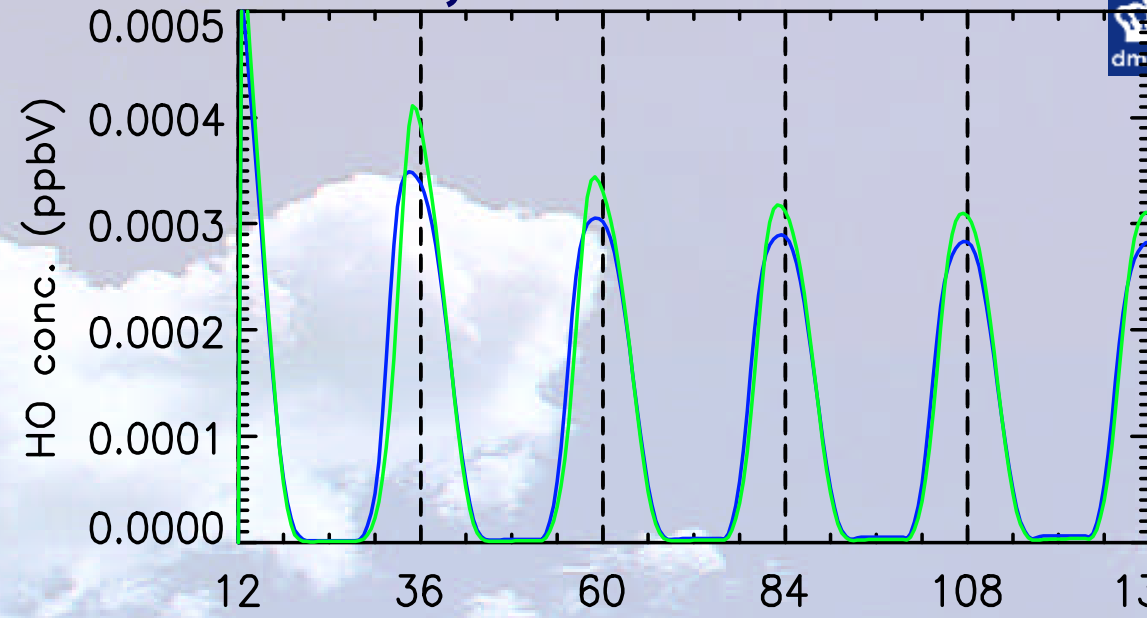
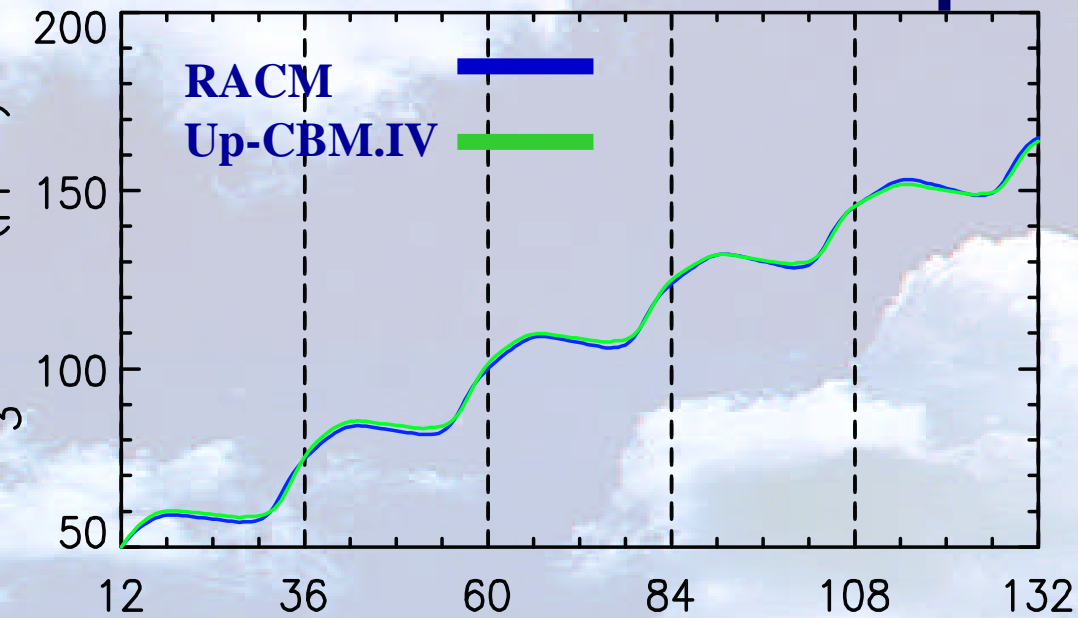
Coupled Trans.-
Aerosol-Chemistry

Modeling of regional scale problems (mainly for Denmark and Europe).

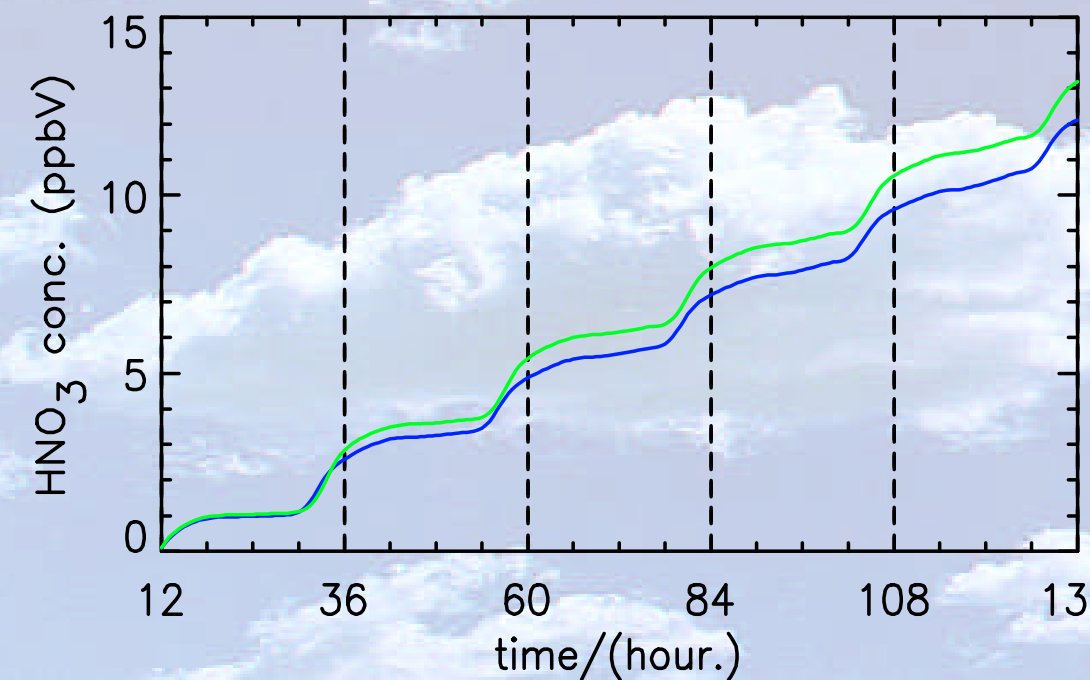
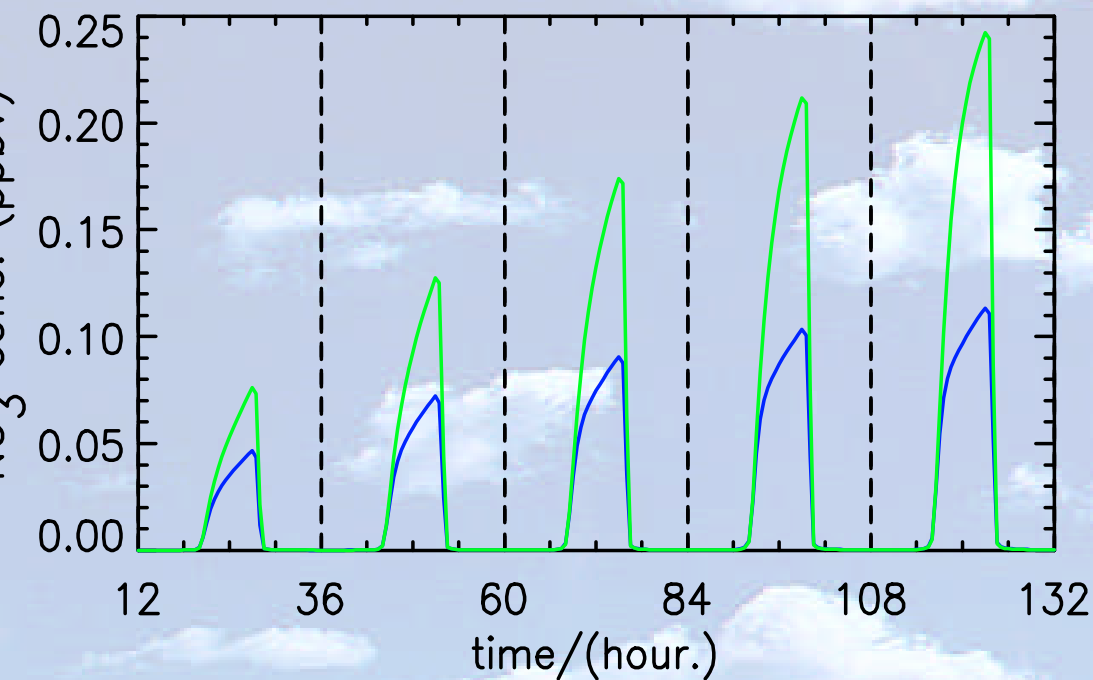
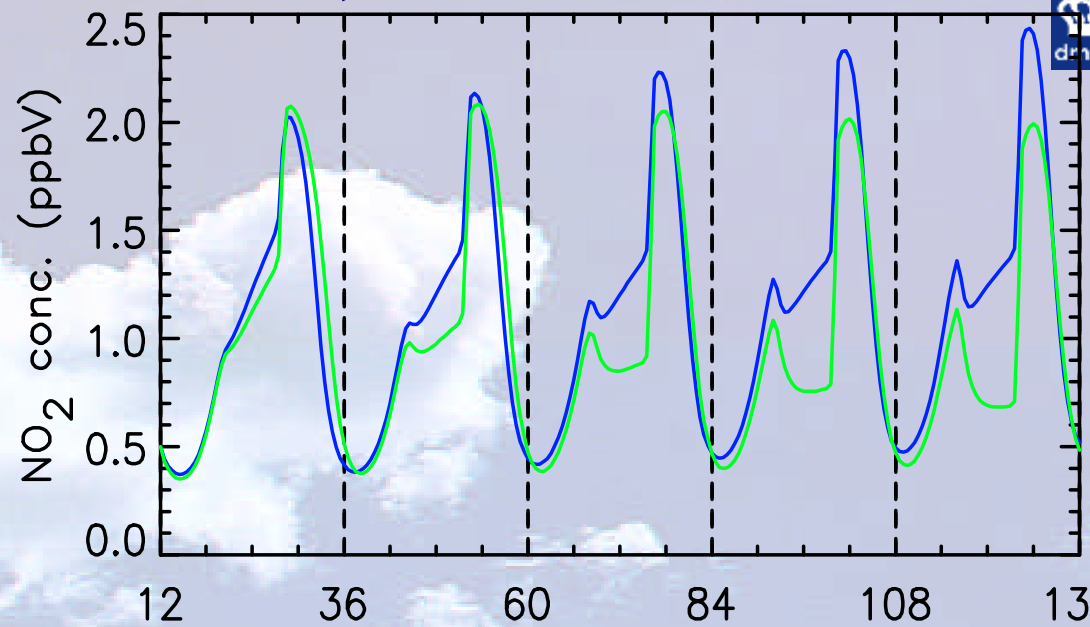
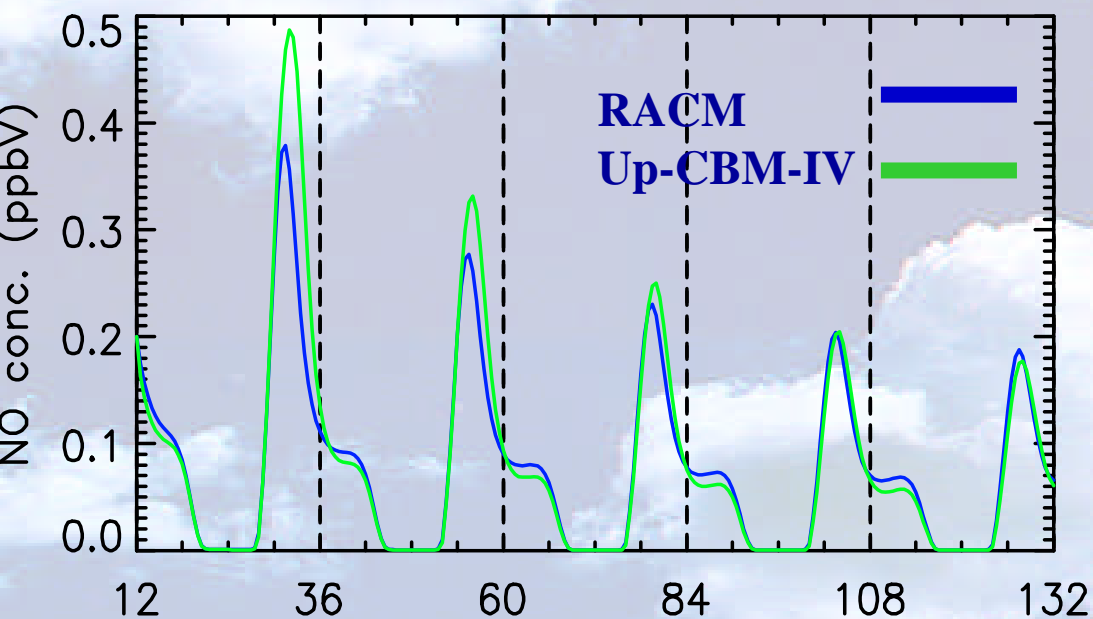
Components Tropospheric DMI-CAC Model



RACM versus Updated CBM-IV, Plume Case



RACM versus Updated CBIV, Plume Case

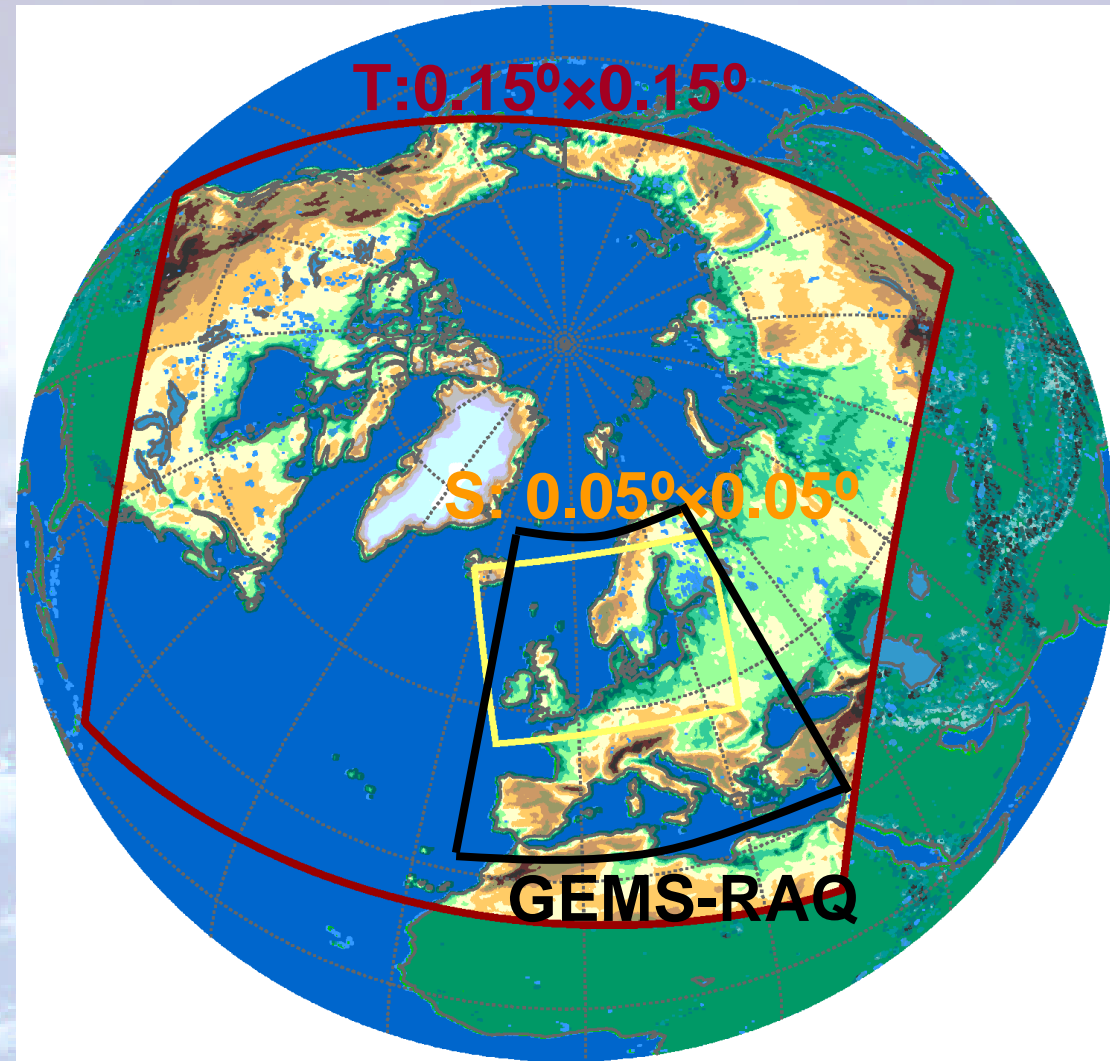


Used DMI-HIRLAM Version

Data from ECMWF will be used to drive DMI-HIRLAM

DMI-HIRLAM will be used to drive the CAC RAQ forecast

High resolution forecast: O₃, "PM", "Sulphur", "NO_x" etc. 4 times a day



CAC Model in Forecasting Model

- **Off-line Eulerian model:**
 - “semi”-operational forecasts of air pollutants over the GEMS grid,
 - horizontal resolution $0.5^{\circ} \times 0.5^{\circ}$ (17 vertical layer).

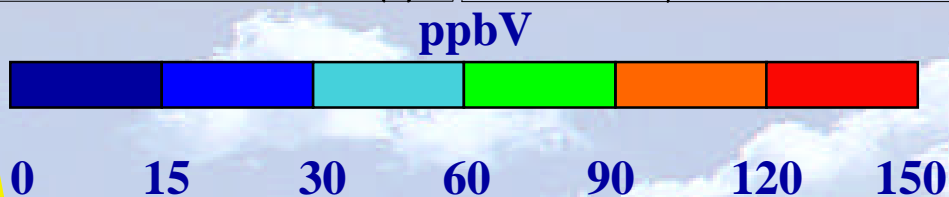
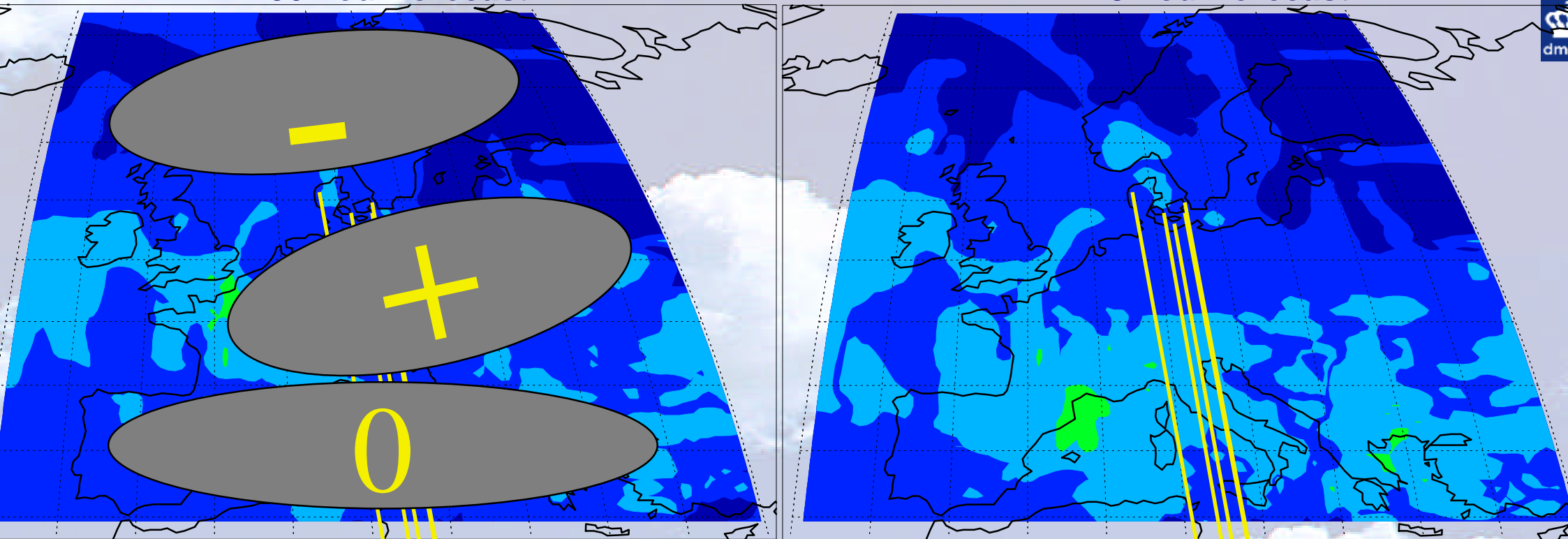
Next, Presentation of Last Forecast

- **Start Thursday, February 2., 2006, 0 UTC,**
- **Forecast length 60 hour.**

Ozone

36 hour forecast

48 hour forecast

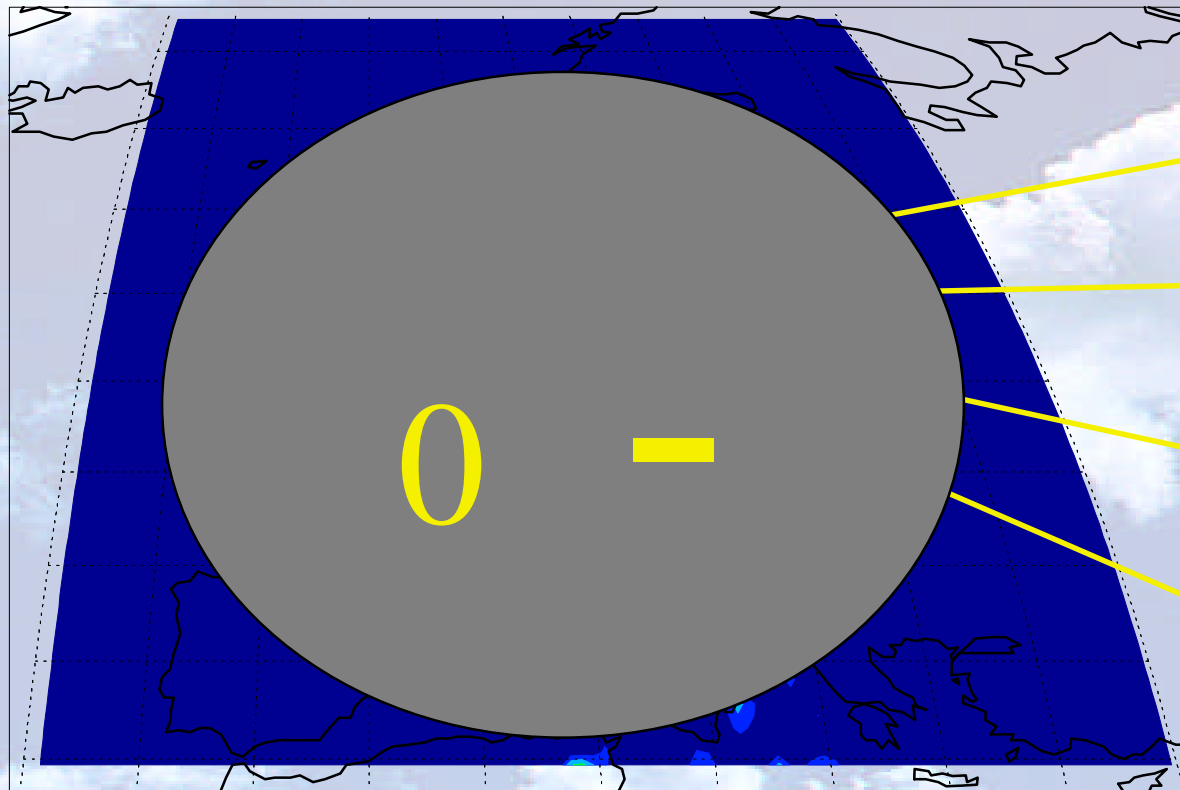


Jægersborg, DK
Storebælt, DK
Keldsnor, DK
Ulborg, DK
Lille Valby, DK

21.6 ppbv
32.9 ppbv
26.2 ppbV
18.8 ppbV
27.6 ppbV

6.4 ppbV
37.9 ppbV
21.6 ppbV
20.2 ppbV
17.5 ppbV

NO₂, Daily Max., Second Day

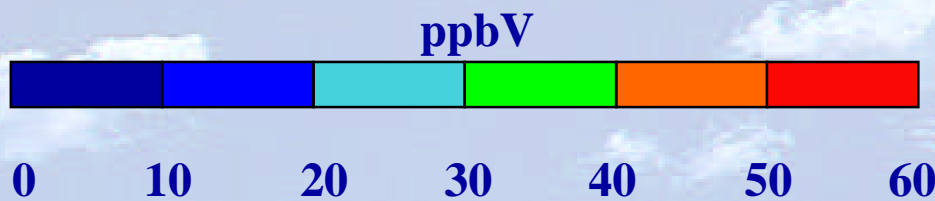


Ulborg, DK
■ 4.3 ppbV

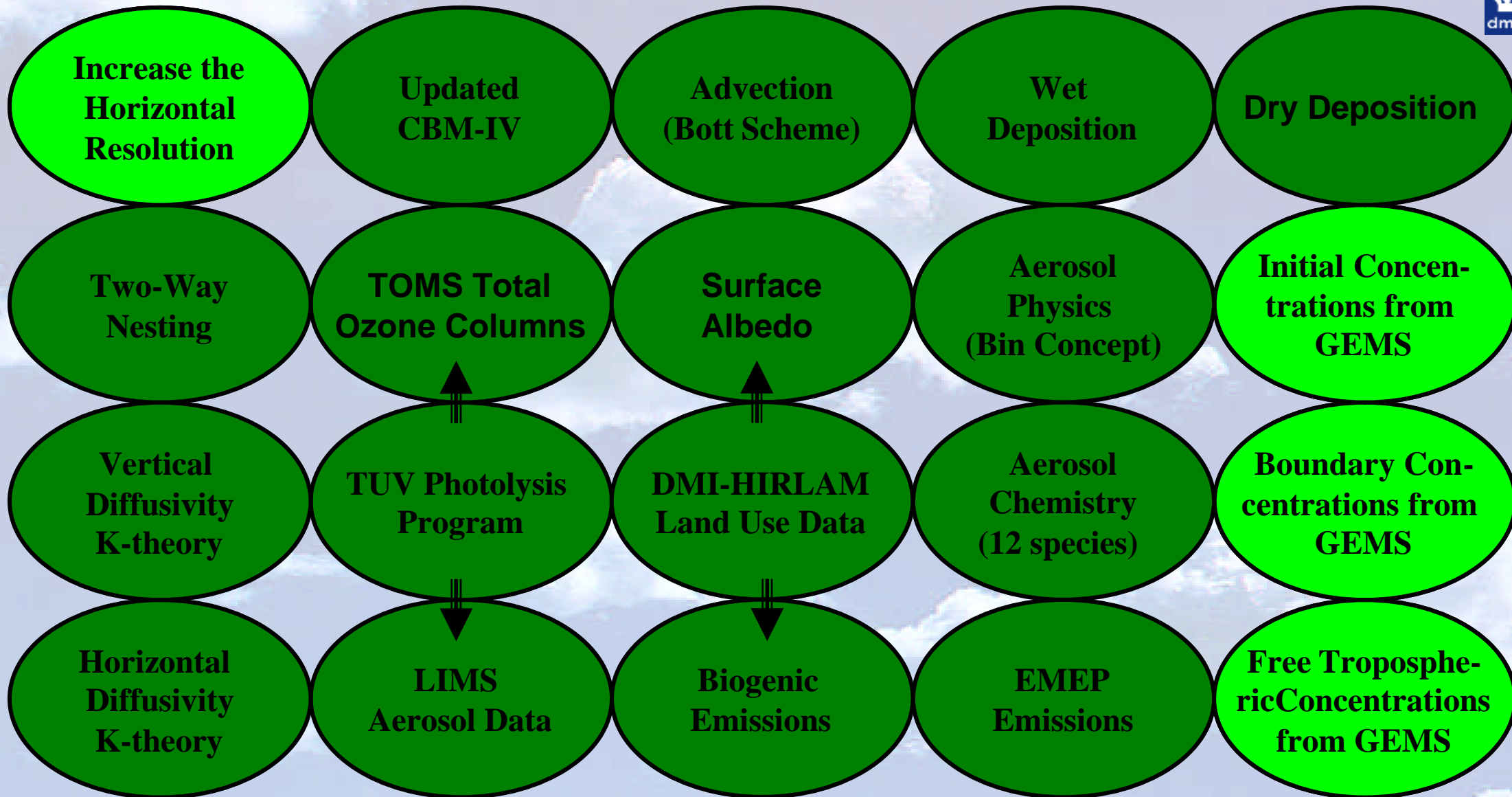
Lille Valby, DK
■ 7.2 ppbV

Storebælt, DK
■ 7.9 ppbV

Keldsnor, DK
■ 6.5 ppbV



Components Tropospheric DMI-CAC Model



Improvements Needed

Milestones, First Year

- **First demonstration runs at partner institutes or ECMWF for the 10 models involved in RAQ forecasting activities. (At least one full day of simulation) - Achieved**

Deliverables, First Year

- **CAC RAQ configuration interfaced with GEMS/IFS global analysis or forecasts (running at DMI) - Achieved**

GEMS-RAQ, WP3

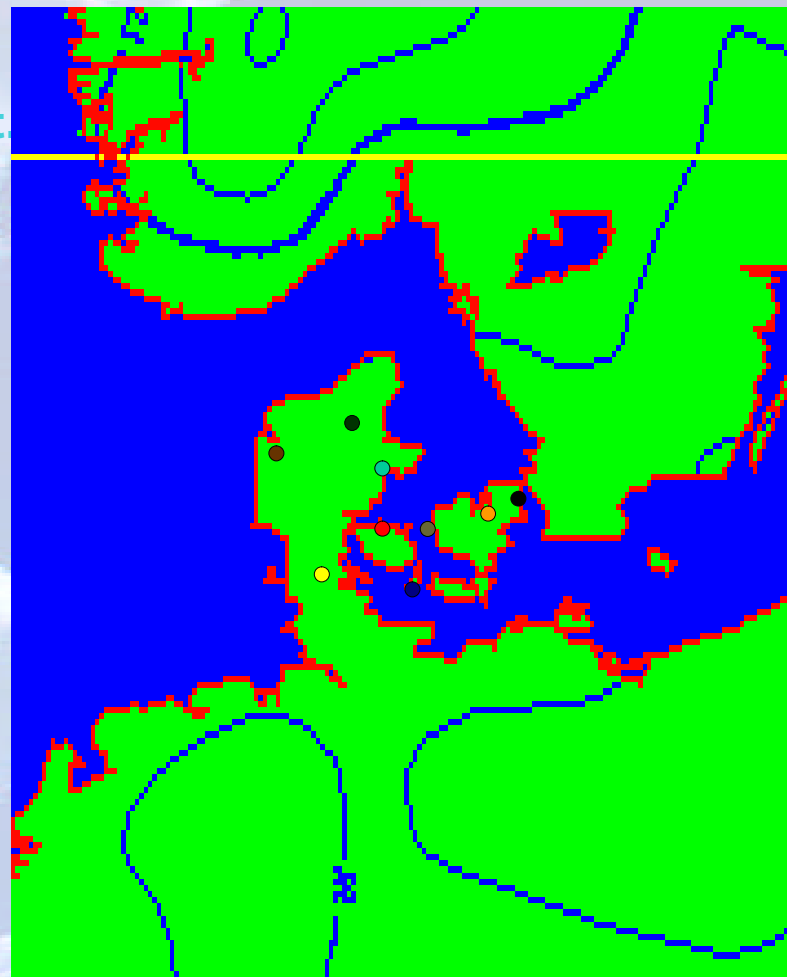
Ground Based Measurement From Denmark

- **2 stations from DMI**
- **12 stations from Danish NERI**

Near-Real Time Measurement Stations in Denmark

•Jægersborg urb.bck		O3								
•Copenhagen street		O3 NO2 NOx CO PM10 PM25 SO2 OC TC								
•Copenhagen urb.bck		O3 NO2 NOx CO PM10 PM25						Met		
•Odense street		NO2 NOx CO PM10						Met.		
•Odense urb.bck		O3 NO2 NOx PM10								
•Århus street		NO2 NOx CO PM10								
•Århus urb,bck		O3 NO2 NOx PM10						Met		
•Aalborg street		NO2 NOx CO PM10 SO2								
•Aalborg urb.bck		NO2 NOx CO PM10 SO2								
•St. Jynde vad rural	O3									
•Keldsnor rural		O3 NO2 NOx PM10								
•Ulborg rural		O3 NO2 NOx PM10								
•Li. Valby rural		O3 NO2 NOx PM10								
•Storebælt rural		O3 NO2 NOx PM10								

OC: organic carbon.
 TC: total carbon.
 Met.: meteorological measurements.
 urb.bck.: urban background.



- **All these near-real time measurements are presented at the Internet.**
- **An oral agreement between DMI and Danish NERI has been made. The measurement data presented at the Internet by Danish NERI can be down loaded and used for GEMS.**
- **Waiting for the Memorandum of Understanding before further steps are taken.**