STRACO KF-RK intercomparison

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Overview

- Why intercomparison
- Example(s)
- Description of intercomparison

KNMI

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Why intercomparison

- Now work is done on two schemes
- With mesoscale model and SREF more work for physics (and rest)
- Reduce work on normal synoptic scale as much as possible and shift towards mesoscale (in Aladin framework)
- After intercomparison, best scheme will be reference, other scheme will be held as option, work will shift to mesoscale/SREF

SMHI

KF-RK/STRACO Intercomparison with Pseudo Satellite imagery

MOTIVATION:

Clouds and precipitation are difficult to verify with ”conventional” methods due to the lack of spatial and temporal distribution of observations.

Pseudo satellite imagery helps identifying structures of clouds.

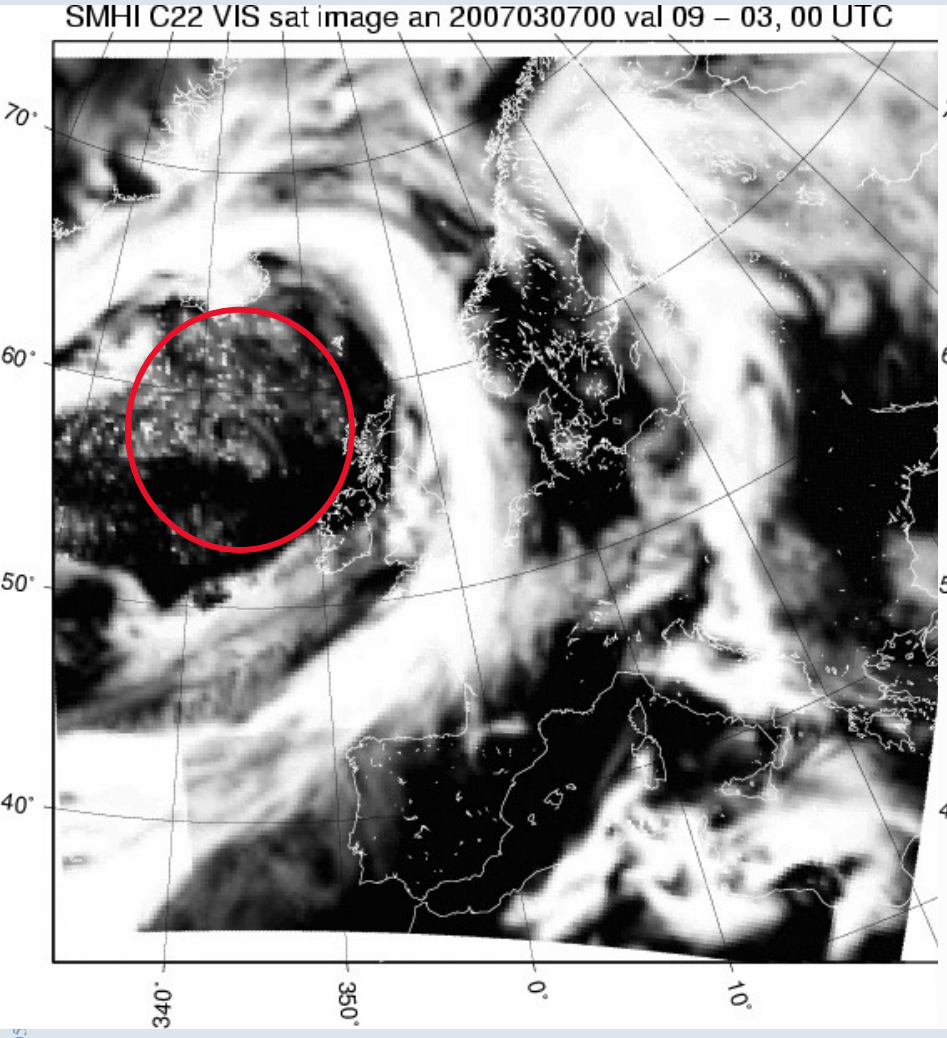
We can learn something about the two cloud schemes by comparing the difference in structure, cloud amount as well as spatial and temporal distribution of stratiform clouds, convection and fog.

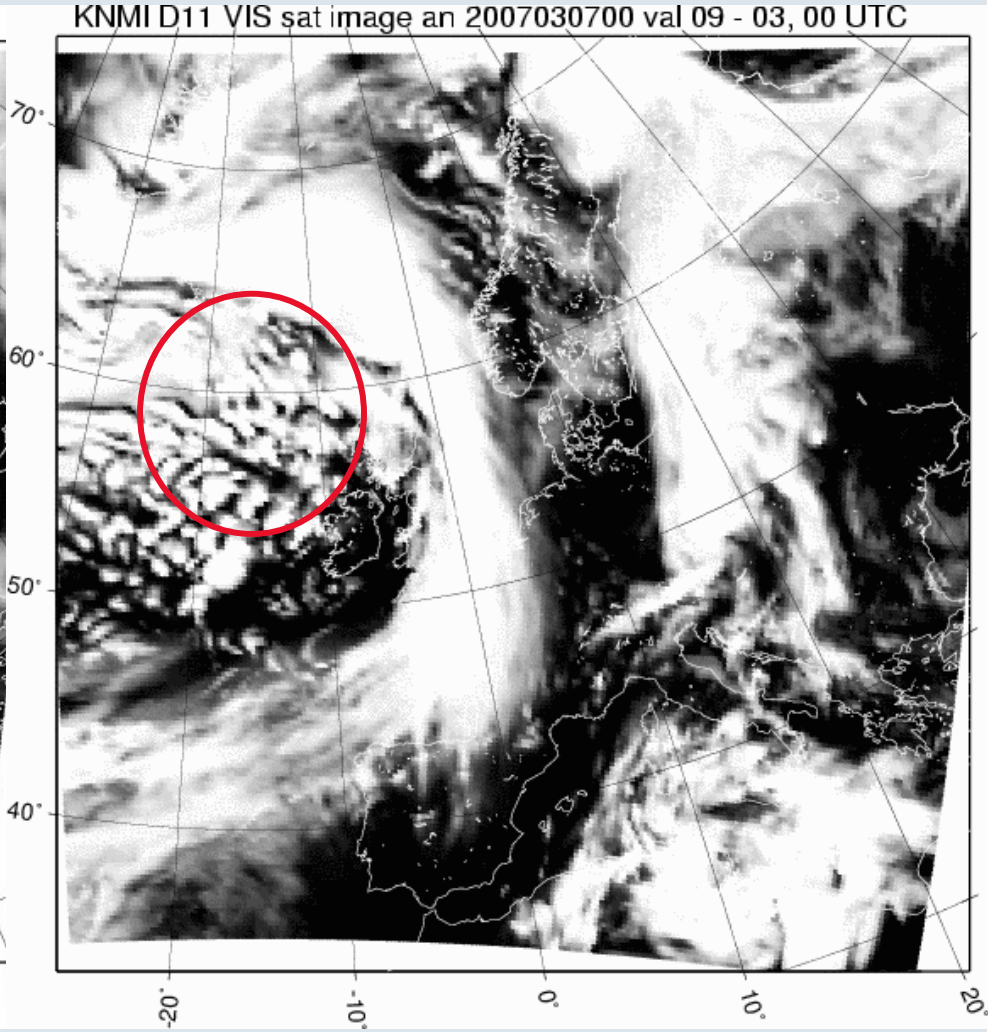
KF-RK/STRACO Intercomparison with Pseudo Satellite imagery

https://hirlam.org/~tijm/satcomp.html

KF-RK/STRACO Intercomparison

CASE example - Convection





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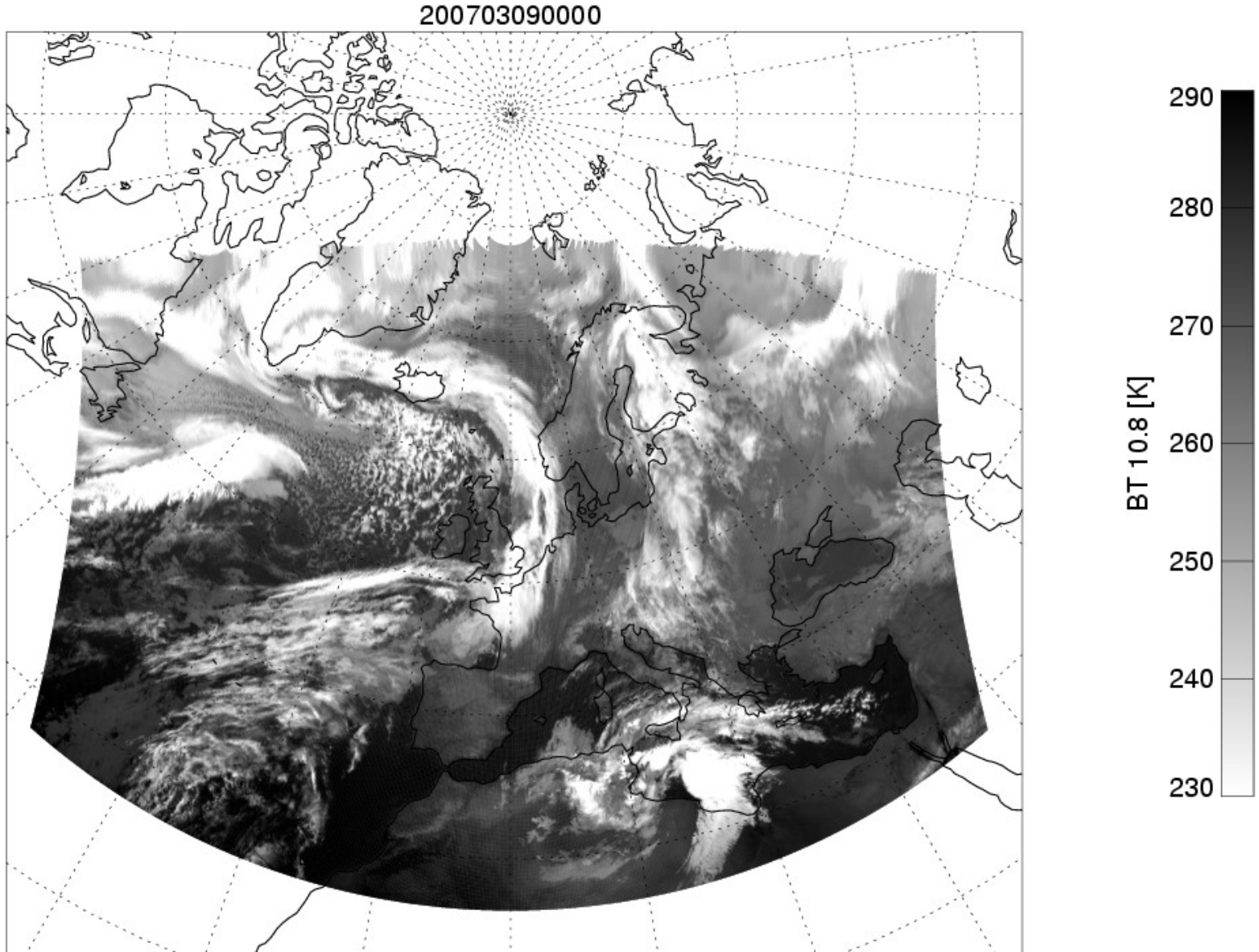
CASE example - Convection



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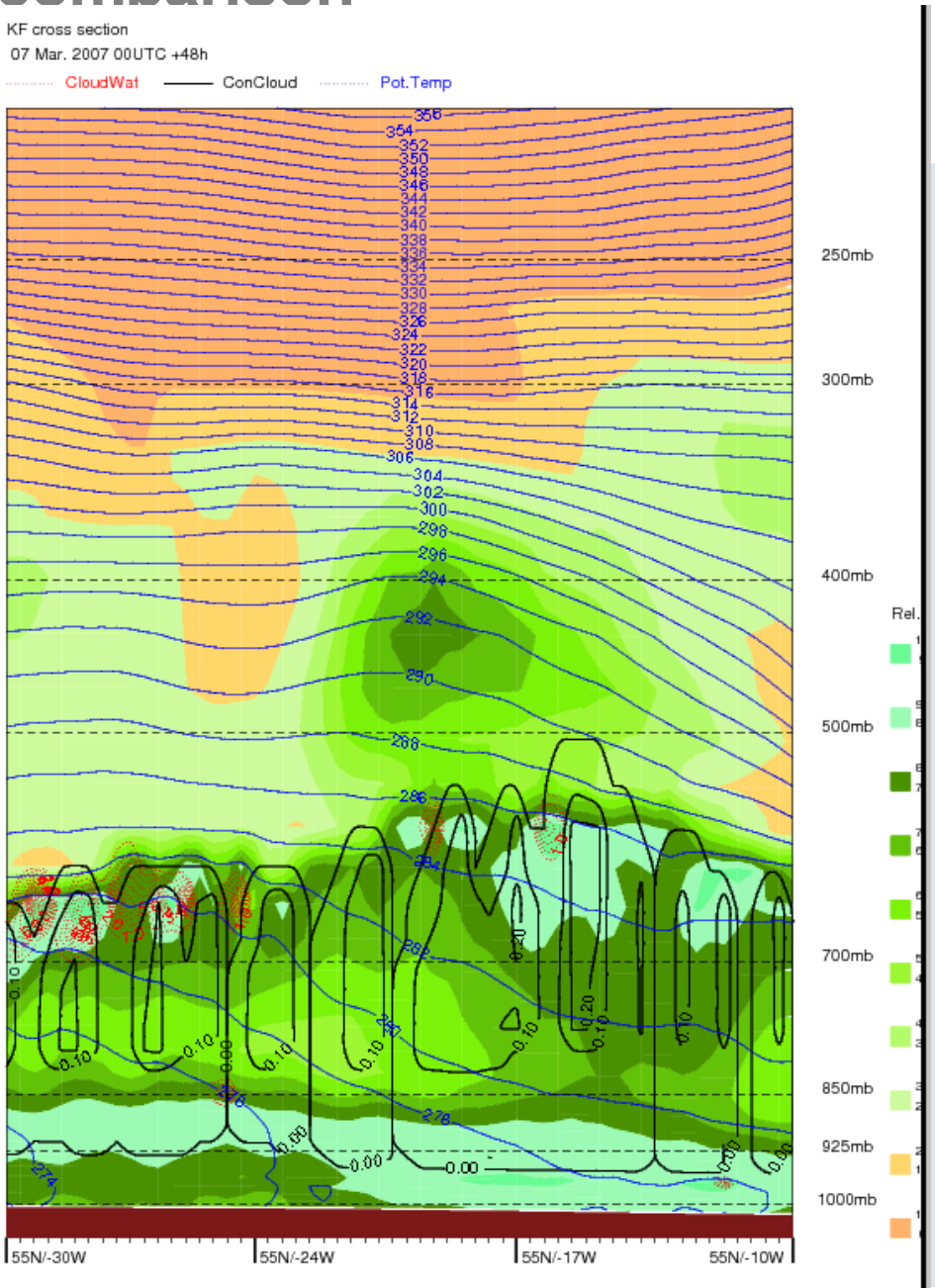
Convection

There is evidence of convective clouds, but cloud water is not produced where there is convection.

Should there be? How can this be added?

How much evaporates in at each time step, due to the strong vertical motions?



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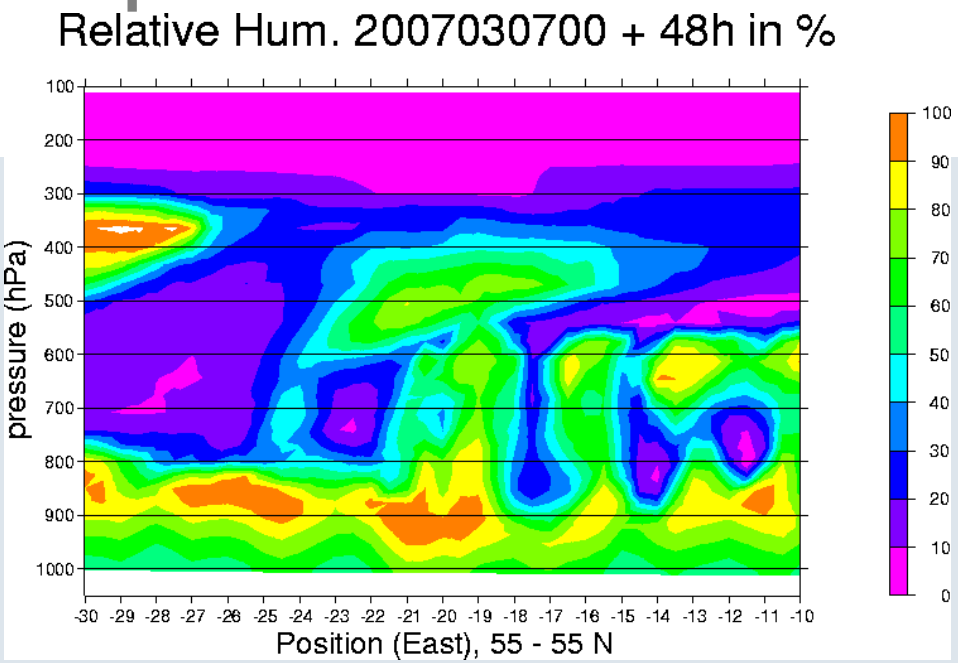
Convection

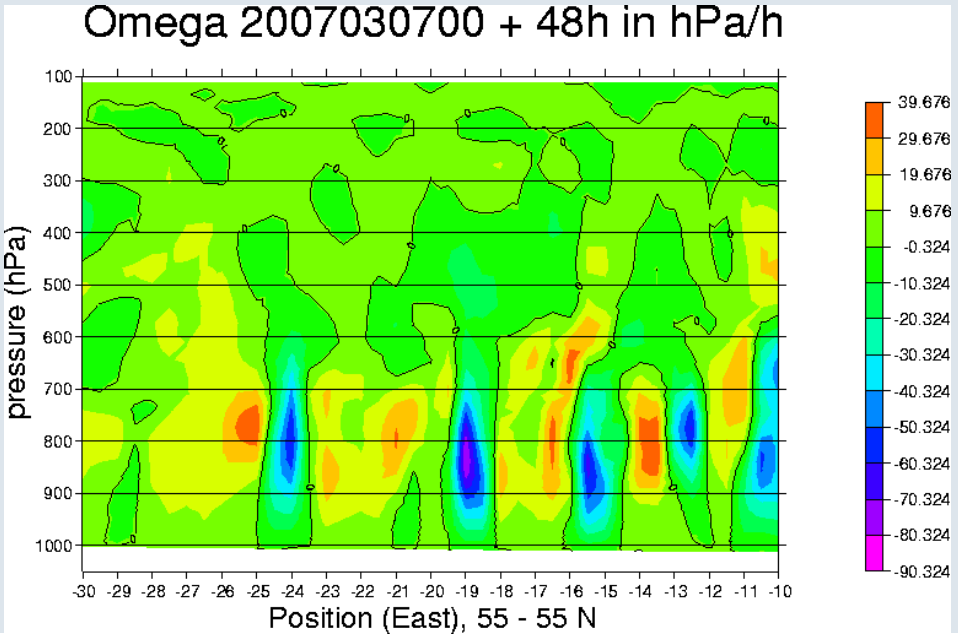
STRACO:

Relative humidity and omega plots indicate that the scheme produces its own convection on grid scale. Too many small scale developments for 11km resolution?

Minimum of less than 40% RH above the PBL. Not enough moisture is detrained from convection at the level of neutral buoyancy - Results in very large convective cells.

Needs to be tested with 7.1





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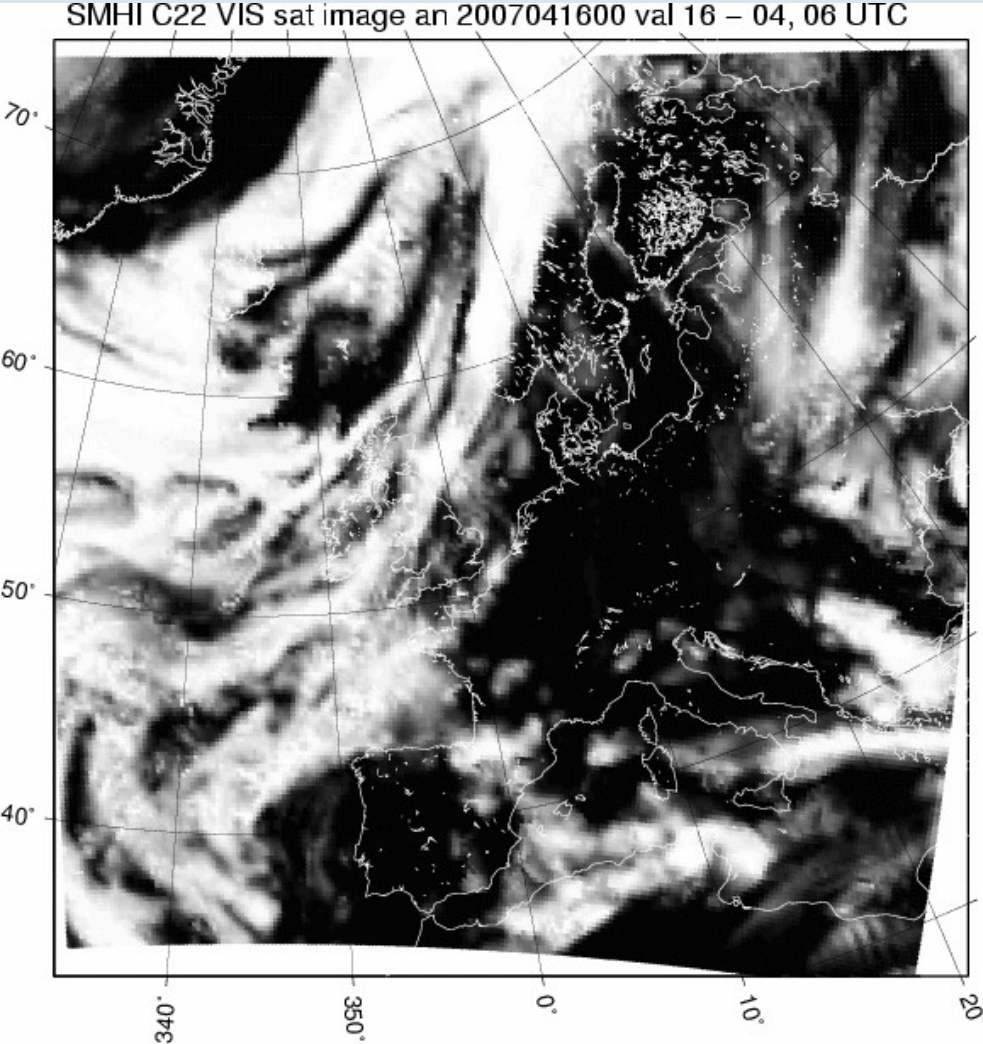
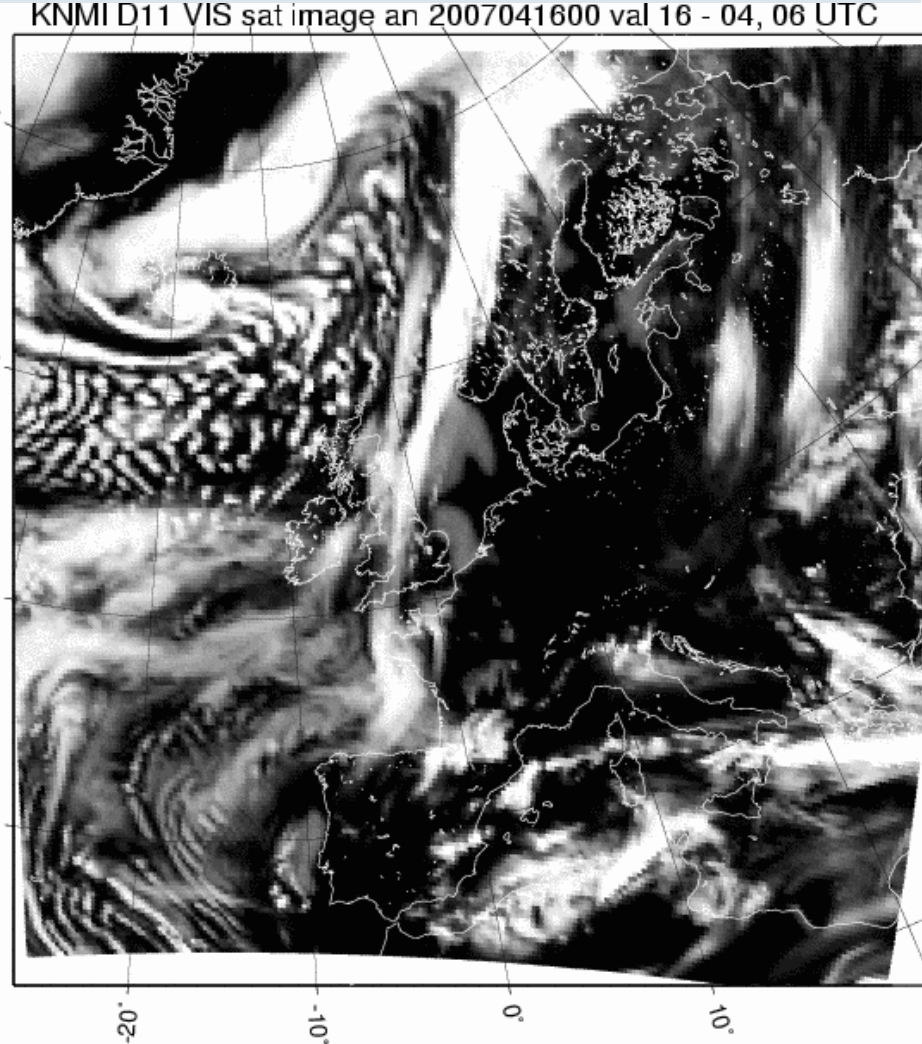
Other examples - Fog





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KF-RK/STRACO Intercomparison

Other examples - Fog

Lessons learned already

- STRACO: convection on model grid scale
- KF-RK: convection not absent, not visible in pseudo satellite imagery
- KF-RK: wavy pattern of high clouds in strong winds
- Fog over sea in both schemes far from optimal

Intercomparison

- Work on schemes until May 15
- Intercomparison on RCR domain, 60 levels, 0.15 degrees, 5 periods, 3D-Var+LSMIX
- Additional tests higher resolution, 4D-Var, newsnow
- Objective reference verification, extend with high resolution precip verification, special observation sites, daily cycle of precip, satellite verification
- Also subjective verification (severe convection, stratocumulus, fog, small precip)
- Runs in May-June, results in summer

After intercomparison

- Best scheme will be reference for 7.2
- Development effort towards mesoscale and SREF
- New subjects: interaction between EDMF and deep convection in mesoscale model (short term), physics perturbations for SREF, interaction between EDMF and deep convection parameterization on 5-10 km scale