Meso-NH modeling for COPS

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http://mesonh.aero.obs-mip.fr/mesonh/COPS/
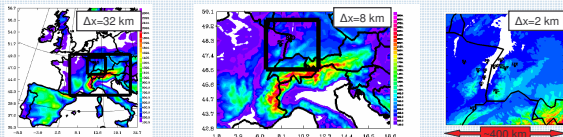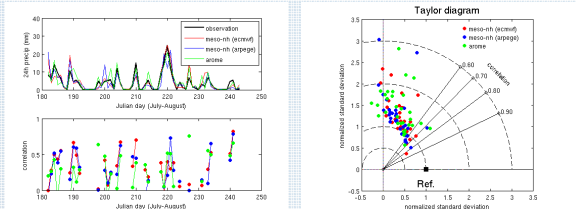
Daily 30-h Meso-NH forecasts in near-real time

Numerical setup

- 3 domains (Δx=32, 8, and 2 km) with 2-way interaction
- vertical grid with 50 levels up to 20 km (Δz=60-600 m)
- initial & coupling fields with ECMWF & ARPEGE operational analysis
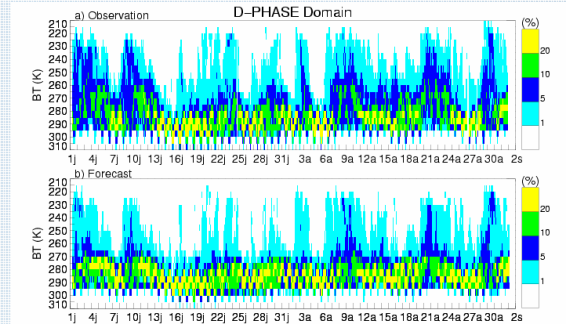- microphysics: cloud, rain, ice, snow, graupel (+hail, inner model only)
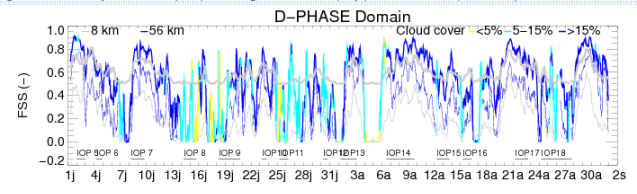

Meso-NH precipitation vs. raingauges

24-h accumulated precipitation averaged over the COPS domain

Meso-NH vs. MSG at 10.8 µm

Brightness temperature (BT) histogram from (top) MSG and (bottom) Meso-NH


Time evolution of Fractions Skill Score for BT less than 250 K

Case studies with Meso-NH

15 July: Isolated Thunderstorm

A thunderstorm developed over the Black Forest during the afternoon in a warm and dry environment that usually characterizes typical summer conditions. Results obtained from two Meso-NH simulations highlight the sensitivity of storm predictability to initial conditions. Both simulations predict the storm over the Black Forest, but the one initialized with ARPEGE analysis predicts other storms that were not observed.
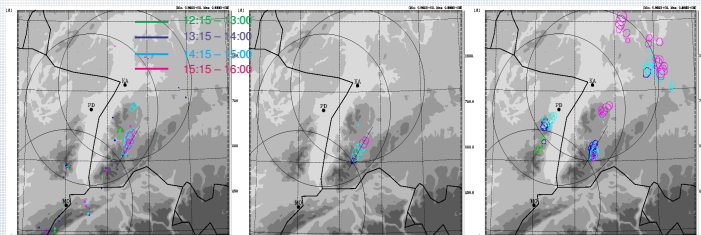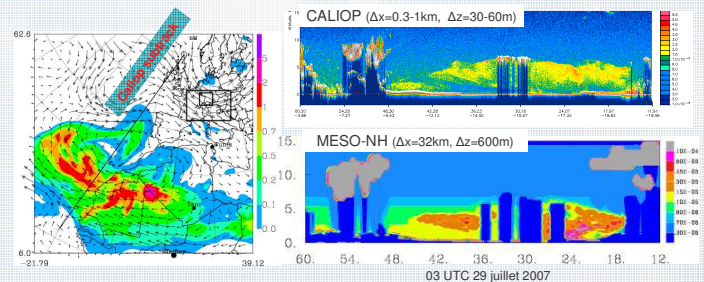

Montancy Radar Observations | Meso-NH simulation (ECMWF) | Meso-NH simulation (ARPEGE)

2O July: Squall Line

A squall line triggered over Massif Central at 00 UTC reaches the COPS area around 12 UTC and further propagates towards the Netherlands and Germany. It is realistically simulated by the model if using a enlarged 2-km domain only.

150-GHz AMSU observations at 1230 UTC (left) as compared to simulations at 1200 UTC using near-real time setup (middle) and enlarged domain with a 2-km grid mesh.

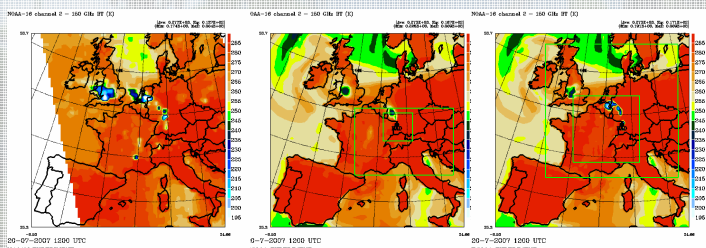### 1 August: Import of Saharan Dust

A dust layer was observed on 15 UTC 1st August by COPS lidars. The dust was emitted from Mauritania a few days before transported over the Atlantic ocean.

03 UTC 29 July 2007 (left) Dust content (g/m2) (right) vertical profile of normalized backscatter lidar signal (top right) observed from CALIPSO and (bottom right) simulated by Meso-NH.

12 & 13 August: Contrasted Convective Activities

On the 12th, convective cells mainly develop over the crests of the Vosges while on the 13th they generate in the lee and propagate downstream. The model to some extent this contrast. On the 12th the driving mechanisms is the orographic lifting whereas on the 13th convection is triggered by lee side convergence.

POLDIRAD observations (from M. Hagen)

Meso-NH simulations (2km / ECMWF)