NUMERICAL WEATHER PREDICTION AT THE DEUTSCHER WETTERDIENST

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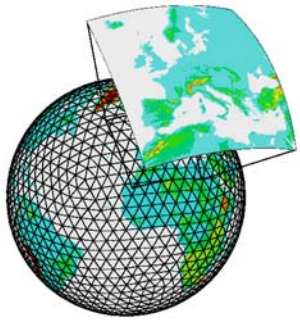
Global Model GME

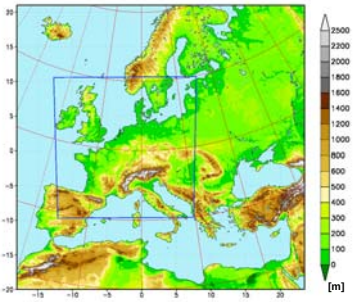
Operational hydrostatic global model
Icosahedral-hexagonal grid
Mesh size ~ 40 km, 368642 grid points/layer
40 layers, top layer at 10 hPa
Prognostic variables: u, v, T, p_s, q_v, q_c, q_i, O_3



Structure of GME grid and model domain of LME.

Lokal-Modell LME

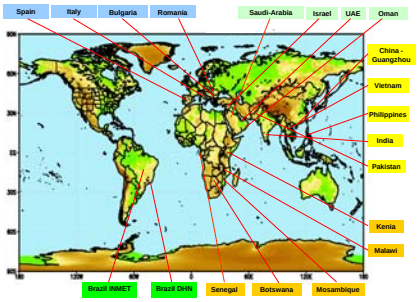
Operational non-hydrostatic, fully compressible limited area model
Rotated latitude-longitude grid
Mesh size ~ 7 km, 665 x 657 grid points/layer
40 layers, top layer at 30 hPa
Prognostic variables: u, v, w, T, p´, q_v, q_c, q_i, q_r, q_s, TKE



Model domains of LME and the former LM (blue frame).

High-resolution Regional Model HRM

Operational hydrostatic regional model at about 20 NMS worldwide
Rotated (regular) latitude-longitude grid
Mesh size ~ 7 - 28 km, different model domains
20 to 40 layers, top layer at 10 hPa
Prognostic variables: u, v, T, p_s, q_v, q_c, q_i



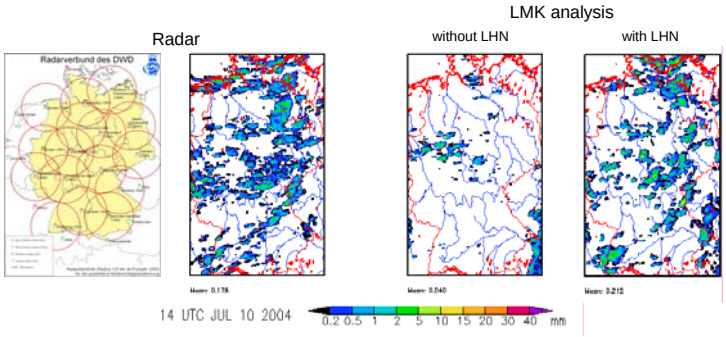
HRM group.

Goals:

Development of a model-based NWP system for very short range (‘*Kürzestfrist*’) forecasts (18 h) of severe weather events on the meso-γ scale, especially those related to

- **deep moist convection (super- and multi-cell thunderstorms, squall-lines, MCCs, rainbands,...)**
- **interactions with fine-scale topography (severe downslope winds, Föhn-storms, flash floodings, fog, ...)**

LM „Kürzestfrist“ LMK

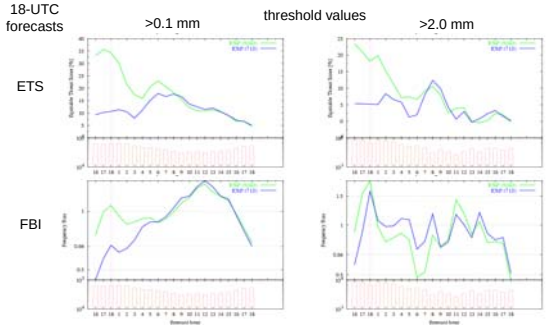


Hourly accumulated precipitation amount in mm on 10 July 2004, 13-14 UTC. Comparison between radar observation and LMK analyses with and without latent heat nudging (LHN). The latent heat nudging clearly improves the result.

Outline:

Model for very short-range NWP
Runge-Kutta 3rd order (2 time level) time-splitting scheme
5th order upwind horizontal advection
6-class cloud microphysics scheme
no deep convection parameterization
Mesh size ~ 2.8 km, 421 x 461 grid points/layer
50 layers, top layer at 22 km above mean sea level
Prognostic variables: u, v, w, T´, p´, q_v, q_c, q_i, q_r, q_s, q_g, TKE

Pre-operational since 14 Aug. 2006
Targeted operational use: Spring 2007



Scores for hourly precipitation: with latent heat nudging / without latent heat nudging
Free forecast starts at purple line

Positive impact of latent heat nudging during the first 4...5 forecast hours, 07 - 16 July 2004.