ENVIRONMENTAL AGENCY
OF THE REPUBLIC OF SLOVENIA

Jure Cedilnik
Jure Jerman
Neva Pristov
Mark Žagar

Limited Area Modeling in Slovenia - 2008

neva.pristov@rzs-hm.si

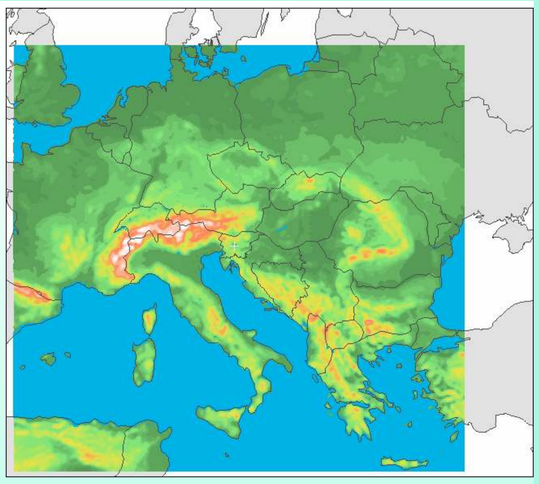
Chair for Meteorology
University of Ljubljana
Benedikt Strajnar

The operational ALADIN

(contact: neva.pristov@rzs-hm.si)

Characteristics of the operational ALADIN/SI model configuration:

- model version: AL32T3 using ALARO with 3MT physics
- integration four times per day: 00 UTC (72h), 06 UTC (60h), 12 UTC (72h), 18 UTC (48h),
- 9.5 km horizontal grid spacing,
- 43 vertical model levels,
- linear spectral elliptic truncation (E134x127, 258*244 points, with extension zone 270*256),
- Lambert projection,
- 400 s time-step,
- initial and lateral boundary conditions from ARPEGE,
- coupling at every 3 hours,
- digital filter initialization.



Operational ALADIN/SI domain

Operational suite is running in Supervisor Monitor Scheduler, ECMWF product. The computer system and operational suite is controlled by NAGIOS supervision system.

Goal for higher resolution and cycling

ALADIN 3MT configuration with resolution 4.4 km,

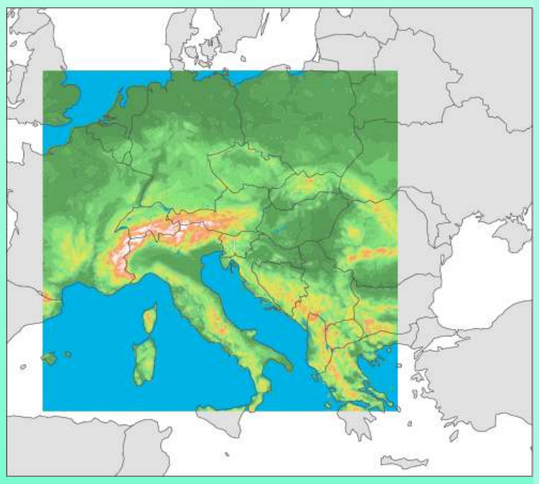
- in parallel suite since August,
- 00,12 UTC forecast range +30h.

CANARI surface analysis,

- installation has been validated,
- ready to be implemented into operational use.

Plans:

- upper-air blending (for prognostic variables),
- AROME, ALARO on 2.5km resolution on request.



ALADIN 4.4km domain, 439x421 points

Evaluation of ALADIN 4.4 km

(contact: mark.zagar@gov.si)

The 3MT scheme performance was evaluated on a few strong convective cases in Slovenia during the summer:

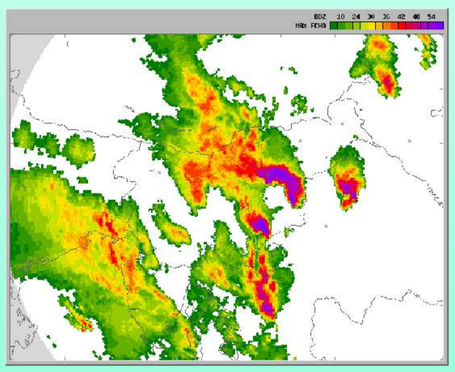
- the simulations on 4km resolution produce realistic features,
- the issue of a proper length of the time-step has been repeatedly raised.

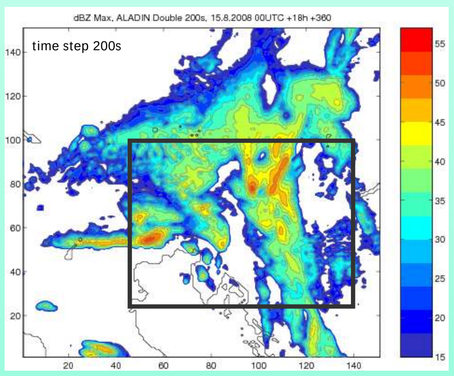
Severe thunderstorms case of August 15th 2008:

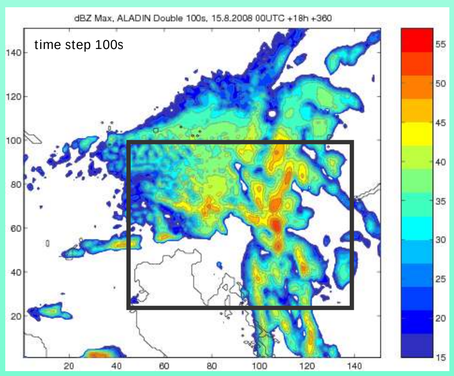
- ALADIN with 3MT, 4.4km grid, 43 levels,
- cold run,
- well reproduced main features of the situation,
- simulated radar reflectivity was computed from ALADIN liquid and solid precipitation field,
- height of the freezing level influences the reflectivity through melting of the snow.

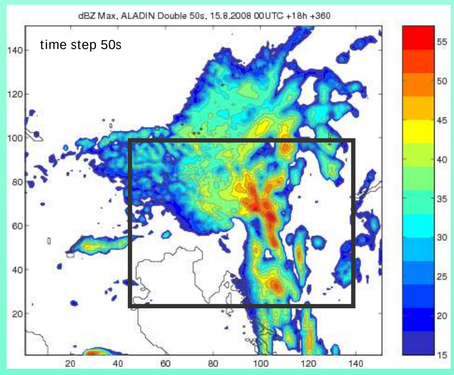
The model performance was tested against the length of the time step: 200 (default), 100 and 50 seconds. Results change significantly even between 100 and 50 seconds. The subjective evaluation of the results clearly indicates that

- simulated field structure is best with the shortest time step and
- the differences between 200 and 100 seconds are much larger than those between 100 and 50 seconds, indicating that the later is probably short enough.









Observed radar reflectivity on 16th August 2008, 00UTC, simulated radar reflectivity at 2008/08/15 00UTC+24h using time-step 200s, 100s and 50s.

The computer system S.I. Altix ICE 8200

(contact: jure.jerman@rzs-hm.si)

Technical characteristics:

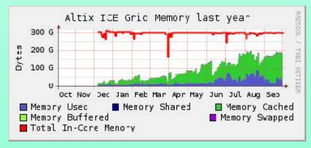
- 35 compute nodes in a single rack,
- 8 GB of memory and 2 Quad core Intel Xeon 5355 processors per node,
- 300 cores,
- two Infiniband DDR networks, one for IO and the other for MPI communication,
- additional 7 service nodes for login, management, control and IO operations,
- a dedicated NAS IO node with 15 TB FC disk array.

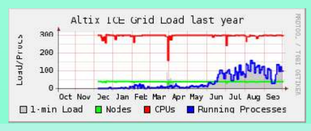
System software:

- S.I. ProPack on top of SLES 10,
- Scali Connect MPI, SGI MPI,
- Altair PBSPro queuing system,
- Intel 10.1.Fortran compilers.

Migration to the new computer system:

- 30.11.2007: delivery
- December, January: installation
- 29.02.2008: ALADIN runs daily
- 23.04.2008: ALADIN in daily parallel run
- 16.06.2008: ALADIN runs operationally

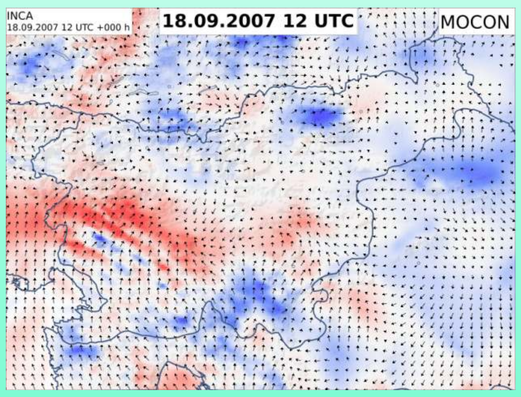


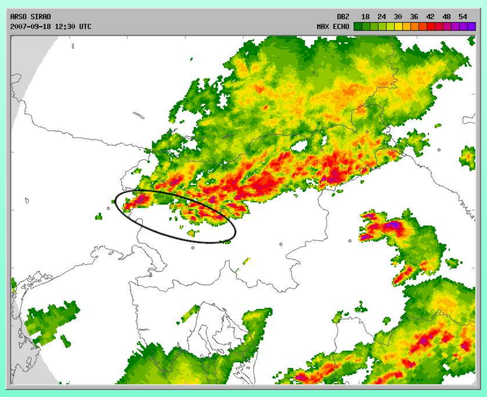


INCA analysis and nowcasting system

(contact: benedikt.strajnar@rzs-hm.si)

- running in pre-operational mode under SMS,
- resolution 1x1km, 401x301 points,
- NWP input: ALADIN fields,
- observations: temperature, humidity, wind and precipitation from AMSs, SYNOPs and radar measurements,
- nowcasting initiated from the analysis and converging to NWP model after 12 hours,
- temperature, humidity, wind and several convective indices are updated hourly,
- precipitation type, rain and snow rate products are updated every half an hour,
- is subject to validation by the forecasters, further evaluation planned.





INCA MOCON analysis valid at 18.9.2007 12 UTC and radar reflectivity half an hour later. Area with high moisture convergence corresponds to the trigering of stationary convection.

Spatially varying background error variances in ALADIN

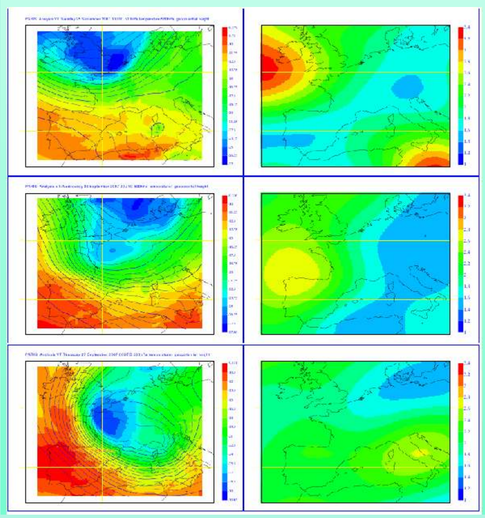
(contact: benedikt.strajnar@rzs-hm.si)

The implementation consists of:

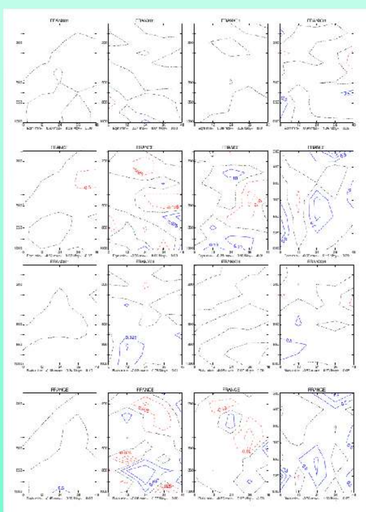
- geographically dependent vorticity background errors from Arpege analysis ensemble are specified at grid points,
- humidity background errors are determined at grid points from background humidity and temperature fields.

Impact of using climatological vs. daily background errors is compared:

- climatological background errors perform similar to spectral specification,
- daily background errors mainly improve humidity and possibly precipitation.



500 hPa geopotential and temperature (left column) and corresponding vorticity (10^{-5} s^{-1}, right column) background errors developing synoptic system.



Verification scores for daily background errors experiment: geopotential, temperature, wind and relative humidity (columns, respectively). RMSE (top half) and BIAS (bottom half) over Europe (FRANX01) and France. Improvements are marked in blue, degradations in red.