NWP at Croatian Meteorological and Hydrological Service

22nd ALADIN Workshop & HIRLAM All Staff Meeting 2012, Marrakech, Morocco

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Current status of the operational suite

Computer

- SGI Altix LSB-3700 BX2 Server with 56 Intel Itanium2 1.6GHz/6MB
- 112 GB standard system memory
- 2x146 GB/10Krpm SCSI disk drive, 3 Tb scratch disk
- Storage: 32Tb online data + tapes
- OS SUSE Linux Enterprise Server 9 for IPF with SGI Package
- Compilers: Intel Fortran version 9.0.031 & C++ version 9.1.053
- Queuing system (PBS Pro version PBSPro_11.1.0.111761)
- Main users: NWP, Air-quality modelling & Climate modelling

LBC files and transmission lines

- global model ARPEGE, coupling frequency 3 hours
- Internet and RMDCN through ecgate as backup from July 2006
- IFS coupling files from October 2010, used for Case studies

Products on Internet-automaticaly generated

- Fields: http://prognoza.hr/karte.php?id=aladin&param=&it=
- Weather symbols: http://prognoza.hr/tri_karta_e.php?id=tri&param=Istarska&code=Pula
- Marine forecast: http://prognoza.hr/nauticari_e.php?id=nauticari

Domains, model set-ups and forecast range
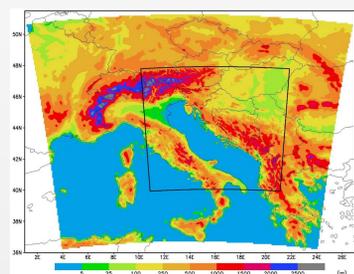

ALADIN HR domain:

- 8 km horizontal resolution
- 37 levels, 229x205 (240x216) grid points
- 32T3: ALARO0-3MT, old radiation scheme, DFI
- 72 hours forecast, 1-3 hourly output

HRDA domain:

- 2 km horizontal resolution: 439x439 (450x450) grid points
- hourly 2 km dynamical adaptation up to 72 hrs @ 15 levels for 10 m wind forecast, model version AL29T2-mxl
- 24 hrs 2 km full NH model run @ 37 levels, model version AL36T1, ALARO0 set-up (operational since July 2011.)
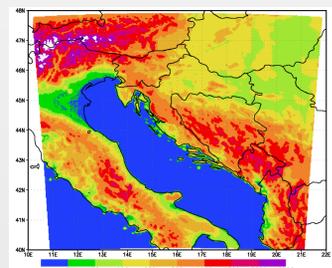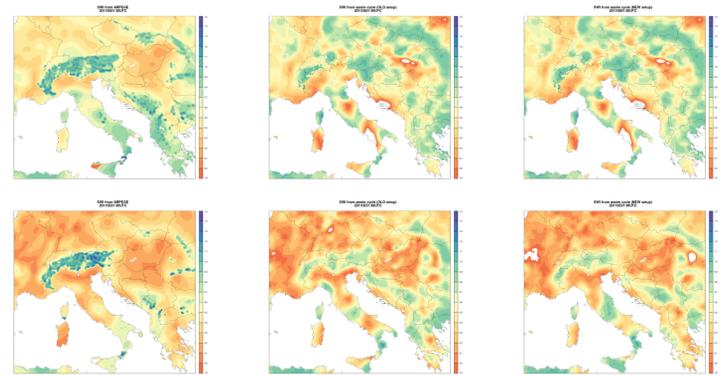
Data assimilation
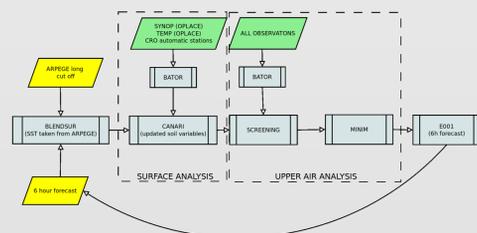
Scheme of the assimilation cycle setup at DHMZ.

- operational from November 2011.
- Cycling: 4 times per day; LBC: long cut off ARPEGE files; before production last 3 cycles are re-run to have as much as possible data used
- Production: twice per day at 00 and 12 UTC, 72h forecast; LBC: short cut off ARPEGE files
- Observations used: SYNOP, TEMP, AIREP, GEOWIND, satellite radiances (NOAA, MSG)
- Data source: OPLACE and Croatian automatic stations
- B matrix: SNMC method, ~100 days, no tuning
- B matrix - computed also with ensemble method for same period as SNMC and for seasons (more on poster about B matrix)

CANARI tuning

- problems with T2m and RH2m verification scores for summer period
- better results obtained when soil from ARPEGE analysis is used - problem with CANARI?

- tuning of CANARI analysis:
  - model standard deviations, horizontal length scale, orolim and orodif
  - blacklisting of suspicious observations
- warm up period for assimilation cycle with new setup: 20110501-20110519
- testing period for which verification scores were calculated: 20110520-20110531

SWI at 00 UTC 01.05.2011. (first row) and at 00 UTC 31.05.2011. (bottom row). First column: ARPEGE long cut off analysis. Second column: 6h forecast from assimilation cycle (old setup). Third column: 6h forecast from assimilation cycle (new setup).
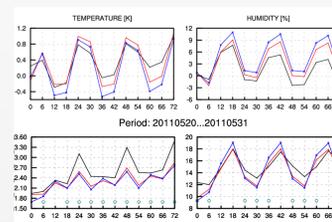

Evolution of BIAS (top row) and RMSE (bottom row) with forecast range. Alar (black) - dynamical adaptation, CV00 (blue) - assimilation cycle (old setup), CatC - assimilation cycle (new setup)
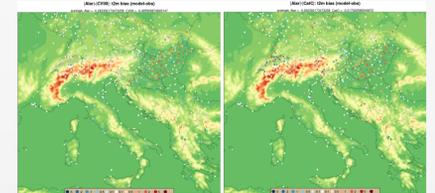
Difference between absolute value of t2m BIAS for Alar and absolute value of t2m BIAS for CV00 (left) or CatC (right) calculated for SYNOP stations in model domain, for period 20110520-20110531 and for +12h forecast range.

2 km ALADIN-NH version run

- since 1st July 2011 - operational 24 hour forecast starting at 06 UTC
- 439x439 (450x450) grid points @ 37 levels
- AL36T1 model version with the ALARO0 set-up of the physics parametrizations
- initial and boundary condition - 8 km operational model forecast
- initial file is 6 hrs forecast from the 8 km run started at 00 UTC, LBC frequency is 1 hour
- scale selective digital filter for initialization
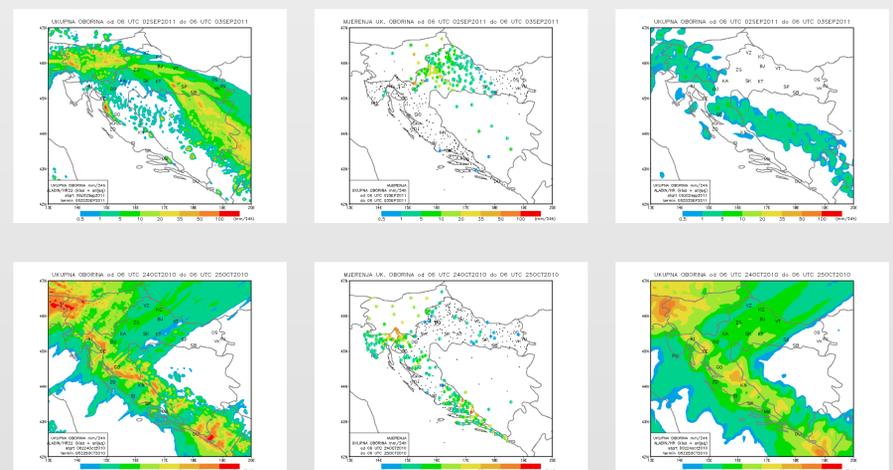
Forecast of the 24 hourly accumulated precipitation in 2 km resolution (left column), available rain gauge measurements (middle column) and 8 km forecast (right column) are shown for 2 days with precipitation: 02-03 September 2011 (top row) and 24-25 October 2010 (bottom row).

Future plans

- change CANARI setup for at least summer
- test with seasonal B matrix computed with ensamble method; tuning of B matrix
- preparation for assimilation of radar data in ALARO (or AROME)
- understand and resolve precipitation problem near steep orography for 2 km ALADIN-NH run
- test with ALARO-1 version at 8 km and 2 km resolutions
- test coupling using IFS LBC (possibly 1hr frequency)
- include more available automatic stations (e.g. from Slovenia) in assimilation