NWP in Croatian Meteorological and Hydrological Service

Current status of the operational suite

Computer
SGI Altix LSB-3700 BX2 Server with 24 Intel Itanium2 1.6GHz/6MB
48 GB standard system memory, 2x146 GB/10Krpm SCSI disk drive
OS SUSE Linux Enterprise Server 9 for IPF with SGI Package
Intel Fortran & C++ compilers version 9.0.031
Queuing system (PBS Pro)

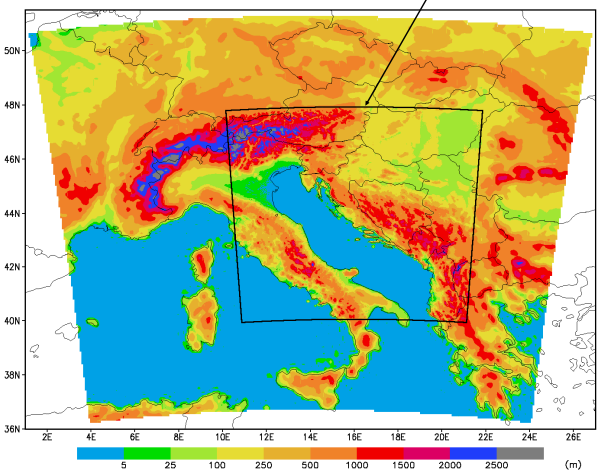
LBC files and lines
global model ARPEGE, coupling frequency 3 hrs
Internet and **RMDCN** through ecgate as backup from July 2006

Products on Internet
http://prognoza.hr/karte_e.php?id=aladin&param=&it=
http://www.dhmz.htnet.hr/prognoza/karte_e.php?id=aladin&param=&it=

Domains, model set-ups and forecast range

8 km - main integration domain: 8 km horizontal resolution, 37 levels in the vertical, 229x205 (240x216) grid points, Corners: SW (36.18,3.90), NE (50.68,26.90) **AL32T3** – ALARO0-3MT version with old radiation scheme 72 hrs forecast range with 1 or 3 hrs time resolution depending on product type, Digital Filter Initialisation.

2 km - high resolution dynamical adaptation domain:
- 10 m mean wind and wind gust forecast,
- 2 km horizontal resolution,
- 15 levels in the vertical,
- 439x439 (450x450) grid points.

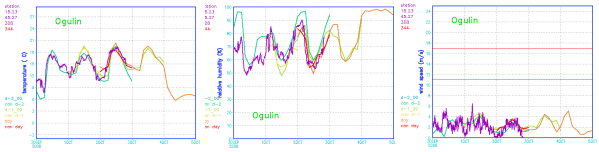


Major changes in operational suite from the last EWGLAM

- Reduction of the operational suite to one model version Alaro0-3MT, after more than one year of parallel suite (Dec 2006-Feb 2008),
- Change of the operational version from AL29T2mxl to AL32T3 at the end of February 2008,
- Introduction of the huge 2 km domain for 10 m wind dynamical adaptation instead of 6 small ones (problems with lateral boundary conditions disappear and it is much easier to control the operational suite),
- Replacement of the old visualisation machines with new Linux machine, number of the operational machines for visualisation of the operational products and operational verification results reduced from 6 to only 1,
- Start of the preoperational assimilation parallel suite (at the moment just cycling of the surface OI),
- Start with operational production of the ALADIN meteorological input for RODOS dispersion model.

Start of the preoperational assimilation suite

Preoperational assimilation suite (at the moment just for SINOP data CANARI OI inside) starts after a lot of trouble with installation and conversion of the measurements in proper format. Surface fields over land inside assimilation cycle are output from the CANARI OI applied on 6 hrs forecast from the last assimilation cycle serving as guess. BC, upper-air fields and surface fields over sea are taken from ARPEGE long cut-off. Temporally 6 hrs forecast from assimilation cycle + CANARI OI for surface fields are used as initial file for 24 hrs forecast event. Newest short cut-off coupling files are used for BC same like it is in dynamical adaptation mode.



Figures above: comparison of the 00 UTC 72 hrs operational forecasts and 24 hrs test assimilation forecast and surface automatic meteorological station data. Left 2m Temperature, centre 2m Relative Humidity and right 10m Mean wind speed.

XXX EWGLAM & XV SRNWP
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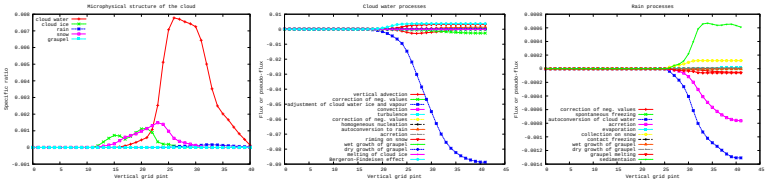
Alica Bajić, Stjepan Ivatek-Šahdan,
Tomislav Kovačić, Lukša Kraljević, Antonio Stanešić
Meteorological and Hydrological Service,
Grič 3, HR-10000 Zagreb, Croatia

Research and application activities

DDH for AROME

DDH is a diagnostic tool. It can be used to study atmospheric processes by means of numerical model, or to study model performances. For both of these uses we must be sure that DDH output has no errors and that it exactly represents that what is going on in the model. In AROME, that takes physical parameterization from French MesoNH, many MesoNH subroutines were used to get data for DDH. To verify that such combination of procedures works well all parts of DDH in AROME were tested. Tests showed that DDH is a reliable and has no errors. To illustrate some of the usage of DDH figures show plots of microphysical cloud structure and processes in which cloud water and rain take part. In short terms this plots show rain formation process in this particular cloud.

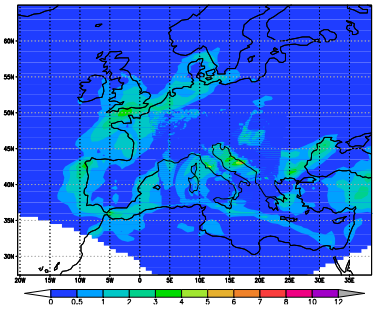
Plots are made by tools developed during DDH testing and GNUPLOT was used for plotting.



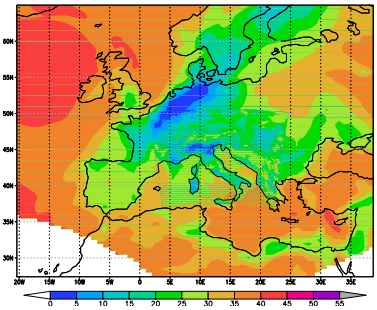
EMEP4HR

The Environmental Modelling and Evaluation Programme for Croatia (EMEP4HR) project is a joint project of Norwegian and Croatian meteorological services. It is based on the Unified EMEP model that simulates atmospheric transport and deposition of acidifying and eutrophying compounds, as well as photo-oxidants and particulate matter over Europe. Project started in 2006, and is due to last until 2010. Its main purpose is to develop and test an operative framework for environmental control of air pollution problems in Croatia.

The resulted EMEP4HR model is EMEP chemical transport model setup run at 10 km resolution and forced with ALADIN meteorology. It is nested into EMEP runs at 50 km resolution forced with HIRLAM meteorology. EMEP4HR domain is nested inside of EMEP 50 km domain.



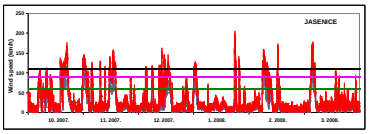
Left - daily sulphate wet deposition fields. Main factors affecting the wet deposition of sulphates are precipitation and wind patterns.



Right - daily average ozone concentrations. Main factors affecting the ozone concentrations are sunshine and NO_x emissions.

Anemo-alarm

Anemo-alarm is a product developed specially for road safety. Now it is operational for more than year. Users were satisfied with an hourly Aladin dynamical adaptation forecast of wind most of the time. Usually Bura start is well forecasted with a precision 0-2 hours. Forecasted wind speed is under predicted for the most stations located near the mountains. Situations with closed roads are almost normal, typically they occur more than once per month during the cold 6 months. There is still some place for improvement. Namely, from time to time there is a few hours gap between measured and forecasted high wind speeds. Most probable reasons are high low level jet which do not reach measurement level or to big discrepancy between the model orography and terrain.



Time series mean wind (blue) and wind gust (red) at Jasenice station below Velebit mountain, October 2007-March 2008. Horizontal lines are critical wind values for safe road traffic depending on vehicle type (60, 90 & 110 km/h).

Example of the well predicted Bura for Station Most Pag 2. Red lines represents wind gust, blue mean wind speed and green wind direction. Light lines represent Aladin 2km dynamical adaptation forecast, heavy lines represents measurements.