

**Operational and other ALADIN activities
in Meteorological and Hydrological Service
of Croatia**

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1. Summary

The operational suite has suffered from numerous problems with hardware. The operational ALADIN forecast did run as scheduled, only the time it finished was delayed by up to one hour.

2. Operational suite

2.1 Status

ALADIN is operationally run twice a day, for 00 and 12 UTC. Coupling files are retrieved from ARPEGE (Météo-France global model) via internet and RETIM2000. Model resolutions are 12.2 km for LACE domain, 8 km for Croatian and 2 km for the high-resolution dynamical adaptation domains. The execution of the suite is controlled by OpenPBS (Portable Batch System) as queuing system.

Initialisation of ALADIN on LACE domain is provided by Digital Filter Initialisation (DFI). Coupling frequency and frequency of output files for the LACE and Croatian domains are 3 hours. When the 48 hours forecast on LACE domain is finished, 48 hours forecast for Croatian domain starts, without initialisation, with coupling files from LACE.

Visualisation of numerous meteorological fields are done on LINUX PC. Comparison of forecasts with SYNOP data are done hourly for today's and yesterday's forecasts. The products are available on Intranet & Internet. Internet address with some of the ALADIN products, like total precipitation and 10 m wind : http://prognoza.hr/aladin_prognoza_e.html .

2.2 Domains

Horizontal resolution of the LACE domain is 12.2 km, with 37 levels in the vertical, time-step 514 sec, 229x205 grid points (240x216 with extension zone). Corners: SW (34.00N,2.18E), NE (55.62N,39.08E).

Horizontal resolution of Croatian domains is 8 km, with 37 levels in the vertical, time-step 327 sec, 169x149 grid points (180x160). Corners: SW (39.00N,5.25E), NE (49.57N,22.30E).

6 domains are used for the dynamical adaptation of the wind field in the lower troposphere to 2-km resolution orography for mountainous parts of Croatia. Dynamical adaptation is run sequentially for each output file, with 3 hour interval. In the dynamical adaptation meteorological fields are first interpolated from input 8-km resolution to the dynamical adaptation 2-km resolution. The same file is used as initial and as coupling file.

2.3 Operational model version

The operational model version is AL25T1 export version.

2.4 Problems

4th May 2005, 4 disks of the RAID5 system collapsed, machine was re-established by the end of May, all data connected to research and a part of operationally stored data (1.5 Tb) were lost.

12th May 2005, 4 processors on the SGI became useless due to a broken switch that was repaired the next day, and lost again the day after. 18th May 2005, 2 processors became permanently gone and got replaced on 31st May 2005.

2.5 Plans

Switch to a configuration of AL28T3 without envelope, new gravity wave drag, cloudiness and radiation packages and semi-Lagrangian horizontal diffusion. The new snow scheme will be used after the required fields become available in the coupling files.

Switch to a single big domain with 8 km resolution in the place of the LACE and the current operational Croatian domain and prolongate the forecast range to 54 hours. The increase of the

vertical resolution is being considered.

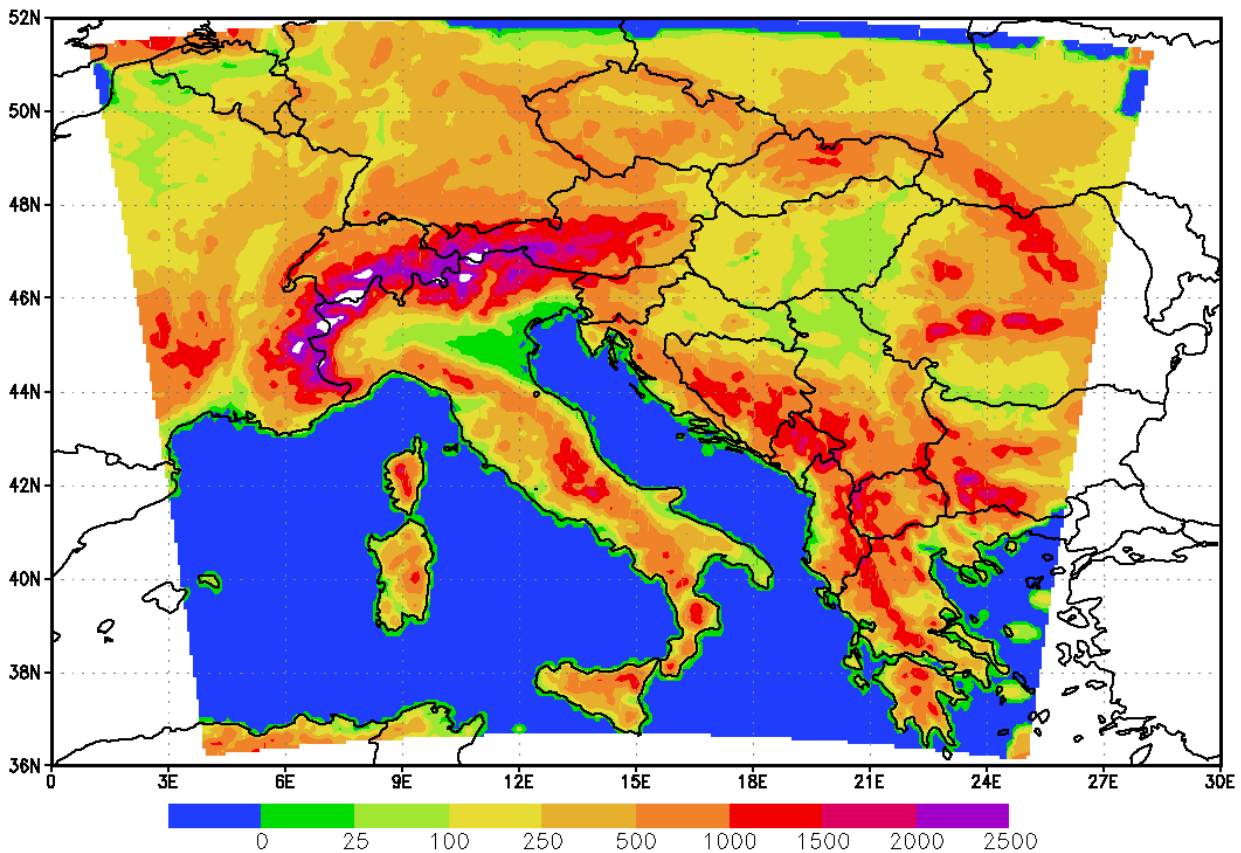


Figure 1. Planned new Croatian domain.

3. Research

3.1 Semi-Lagrangian horizontal diffusion

Semi-Lagrangian Horizontal Diffusion (SLHD) shows beneficial impact on the reduction of the overestimated cyclone intensity, correction of cyclone position while not altering a good intensity prediction and improvement of fog forecast in the valleys in an anticyclone.

3.2 Radiation and cloudiness

Unsatisfactory model forecast in fog has encouraged a study of alternative radiation and cloudiness schemes combined with different cloud overlap assumptions.

3.3 Envelope or not?

Removal of envelope and changes in gravity wave drag parametrization result in stronger winds on the windward and generally weaker winds on the leeward side of the obstacles, as well as mountain wave amplitude reduction and smoothing.

3.4 Vertical structure of bura flow

ALADIN 8 km and 2 km resolution dynamical adaptation forecasts and COAMPS NH 3 km resolution forecast are compared to the aircraft measurements showing that ALADIN is able to reproduce the structure of PV banners, especially the 2 km resolution run.

3.5 Sensitivity to the initial conditions

Different initial and boundary conditions were used to run the ALADIN forecast: operational ARPEGE from 1999, ECMWF reanalysis from 2003 and a mixture of ECMWF upper-air and ARPEGE surface fields. Results of the numerical experiments show the higher sensitivity to the initial conditions for the MAP IOP 5 heavy precipitation case. Looking only on the wind field forecast during the MAP IOP 15, different initial conditions do not have a significant influence.

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