Status of ALADIN activities in Portugal

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1. Summary of main activity

Several changes have taken place on the local team and NWP systems in Portugal since last year. Human resources have been strategically chosen in order to allow fast progress of the local team. In this way although an extra effort has been put on the training of newcomers, the upgrade of ALADIN local version will change before the end of May from AL12_bf02 to CY28T3 with the enlargement of the forecast area to the west (adjacent Atlantic Ocean). Tests on the installation of ALADIN on a PC cluster of 6 AMD64 dual core processors using the private Linux distribution PaiPix/IM have been successful, allowing us to run the local CY29T2 version of the model in about 10 minutes. From end of May on, objective verification procedures will allow us to compare HIRLAM/Spain and MM5/Portugal with operational ALADIN/Portugal on part of Peninsula Iberian and adjacent Atlantic Ocean. An historical data base of our GRIB data production is finally being done using an home made relational data base, TIDB2, for NWP purposes.

2. Workstation version of ALADIN/Portugal

2.1 History of the Main Events

Since 24 of April 2000, IM has a Limited Area Model (LAM) running in operational mode. This NWP model is a local installation of the ALADIN model, hereafter called ALADIN/Portugal model.

As a brief history, we refer the following operational changes:

  Apr 2000 → cycle AL09
  Jun 2000 → cycle AL11T2 (CYCORA included)
  Jul 2001 → cycle AL12_bf02 (CYCORA_bis included)
  Apr 2002 → change of the time step (540s to 600s)
  Nov 2002 → dissemination of coupling fields to support ocean modelling
Pre-operational:
  May 2006 → CY28T3
  May 2006 → implementation of model objective intercomparison verification procedures
Test:
  April 2006→ CY29T2 on 6 PC cluster of AMD64 dual core processors

2.2 Foreseen activities

- Tests to increase the coupling frequency and the number of levels
- Verification of the wind dynamic adaptation for 3 different areas on Portugal
- Operational implementation of CANARI
- Implementation of SMS as operations monitoring tool
- Establishment of the future computer environment
- Upgrade of GRIB de/coding tools
- Validation of coupling fields as support to MATCH (Multi-scale Atmospheric Transport and CHemistry model)

2.3 Operational version

The operational environment and main characteristics of ALADIN/Portugal are:

Computer characteristics
  DEC Alpha XP1000 (Compaq), 500MHz, 1 Gb memory
  DIGITAL UNIX V4,0
  DIGITAL F90 and 77 Compiler V5.1, native C Compiler

Model characteristics
  Spectral hydrostatic model
  Hybrid vertical co-ordinates
  DF initialisation
  Semi-Implicit Semi-Lagrangian two-time-level advection scheme
  ISBA surface parameterisation scheme
  Initial and lateral boundary conditions from the latest ARPEGE forecast
  6 hour coupling frequency from ARPEGE
  Integration domain:
  Size: 100x90 points
  Number of vertical levels: 31
  Horizontal resolution: 12,7 km
  Time step: 600 s
  Integration frequency: twice a day
  Forecast range: 48 hours
  Output frequency: 1 hour

Available configurations
  001, e927, e923 and 701

Graphical software
  The METVIEW/MAGICS graphical software (ECMWF) is used to display ALADIN/Portugal products under a development and an operational environment both in UNIX and Linux operating systems. Besides, a user-friendly visualisation tool for PC's was designed to display up to a maximum of three overlapped meteorological fields coming from the last two operational runs of the model.
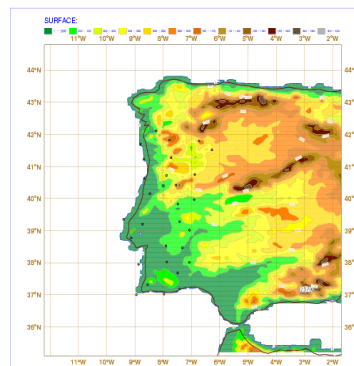

Figure 1 Orography of ALADIN/Portugal domain

3. Installation and validation of CY28T3
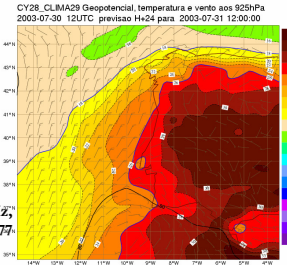(info: margarida.belo@meteo.pt & joao.rio@meteo.pt)

The impact of new geographical configurations of the ALADIN/Portugal has been tested in order to prepare a better answer of our operational system. Experimental runs allowed the conclusion that severe weather conditions (usually arriving from the ocean side) could be better forecasted with the enlargement of the integration domain more to the west. Besides an upgrade of the local version of ALADIN was required among the climatology changes on both the ALADIN and ARPEGE models. In this way, several validation and verification tests have taken us to a balanced solution to the new configuration of near future ALADIN/Portugal operational system that should be switched on the 22nd or 23rd of this month. A new computer platform will also be used.

New configuration:

N. points in lat, lon: 85, 96
Central coordinates: 30,9ºN, 350,9ºE
Lat/lon of most SW: 34,76ºN, 345,2ºE
Lat/lon of most NE: 44,84ºN, 356,6ºE
Resolution (square): 0,12º

New computer characteristics:

Alpha server cluster ES40, 667MHz, True64 UNIX (V5,0), native F90, F77 and C compilers

4. Objective verification
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Annual regular objective verification for ALADIN/Portugal during 2005/2006 year is under analysis. Some changes took place on the output plotting configurations. Daily and monthly serial graphical have been performed. All the computations use still the nearest grid point from the observation station point (SYNOP or TEMP observations).

Changes are presently being introduced on the operational procedures to allow a more interactive and immediate assessment tool of the models signals to the weather meteorological phenomena over Portugal. In particular some intercomparison graphical outputs forms have been studied in order to give a clear understanding of the behaviour of several models in different meteorological situations. This new package will be implemented with the new local model configuration before the end of May.

5. Diagnostic tools
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Since last report, the verification of diagnostic tools has been successfully done. By now, diagnostic tools post-processed from direct model outputs are fully in use on the weather forecasting room for the identification of severe weather situations. The composite of some diagnostic fields was recently created as a risk assessment – RISCON – for heavy precipitation situations. This tool is under validation.
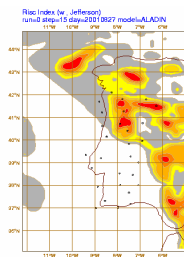
6. ALADIN on AMD64 dual core processors
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With the new models generation of the ALADIN community NWP challenges are grown for countries with few resources. The new computer requirements of the community trigger local strategies based on low price solutions[1]. Recently, the PaiPix[2]/IM Linux distribution has been locally implemented as an optimised development environment for NWP activities. This work consisted in creating the appropriate Debian packages and patches for the ECMWF applications using the Debian Sarge distribution and the Linux kernel 2,6. The PaiPix work also integrated the database tools currently being developed at IM, or TIDB2[3]. Although this platform could be directly booted from a DVD (live)it has been locally installed on the hard disk of each AMD64 PC available for each working position. Basic tests with ALADIN source code have now allowed the installation of the local version of ALADIN/Portugal on a private 6 AMD dual core PC cluster under the PaiPix operating system: gmkpack has been used on the installation of CY29T2. Foreseen tests will increase power of this cluster with the compatible AMD64 PC's of each NWP working position. At the end conclusions will be taken about the suitable design of the best quality/price computer platform solution for operational and development NWP activities.

AMD64 PC characteristics:
Chipset ASUS A8N-E
1 Gb RAM
120 Gb disk space
Graphical ATI Radeon 68 Mb card

References
[1] Amorim, A. and Lígia Amorim, 2006, Making the ECMWF tools, including METVIEW, available in a restricted version of the PAIPIX scientific live Linux, Proceedings of the 10th ECMWF Workshop on Meteorological Operations Systems
[2] http://www.paipix.org
[3] Simões, J. et all, 2006, Implementation and Testing Object Extensions of Open Source RDMS for Meteorological Data, Proceedings of the 10th ECMWF Workshop on Meteorological Operational Systems