

# Hirlam at INM. News and plans.

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## **Introduction**

Hirlam is INM operational model from 1995. Hirlam version was updated to 4.6.2 in December 1999. INM computer, CRAY C94, is 10 years old and it means that no changes in resolution can be done in the operational model.

In 2002 INM made an ITT for a new computer and CRAY take again the responsibility to supply the new computer. It will be a CRAY X1 and it will arrive to INM in June 2003.

Meanwhile and just for migration purposes we have got since November 2002 a CRAY SV1 16 PE's. It has 16 Gb of shared memory. INM Operational Hirlam (still 4.6.2) run on SV1 since January 2003. This computer also has not enough power to increase resolution.

## **New Supercomputer at INM**

The road map consists in two main phases (2002-2005 and 8.427 M€), the first one in 2002 and 2003, 5.119 M€ and 160 Gf of sustained performance with IFS code. The second one, 2004-2005, is 3.308 M€ and up to 270 Gf of sustained performance with IFS. We measured with IFS to be able to compare our ITTs with the ECMWF's ones.

Benchmarks and acceptance tests will also be done with Hirlam 5.0+KF for operational purposes.

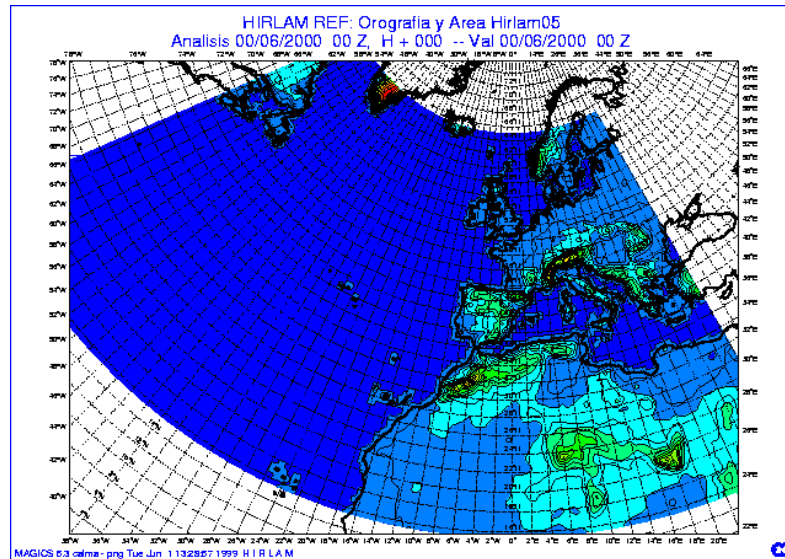
## **New operational model**

Plans for the new computer are focused on increase vertical and horizontal resolution. We will also update Hirlam version to 6, using 3DVAR, Semilagrangian dynamics and ISBA. Kain-Fritsch/RK is the option for condensation and convection.

We will keep the same integration areas for OPR and HIR, but increasing horizontal resolution to 0.15 deg. and 0.05 deg. latxlon and vertical resolution to 50 or 60 levels, depending on the parallel test results.

Parallel tests will take place at the end of 2003 and the new will become operational, hopefully, at the beginning of 2004.

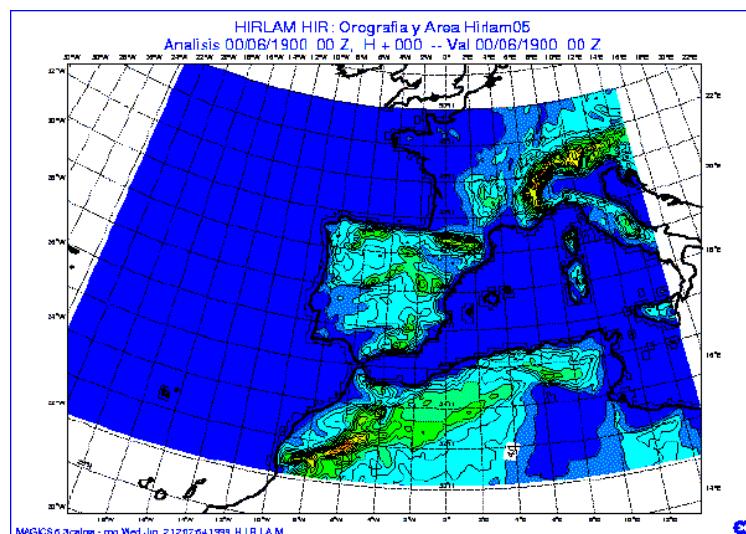
## New Hirlam OPR



We'll keep the same integration area, using Hirlam 6.0 or newer. Horizontal resolution will be 0.15 deg latlon (726x335 grid points). Up to 50 or 60 levels in the vertical (more resolution in the PBL).

Forecast up to 72 hours four times a day (00, 06, 12 & 18). We will also use SL Dynamics and new physics (Kain-Fritsch). Data assimilation will be 3DVAR.

## New Hirlam HIR



Characteristics will be the same than OPR, but 0.05 deg. latlon horizontal resolution and 3DVAR if it is possible to use it at that resolution. Forecast will go up to 36 hours at main synoptic time.

## **Short Range EPS**

Short range forecast of extreme events (convective precipitation, wind gales) are very difficult. Numerical models don't give an appropriate signal even at high resolutions. Probabilistic forecast seems to be a good approach to the problem.

INM is going to set up an Ensemble Prediction System for the Short Range (SREPS). But there is no operational experience about the best way to build the ensemble, then basic research is needed for that issue. According to Hou et al. **(Hou D., Kalnay, E. & Drogemeier, K. (2001). "Objective Verification of the SAMEX'98 Ensemble Forecasts". Mon. Wea. Rev.,129,73-91)** Multimodel approach may be the best way to have enough spread in the short range.

Our intention is to test this approach when the new computer become available and to start operations when the second enlarge of computer power be operational (June 2005).

The plan consists in three of four LAMs (Hirlam, HRM model, MM5), using boundaries from several global models (ECMWF, DWD global model GME, NCEP, UKMO global model).

The integration area will be the same that OPR with horizontal resolution about 0.25 deg. latlon (406x200). Vertical resolution should be 31 or 40 vertical levels and forecast length goes to 72 hours . This means 25 members every three hours (00, 03, 06, ...21) or six hours (00, 06, 12 and 18) and then we'll build a super ensemble of 100 members combining the last four ensembles.

The final characteristics of the system will be updated according with the results of the experiments and parallel tests we have to perform during 2004.