NATIONAL STATUS REPORT
on
Operational NWP at the Swedish Meteorological and Hydrological Institute

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Lars Meuller, SMHI

Introduction

The Swedish Meteorological and Hydrological Institute (SMHI) is a member of the HIRLAM project. All research and development in the area of numerical weather prediction are done within the HIRLAM project. This report will only describe the operational HIRLAM at SMHI.

Computer system

HIRLAM at SMHI is run on the computer resources at the National Supercomputer Center (NSC) at Linköping University.
SMHI operational models, HIRLAM and an oceanographic model, HIROMB, are run on a dedicated cluster, BLIXT, that consists of:

- Linux operating system.
- 60 nodes.
- dual Intel Xeon processors, 3.2 GHz, 2 GB memory.
- Infiniband Interconnect.
- PCI Express bus.
- Scali MPI connect.
- Intel compilers.
- 5.6 TB disc.
- peak performance 768 Gflops.

SMHI has for a long time also, for backup reasons, been running a complete model setup also at another computer. If BLIXT is down the production can easily be switched to BRIS by just issuing one operator command.

BRIS is also a Linux cluster:

- home made by NSC.
- 16 nodes.
- dual Intel Xeon processors, 2.2 GHz, 1GB memory.
- Scali interconnect.
- ScaMPI.
- Intel compilers.
- 1 TB disc.

HIRLAM system

SMHI runs a HIRLAM model with version number 6.3.5 which in our case means a system with:

- 3D-VAR analysis
- DFI initialization
- ISBA surface scheme
- CBR turbulence
- Kain-Fritsch convection

- Rasch-Kristjansson large scale

SMHI at present runs 3 operational suites of the HIRLAM analysis and forecast model with different horizontal resolutions, C22, E11 and F05. They all have their own separate 6 hour data assimilation cycle.

Domain:	**C22**:	**E11**	**F05**
Horizontal resolution:	0.2×0.2° (22 km)	0.1×0.1° (11 km)	0.05×0.05° (5.5 km)
N:r of gridpoints:	306x306	246x268	294x241
Vertical levels:	40	60	60
Boundaries:	ECMWF 3 hourly	ECMWF 3 hourly	HIRLAM E11 every hour
S.L time step:	10 min	5 min	2.5 min
Forecast length:	+48 hour	+72 hour	+24 hour

E11 is run to +72 hour to give input to a LEPS (Lagged EPS) system

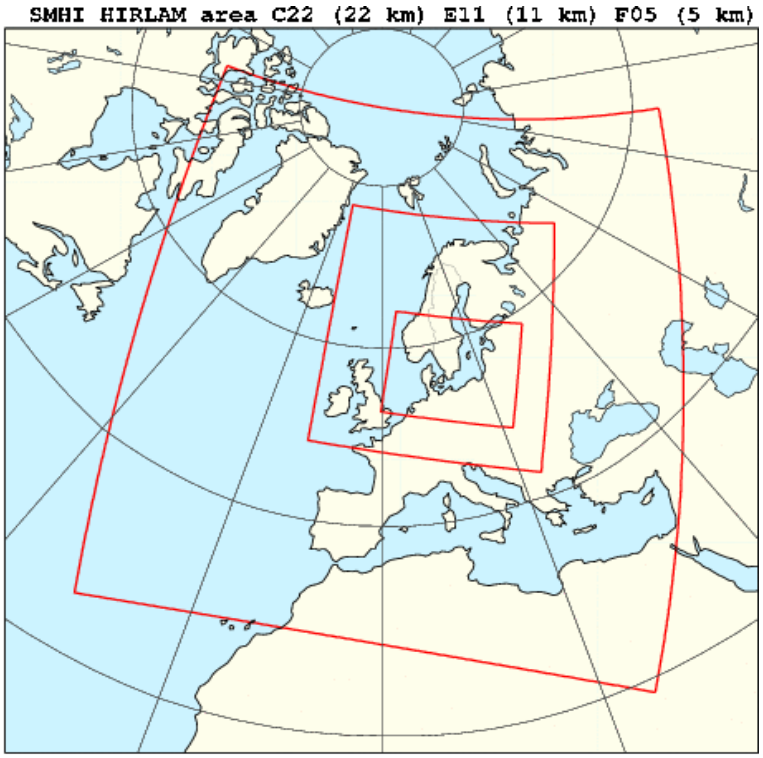

Fig 1. SMHI HIRLAM horizontal domain's

Model input

The observations used for the analysis are SYNOP, SYNOP SHIP, TEMP, PILOT, BUOY, AIREP and AMDAR.
Additional AMDAR in BUFR form from GTS are also used.
ATOVS AMSU-A radiances (EARS) over sea used in HIRLAM C22

A version of ECMWF observational pre processing system is used to convert from WMO alphanumeric code forms to BUFR.

In SMHI version of HIRLAM, the ice-cover in the Baltic Sea from the BOBA sea ice model and pseudo SST observations from manually analyzed SST fields in the Baltic Sea and the North Sea are used in the surface analysis.

Operational schedule

Every 3 hour a preliminary HIRLAM analysis is run with a cut-off time of +0h25m using mainly SYNOPs. The output is mainly used for the automated analysis of weather charts.
Every 6 hour E11 is started with a cut-off time for observations of +1 h 15 min. After E11 have ended F05 is started.
Every 6 hour C22 is started with a cut-off time for observations of +2 hours.

The clock time for all the runs to complete is about 40 – 50 minutes.

Model output files are written every hour and sent to SMHI.

Events

- Nov 2004 - Starting to use AMDAR from GTS in BUFR code
- June 2005
  - upgrading of the model from HIRLAM version 5.1.4 to version 6.3.5
  - replacement of the SGI Origin 3800 with Linux cluster BLIXT
  - introduction of a 5.5 km resolution HIRLAM (at present in a test phase)

Plans

- Starting of a near-real time test of HIRLAM 4D-VAR analysis.
  The start of the test is planned for March 2006
- HIRLAM has now started a cooperation with the ALADIN group to develop a non-hydrostatic model and a version of that has been tested at SMHI and very soon near-real time runs will be started