

Operational HIRLAM at *met.no*

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Model version

On March 20, 2003, the model and script system was upgraded to HIRLAM version 5.2.3, with corrections for 6.0.0 included as “local” modifications. This means that we have finally abandoned the old 2.6 physics.

The model grids are listed in Table 1, and the areas covered are shown in Fig. 1. The most notable change is that the main model is now at 0.2° resolution and 40 vertical levels. With this change, the models with finer horizontal resolution were also upgraded to 40 levels in the vertical. In addition, HIRLAM 10 now uses ECMWF frames as boundaries instead of being nested inside the main model. This implied a small extension of the HIRLAM 10 domain, in order for the disseminated frame not to exceed 33% of the model area.

Name	Resolution	Grid	Boundaries
HIRLAM 20	0.2°	468x378x40	EC frames $0.5^\circ/3h$
HIRLAM 10	0.1°	248x341x40	EC frames $0.5^\circ/3h$
HIRLAM 5	0.05°	152x150x40	HIRLAM 10

Table 1: Operational HIRLAM model grids

Hardware

The operational forecasts are run on an SGI Origin 3800 system located at NTNU, Trondheim. This installation consists of two main computers, one with 512 CPUs and another one with 384 CPUs. The operational HIRLAM models run on 196 processors, but none of the models are running really efficiently on this many CPUs.

As a backup solution we have a Linux cluster with 10 nodes (20 CPUs) and 5Gb RAM located at *met.no*. When this solution is used, the main model runs at 0.5° resolution (instead of 0.2°), and HIRLAM 10 and 5 are not run at all (but results are interpolated to finer resolution from the backup model run).

Assimilation of observations

The HIRVDA (3D-Var) code has been upgraded from version 4.4.3 to version 5.0.3 since last year. Thus we are slightly behind the reference on this part. The assimilation is currently running on (only) 90 CPUs, since it appears that the domain decomposition in grid-point space prohibits going to a larger number.

Assimilation is done only in the main model. HIRLAM 10 interpolates its initial upper air fields from the HIRLAM 20 analysis. We have also made some modifications so that most ISBA surface fields are also interpolated from the HIRLAM 20 analysis instead of being taken from the climate file.

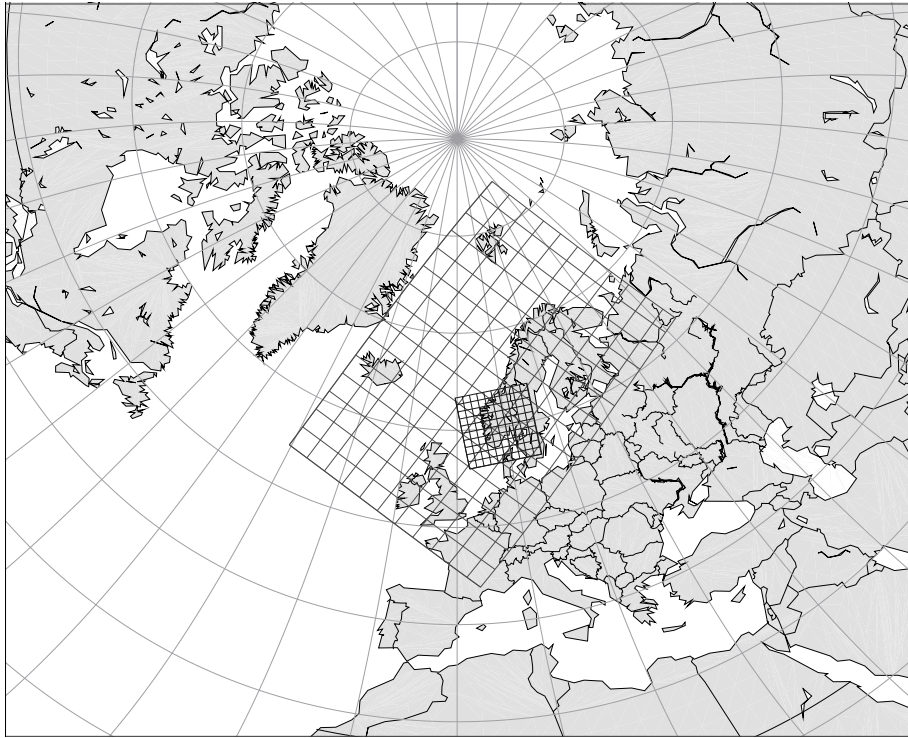


Figure 1: Areas covered by HIRLAM 20, HIRLAM 10 and HIRLAM 5

The assimilation is now using ATOVS AMSU-A radiances (from NOAA-15 and NOAA-16) in addition to the conventional observation types (AIREP, DRIBU, PILOT, TEMP, SYNOP, SHIP). With the introduction of ATOVS data we also started to use the FGAT (First Guess at Appropriate Time) option of 3D-Var.

With the last model upgrade, including the ISBA surface scheme, we now also run the surface analysis scheme. However, this scheme has been modified so that we only analyze land surface temperature and soil wetness. Sea surface temperature, snow depth and sea ice are read in directly from fields supplied by the “Ice Map Service” in Tromsø.

Model output

The 0.2° model is run up to +60h. The increase from +48 to +60h is mainly in order to produce input to a nuclear accident program (SNAP). HIRLAM 10 and HIRLAM 5 are run up to +48h as before. MSLP, T2m, precipitation and 10m winds are written out each hour. 6 fields on 15 pressure levels, and 8 fields on 40 model levels are written out at 0, +3, +6, +9, +12, +18, +24, +30, +36, +42, +48h (+54 +60h).

Operational schedule

The operational schedule is as given in Table 2. Note that HIRLAM data are also used to force various ocean and wave models.

UTC	Model	CPU min.	Description
00	HIRLAM 20km	35	+60h, EC frames
	WAM 50km	2	Wave model, HIRLAM 20+EC winds
	ECOM3D 20km	4	Ocean model, HIRLAM 20 winds
	HIRLAM 10km	20	H2O analysis, +48h, EC frames
	MM5, 3+1 km	90	Air quality (Linux cluster)
	HIRLAM 5km	13	+48h, HIRLAM 10 boundaries
	WAM 8km	2	HIRLAM 10 winds
	ECOM3D 4+0.3km	27	HIRLAM 20 winds
	HAVBIO 20+4km	11	EC winds
06	HIRLAM 20km	50	00r+9h (FGAT), 06+60h
12	WAM 50km	1	HIRLAM 20 winds
	HIRLAM 20km	35	+60h
	WAM 50km	2	HIRLAM 20 winds
	ECOM3D 20km	4	HIRLAM 20 winds
	HIRLAM 10km	20	+48h
	HIRLAM 5km	13	+48h
18	HIRLAM 20km	50	12r+9h (FGAT), 18+60h
	WAM 50km	1	HIRLAM 20 winds

Table 2: Operational schedule after 20.03.2003

The “r” runs are reruns with more observations (longer cut-off) in the assimilation, and more recent boundaries.

Plans

Plans for operational forecasting:

- Optimize code, introduce asynchronous I/O (HIRLAM 20)
- Replace “old” version of 3D-Var with a more recent reference version
- Assimilate more ATOVS data (EUMETSAT retransmission)
- Assimilate QuikScat winds
- Get the Met. Office Unified Model (on 0.03° on HIRLAM 5 area) running, with EU-ROLAM (20km) or HIRLAM 10 boundaries.