

Reference system status June 2001

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Release notes of HIRLAM 5.0.2

HIRLAM 5.0.2, released 28 May 2001, is the first (beta) release under mini-SMS. The implementation under (mini-)SMS is totally different from earlier HIRLAM versions. It will take some time to get used to the new system.... You may profit from the fairly extensive documentation on (mini-)SMS available on the *HEXNET*.

Meteorological impact

None, except for compute accuracy: (mini-)SMS may result in a different order of execution, and in particular, in execution of some programs on a different host than before.

Description

The main aim of (mini-)SMS is to increase throughput of the HIRLAM system, by distributing the different jobs within the system over the available hardware, such that *e.g.* vectorcode is executed on a vector machine, but IO-bound jobs can be run on a machine that handles IO efficiently, provided of course that those machines are available. By default, all jobs are run on a single machine, but at ECMWF the default is to use SGI and Fujitsu in tandem. The directory structure, and the archive strategy have totally changed under (mini-)SMS.

An appealing feature of mini-SMS is the possibility to monitor the progress of the HIRLAM run graphically, or even to interact with it, with Ole Vignes's mXCdp. Mini-SMS will by default attempt to start the interface. This will normally succeed if the Perl ToolKit has been installed, the user has the DISPLAY variable properly set and allows X-connections to the DISPLAY host, and X-connections are allowed between that host and the machine on which mini-SMS is run.

One of the great virtues of the graphical monitor is that it gives access to a variety of help functions. One of those is to provide the names and addresses of relevant experts to be contacted in case of troubles with a particular HIRLAM task.

Together with mini-SMS, a few code changes were introduced. They are those required to run with more grid points (the new system is suitable for grids with up to approximately 150,000 points in the horizontal); some coding errors were corrected; and facilities to avoid analysis or to replace OI by 3DVAR (the latter only at ECMWF) were added. However, currently OI is the only supported option.

The utilities for local installation of HIRLAM have not been modified yet. But be assured that they will need modifications. The worst of these is that the two files to describe the hard- and software system, `Env_system_5.0.2` and `scripts/hirlam.tdf`, will have to be edited to describe the local computer configuration and how the several HIRLAM components must be executed on the available hardware, *resp.*

Revision numbering

To make the revision numbers clearly reflect the status of a particular revision, the management group decided to introduce the notation $n.m$, that is a two-level version number, for official releases. By convention, to avoid ambiguity, the three-level version number $n.m.0$ is identical to $n.m$ (so the $.0$ suffix is redundant). All other three-level version numbers identify beta-releases. The new scheme takes effect from version 5.0.

When a certain beta-release is considered a candidate to be ‘promoted’ to an official release, a full test programme will be executed. If the results of the tests are satisfactory, the next official version will be defined. For example: if beta-version 5.0.2 after the tests is found suitable as an official release, the version number 5.1.0 will be introduced as an alias of 5.0.2; and the shorthand 5.1 will refer to 5.1.0.

It is possible that during the execution of the test programme new beta-releases were introduced. To preserve the relevant changes into the new official release, the new beta-release will also be made known as the next beta-release for the new official release. An example may clarify this: If in the example above during the tests of 5.0.2 new beta-releases 5.0.3 and 5.0.4 were developed, then after the ‘promotion’ of 5.0.2 to 5.1, the beta-release version number 5.1.1 will be introduced as an alias to 5.0.4. After this, beta-release numbering will continue with 5.1.2. The ‘5.0 branch’ will not be further developed; it stops with 5.0.4.

So a two-level version number identifies an official release. It is in fact a shorthand notation for the three-level number that is obtained by appending $.0$. Three-level numbers that do not end in $.0$ are beta-releases. If such a number ends in $.1$ it may identify an earlier beta-release, namely in case the latest official release is not the latest beta-release.

Release notes of HIRLAM 5.0.1

HIRLAM 5.0.1, released 9 April 2001, implements technical changes over 5.0.0.

- The main correction is to exchange scalar variables (among which TKE (!)) across area boundaries when executing on a massively parallel machine.
- By controlling negative humidity after the Asselin time filter no negative humidity in the model fields should now be seen anymore. Negative humidity at 2 m is now avoided with a cosmetic change (without which the model occasionally failed with an illegal instruction).
- The climate generation system was further extended, in preparation of ISBA.
- A few minor coding errors were cured.

Meteorological impact

A coding error prevented the exchange of physical and dynamical tendencies of the so-called scalar variables across sub-domain boundaries, in the semi-Lagrangian scheme. The impact of the error increases with the number of the sub-domains, which is usually the number of processors. Because the error went undetected for a long time, it seems safe to say that the impact of it was small.

Ulf Andrae reported no visible impact of the correction to avoid negative humidity in the (upper air) model fields. The change of humidity at 2 m is diagnostic, without impact on the rest of the forecast.

Release notes of HIRLAM 5.0.0

HIRLAM 5.0.0, released 19 February 2001, is 4.9.1 with a few technical changes.

This version has been accepted as the **Reference System** by the HIRLAM management group, to succeed 4.7, after a thorough validation by Ray McGrath (HIRLAM newsletter 37).

- In 4.9.1, vertical diffusion of cloud water was accidentally switched off. This is now corrected.
- Since 26 June 2000 ECMWF have proper SST analyses. Before that date, only surface temperature (ST) was available. In 4.9.1, the SST analyses are used, where earlier versions used ST.
- Preparation for lateral boundary conditions on frames only.
- Rethought of the parallellisation/vectorisation configuration parameters.

Meteorological impact

The re-introduction of vertical diffusion of cloud water should not have a big impact. The error was introduced in 4.9.1, so McGrath's validation of 5.0 against 4.7 becomes even more valid by taking the error out.

Planned releases

Below is a list of modifications that are in the pipeline. The new revisions numbering strategy inhibits the assignment of tentative version numbers to the modifications: as long as version $5.n.m$ has not been proven to be good enough to become version $5.n+1$, a new release will have a revision number that is obtained by incrementing the minor release number, so as to become $5.n.m+1$. On the other hand, if the validation tests did promote $5.n.m$ to $5.n+1$, the new release will receive number $5.n+1.1$. So the progress of release numbers depends on the progress of the validation tests. The list below is ordered according to the tentative implementation schedule.

1. DFI re-write
2. STRACO with shallow convection
3. CBR revision
4. 3DVAR implementation.
5. ISBA with the new surface analysis.
6. GWD and physiography.
7. Boundary interpolation in model.
8. Resolution increase of Reference system and DMR & 2 delta x orography smoothing.
9. The vertical resolution increase of the DMR is likely to take place later than the horizontal, based on the impact studies and also on cost considerations.
10. Kain-Fritsch and Rasch-Kristjánsson