

Status of the reference system*

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1 Recent HIRLAM releases and status of the reference RCR

The current official version of the reference system is Hirlam-7.1, released on March 27, 2007. On Dec 6 2007 and Feb 18 2008, two minor bug-fix updates are released, 7.1.3 and 7.1.4 respectively. 7.1.3 corrects mainly a diagnosis error in the STRACO condensation scheme, associated with the calculation of total precipitation that fails to include snowfall. 7.1.4 corrects a deficiency in the condensation scheme which causes unrealistic rainfall in sub-freezing temperature conditions. None of these updates have significant impact on the overall HIRLAM forecast quality.

The next version of the HIRLAM reference system, Hirlam-7.2, has been in preparation since second half of 2007. On Nov 28 2007, the beta version, Hirlam-7.2beta1, is assembled for evaluation. On Feb 8 2008, the release candidate for Hirlam-7.2, Hirlam-7.2rc1, is tagged.

Compared to Hirlam 7.1, the main features in Hirlam 7.2 are:

- 4D-VAR upper air analysis, with no more explicit initialization
- Kain Fritsch Rasch Kristjansson condensation scheme and tuning in vertical diffusion
- Technical upgrade in ATOVS data assimilation and implementation of RTTOV-8 package for satellite data assimilation
- Update in background error statistics data both for screening and for minimization; update of bias correction data

More information about Hirlam 7.2 can be found in the HIRLAM system wiki page (https://hirlam.org/trac/wiki/Hirlam_7.2)

The release of 7.2 has been somewhat delayed due to preparation and tuning of the new surface parameterization scheme. Despite of many devoted efforts, the scheme is ultimately left out of Hirlam 7.2 due to a need for further evaluation and tuning, the amount of effort needed still likely to be extensive.

Validation studies using trial versions of Hirlam-7.2 indicate a general improvement in observation verifications of the upper air parameters, surface wind and cloud cover. For precipitation forecast, the new system has been seen to have better performance in the prediction of large-amount precipitation, while suffering general overprediction in cases with light precipitation.

The real-time pre-operational suite of RCR with Hirlam-7.2 is currently being setup at FMI. The official release of Hirlam-7.2 is expected to occur in March 2008.

At FMI, where the reference HIRLAM system has been run operationally since 2004, the trend for a positive and stable progress in the RCR forecasts quality continues, which is demonstrated in the FMI HIRLAM-RCR monitoring web-page for long term verification (FMI, web-link).

* this is a "snapshot" of the online version at the Hirlam system wiki page <https://hirlam.org/trac/wiki/ReferenceSystemStatus>

2 Development of the HIRLAM mesoscale forecast system HARMONIE

On Dec 19, 2007, the latest HARMONIE reference system, 32h3, is released. The system is based on IFS/ALADIN Cycle 32t3 with many of HIRLAM's extensions, mostly in scripts and utilities. Harmonie 32h3 features the first installation of the HIRLAM Supervision and Monitoring System, commonly known as mini-SMS script system. The Harmonie 32h3 script now enables Hirlam developers to use their familiar script tool/interface to configure, build and run experiments using Harmonie, e.g., to

- build main source and utilities using the reference installation
- synchronise local modifications of source codes and scripts with the reference
- define experiment characteristics such as model domain, resolution, coupling model, hydrostatic or nonhydrostatic dynamics, physics using either AROME/ALARO/ALADIN/HIRLAM
- generate climate data
- prepare initial and lateral boundaries using host model data
- prepare experiment name-lists
- perform forecasts
- post-processing forecast data
- observation verification

Further recent developments in the HARMONIE system include the extension of the HARMONIE monitoring facilities to cover the needs for common verification and model inter-comparison for both HIRLAM and HARMONIE systems, and the inclusion of the Arpege/Aladin surface and upper air analyses into the mSMS scripts.

The latter are mainly based on the pioneering efforts made by the staff at met.no.

3 Reference system upgrade plans

Hirlam 7.2 is targeted to be released in March 2008. During the remaining part of 2008, the next version(s) of the Hirlam synoptic system will be prepared to feature

- updated surface scheme
- assimilation of observation data from AMSU-B/MHS, Seawinds, MODIS/AMV-wind, OSI-SAF
- 4D-VAR with multi-incremental outer-loops
- updated KFRK scheme
- MSO-SSO scheme and orographic radiation
- further system overhaul

For the meso-scale forecast system, releases of Harmonie-33H, 34H and 35H are scheduled, following the corresponding expected releases of cycle 33t, 34t and 35t, respectively. The mSMS scripts to enable a full data assimilation cycle is targeted to be featured in these later releases.

References

FMI: Hirlam-RCR monitoring webpage on long-term verification: <http://fminwp.fmi.fi/verif/LTVerifIndex.html>