



# Annual review of operational HIRLAM/HARMONIE forecasts and status of the Reference System

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with input from all member services

ALADIN 22<sup>nd</sup> WS - HIRLAM ASM  
Marrakesh  
7-10<sup>th</sup> May 2012

# Yearly review of the Reference system(s)

- **HIRLAM**
  - Last hirlam version
  - Different operational setups
  - Experiences
- **HARMONIE**
  - Different real time setups
  - Changes since last year
  - Present and coming cycles
  - The Hungarian quest
- **Announcements and commercial**

# HIRLAM 7.4, released on 9<sup>th</sup> of March 2012

## The very last HIRLAM release! (?)

### Default changes

- RCR domain with increased resolution in horizontal and vertical,
- Parameterisation the fresh lake scheme Flake.
- Orographic radiation effects
- Using lower surface roughness over ice over Baltic Sea, for better 10m winds
- Tunings for 2m temperature in stable conditions. Gives slightly better temperatures in case of weak winds.
- Precision change in SL dynamics
- ...

### Non default options

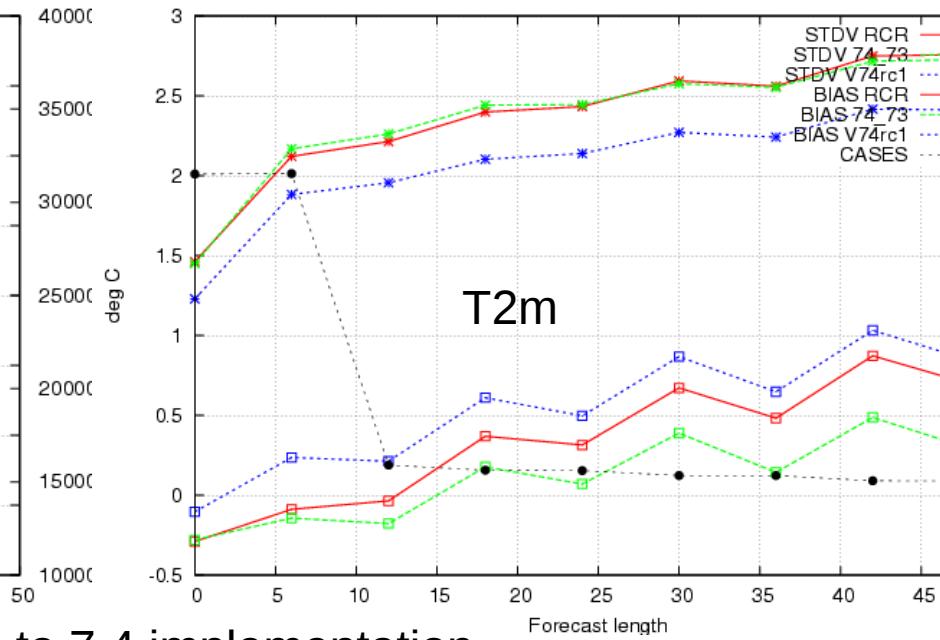
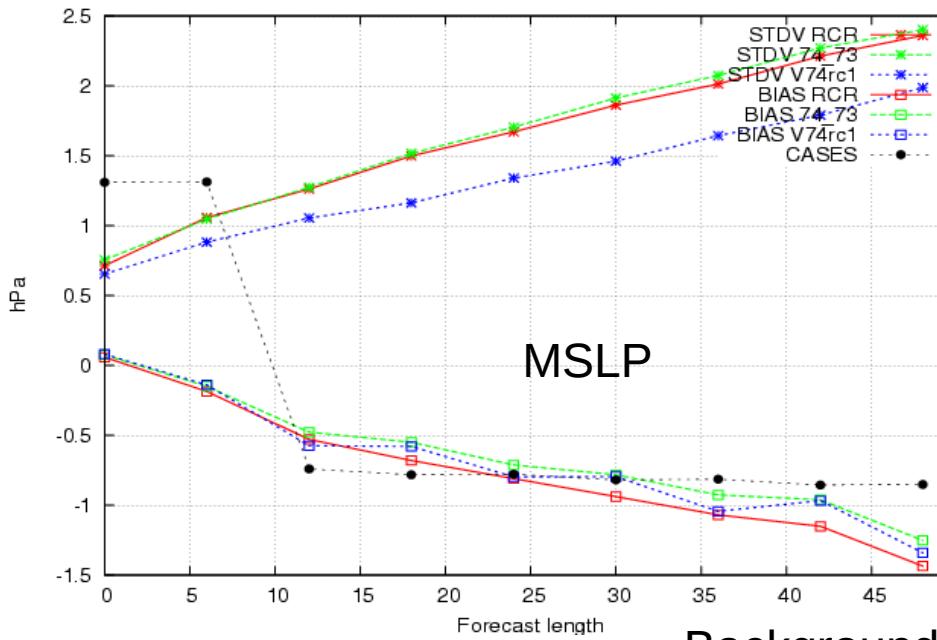
- Jk
- Liu-Penner cloud parametrization. Gives a somewhat more realistic CCN distribution.
- STRACO updates: Improved cloud initialisation and an generalised stratiform cloud scheme which also improved for sub-freezing temperatures.

### Post 7.4 updates

- Hybrid assimilaton (Nils & Jelena et.al. )
- Other EPS related changes ( as a basis for GLAMEPS v2 )
- ?

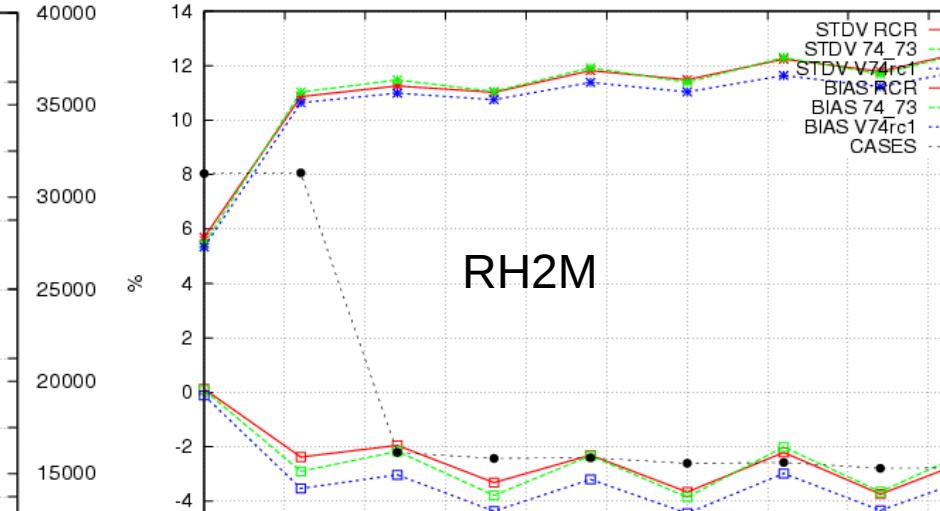
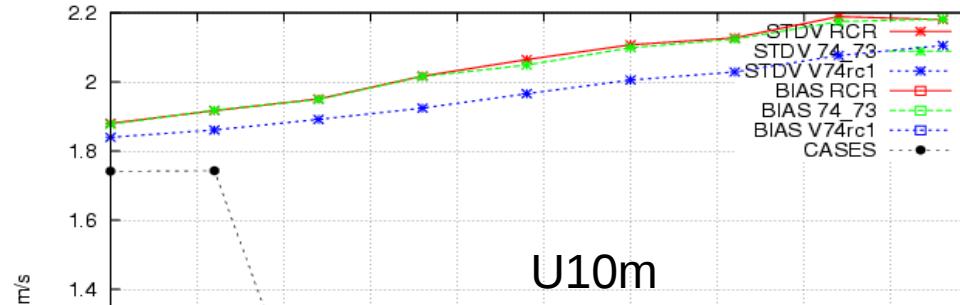
## 7.4 7.4 on 7.3 domain 7.3

Selection: EWGLAM using 282 stations  
 Period: 201202  
 Mslp Hours: 00,06,12,18



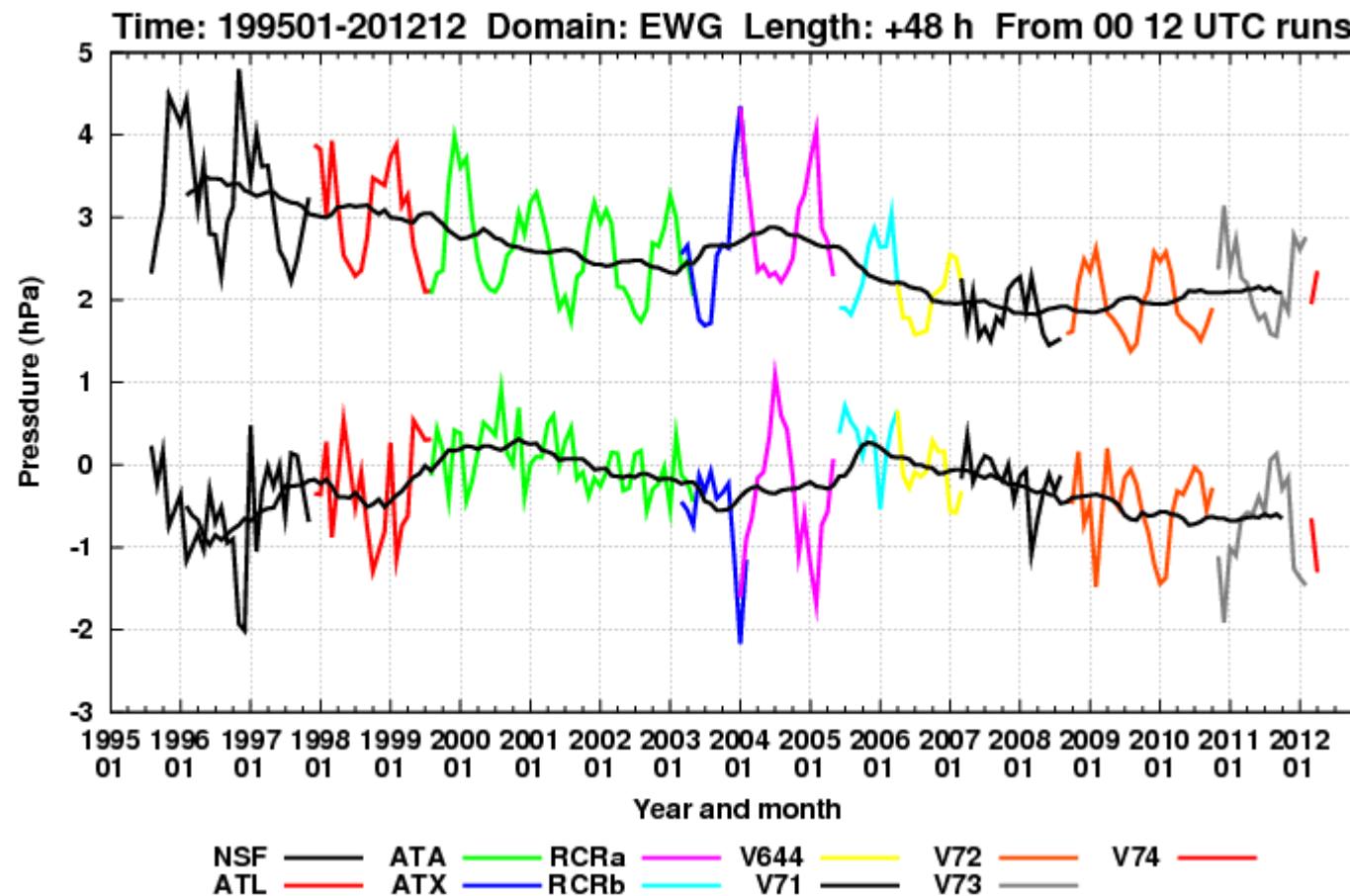
## Background to 7.4 implementation

Selection: EWGLAM using 285 stations  
 Period: 201202  
 U10m Hours: 00,06,12,18

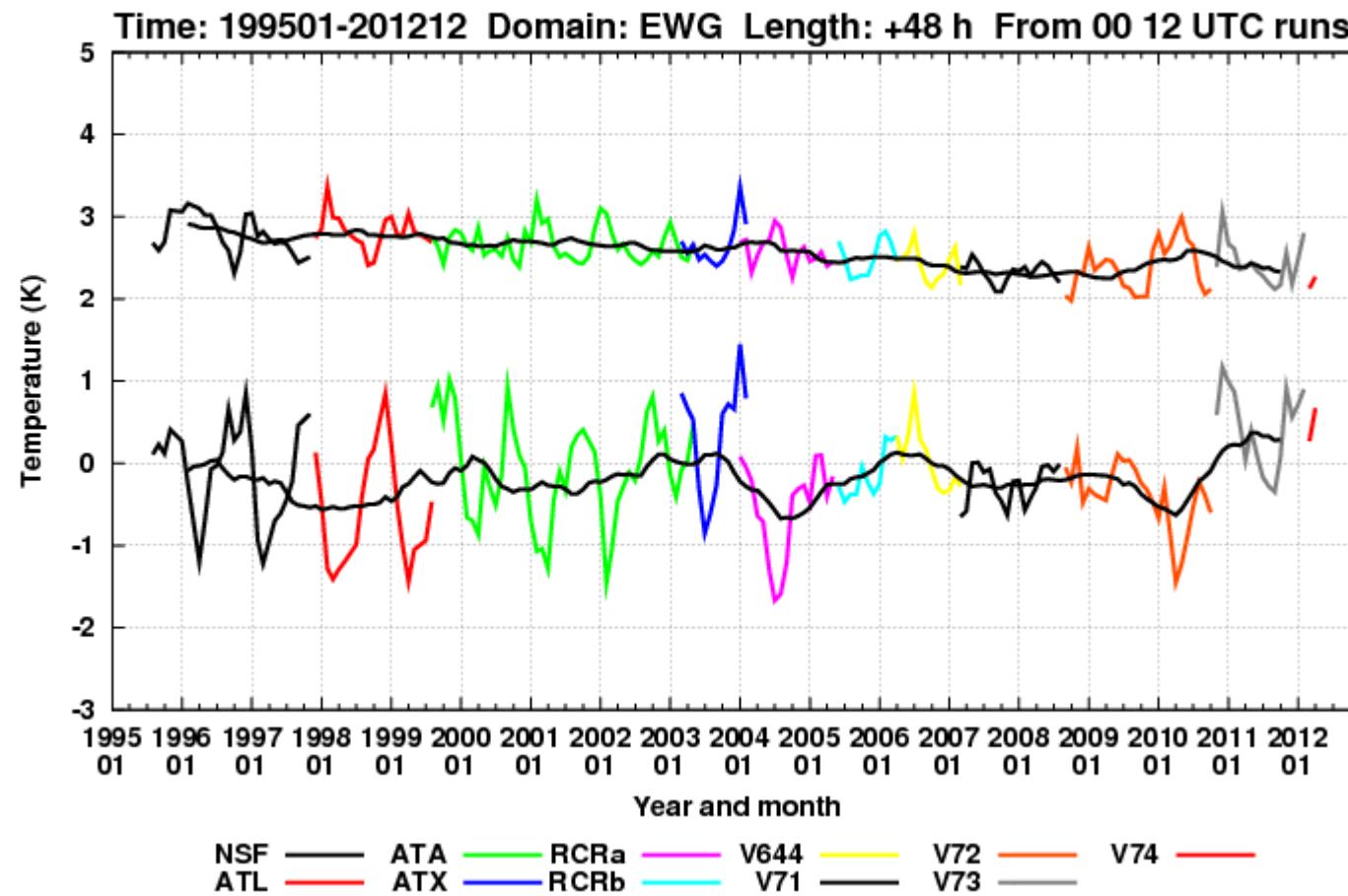


# RCR statistics MSLP

Monthly bias and rms of Mean Sea Level Pressure



### Monthly bias and rms of 2 metre temperature



## Operational coarse resolution HIRLAM 2012

Domain	Cycle	Size	DX ( deg)	DA
AEMET ONR	7.2	582 x 424 x 40	0.16	3DVAR, LSMIX
DMI-SKA	7.3rc2	970 x 818 x 65	0.03	3DVAR, LSMIX
EMHI ETA	7.1.2	366 x 280 x 60	0.1	3DVAR
FMI RCR	7.4	1030 x 816 x 65	0.068	4DVAR, LSMIX
LHMS L7	7.3bf1	492 x 398 x 60	0.071	3DVAR, LSMIX
KNMI D11	7.2	726 x 550 x 60	0.1	3DVAR, LSMIX
Met Eirann I10	7.2	654 x 424 x 60	0.1	4DVAR, LSMIX
Met.no 8	7.2	344 x 555 x 60	0.072	4DVAR, LSMIX
SMHI C11	7.1.2	606x606x60	0.1	4DVAR, LSMIX

# Operational experiences

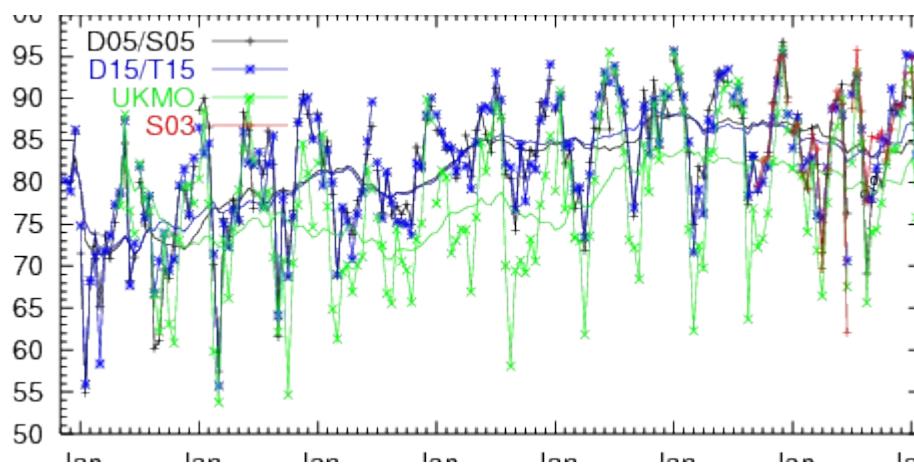
## Meteorological

- Problematic lake temperatures corrected by Flake in 7.4.
- In general forecasters continue to be happy with the performance of HIRLAM. HIRLAM is particularly noted for its rain/sleet/snow mix diagnoses during winter precipitation.

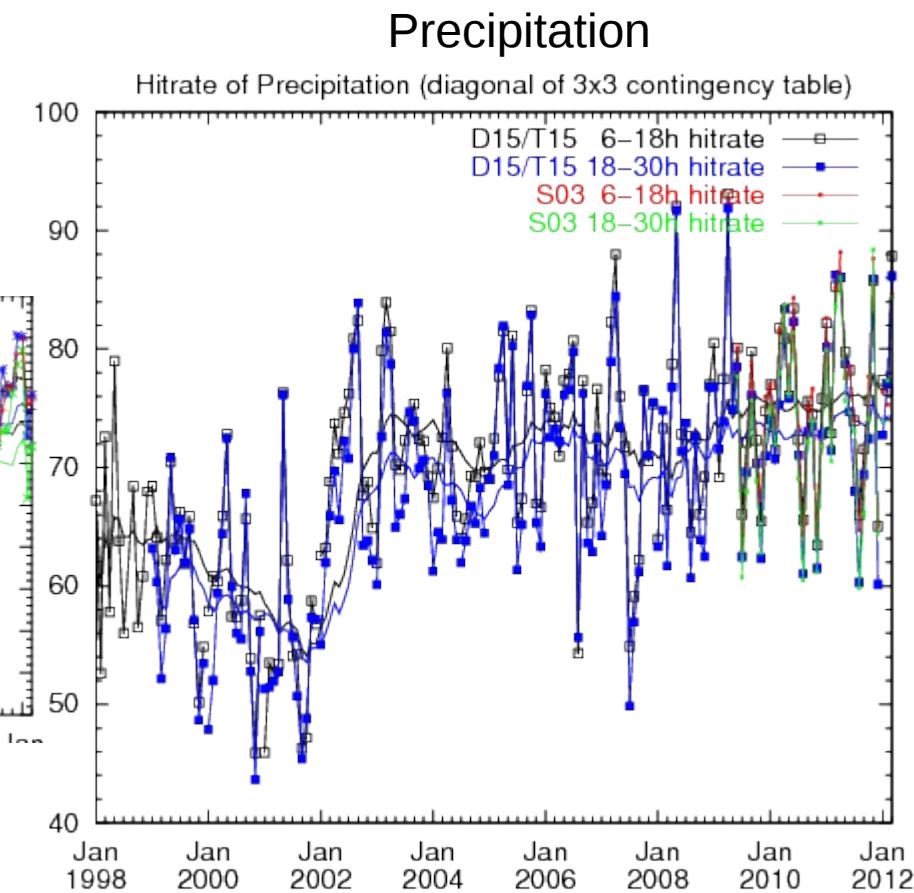
## Technical

- HIRLAM scripts do not work well on debian because of the "dash instead of bash"
- A notable feature for Hirlam versions (7.1, 7.3 and 7.4) used during 2011/2012 hasbeen the very good stability: the few problems that we have had have been computer hardware and system software related.

# DMI hitrates



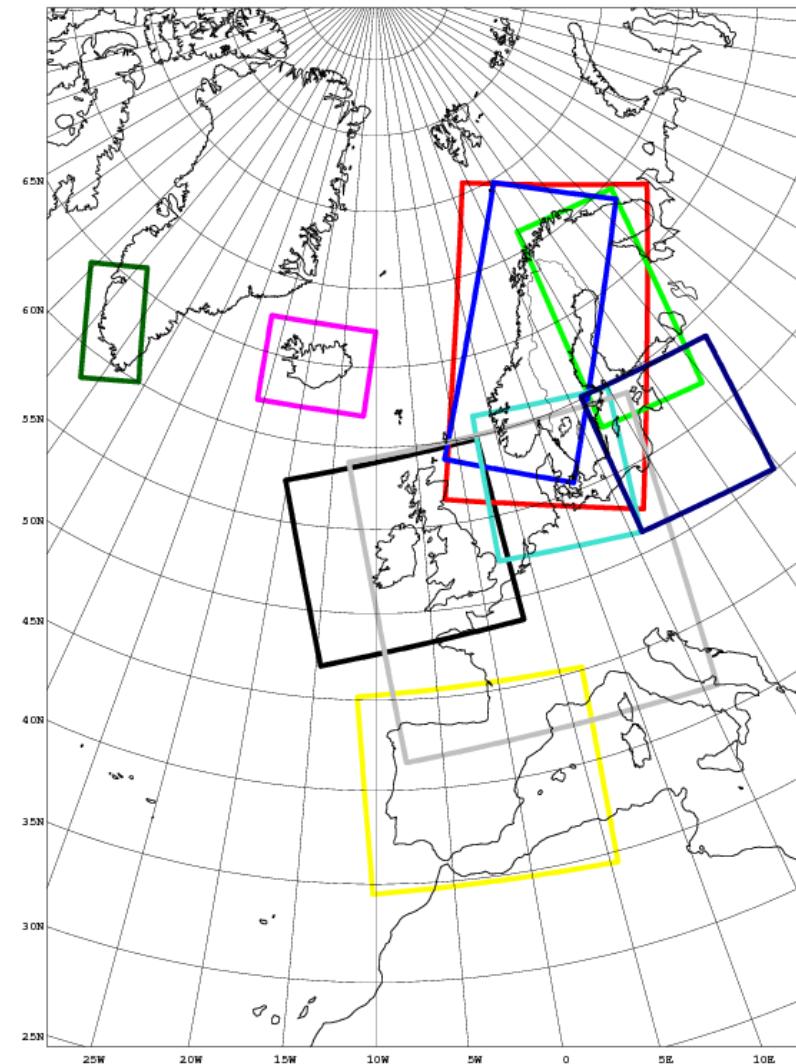
T2m



# HARMONIE (AROME) DOMAINS

AEMET  
DMI  
FMI  
KNMI  
Met Eirann  
met.no  
MetCoop  
IMO  
LHMS  
DMI NUUK

Only Estonia missing



## AROME 2.5km, Surface assimilation CANARI+OIMAIN

Domain	Cycle	Size	DA	COMMENTS
AEMET	36h1.4	384 x 400 x 65	3DVAR	3h ECMWF LBC
DMI	36h1.4bf1	384 x 400 x 65	3DVAR	3h ECMWF LBC
FMI	36h1.4	300 x 600 x 60	3DVAR	3h ECMWF LBC
KNMI	36h1.4	800 x 800 x 60	3DVAR	3h cycling, HIRLAM (H11) boundaries
Met Eirann	36h1.3	540 x 500 x 60	BLENDING	HIRLAM 10km LBC
Met.no	36h1.3	360 x 800 x 60	BLENDING	3h ECMWF LBC
IMO	36h1.4bf1	360 x 288 x 60	Downscaling	3h ECMWF LBC
LHMS	36h1.4	384 x 400 x 65	BLENDING	3h ECMWF LBC
MetCoop	36h1.4	540 x 900 x 65	3DVAR	3h ECMWF LBC

ALARO realisations in HIRLAM

Both uses SURFEX (no TEB), 3DVAR and  
surface assimilation ( CANARI+ OI MAIN )

Domain	Cycle	Size	DX	COMMENTS
Met.no	36h1.3	360 x 800 x 60	5.5km	3h ECMWF LBC
SMHI	36h1.4.bf1	506 x 574 x 60	5.5km	3h ECMWF LBC

# Comments on cy36h1 ( AROME )

## Meteorological aspects

Wind speed overestimated over land areas

Some wind noise seen in 10 m. fields over the sea during intense storms (might be platform specific)

Wind speed underestimated over land areas (especially in northern part of Finland)

The wind is still underestimated.,

Wind gusts may be a little bit too high in convection, warm sector gusts OK

All models but Harmonie2.5 underestimates mountain winds

Too low temperatures over large inland water bodies in autumn.

Too warm night-time temperature in summer/autumn.

Winter-time "Nordic temperature problem".

Very good guidance in dynamic weather cases (line convection in cold front, wind gusts)

Precipitation structure has received good feedback.

Good performance in several late autumn/early winter convective cases.

Cloud base too low, too many high clouds

# Comments on cy36h1

## Technical aspects

Large number of Listener tasks was suspected to have caused crashes caused by failed ls and cat commands. Setting taskmax to 10 seems to have helped with this problem.

One model crash in August 2011 related to strong upper air winds required a change in time-step to 45s for a couple of cycles.

I/O problems with SURFEX in writing fields and especially startup time for large domains and many CPU'S.

Problems with scalability of CANARI

Fullpos not working because of memory requirements

# Features in HARMONIE cy37h1

Based on cy37t1main + the 4 bugfix branches

## Physics

- SURFEX 6.1
- EDMFM tuning
- Improved spinup of surface variables through a corrected handling of frozen soil moisture when starting with ECMWF/HIRLAM data.
- Diagnostics of cloud heights according to WMO definitions is now default for AROME (in HARMONIE)
- Cellular automata in ALARO
- MUSC, the single column model in HARMONIE (scripts Forecast\_musc, Harm2musc)
- The HIRLAM physics removed

## Assimilation

- Allow for assimilation cycles shorter than 6h ( RUC )
- Use deep soil temperatures as a proxy for lake temperatures in assimilation.
- Experimental EKF setup for surface assimilation with SURFEX
- Simple single obs experiment through the SINGLEOBS flag

## HARMONEPS

- Several technical updates for better performance. ( work in progress)

# Features in HARMONIE cy37h1

## Technical

- Open-MP adaptations and other I/O optimizations
- Reproducibility checks in testbed
- Several mSMS updates
- RUNNING\_MODE=operational research for different behavior in error treatment

## Outstanding problems

- Conversion to GRIB1 needs more work. **BLOCKER!**
- Still problems with ATOVS
- Occasional MPI comm problems on c1a.
- ...

## Tested configurations

**AROME\_3DVAR:** AROME, EDMFM, 3DVAR, CANARI+Olmain

**ALARO\_3DVAR:** ALARO, SURFEX (no TEB), LSMIXBC, 3DVAR, CANARI+Olmain

**ALADIN\_SURFEX\_3DVAR:** ALADIN, SURFEX (no TEB), 3DVAR, CANARI+Olmain

**AROME\_MUSC:** AROME MUSC

**ALARO\_MUSC:** ALARO MUSC

**AROME\_EPS:** HARMONEPS with AROME, downscaling

# Comments on cy36h1

## Technical aspects

- \* Too low temperatures over large inland water bodies in autumn. **Soil temperature proxy**
  - \* Large number of Listener tasks was suspected to have caused crashes caused by failed ls and cat commands. Setting taskmax to 10 seems to have helped with this problem. **Changed in cy37h1**
  - \* I/O problems with SURFEX in writing fields and especially startup time for large domains and many CPU'S. **Startup time improved, for general I/O improvements wait for cy38t1.**
  - \* Fullpos not working because of memory requirements. ?
  - \* Problems with scalability of CANARI. **See Ryad's talk -> cy38t1**
- 
- \*One model crash in August 2011 related to strong upper air winds required a change in time-step to 45s for a couple of cycles. **Will never happen again ;-)**

# The Hungarian quest

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**A:** harmonie-37h1.beta.2, Ulf, Roger, 3 days, good support from the Hungarian group and a lot of coffee.

**Challenge:** First dual host outside ECMWF ( to my knowledge )

- \* Run mSMS and some smaller jobs on a smaller server
- \* Run other computations on the HPC

**Problems:** Mainly file ownership problems related to the dual host setup. Compiler and queue system known.

**Changes:** Very few. Hungarian configuration files included in cy37h1 + generalization of the dual setup.

**Result:**

- \* gmkpack & makeup compilations
- \* All testbed configurations successfully run through
- \* ALARO ( without SURFEX) on the Hungarian domain with 3DVAR, CANARI, operational boundaries (ECMWF) and SOME of the operational observations

**Future: That's up to the Hungarians!**

# cy37t1 Export version vs HARMONIE cy37h1

Most of the differences have been introduced in cy38t1.

<https://hirlam.org/trac/wiki/Phasing/cy38t1>

- \* CA scheme
- \* RK updates in ALARO
- \* Problems with empty pools solved
- \* LSMIXBC ( Yet another blending technique )
- \* LCRITSNOWTEMP, change in snow diagnostics in fullpos
- \* EDMFM updates
- \* Cloud diagnostics
- \* Portability and parallelisation fixes

**One important out of bounds bugfix in the spectral coupling!**

# HARMONIE training

Harmone system training in Norrköping September 2011

Dynamics

Physics

DA

Verification/Postprocessing

Usage of HARMONIE



New training in 17th-21<sup>st</sup> of September 2012!

- Public open forum
- Monitored by “on-duty” team
- Better feedback on your questions!

Home > Communication > HIRLAM forum

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[fidext.f question](#) (1 viewing) (1) Guest

Forum header

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**TOPIC: fidext.f question**

#42

**fidext.f question** 1 Day, 2 Hours ago

I'm assessing the impact of ASCAT observations assimilation on HirLam. I intended to use the vfld files which are created by /home/ms/dk/nhz/harmonie\_release/trunk/util/gl/prg/fidextr.F on ECMWF.

As the largest impact of ASCAT assimilation is expected over sea I planned to use the Vfld output for moored buoys. Unfortunately I fail to ensure that the moored buoys information is appearing in the vfld output files created by fidextr.F.

I incorporated the moored buoys into the allsynops.list which is copied by the VER\_create\_fld script to synop.list. This did not lead to the desired result : vfld files containing moored buoys.

I assume that it has something to do with the land\_limit=0.01 setting in the VER\_create\_fld script( but I'm not sure about this). I couldn't find information on this on the HirLam Twiki page. Only that some modifications were done in 2007.  
How can I get sea surface data into the vfld files, or it this not possible?

[REPLY](#) | [QUOTE](#)

Ulf Andrae

Admin

Posts: 3

OFFLINE PROFILE

#43

## Where is the OnDuty team?

A wide-angle photograph of a mountainous landscape. In the foreground, there's a mix of green grassy fields and some small, dark pools of water. A river or stream winds its way through the valley floor. The middle ground is dominated by steep mountains covered in patches of green vegetation and exposed, light-colored rock. The background shows more mountain ridges under a sky filled with white and grey clouds.

Thanks for your attention  
Questions?