



# HIRLAM-A status and plans

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ASM/Workshop Oslo, 20070423

# Steps towards mesoscale assimilation system

- Planning meeting Zürich, October 2006 => common mesoscale DA plan
- Met.no, SMHI staff:
  - Implementation of ALADIN 3D-VAR
  - Study of characteristics, performance wrt HIRLAM 3D-VAR
- Use of hi-res observations:
  - Radar: Good H-A cooperation in joint reflectivities assimilation work; radial winds: homogenize radar preprocessing
  - Impact assessments for GPS/RH2m
  - Good progress with AMSU over sea/ice, inclusion of SEVIRI, MODIS; ATOVS/RTTOV-8 upgrade
  - Start made with research on assimilation of binary cloud data
  - Obs operator convergence: descriptions of obs operators largely made, process of common choices ongoing
- SRNWP Mesoscale data assimilation workshop, March 2007, Norrköping

# Data assimilation (cont.)

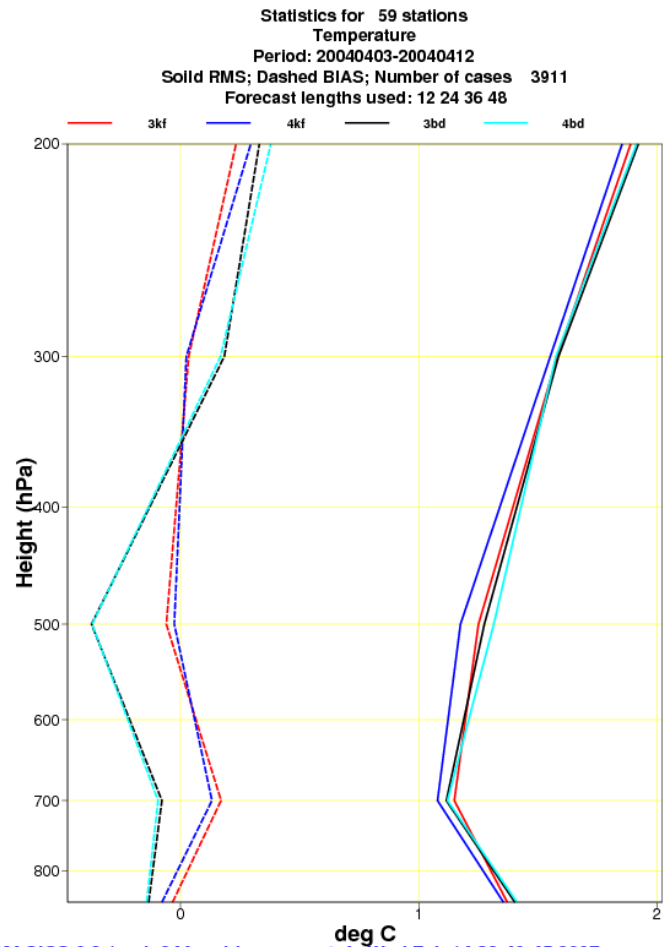
## 4D-VAR pre-op testing:

- Reproducibility problems at ECMWF platform, later found to be due to differences in model configuration (dependent on background error scaling, very sensitive to choice of convection scheme)
- Due to delay, new 4D-VAR included in Ref System but not yet as default

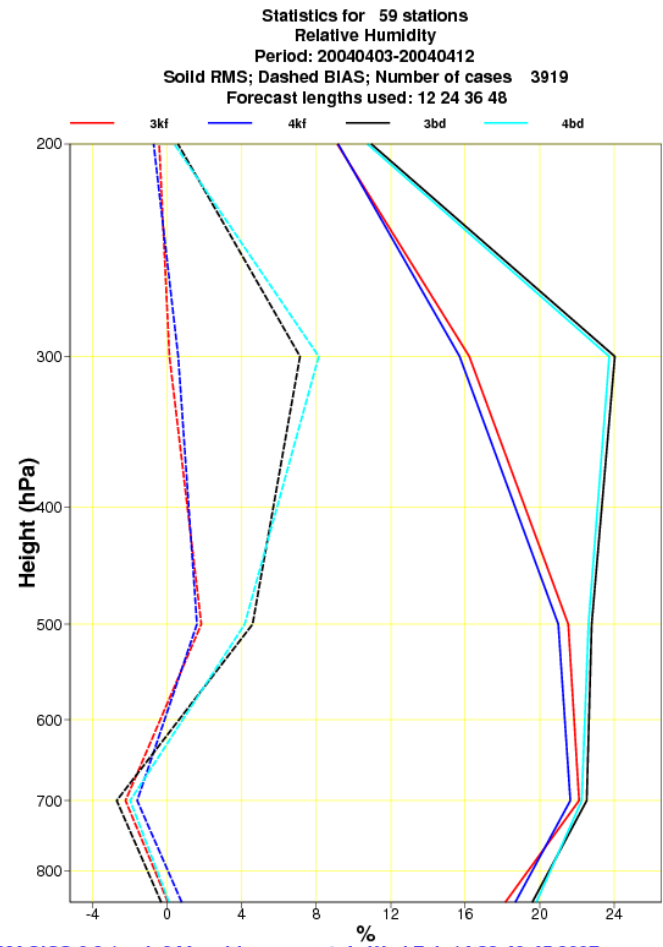
Aim: fully exploit 4D-VAR potential for assimilation of ground- and spacebased remote sensing observations

## ➔ 4D-VAR training/working week for observation experts, February 2007, Norrköping

- Knowledge transfer, hands on training in working with 4D-VAR
- Review of status of use of obs activities
- Definition of plans / setup of coherent observation impact studies:
  - Over mid-latitude sea areas: AMSU A/B, AMV, scatterometer, OSI SAF SST/sea ice, VAD profiles, buoys
  - Over Arctic (IPY): MODIS in addition to the data types above
  - Convection: radar winds, SEVIRI, GPS, surface obs
- First results: tbd at this meeting



MAGICS 6.9.1 pclx044.smhi.se - ngustafs Wed Feb 14 22:40:45 2007



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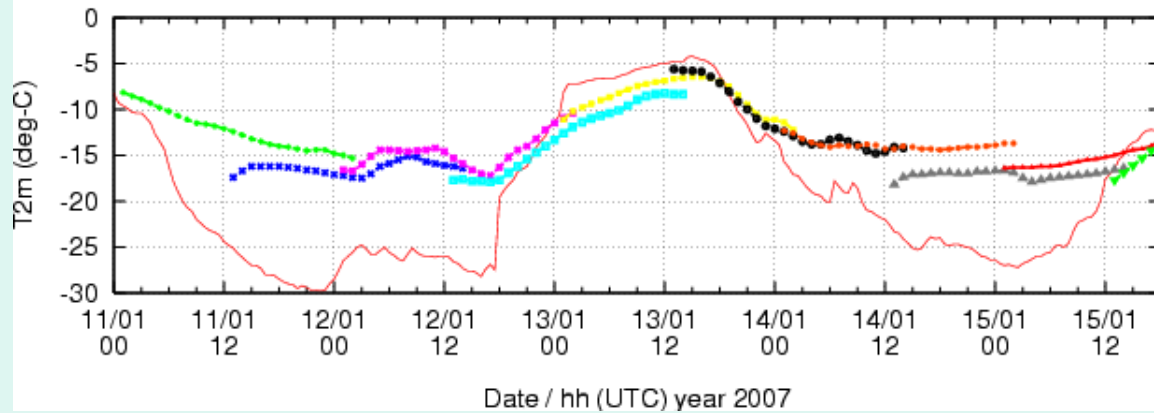
# Mesoscale model developments and testing

- HARMONIE repository, reference setup created. New HARMONIE NRT forecast models being set up at INM, KNMI, metno?
- Evaluation of routine monitoring and verification at DMI, FMI, SMHI
  - Identification of some areas for improvement
  - Comparison AROME-HIRALD
  - Extend parallel runs with ALARO-0?
- Combined TKE/convection scheme EDMF being integrated, implemented in ECMWF/AROME for further tuning, testing (Cabauw)
- In-depth validation and intercomparison of now available physics packages during the remainder of 2007:
  - Setup of joint validation of physics packages against SOP's
  - Training week for HIRLAM physics staff to work with HARMONIE, then get involved with validation for own areas of expertise.

# Synoptic model/surface developments

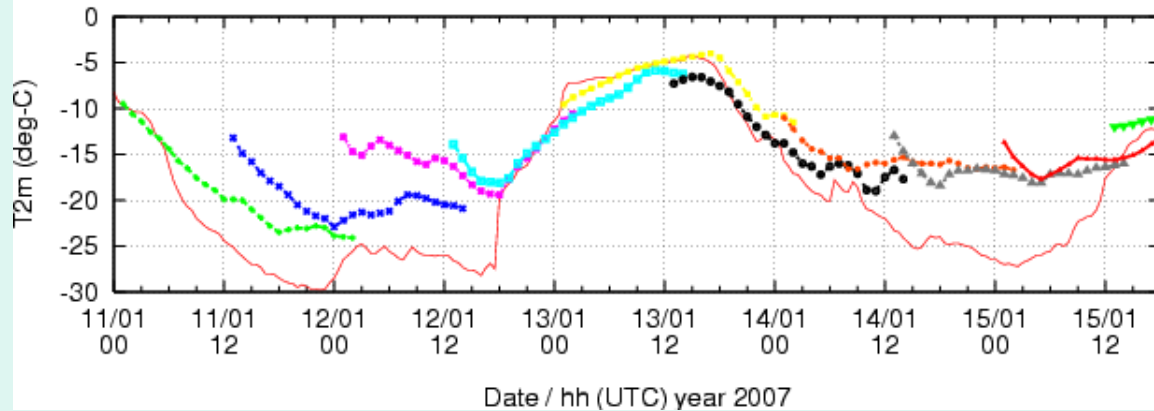
- Preparations/testing for introduction of new synoptic surface scheme
  - In-depth study of BL/surface behaviour of new snow+forest surface scheme
  - Existing problems in winter and summer now apparently solved
  - Presently available as separate branch
- Attempts to improve description of stable boundary layer
  - Perov and Sukoriansky, Tijm and de Bruijn
- Preparations, preliminary studies for intercomparison of STRACO and KF-RK convection schemes (to be completed before autumn)

Screen level temperature Exp 71b1SR Station Soda



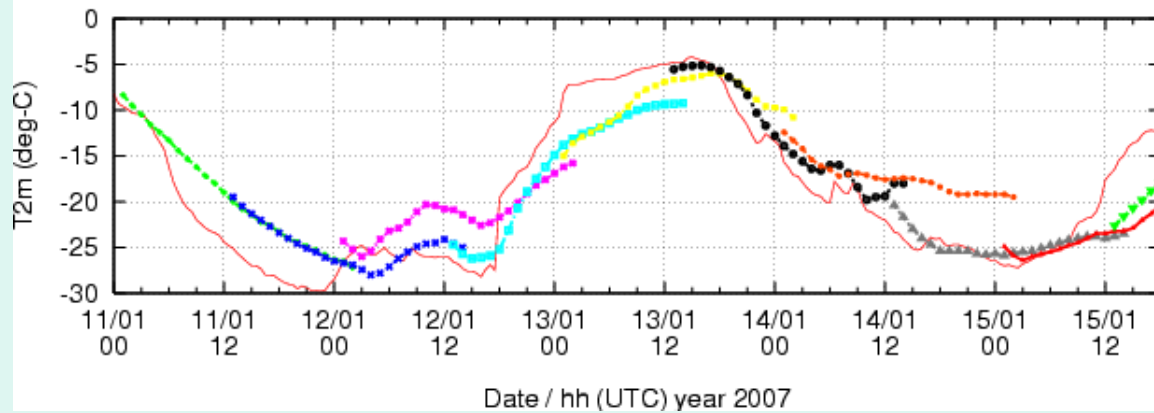
Old surface scheme

Screen level temperature Exp 71a3nS Station Soda



New surface scheme  
without DA adaptations

Screen level temperature Exp 71nS Station Soda



New surface scheme  
with DA adaptations

# Surface modelling and data assimilation

- Mesoscale: Toulouse surface/SURFEX workshop, Dec 2006
  - High priority to start WG activities on interfacing, consistency of surface-upper air
- Lake model
  - Built on top of new synoptic surface scheme
  - Adjustments in data base for lake depth, surface analysis still needed
  - Implementation in SURFEX of model by MF, of DA by HIRLAM
- Sea/ sea ice
  - Development of 2D-VAR scheme for OSI-SAF SST/sea ice assimilation



# Probabilistic forecasting: GLAMEPS

- GLAMEPS concept:
  - Create grand ensemble of EPS systems, produced in HIRLAM/ALADIN countries in a distributed manner, using a variety of ensemble generation mechanisms
  - Use GLAMEPS laboratory at ECMWF to experiment with e.g. new EPS generation methods, and to design possible initial operational GLAMEPS setup.
  - Start quasi-operational distributed production with this initial system.
- Status:
  - GLAMEPS laboratory environment created at ECMWF (incl. ensemble generation scripts, and monitoring and verification tools)
  - Initial HIRLAM ensemble components from met.no, INM; ALADIN components from ZAMG, HMS.
  - Start with technical testing of components at ECMWF, later continue with experiments to define first quasi-operational configuration
  - EUMETNET proposal EurEPS for pan-European system

# Developments in probabilistic forecasting

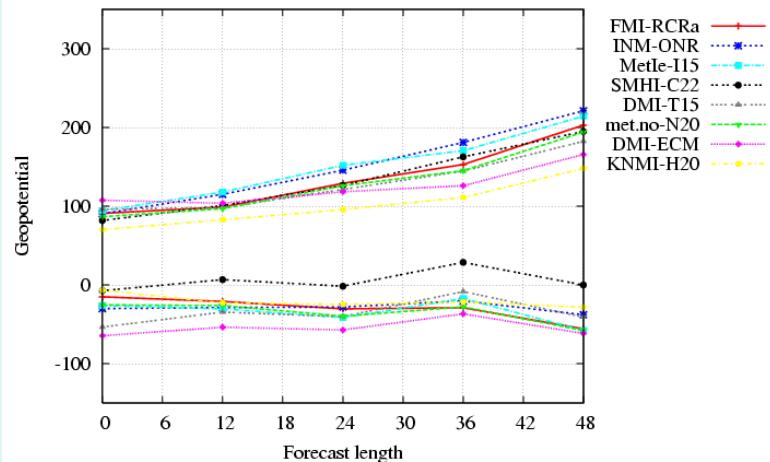
- HIRLAM singular vectors
- INM experimentation with multi-physics
- Ensemble Kalman Filter experimentation at Stockholm University
  
- Monitoring and verification software from INM available as basic tool
- BMA: applied successfully to INM SREPS, PEPS. Application to non-Gaussian parameters under investigation
  
- In context of INM SREPS, couplers developed between global/regional models => relevant tool for interoperability.

# System developments

- Version 7.1: February 2007.
- Mesoscale system aspects:
  - HARMONIE Mesoscale code, scripts, tools included in repository
  - System aspects for mesoscale: discussion on medium-range plans started in HMG-CSSI
- Probabilistic forecasting: EPS generation scripts included in repository
- Cleanup in progress, first results included in version 7.1.
- Hexnet
  - Gradual build-up of data product portal
  - Enhanced scientific, technical and user documentation (“howto” pages)
- Verification working week
  - Inventory of available methods and choice of method for model intercomparison exercises
  - Decision: Central verification at hirlam.org server; Adapt present Reference verification package to make it more flexible

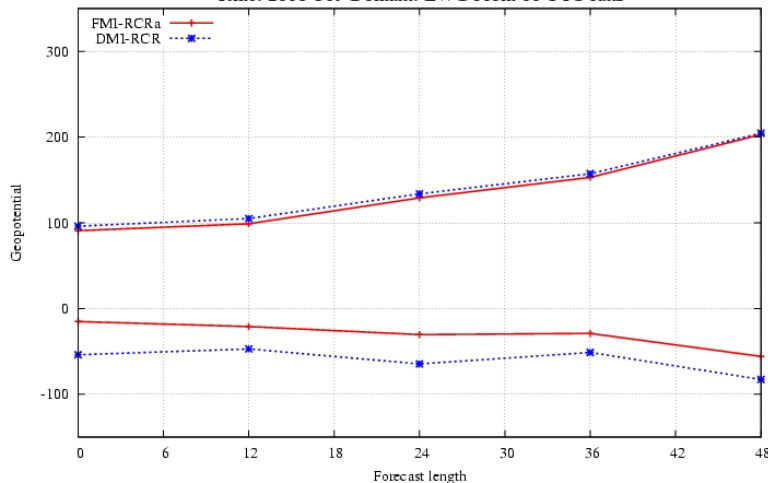
Monthly bias and rms of Geopotential at level 500 hPa

Time: 2006 Oct Domain: EWG From 00 UTC runs



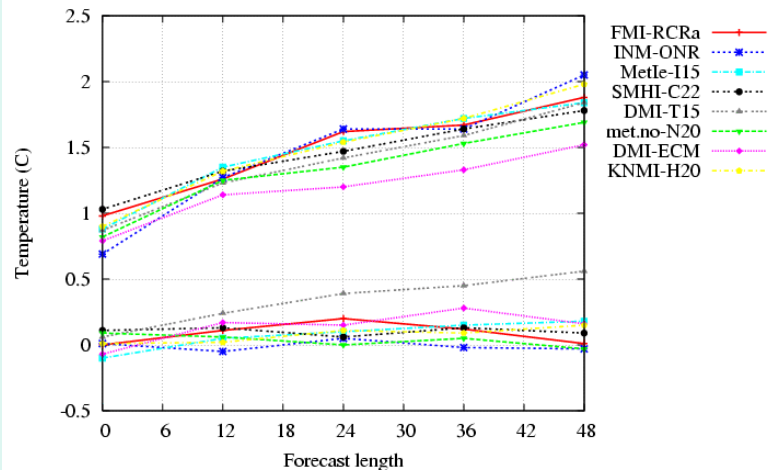
Monthly bias and rms of Geopotential at level 500 hPa

Time: 2006 Oct Domain: EWG From 00 UTC runs



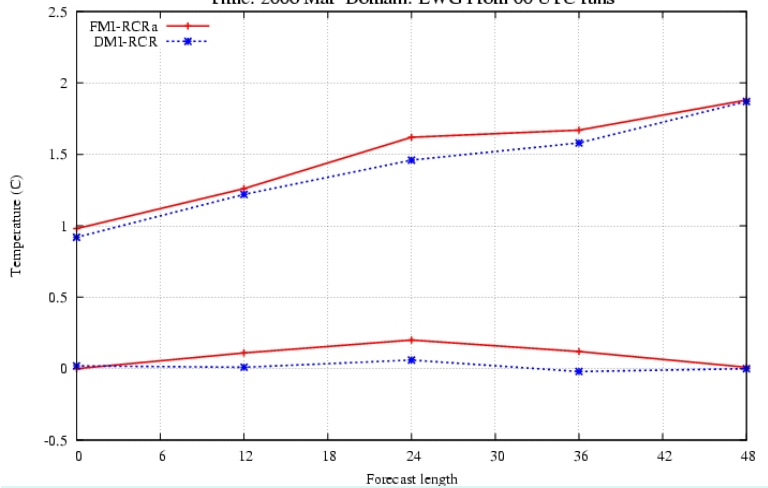
Monthly bias and rms of Temperature at level 850 hPa

Time: 2006 Mar Domain: EWG From 00 UTC runs



Monthly bias and rms of Temperature at level 850 hPa

Time: 2006 Mar Domain: EWG From 00 UTC runs



# HIRLAM Reference system version 7.1

## New features:

- Resolution increase
- Adapted structure functions, statistical balance
- Retuned, recoded physics package incl moist CBR
- 4D-VAR upgrade (option)
- Ensemble generation scripts
- Assimilation packages for AMV/MODIS, surface relative humidity
- Extended postprocessing package
- First results of code and script cleaning, numerous bug fixes

## Not-quite-ready developments made available via branches:

- New surface scheme
- Upgraded RTTOV-8 / ATOVS module
- Improved openMP parallelization
- System overhaul trial suite

# Consortium / organizational matters

- Application for membership of HIRLAM consortium by:
  - Estonia (EMHI): Formally admitted at July 2006 Council
  - Latvia (LEGMA): Application July 2006, under consideration
  - Lithuania (LHMS): Application February 2007, under consideration
- Project leader changes:
  - Trond Iversen: PL probabilistic forecasting (sep 2006)
  - Mariano Hortal: PL dynamics (dec 2006)
- HIRLAM-ALADIN coordination
  - Planning meetings/workshops on data assimilation, probabilistic forecasting, surface issues
  - Mutual representation in Council/Assembly, HAC/PAC
  - HMG-CSSI meeting 22 April