Status Report on Operational Hirlam

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with contributions from

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Outlines

- Highlights on operational activities
  - Changes/trends in configurations
  - Quality trends
  - Reported problems, topics
  - Model system upgrade
- Real time HARMONIE experiment suites

Most details in national posters!

Highlights of the Operational NWP

- HIRLAM 4D-VAR operational at SMHI late Jan 2008
- SREPS operational at AEMET 2007
- Improved resolution, further system harmonization
- 7.1, 7.2

Operational Hirlam 2008: coarse resolution

	Model version	Grid-mesh	Resolution	Level	LSMIX
AEMET-ONR	6.1.2	582x424	0.16d	40	N
DMI-T15	6.3	610x568	0.15d	40	Y
EMHI_ETA	7.1.2	366x280	0.10d	60	N
FMI-RCR	7.1.4	582x448	0.15d	60	Y
KNMI-D11	7.0.1	816x650	0.10d	60	Y
LHMS-HL8	7.1.2	186x186	0.08d	60	N
METIE-OPR	7.0.1	438x284	0.147d	60	N
METNO-N11	7.1.4	864x698	0.108d	60	Y
SMHI-C22	7.1.2	306x306	0.20d	40	N

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Hirlam Operational Domains
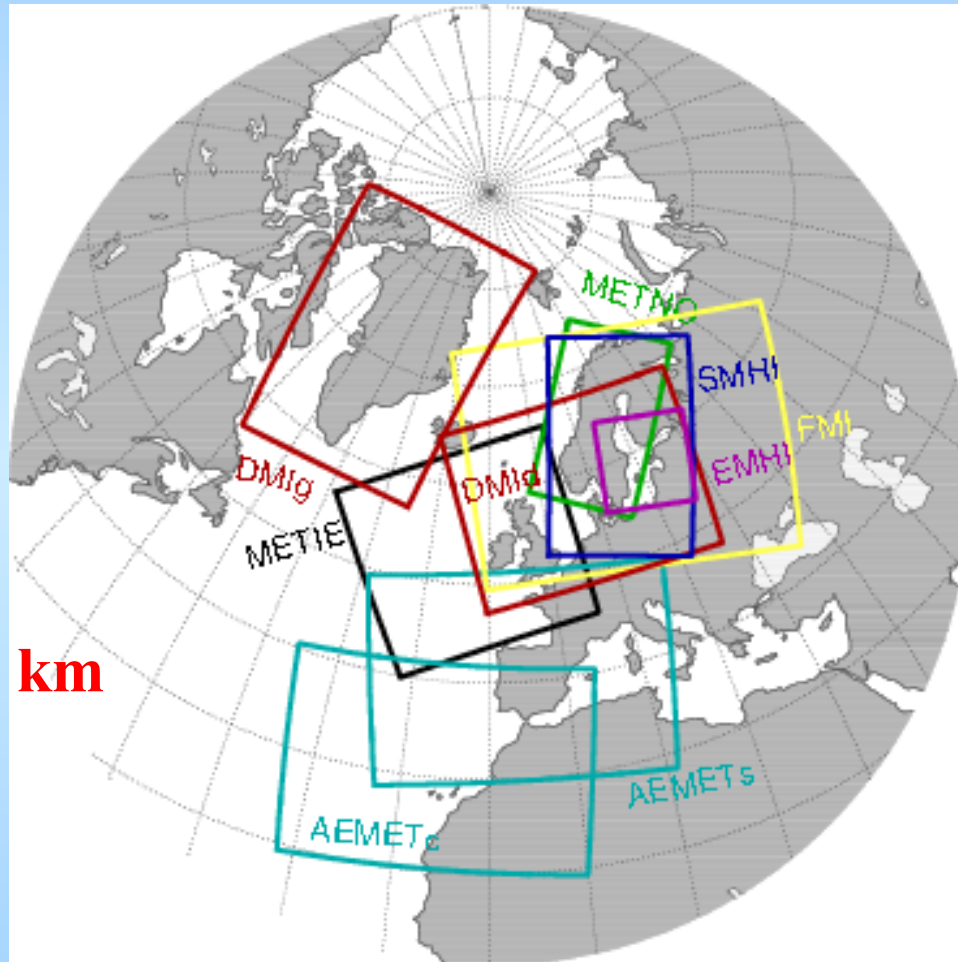
Fine scale, 3.5-9 km

("Atlantic scale", 9.5-17 km)

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Operational Hirlam 2008: fine resolution

	Model version	Grid-mesh	Resolution	Level
AEMET-HNR	6.1.2	606x430	0.05d	40
AEMET-CNN	6.1.2	606x430	0.05d	40
DMI-Q05	6.3	550x378	0.05d	40
DMI-S05	6.3	496x372	0.05d	40
EMHI_ETB	7.1.2	306x306	0.03d	60
FMI-MB71	7.1.4	482x360	0.068d	60
METIE-FIN	7.0.1	438x395	0.05d	60
METNO-N04	7.1.4	300x500	0.036d	60
SMHI-G05	7.1.2	294x441	0.05d	60

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Hirlam Forecast Quality Trend

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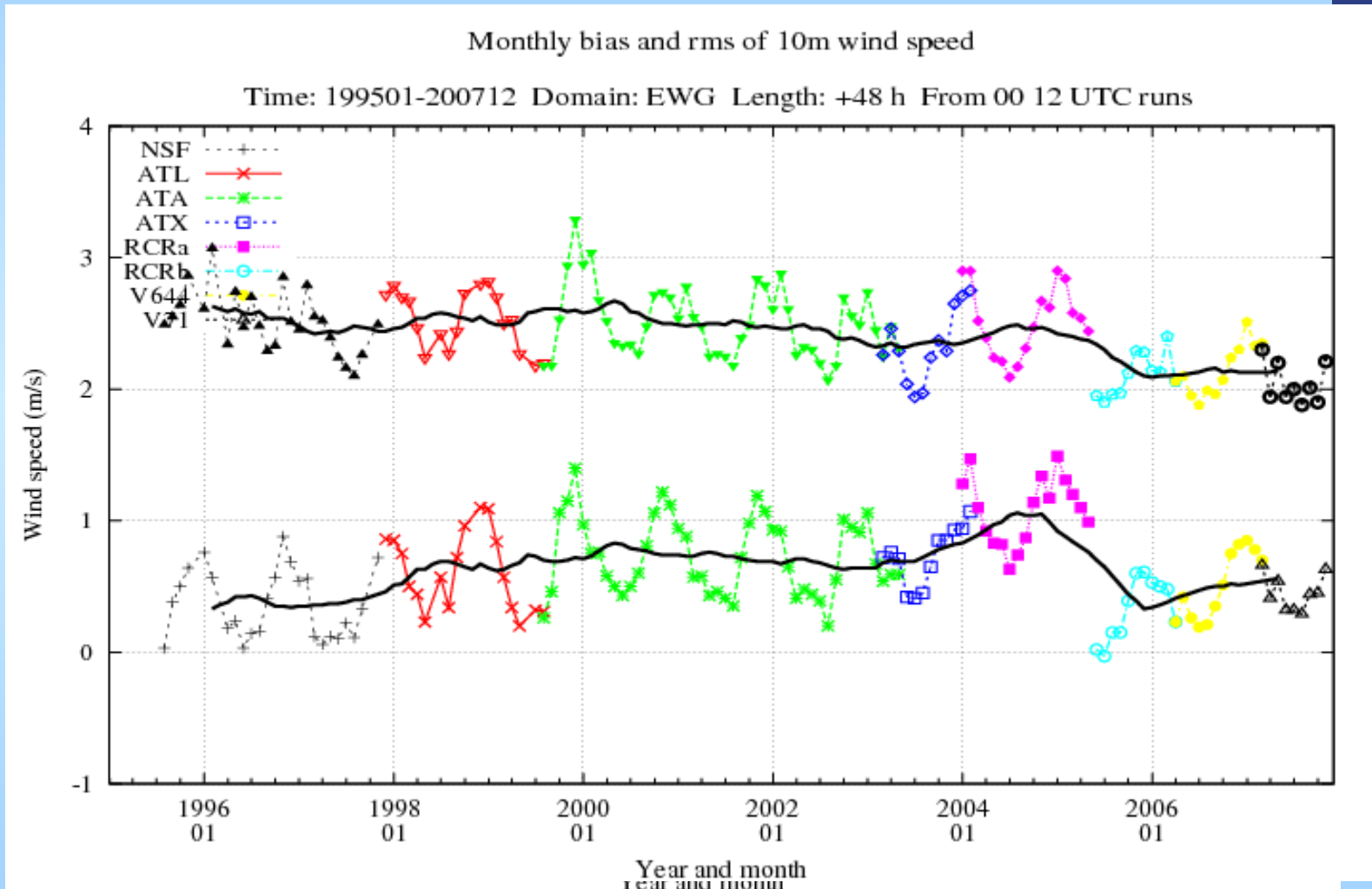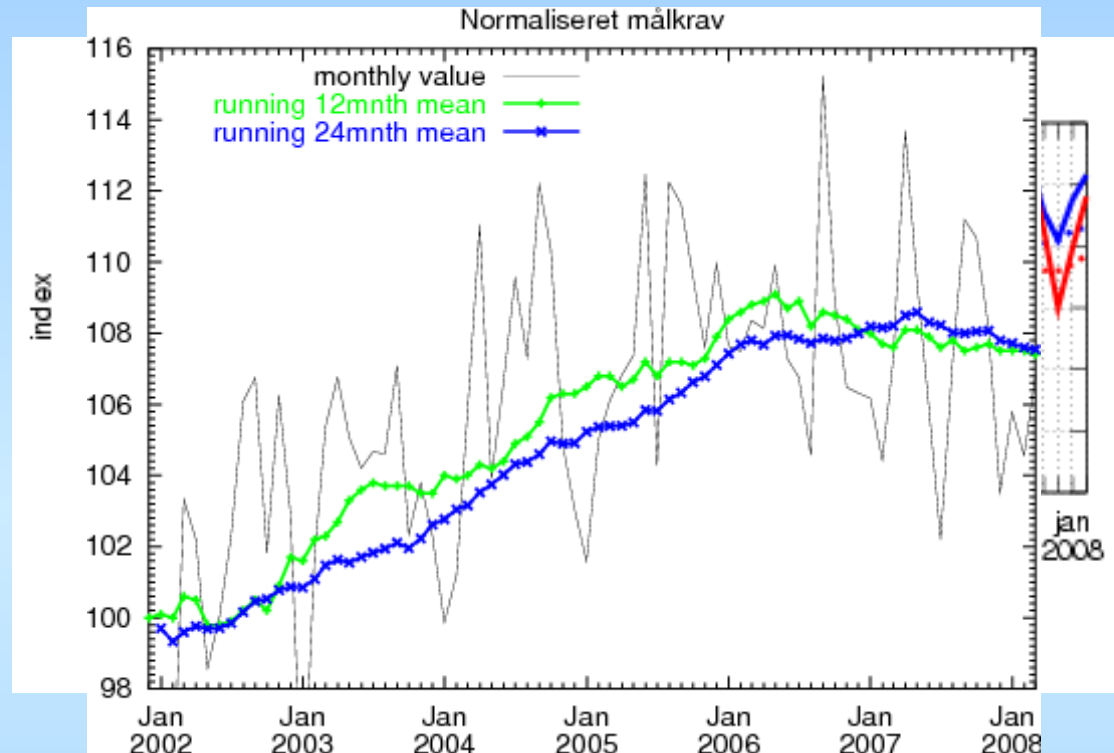
Månedlige RMSE av 12+48–prognoser av geopotensiell høyde summert over EWGLAM–stasjonene
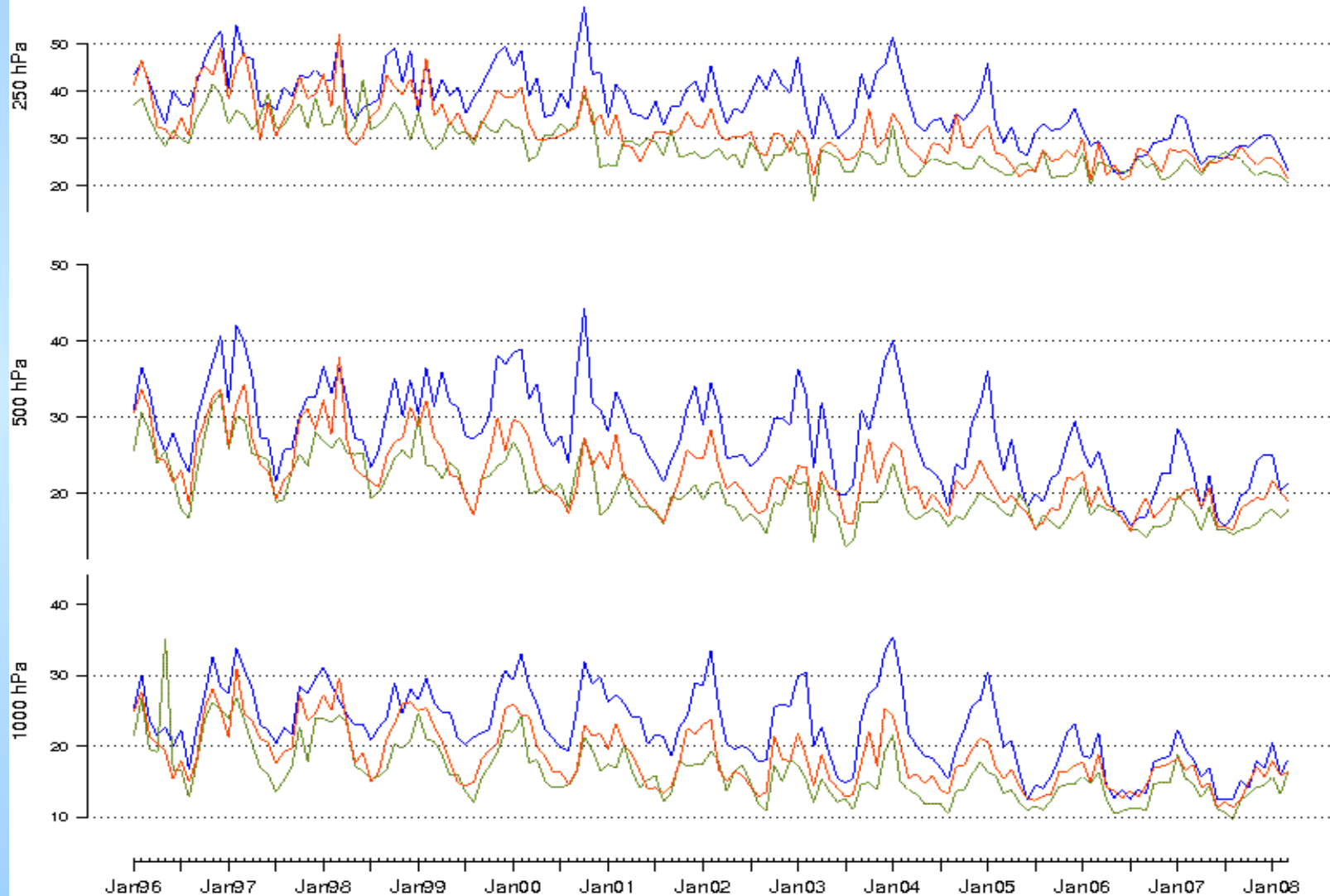
Other performance indicator

- • SMHI Forecast Index:
  - – Hit-rate for T2m and 10m ; Kuipers index for cloud and rain
- • DMI Index
  - – Hir-rate for T2m, 10m and precipitation for Denmark, Greenland, Faroe Island

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Reported operational problems, deficiencies…

- Spring fog, "Green rain", Greenland T2m, missing extreme weather (Aug 22, Jan 7…), poor quality in some post-pp parameters
- Implementation difficulties (-mp, scripts on LSMIX&archive&use of BC frames&Span…)
- Numerous patches for 7.1?
  – Poor documentation about new features
  – Confusion on girb parameter definition
  – "Surprises" about forecast parameters
- Advice: use latest versions from same release series!
- Questions:
  – Reference system procedure for testing, validation and release?

Real time Harmonie experiment suites

domain	Cycle	Grid-mesh	Resolution	Dynamics	Physics
AEMET-Mediterranean	31h1	384x400x40	11km	Hydrostatic	ALADIN
AEMET-Iberia	31h1	300x300x40	2.5km	NonHydrostatic	ALADIN
DMI-Scandinavia	32h2	256x288x40	11km	Hydrostatic	ALADIN
DMI-Denmark	32h2	384x400x40	2.5km	NonHydrostatic	ALADIN/AROME
FMI-Finland_south	32h2	300x300x40	2.5km	NonHydrostatic	AROME
KNMI-Netherland	31h1	300x300x40	2.5km	NonHydrostatic	AROME
SMHI-Scandinavia	32h3	300x450x60	2.5km	Hydrostatic	ALARO
SMHI-NorthSweden	32h3	288x270x60	2.5km	NonHydrostatic	AROME

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Outlook for 2009

- Several services move over to 7.2/7.3
  - 4DVAR, KFRK, newsnow, new obs
- Several services to operationalise 4DVAR
- LSMIX or alike used by all services
- Typical resolution looks to move down to 8-12 km range
  - Probably single Hirlam suite with high resolution replaced by HARMONIE system or RUC road system
- Operational 2.5 km AROME or 5 km ALARO targeted in several centers
  - All large services running real-time HARMONIE

Summary

- 4DVAR, SREPS
- Resolution progress: => 10-12 km, 60 layers
- Hirlam on right track on forecast quality…
- Improved, more comprehensive monitoring needed
- Improved pre-official release tests needed
- Toward 2009
  - More 4D-VAR suite,LSMIX, main resolution => 8-10 km
  - Newsnow, more obs data
  - GLAMEPS
  - Operational, cycled HARMONIE with AROME or ALARO

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The bumpy road with 7.1 …

- 7.1.4 released on 18 February, 2008, see **ReleaseNotes7.1.4**, correcting unrealistic rainfalls under sub-freezing condition in STRACO option
- 7.1.3 released on 6 Dec, 2007, see **ReleaseNotes7.1.3**, correcting errorneous summation for total precipitation in STRACO option and error in cloud cover initialisation
- 7.1.2 released on Aug 3, 2007, correcting selection for moist CBR
- 7.1.1 released on May 30, 2007, correcting on missing cloud ice in radiation parameterisation and confusion on grib output for cloud water, cloud liquid water cloud ice
- 7.1 released on March 28, 2007
- 7.1 rc 2 released on March 14, 2007: wind maxima bug correction; STRACO tuning
- 7.1 rc 1 released on February 19, 2007
- 7.1 beta 3 released on February 16, 2007: STRACO tuning, extra post-processing
- 7.1 beta 2 released on February 1, 2007: STRACO tuning, extra post-processing
- 7.1 beta 1 released on January 9, 2007: give up on 4D-VAR and newsnow
- 7.1 alpha 3 released on November 27, 2006, updating minimisation scheme
- 7.1 alpha 2 released on November 8, 2006, climate generation correction
- 7.1 alpha 1 released on September 27, 2006: with 4DVAR, newsnow

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The bumpy road with 7.2 …

- 7.2 official release: ???
- 7.2 rc3: Apr 13 2008: bug fixes on CPP; grib-output cleaning
- 7.2 rc2: March 3 2008: CBR Bruijn & Tijm; bug corrections; cw i/o
- 7.2 rc1: Feb 2 2008: no more waiting on newsnow; bug correction
- 7.2 beta1: Nov 23, 2007: 4DVAR, KFRK, CBR with QNSE, RTTOV 8 and satellite data assimilation recoding; screening procedure update; waiting for newsnow…

- Lessons learned??

What lessons to learn with reference releases?

- Long and early enough parallel testing (beta-suite) at operational platforms needed
  - including test of historical episodes covering different seasons
  - Technical tuning (platform specific) needs to be done locally
- Platform equivalence ensured between ECMWF and national platforms
  - No technical surprises
- Monitoring process shall include check of all HIRLAM output parameters, including non-"key parameters"
  - Precipitation category, Fog/visibility, Gust wind, tke
- More active pre-release involvement by forecasters and other downstream users as well as local NWP team
- More active bug report, operational logs
- More services with real time suite
- Improved monitoring for developers to real time runs
  - Facility
  - Developers spend time!

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