

Recent news in HIRLAM verification and monitoring

Xiaohua Yang, also reporting works by
**Ulf Andrae, Karl-Ivar Ivarsson, Bent H. Sass,
Carl Fortelius, et al**

Outlines

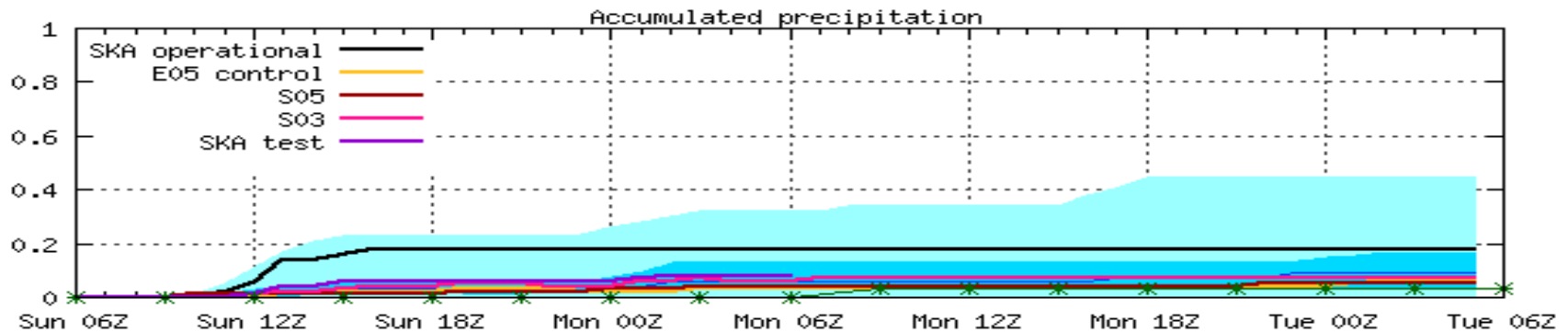
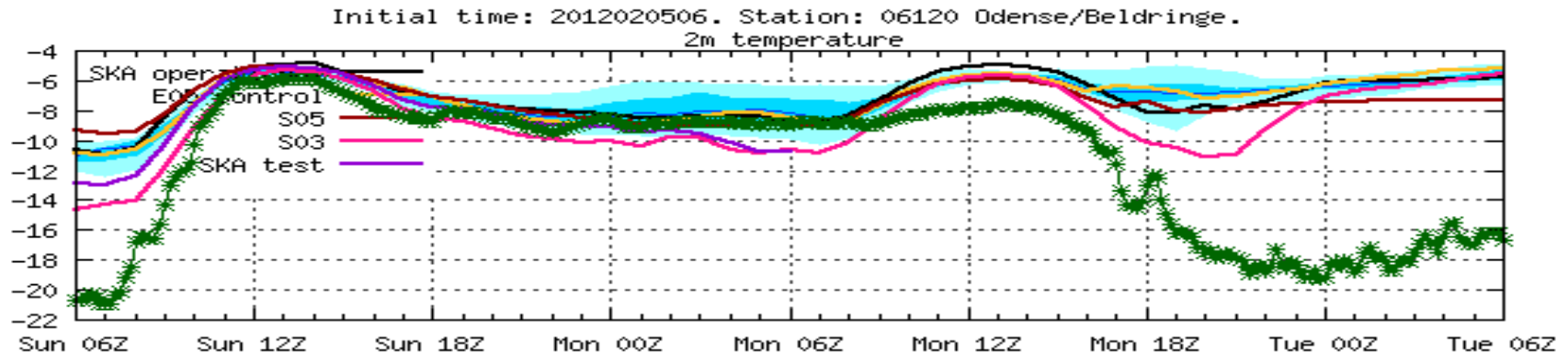
What's new in the HIRLAM observation verification

- Stratified verification
 - Conditional verification
- Compare comparables!
 - Height correction of surface temperature
 - Extraction of surface wind
 - Use of nearest grid point for prec, cloud, gust etc.
- New convention for local observation station-id
- New flexibility to add additional parameters
- Spatial verification and upscaling
 - FBSS, SWS

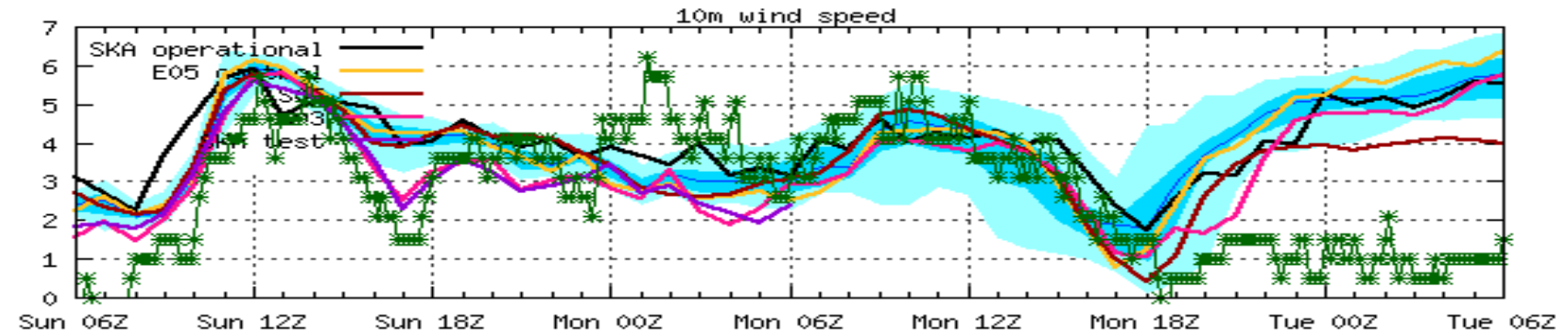
New features in operational HIRLAM/HARMONIE monitoring

- Hirlam data portal
 - Additional skill scores, significance scores
 - Harmonie forecast chart, DA and forecast diagnosis, verification
 - Expansion of participating service, model and data category
- Monthly statistics of mast profile verification
- Hirlam on-duty team

Cold Feb 5, Feb 7 morning in Odense

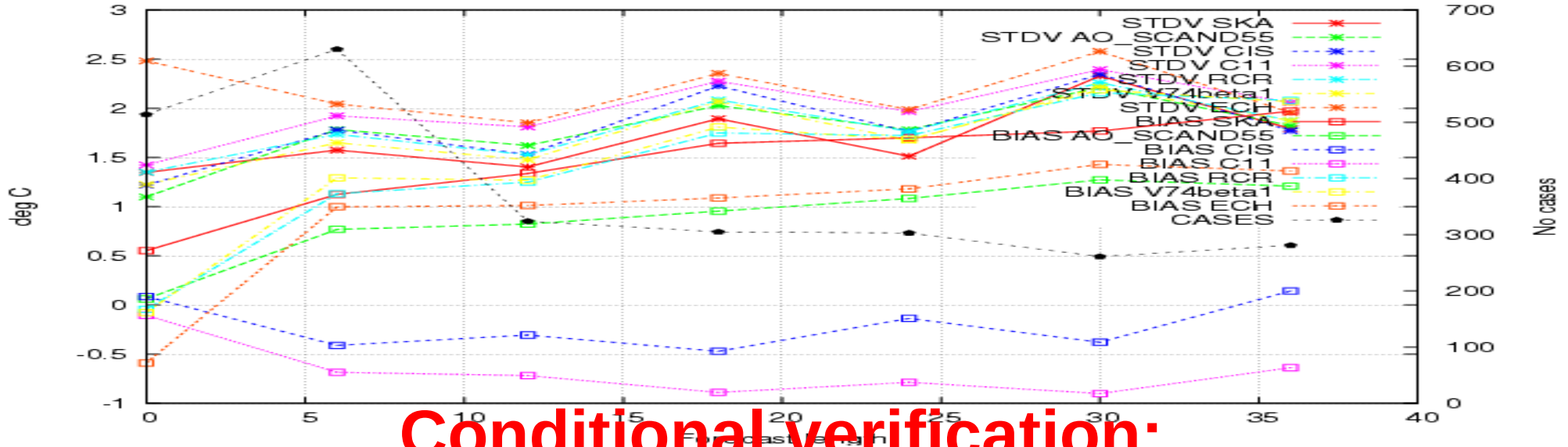


Updated: 07/02-2012 13:13 UTC



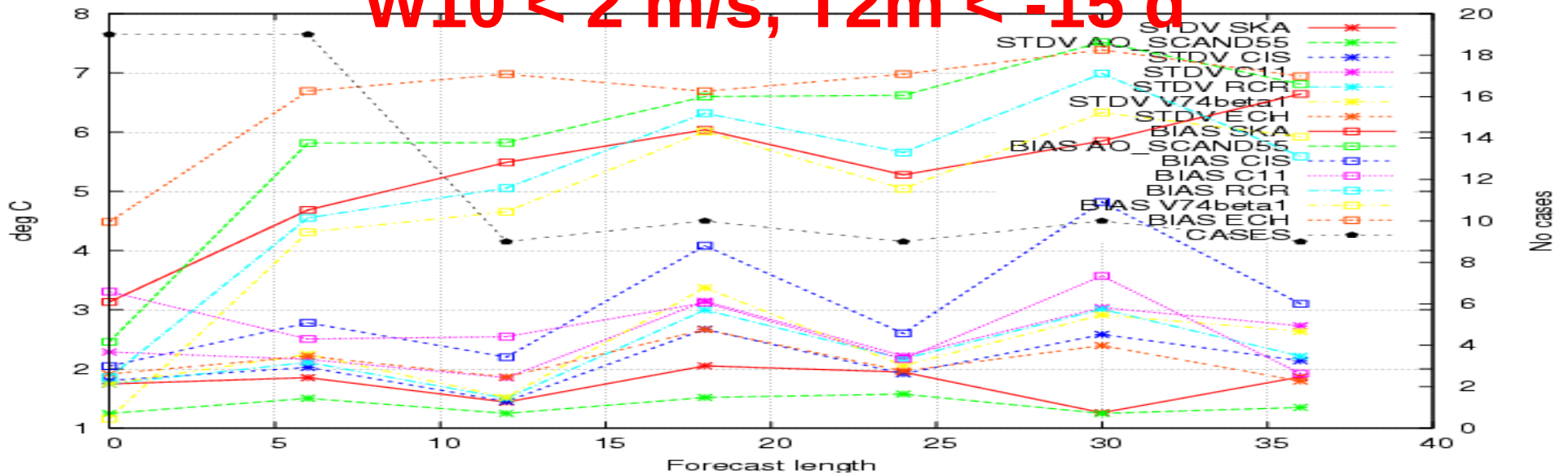
T2m verification

Selection: Denmark using 22 stations
Period: 20120202-20120209
T2m Hours: 00,06,12,18

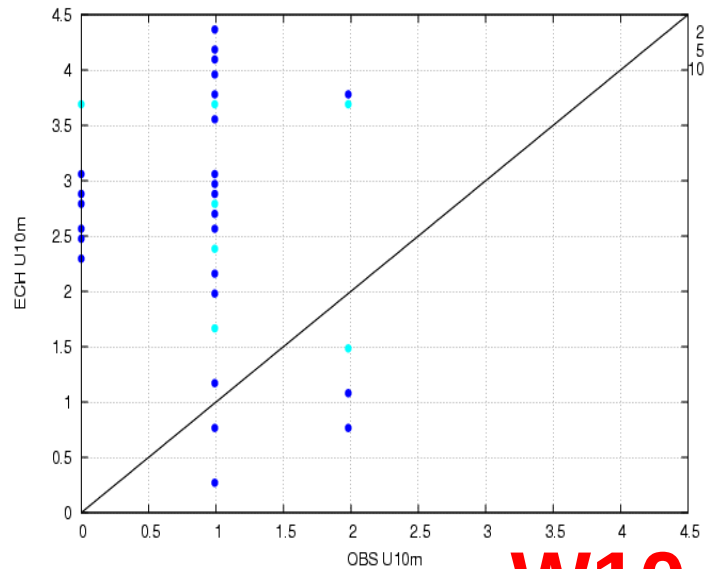


**Conditional verification:
W10 < 2 m/s, T2m < -15 d**

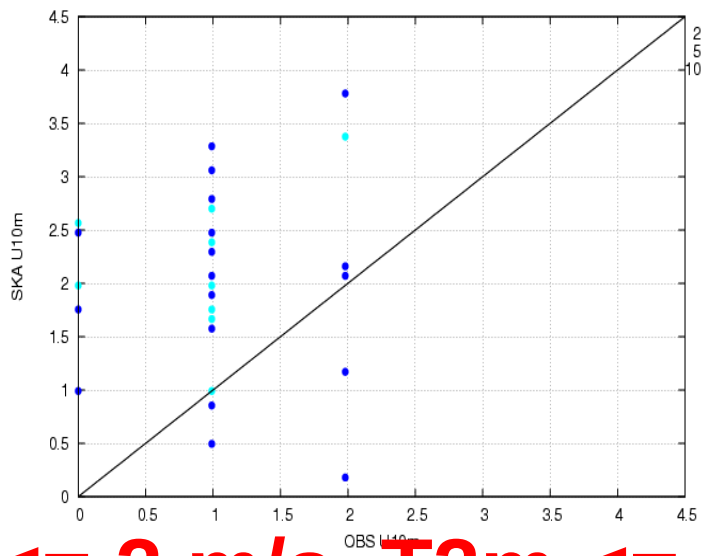
Selection: Denmark T2 w le 2 using 7 stations
Period: 20120202-20120208
T2m Hours: 00,06,12,18



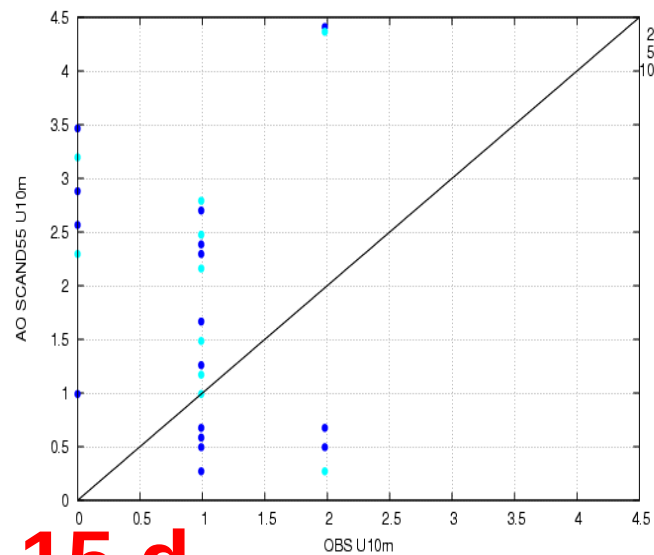
Scatterplot for 7 stations Selection: Denmark T2 w le 2
U10m [m/s]
Period: 20120203-20120207
Used 00,12,18 + 06 18 30



Scatterplot for 7 stations Selection: Denmark T2 w le 2
U10m [m/s]
Period: 20120203-20120207
Used 00,12,18 + 06 18 30

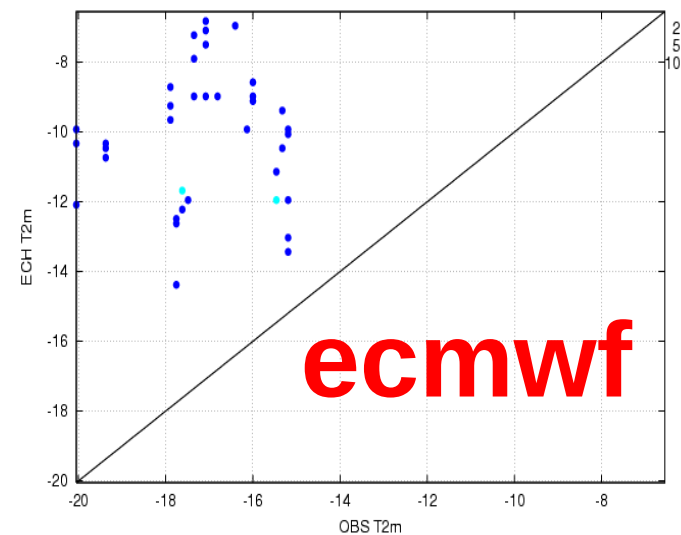


Scatterplot for 7 stations Selection: Denmark T2 w le 2
U10m [m/s]
Period: 20120203-20120207
Used 00,12,18 + 06 18 30

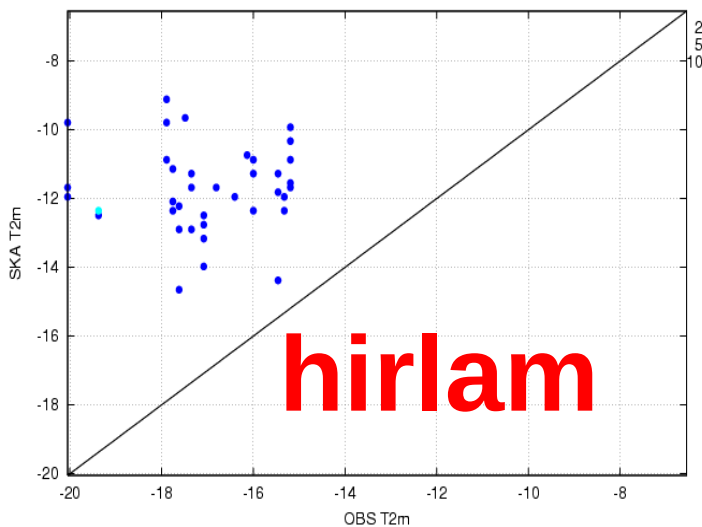


W10 <= 2 m/s, T2m <= -15 d

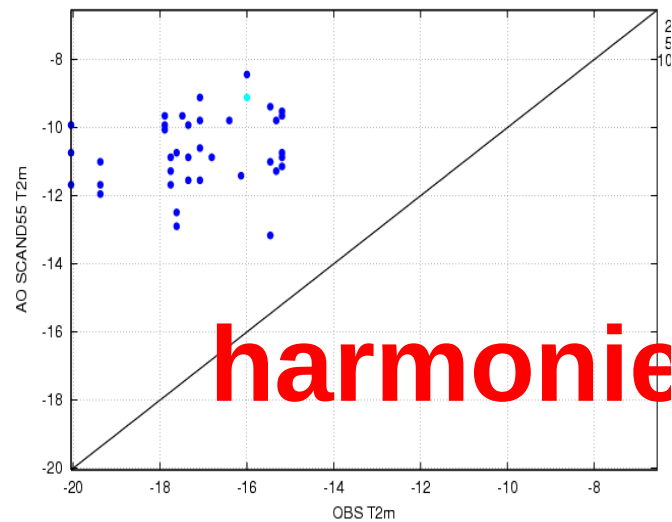
Scatterplot for 7 stations Selection: Denmark T2 w le 2
T2m [deg C]
Period: 20120203-20120207
Used 00,12,18 + 06 18 30



Scatterplot for 7 stations Selection: Denmark T2 w le 2
T2m [deg C]
Period: 20120203-20120207
Used 00,12,18 + 06 18 30



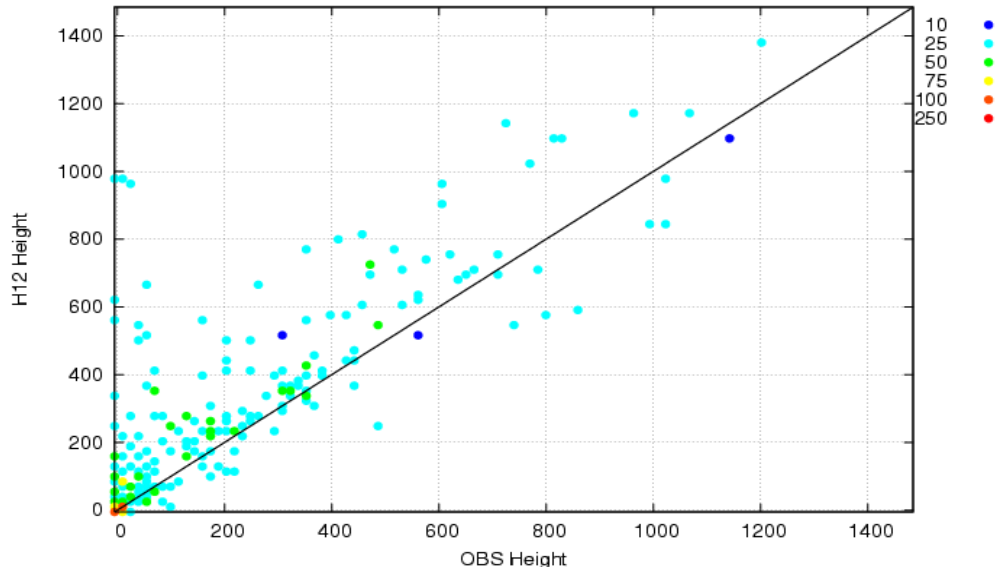
Scatterplot for 7 stations Selection: Denmark T2 w le 2
T2m [deg C]
Period: 20120203-20120207
Used 00,12,18 + 06 18 30



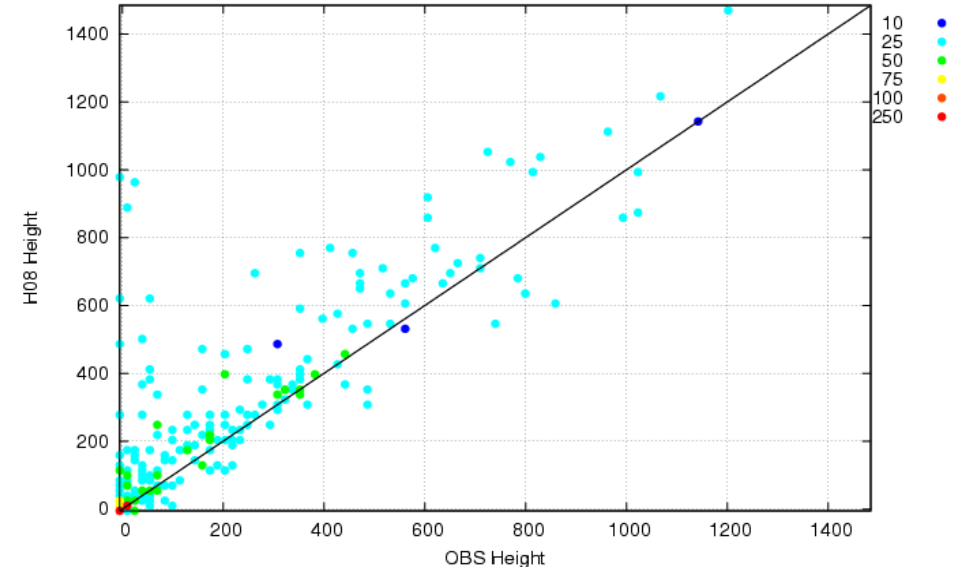
Conclusion: most extreme T2m conditions here were associated with clear and calm conditions. Models in general fail to predict calm conditions.

Model vs station heights: Norway

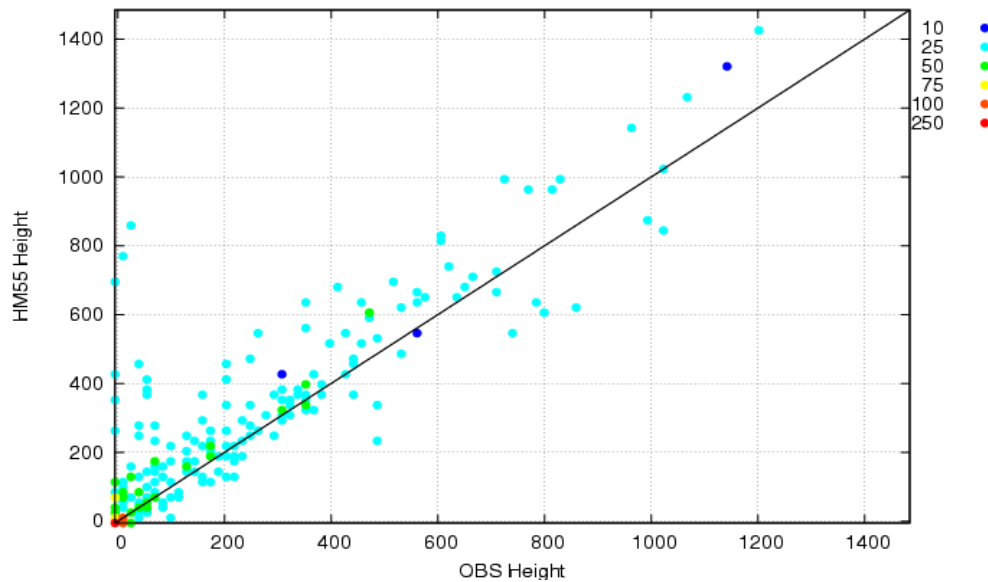
Scatterplot for 225 stations Selection: ALL
Height [m]
Period: 20120301-20120303
Used 00,06,12,18 + 06 12



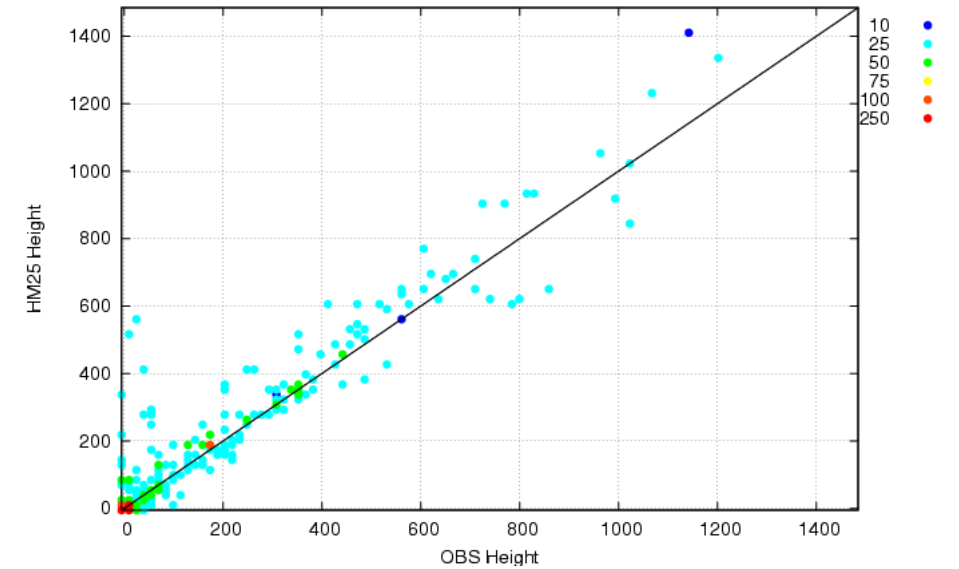
Scatterplot for 225 stations Selection: ALL
Height [m]
Period: 20120301-20120303
Used 00,06,12,18 + 06 12



Scatterplot for 225 stations Selection: ALL
Height [m]
Period: 20120301-20120303
Used 00,06,12,18 + 06 12



Scatterplot for 225 stations Selection: ALL
Height [m]
Period: 20120301-20120303
Used 00,06,12,18 + 06 12



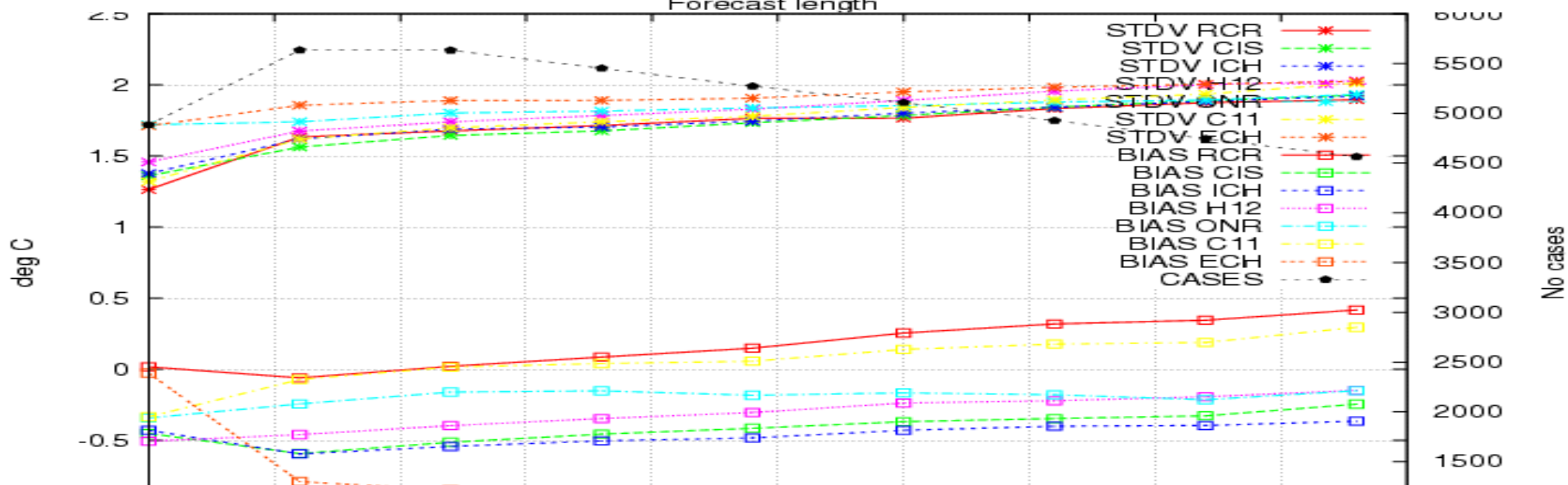
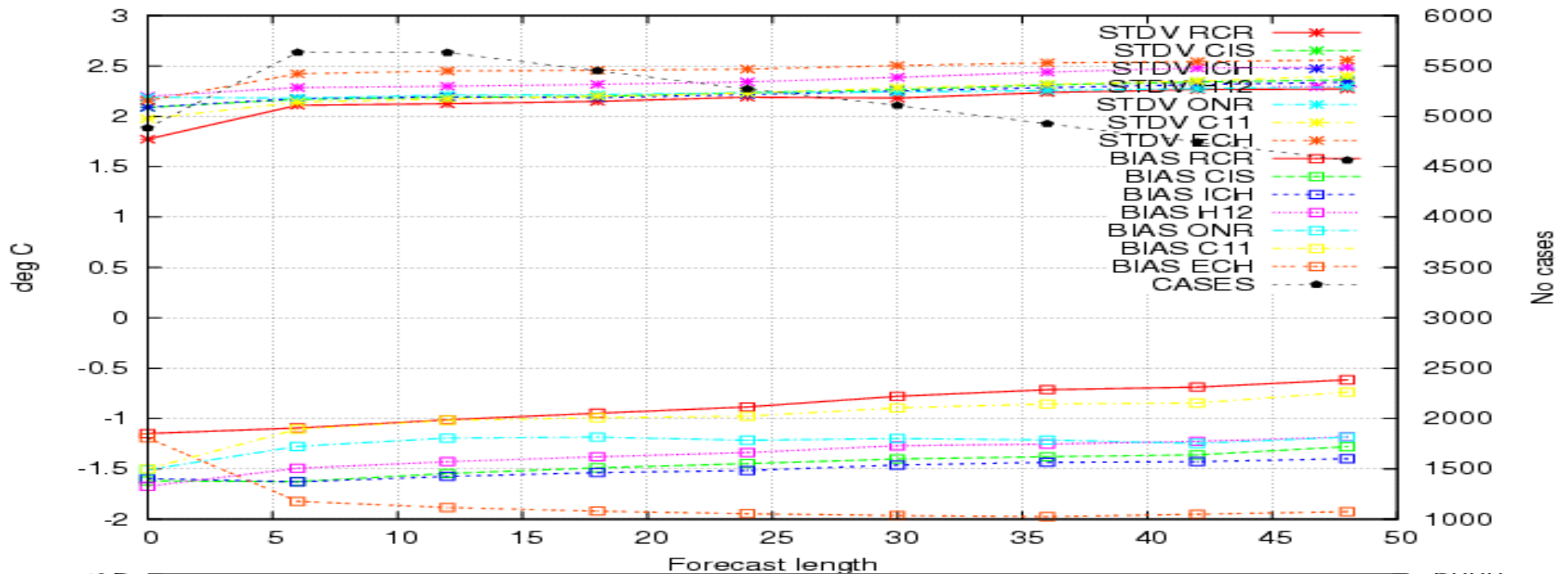
Height correction of T2m

Observation sites in hilly area (Norway, ...) often lie in a valley

- Model heights > observation heights
 - ECMWF/T15: + 165m (norway)
 - H12: +120 m (norway), +180m (south norway)
 - H08: +150 m (south norway)
 - Alaro 5.5: +120 m (south norway)
 - Arome 2.5: + 80 m (south norway)
- Accordingly, post-processed model values of T2m interpolated to station position suffers systematic bias due to height difference
- HIRLAM observation verification now provides optional correction using constant lapse rate

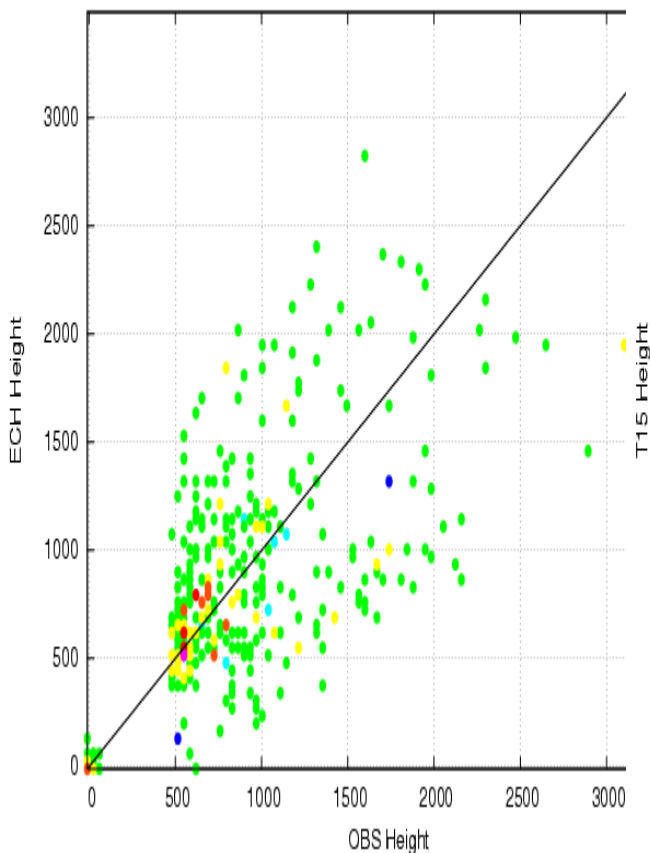
Observation verification

Selection: Norway using 91 stations
Period: 201204
T2m Hours: 00,06,12,18



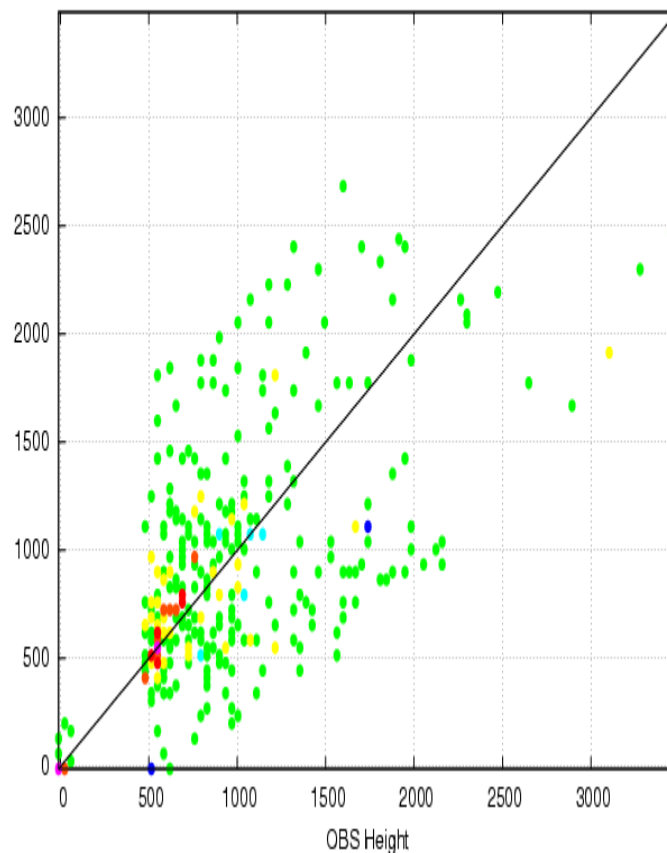
However, such is not generally true for European mountains...

Scatterplot for 347 stations Selection: Eumou
Height [m]
Period: 20120301-20120303
Used 00,06,12,18 + 06 12



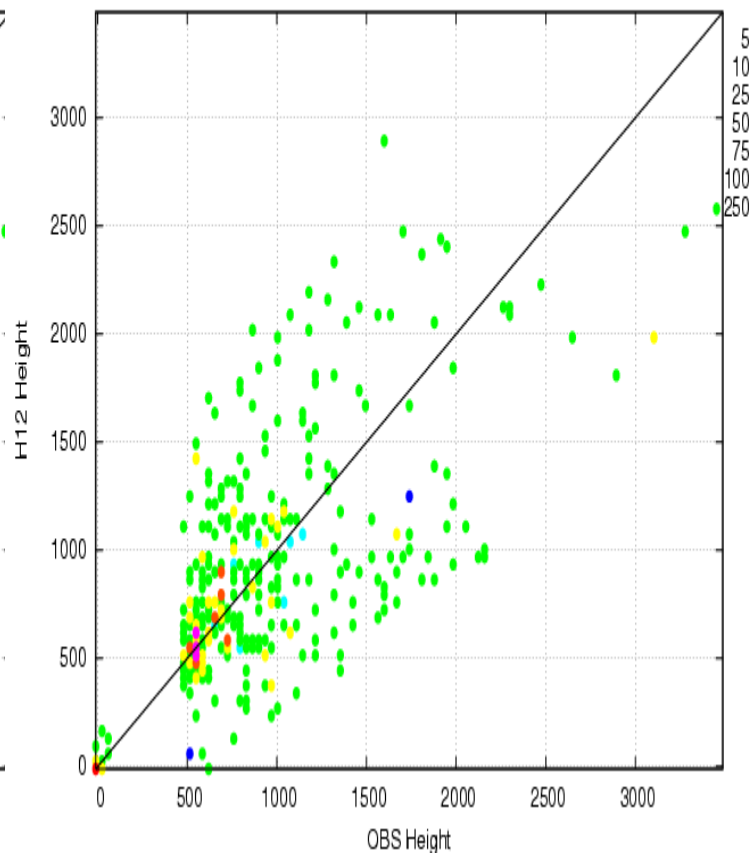
ecmwf

Scatterplot for 347 stations Selection: Eumou
Height [m]
Period: 20120301-20120303
Used 00,06,12,18 + 06 12



dmi T15

Scatterplot for 347 stations Selection: Eumou
Height [m]
Period: 20120301-20120303
Used 00,06,12,18 + 06 12



met.no H12

Verification of surface wind: With and without forest fractions?

Up to now HIRLAM obs verification for surface T/RH uses weighted model average from open land tiles (non-water/ice/forest)

for other parameters (MSLP, W10m), all-tile weighted sum have been used

However, no surface measurement is done within forest...

Hirlam RCR

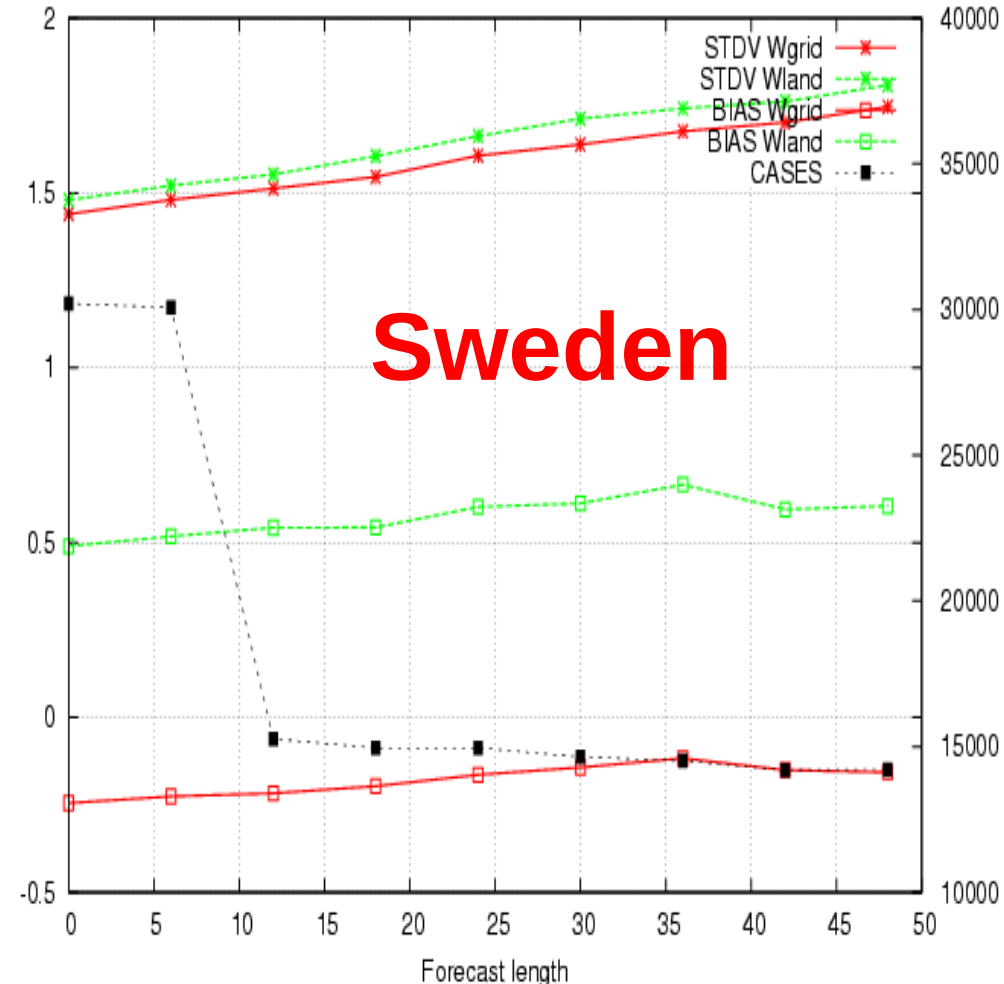
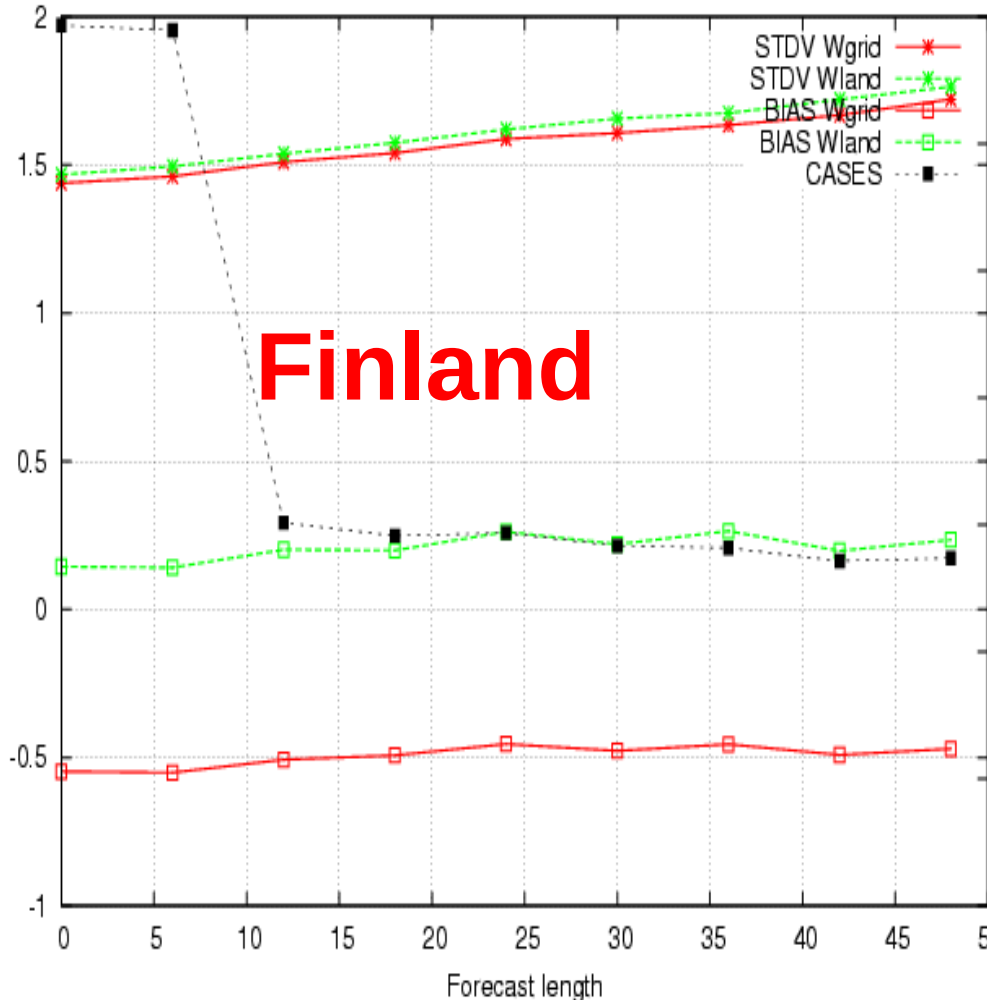
Wind verification, average

Selection: Finland using 41 stations
 Period: 20110620-20110812
 Wind speed Hours: 00,06,12,18

Selection: Sweden using 155 stations
 Period: 20110620-20110812
 Wind speed Hours: 00,06,12,18

Finland

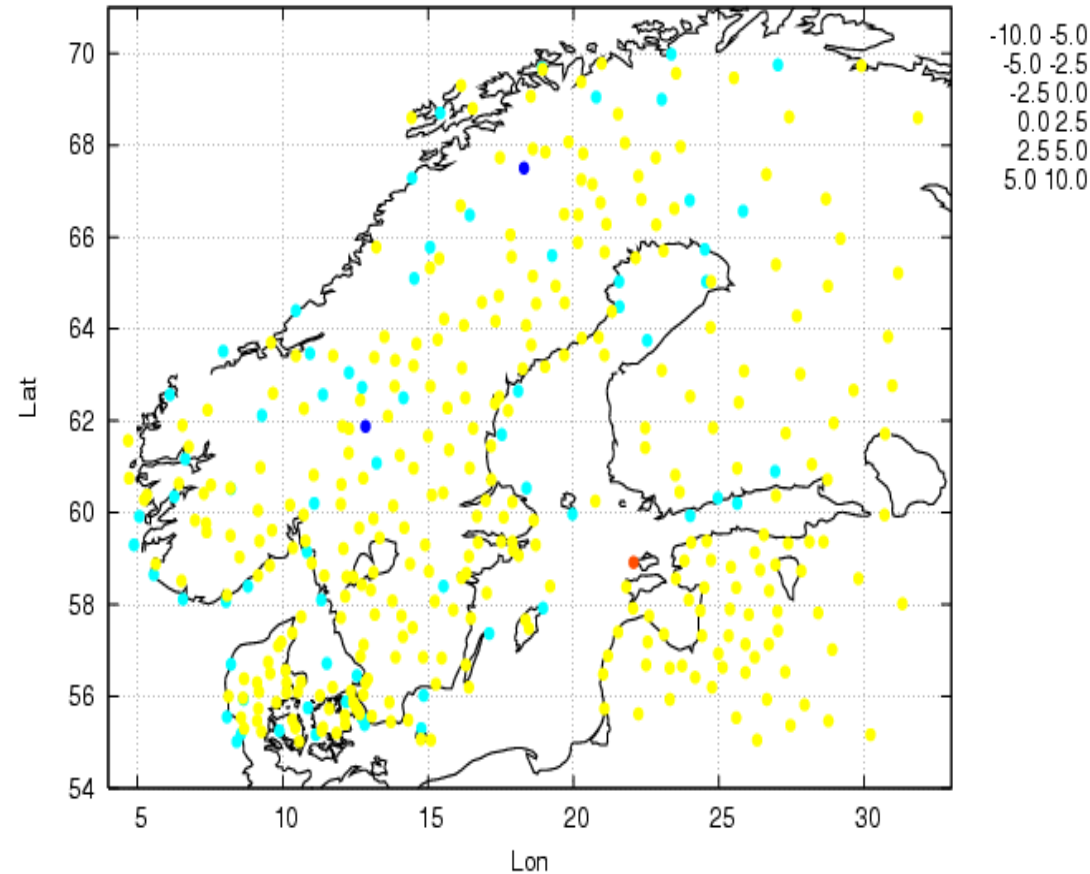
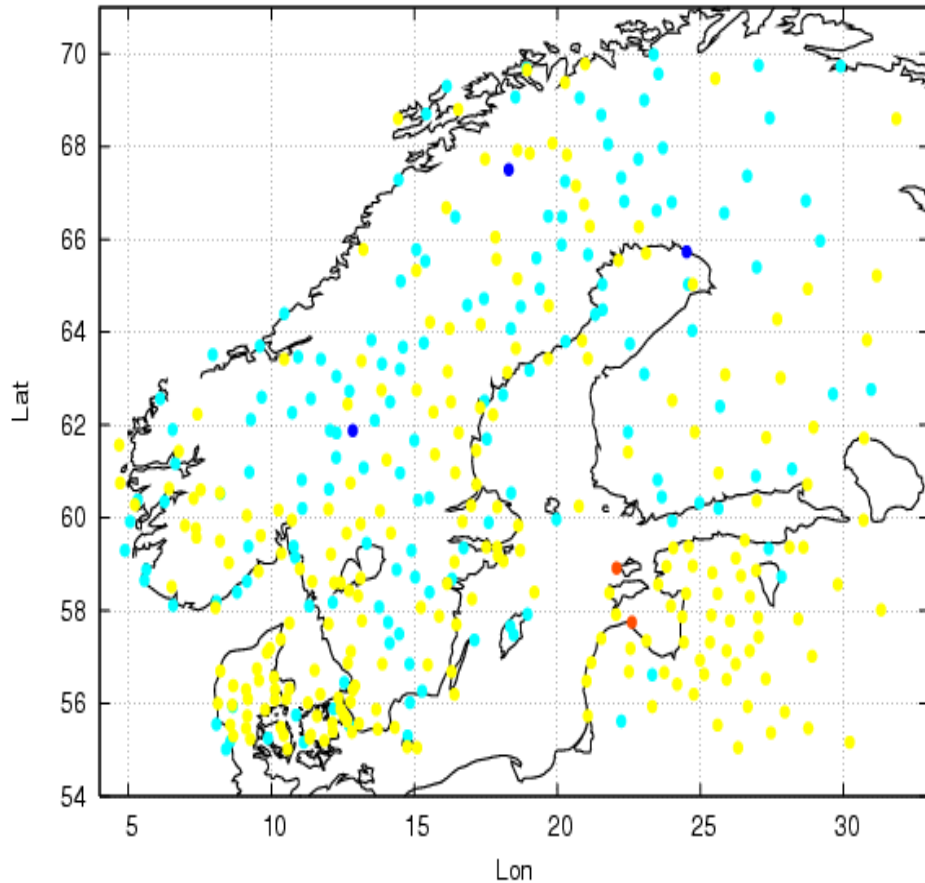
Sweden



Wind verification over forest-dominant area

Exp: Wgrid Selection: Scandinavia 384 stations
Period: 20110620-20110812
Wind speed bias [m/s] at 00 UTC
At 00,06,12,18 + 00 06 12 18 24 30 36 42 48

Exp: Wland Selection: Scandinavia 384 stations
Period: 20110620-20110812
Wind speed bias [m/s] at 00 UTC
At 00,06,12,18 + 00 06 12 18 24 30 36 42 48



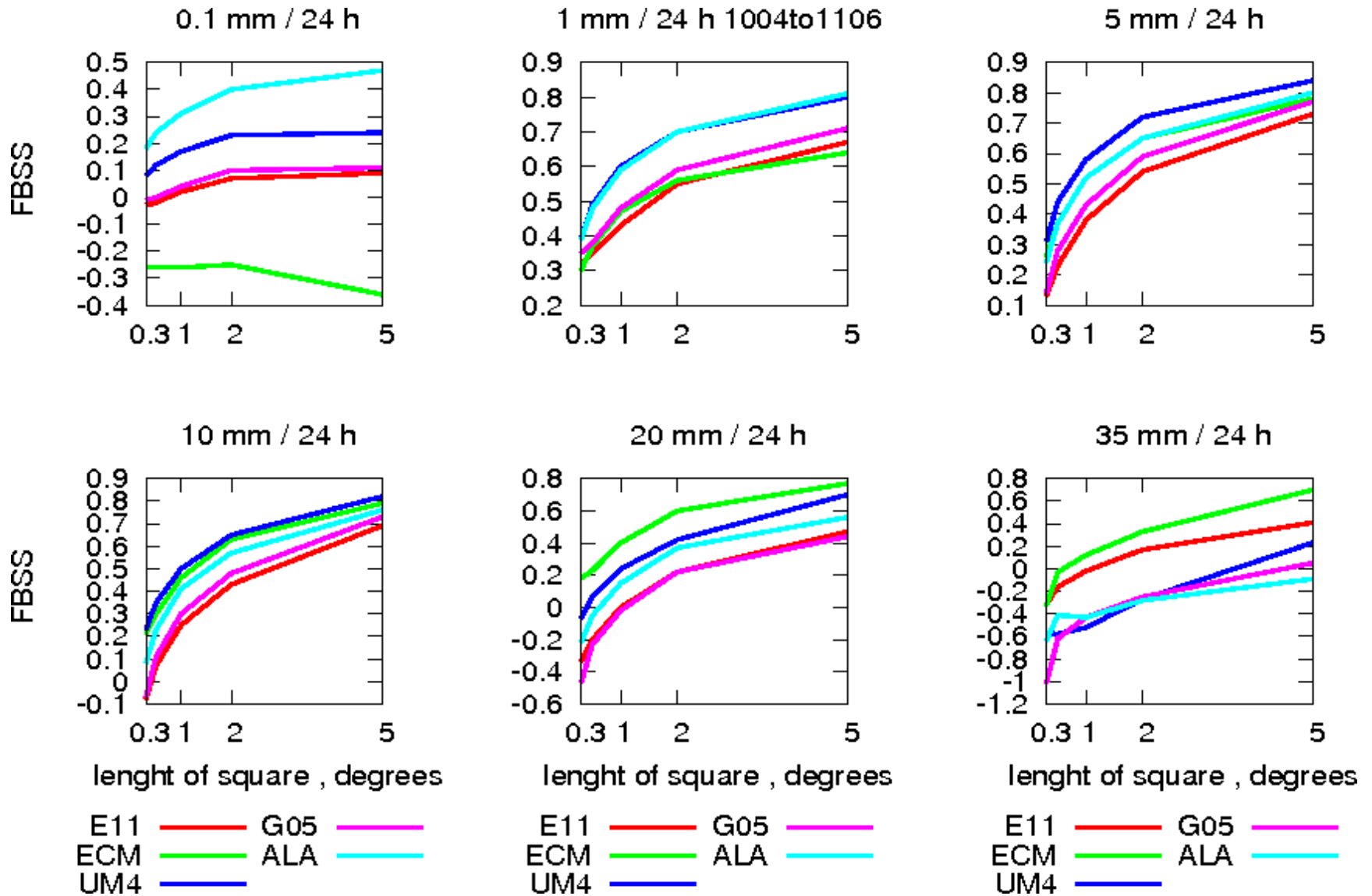
Conclusion: model extracted surface wind shall only be computed from non-forest land tiles.

Fractions Brier skill Score (FBSS)

(K-I Ivarsson)

- Swedish gauge data, climatological, 24h, ~30 km.
 - fewer obs than radar, larger reliability error
 - Still more reliable!
- FBSS: detect information on sub-grid scale variation of a forecast by comparing the mean values of forecasts and observations for different sizes of areas.
- ECMWF, HIRLAM, UM, HARMONIE-ALARO, multi-year (earliest data from 2006)

Results (April 2010 to June 2011. Minimum 4 values per square, reference forecast = sample clim.) E11: Hirlam 11km, G05: Hirlam 5.5km, ECM=ECMWF, ALA= Alaro 5.5 km, UM4= Unified model 4km



Karl-Ivar's early Christmas 2011 wish : Reliable radar data to use

SWS (B. Sass, 2011): “severe weather score” --
A performance measure on relative skills between two
models on correct forecasts for defined events, with
upscaling principles:

$$\text{SWS} = \left(1 + \sum_{j=1}^K J_{\text{meso}} \right) / \left(1 + \sum_{j=1}^K J_{\text{ref}} \right)$$

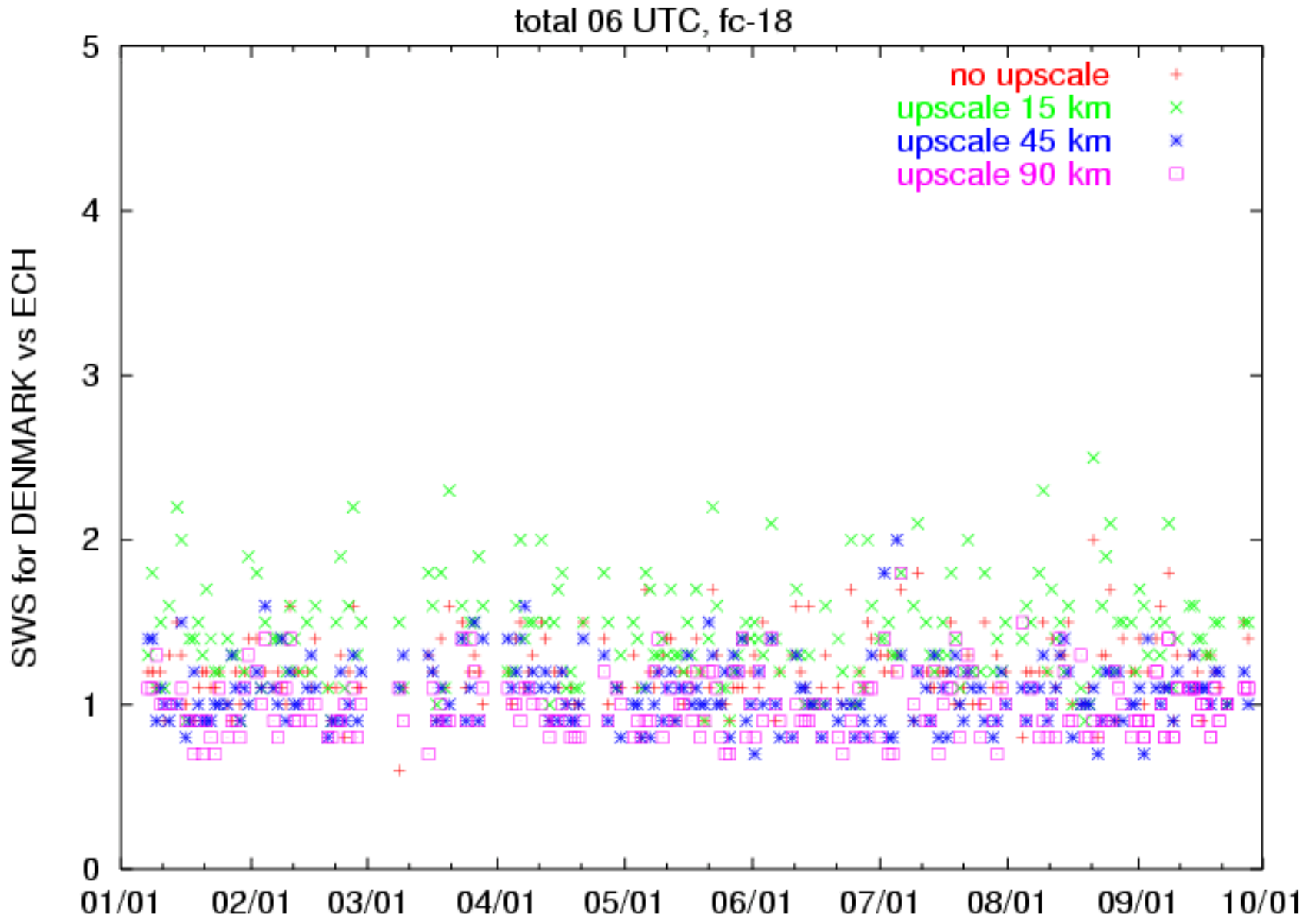
J is the hit rate for a defined event, $0 < \text{SWS} < \text{infinite}$
a $\text{SWS} > 1$ indicates better mesoscale model forecast





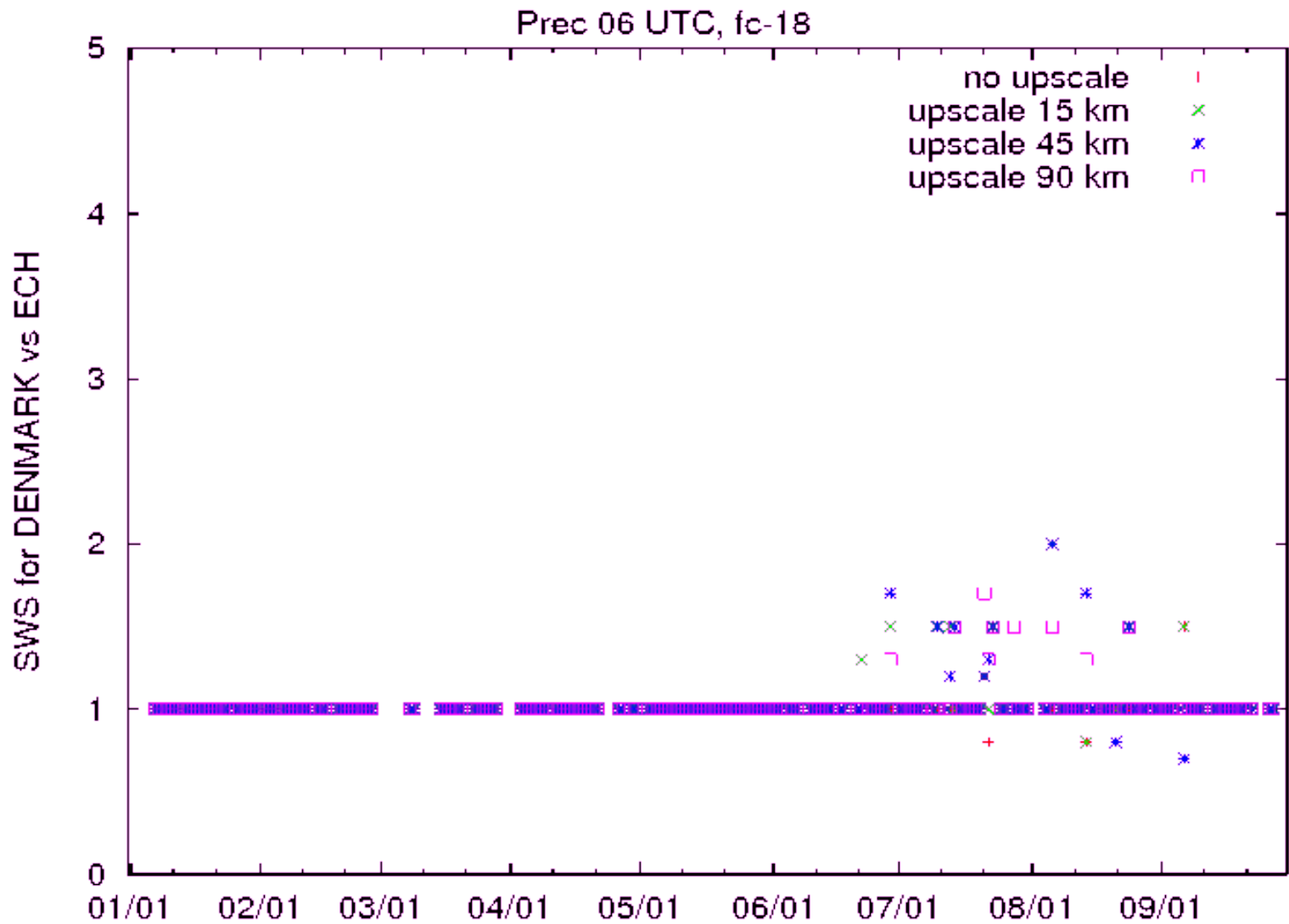
combined SWS score (T2m,W10m,Precip)

Harmonie 2.5 km / ECMWF, 1 Jan.- 1 Oct. 2011



SWS (Warning over Danish area)

Harmonie 2.5 km / ECMWF, rr/12h > 24 mm



Data portal at Hirlam.org

The screenshot shows a Mozilla Firefox browser window displaying the Hirlam Data Portal. The browser's address bar shows the URL "dataportal - HIRLAM". The page title is "Hirlam Data Portal" and the main heading is "Monitoring and Inter-comparison of Operational and Real time HIRLAM/Harmonie". The page is organized into several sections: "Forecast", "Verification", "GLAMEPS", "trunk", "Observation", and "Data". Each section contains a list of links to related content. A navigation menu at the top includes "Wiki", "Timeline", "Roadmap", "Browse Source", "View Tickets", "New Ticket", "Search", "Admin", and "Blog". A search bar is located in the top right corner. The page footer contains a disclaimer and the text "Last modified on 2012-01-29 14:08". The browser's taskbar at the bottom shows the Firefox icon, the current page title, and the system clock displaying "03:13 PM UTC".

Firefox ▾ | Hirlam Forecast Model Diagnosis e... | dataportal - HIRLAM | 22nd ALADIN Workshop & HIRLAM... | Surface verification Fig: Timeserie... | +

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[wiki: dataportal](#) | [Start Page](#) | [Index](#) | [History](#) | [Last modified 3 months ago](#)

Hirlam Data Portal
Monitoring and Inter-comparison of Operational and Real time HIRLAM/Harmonie

Forecast

- [Real time HIRLAM and HARMONIE forecasts](#)

Verification

- [Verification of HIRLAM and HARMONIE models](#)

GLAMEPS

- [GLAMEPS real-time forecast](#)

trunk

- [Monitoring of development versions of HIRLAM and HARMONIE](#)

Observation

- [Observation data monitoring](#)

Data

- [Participating services and data availability](#)

Hirlam Data Portal
Monitoring and Inter-comparison of Operational and Real time ...
[Forecast](#)
[Verification](#)
[GLAMEPS](#)
[trunk](#)
[Observation](#)
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Last modified on 2012-01-29 14:08

Firefox | snapshot2.png - KSnapshot | asm_verification_new.odp - Lib | XTerm | 03:13 PM UTC

Mast verification summary statistics (Carl Fortelius)

Sodankylä

[2010 DJF](#)
[2010 MAM](#)
[2010 JJA](#)
[2010 SON](#)
[2011 DJF](#)
[2011 MAM](#)
[2011 JJA](#)
[2011 SON](#)
[2012 DJF](#)
[2012 MAM](#)

Cabauw

[2010 DJF](#)
[2010 MAM](#)
[2010 JJA](#)
[2010 SON](#)
[2011 DJF](#)
[2011 MAM](#)
[2011 JJA](#)
[2011 SON](#)
[2012 DJF](#)
[2012 MAM](#)

Lindenberg

[2010 DJF](#)
[2010 MAM](#)
[2010 JJA](#)
[2010 SON](#)
[2011 DJF](#)
[2011 MAM](#)
[2011 JJA](#)
[2011 SON](#)
[2012 DJF](#)
[2012 MAM](#)

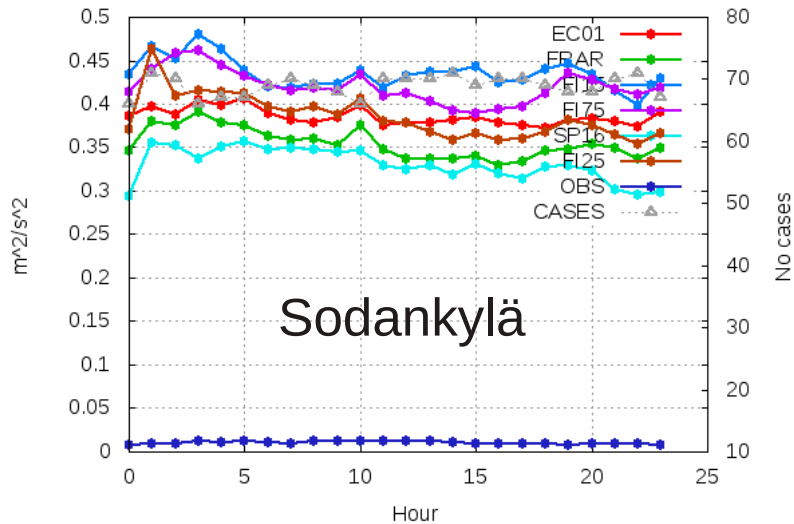
Valladolid

[2011 DJF](#)
[2011 MAM](#)
[2011 JJA](#)
[2011 SON](#)
[2012 DJF](#)
[2012 MAM](#)

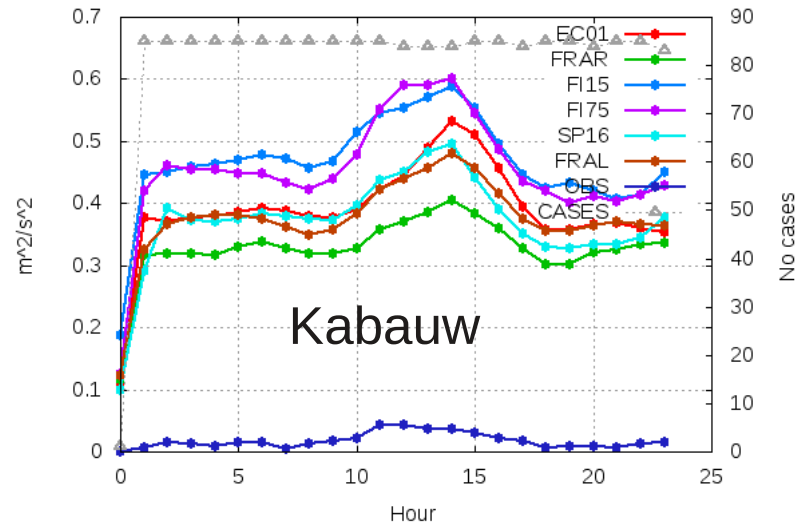
- Graphics of seasonal statistics have been included in the HIRLAM on-line mast verification facility under <http://hirlam.org/>
- Data-model inter-comparisons are compiled using the HARMONIE verification system are shown for each site individually
- Data from Sodankylä, Cabauw, and Lindenberg start from the winter 2009/2010. Data From Valladolid a year later
- Forecasting systems included in the inter-comparison are currently: HIRLAM RCR “FI07”, ECMWF IFS “EC01”, MF ARPEGE “FRAR”, INM HIRLAM “SP16” FMI HARMONIE “FI25” , and MF ALADIN “FRAL”
- Graphics are updated in the middle and at the end of each 3-monthly season
- The graphics are generated from the data as it has been displayed in the daily graphs

Surface momentum flux

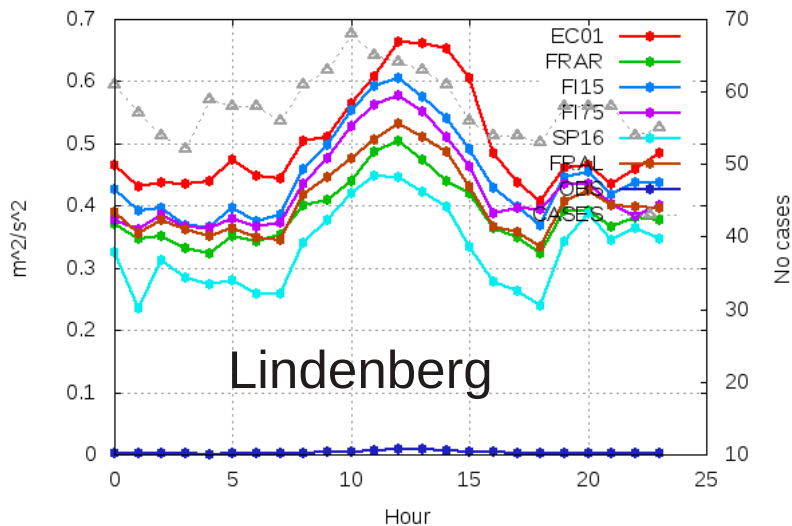
Selection: ALL using 1 stations
Period: 20111201-20120227
Momentum flux Used {00} + 01 02 ... 24



Selection: ALL using 1 stations
Period: 20111201-20120227
Momentum flux Used {00} + 01 02 ... 24



Selection: ALL using 1 stations
Period: 20111201-20120227
Momentum flux Used {00} + 01 02 ... 24



- Mean diurnal cycle of the surface momentum flux in DJF 2011/2012.
- **All models overestimate flux at all stations where it is measured.**
- Similar results are obtained in other periods as well, although relative differences tend to be smaller in summer. **Visit the site and see for yourself!**

hirlam.org on-duty team needs you!

OnDuty - HIRLAM - Mozilla Firefox

File Edit View History Bookmarks Tools Help

https://hirla...6_ALAD37_old/ x Velkommen - Jægerhytten x OnDuty - HIRLAM x Surface verification Fig: Fc L... x Surface verification Fig: Tim... x Mail :: INBOX x

hirlam.org https://hirlam.org/trac/wiki/OnDuty?version=66#Whoisonduy

CALIFORNIA SUITES HOTEL

Who is on duty?

Week in 2012	Name	Email	Comment
..	-	-	-
45	Niels Wothman Nielsen	nwn@dmi.dk	5 - 9 /11
..	-	-	-
41	Eoin Whelan	eoin.whelan@met.ie	8 - 12/10
..	-	-	-
36	Magnus Lindskog	magnus.lindskog@smhi.se	3 - 7/9
..	-	-	-
33	Xiaohua Yang	xiaohua@dmi.dk	13 - 17 / 8
..	-	-	-
28	Kalle Eerola	kalle.eerola@fmi.fi	9-13 / 7
27	Javier Calvo	j.calvo@aemet.es	2-6 / 7
26	Martynas Kazlauskas	martynas@meteo.lt	25-29 / 6
25	Inger-Lise Frogner	i.l.frogner@met.no	18-22 / 6
24	Kristian Pagh Nielsen	kpn@dmi.dk	11-15 / 6
23	Niels Wothman Nielsen	nwn@dmi.dk	4 - 8 /6
22	Eoin Whelan	eoin.whelan@met.ie	28/5 - 1/6
21	Jelena Bojarova	jelenab@met.no	21/5 - 25/5
20	Martynas Kazlauskas	martynas@meteo.lt	14 - 18 / 5
19	Bjame Amstrup	bja@dmi.dk	7 - 11 / 5
12	Mariken Homleid	mariken.homleid@met.no	19 - 23/3
10	Carl Fortelius	carl.fortelius@fmi.fi	5/3 - 9/3
09	Jelena Bojarova	jelenab@met.no	27/2 - 2/3
08	Kristian Nielsen	kpn@dmi.dk	20 - 25/2
07	Ulf Andrae	ulf.andrae@smhi.se	13 - 17/2
06	Eoin Whelan	eoin.whelan@met.ie	6/2 - 10/2
05	...		30/1 - 3/2
04	Xiaohua Yang	xiaohua@dmi.dk	23-27 / 1
mailto:jelenab@met.no	anette Onvlee	onvlee@knmi.nl	16 - 20 / 1

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