

Operational NWP - Met Éireann

ASM 2014 - Eoin Whelan

Harmonie is used at Met Éireann to produce operational forecasts. The “ireland25” Ireland & UK domain configuration produces a 54 hour forecast four times per day. Harmonie was first made operational by Met Éireann on July 11th 2011. Harmonie 37h1.1 was introduced on January 31st 2013. It is hoped that Harmonie 38h1 will be made operational later in 2014.

Harmonie - Ireland & UK domain

- Harmonie version: cy37h1.1 (METIE branch)
- Domain: 540x500 grid-points with 65 levels
- Model top: 10hPa
- Grid-spacing: $\Delta x = \Delta y = 2.5\text{km}$
- Cut-off: 45min
- Observations: Conventional only
- DA: Surface analysis only with *Blending*
- Forecast: 54 hour forecast at 00z, 06z, 12z & 18z
- Aladin-NH dynamics and AROME physics
- Boundary conditions: IFS

Compute Resources

fionn (operational):

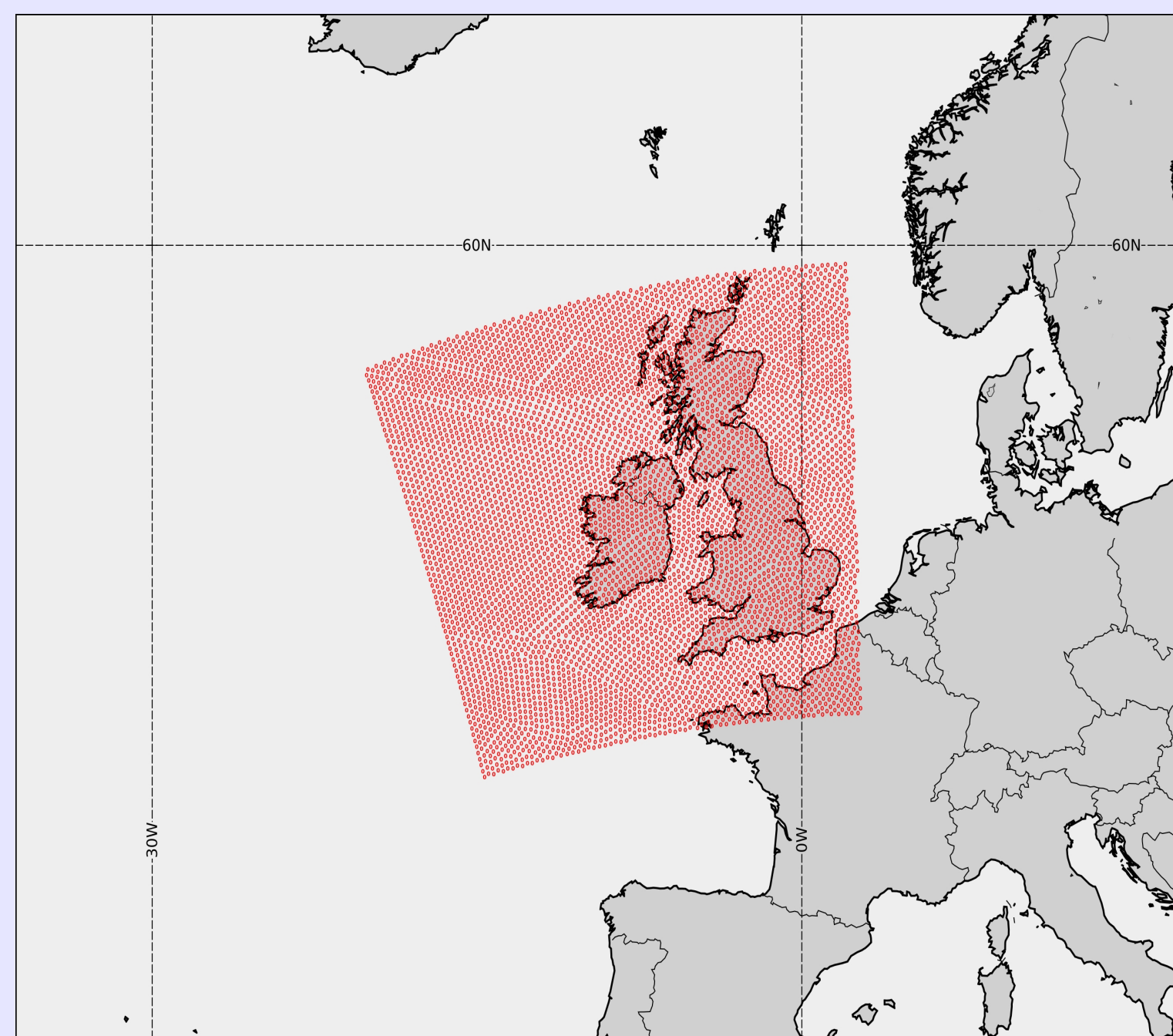
- heterogeneous machine made up of four components: Thin, Hybrid, Fat and Service
- Thin component is an SGI ICE X system with Lustre filesystem
- 320 compute nodes with two Intel (Ivybridge) 12-core processors on each node
- Total of 7680 cores and 20TB of RAM
- Met Éireann uses 16 nodes with a dedicated login node

indra (backup):

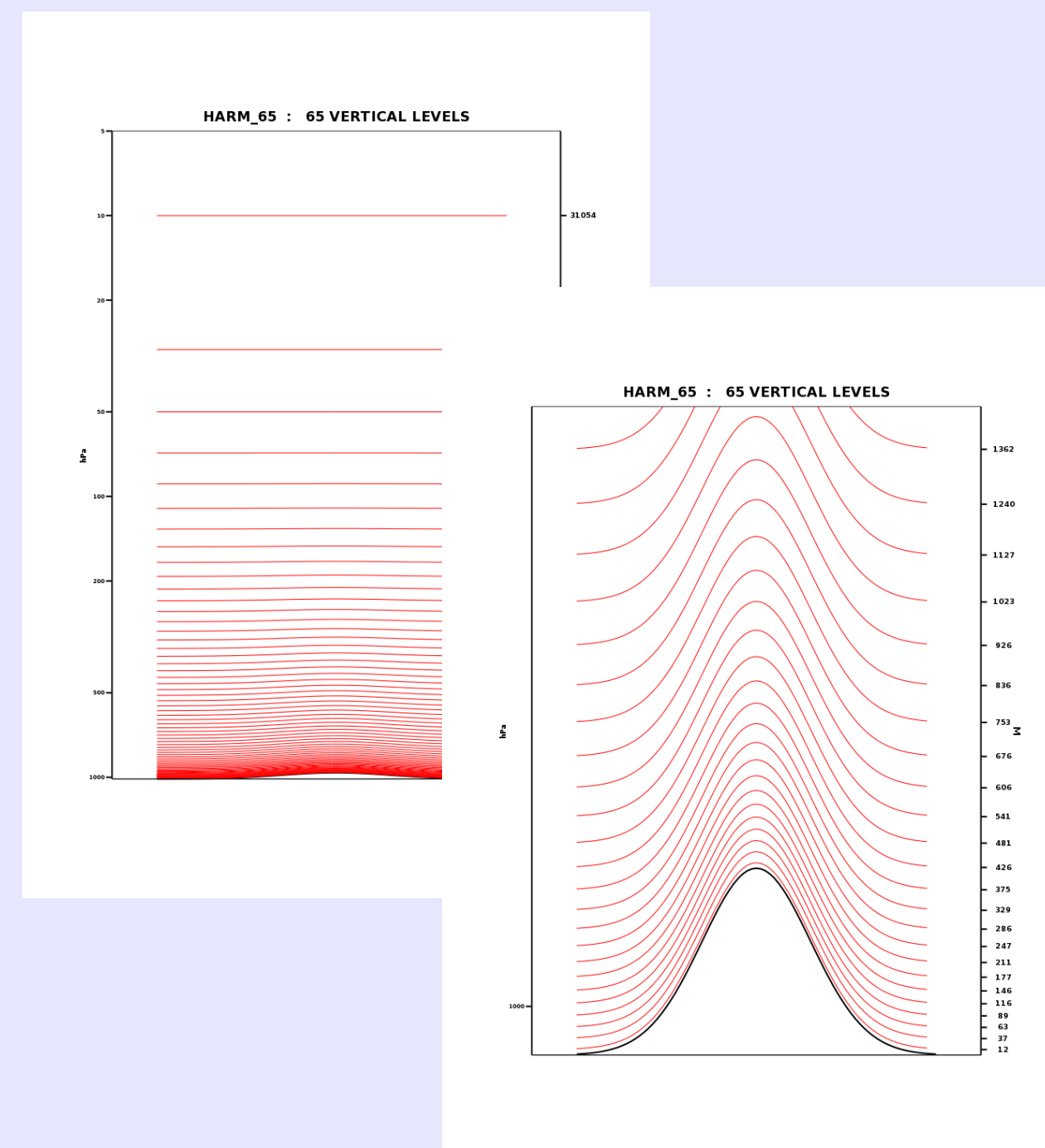
- SGI linux cluster with Panasas filesystem
- 16 compute nodes with two Intel (Ivybridge) 10-core processors on each node
- Total of 320 cores and 32GB of RAM
- Met Éireann uses the 16 nodes plus a dedicated login node



Harmonie domain

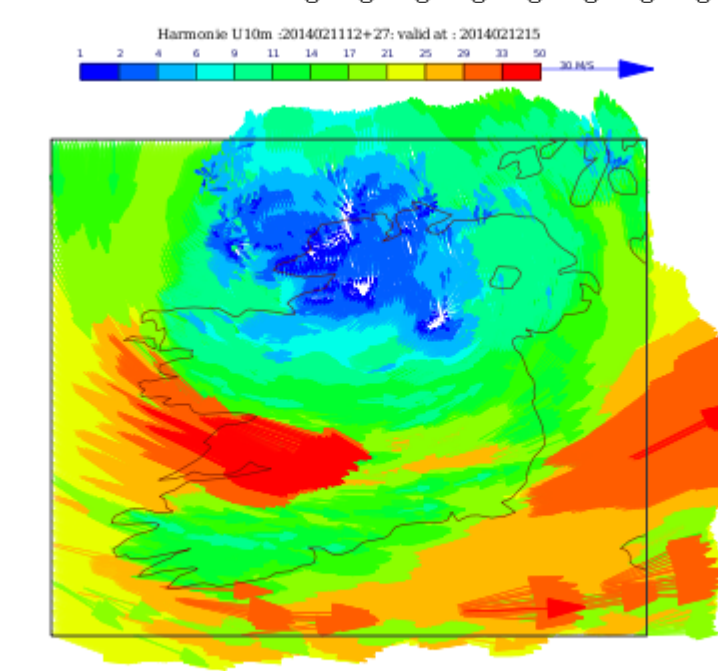
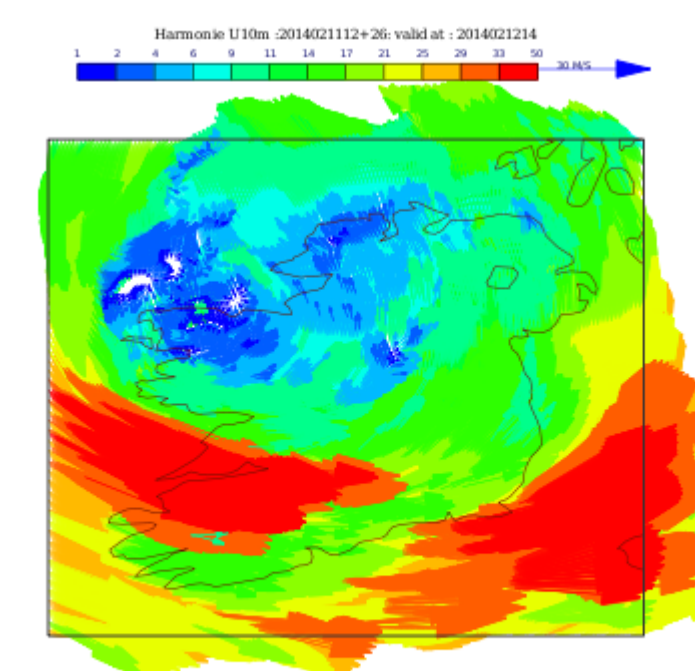
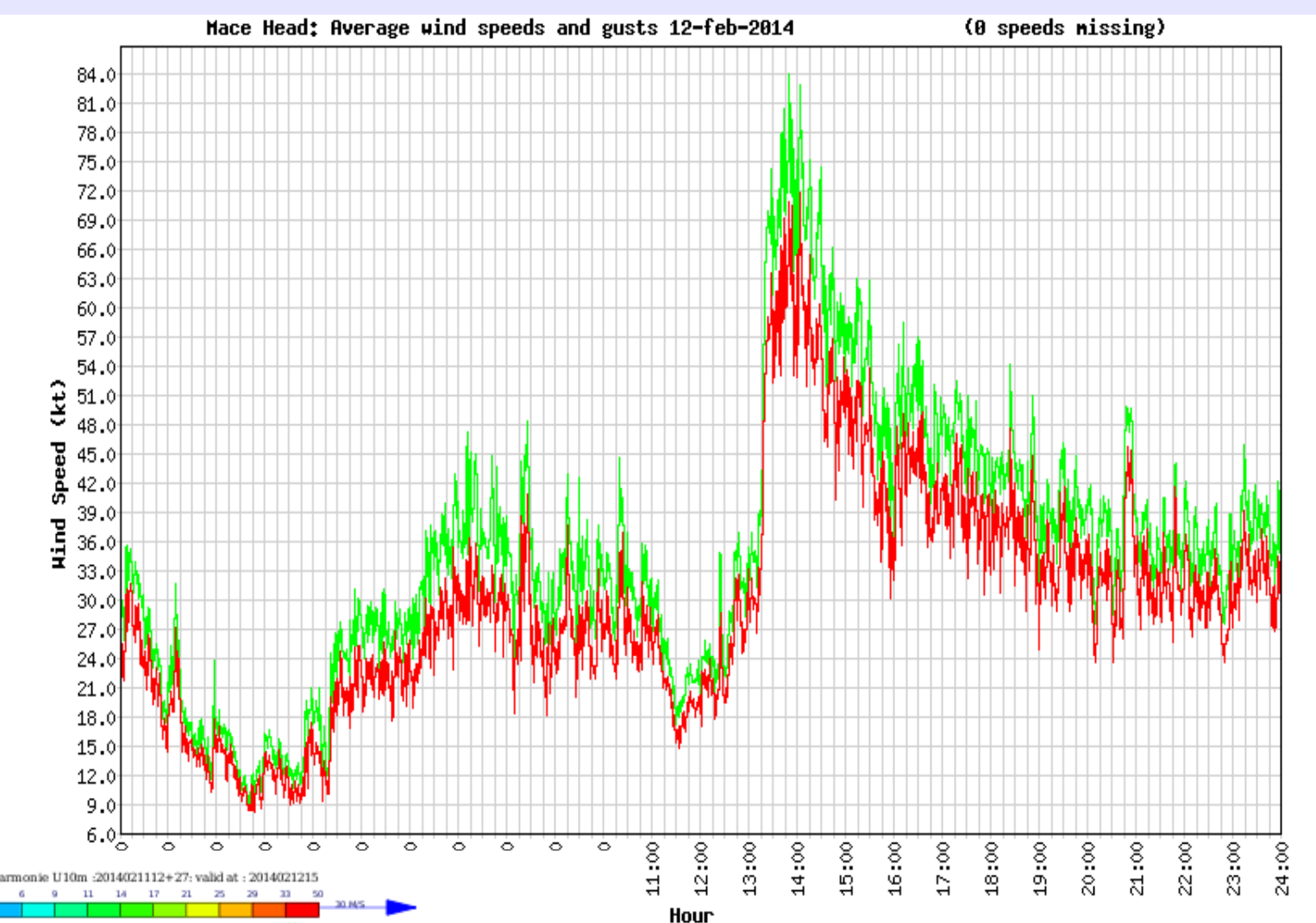
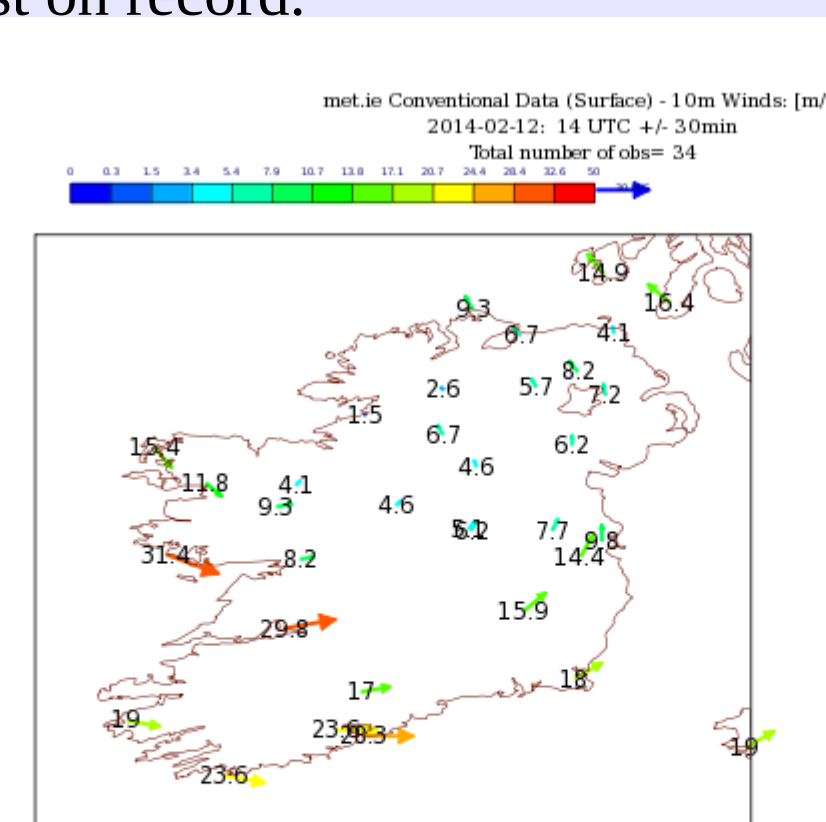


65 vertical levels



A stormy winter ...

“Storm force winds occurred on twelve different days – on the 5th/14th/18th/24th/26th/27th Dec 2013 and 3rd/25th/26th Jan and 1st/8th/12th Feb 2014. This series of storms led to an increase in rainfall amounts of between one and a half and two times above normal. The most severe storm occurred on the 12th February 2014 and was associated with an active depression off the south coast that tracked steadily north-eastwards over the country. Kinsale Energy Gas Platform recorded a maximum wave height of 25m on the same day, its highest on record.”



Operational Timeline

| T+0:15 | T+0:30 | T+0:45 | T+1:00 | T+1:15 | T+1:30 | T+1:45 | T+2:00 | T+2:15 | T+2:30 | T+2:45 | T+3:00 | T+3:15 | T+3:30 | T+3:45 | |
|---------------|--------|----------|--------|---------------|--------|----------------|--------|--------|--------|--------|--------|---------------|--------|--------|--|
| | | Harmonie | | | | | | | | | | | | | |
| | | | | | | HIRLAM (LSMIX) | HIRLAM | | | | | | | | |
| HIRLAM Hourly | | | | HIRLAM Hourly | | | | | | | | HIRLAM Hourly | | | |

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HIRLAM is used at Met Éireann to produce operational forecasts. The “Main” Atlantic domain configuration produces a 54 hour forecast four times per day. The “Hourly” Ireland & UK domain configuration produces a 9 hour forecasts every hour.

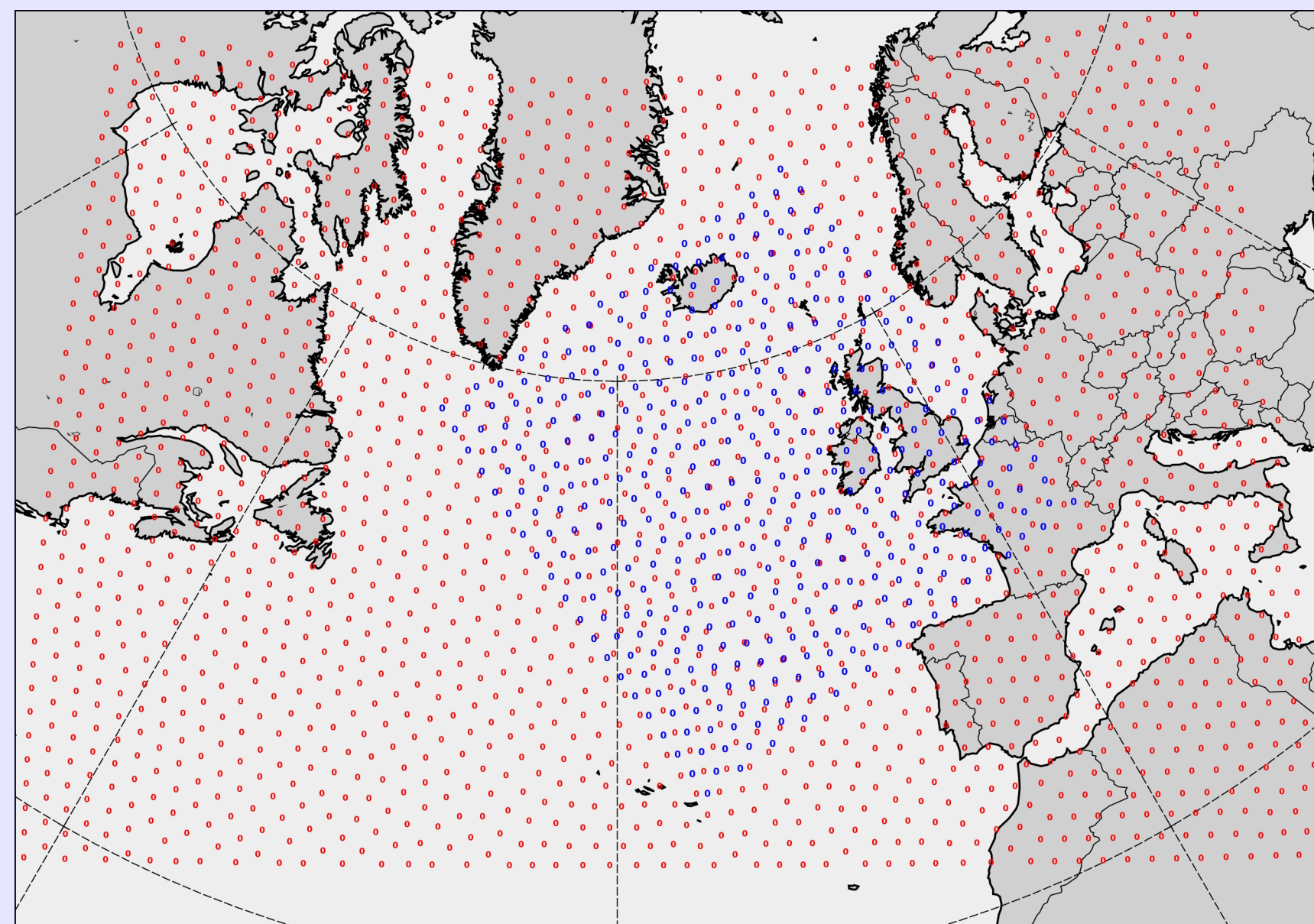
HIRLAM: I10 “Main” Atlantic configuration

- HIRLAM version: 7.2
- Domain: 654x424 grid-points with 60 vertical levels
- Grid-spacing: $\Delta x = \Delta y = 0.1^\circ$
- Model top: 10hPa
- Cut-off: 2hr 00min (when Harmonie finishes)
- Observations: Conventional only
- DA: 4DVAR
- LSMIX: every cycle
- Forecast: 54 hour forecast at 00z, 06z, 12z & 18z

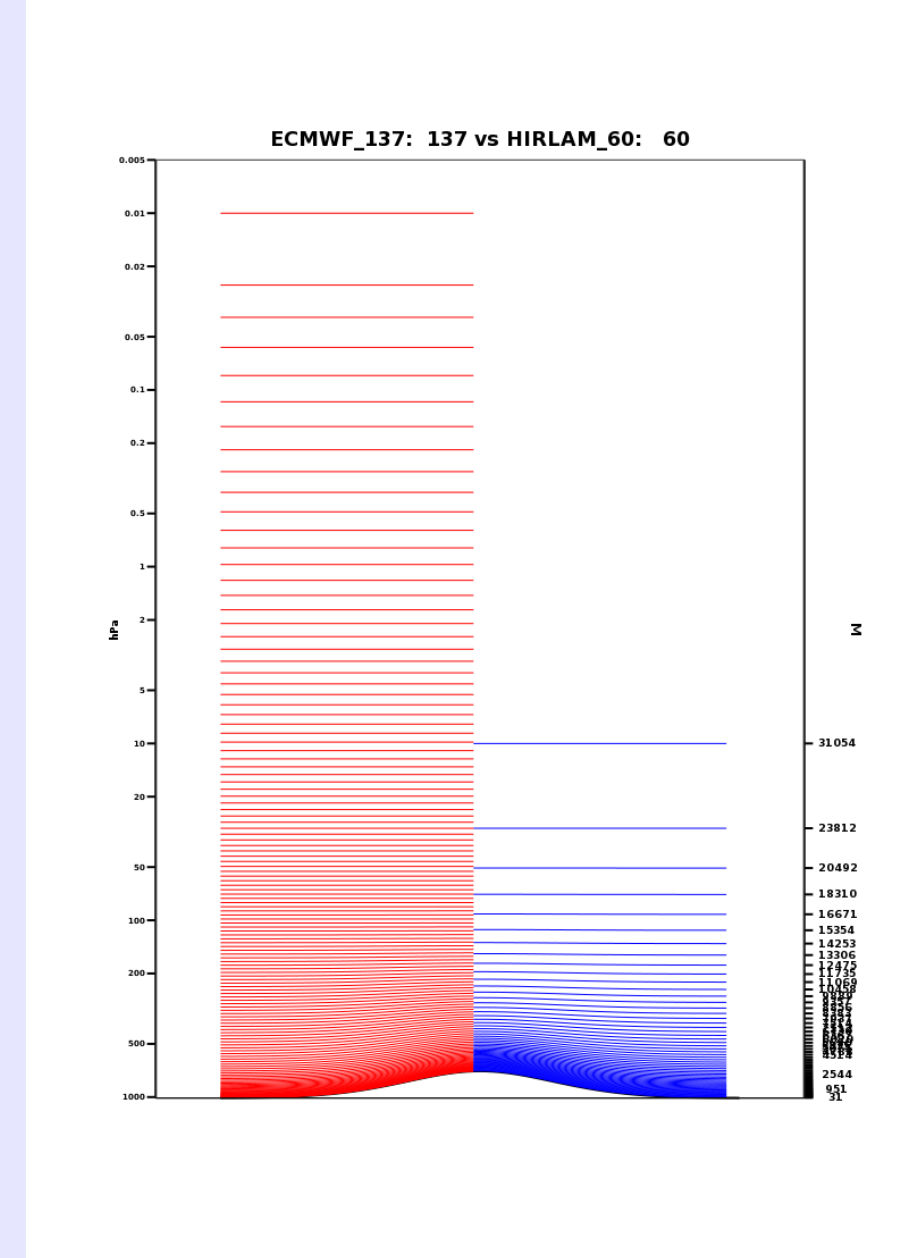
HIRLAM: HHH “Hourly” Ireland & UK configuration

- HIRLAM version: 7.2
- Domain: 366x344 grid-points with 60 vertical levels
- Grid-spacing: $\Delta x = \Delta y = 0.07^\circ$
- Model top: 10hPa
- Cut-off: 20min
- Observations: Conventional only
- DA: 3DVAR
- LSMIX: every 6 hours
- Forecast: 9 hour forecast every hour

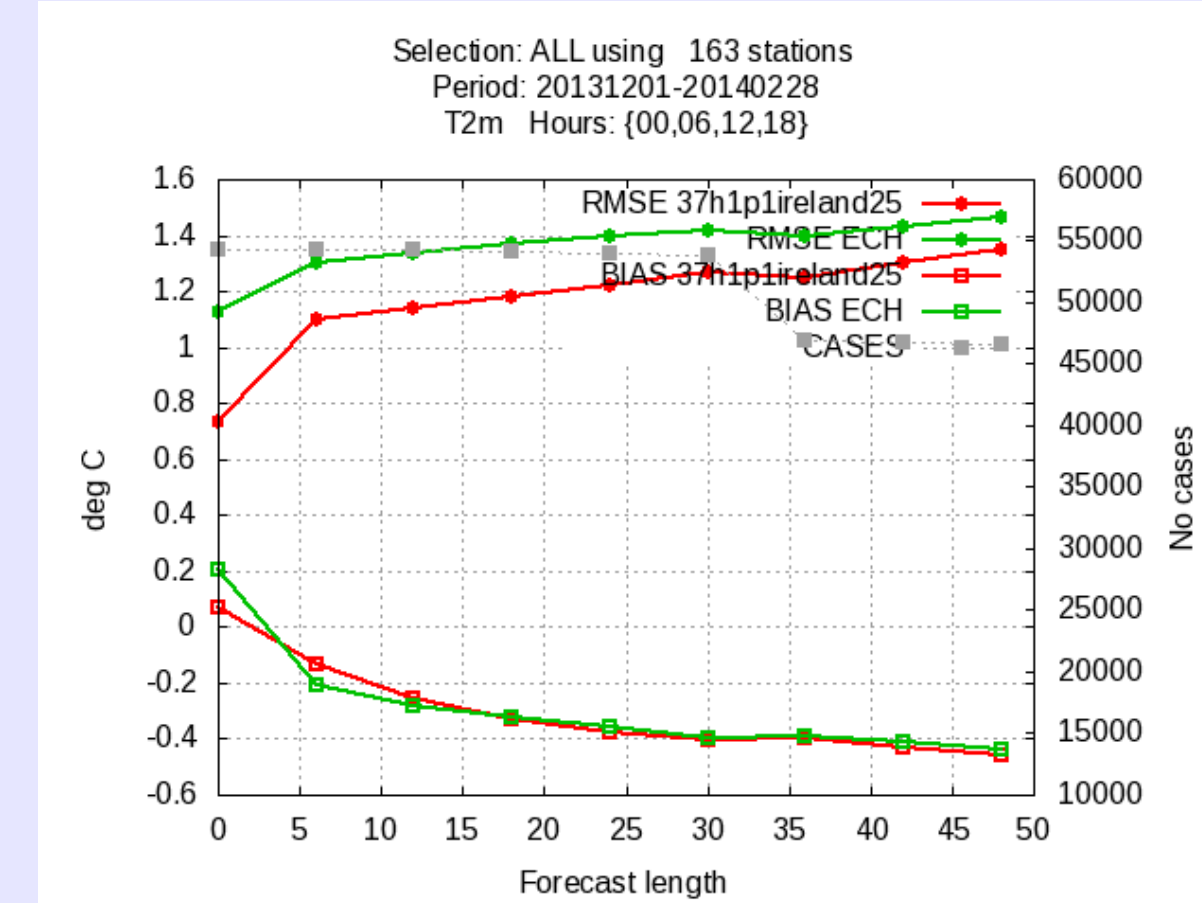
HIRLAM I10 and HHH Domains



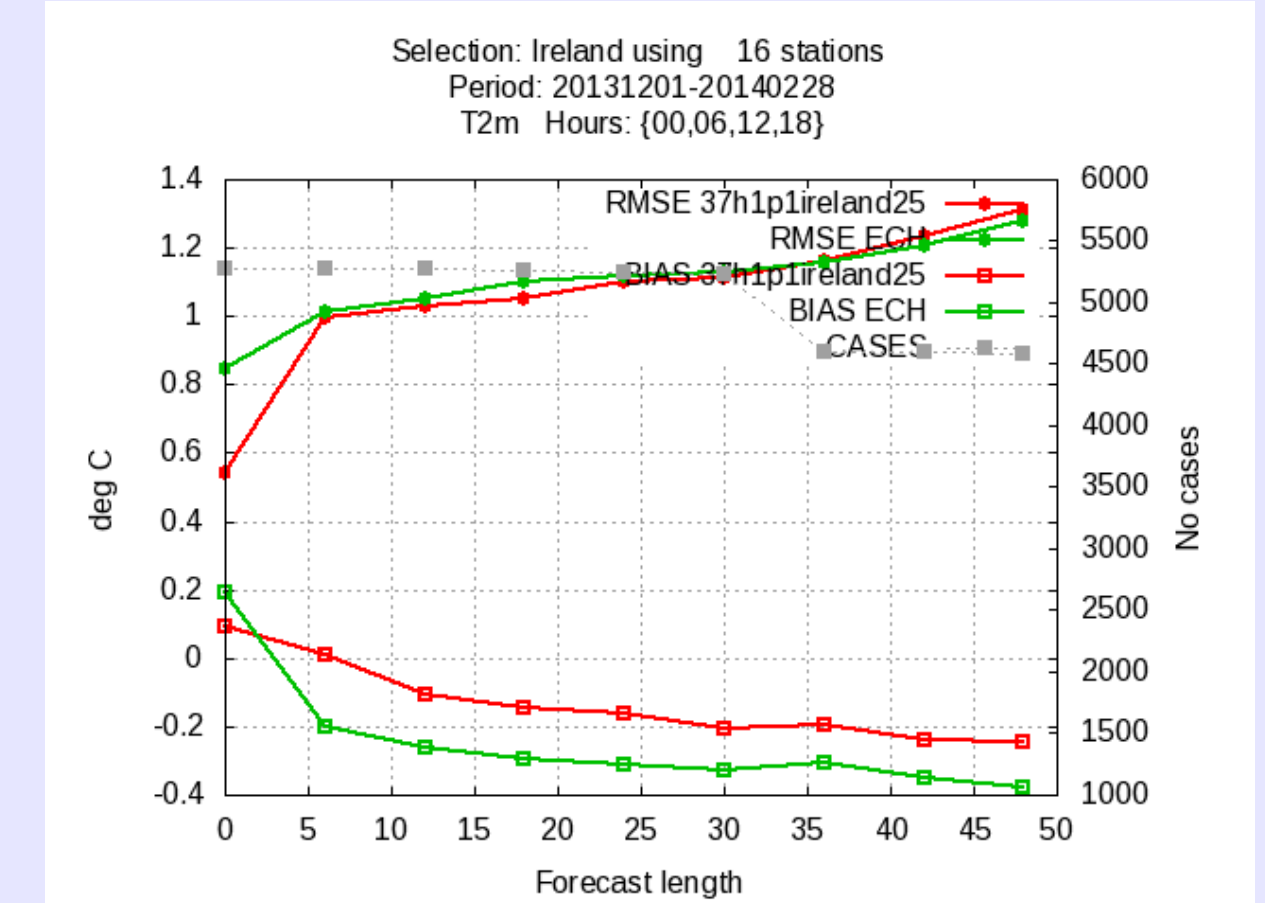
IFS L137 vs HIRLAM L60



Harmonie verification: DJF 2013/2014: 37h1.1 vs IFS

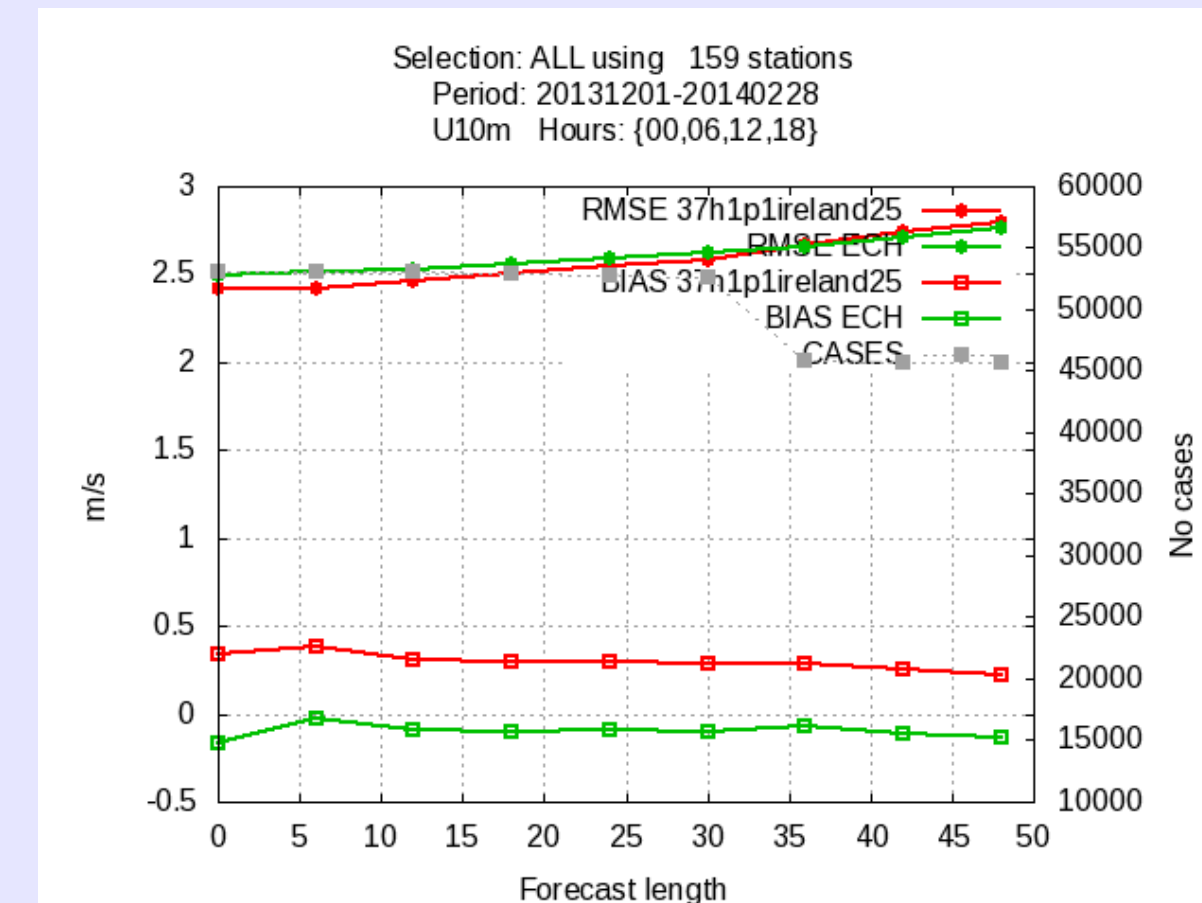


T2m (ALL)

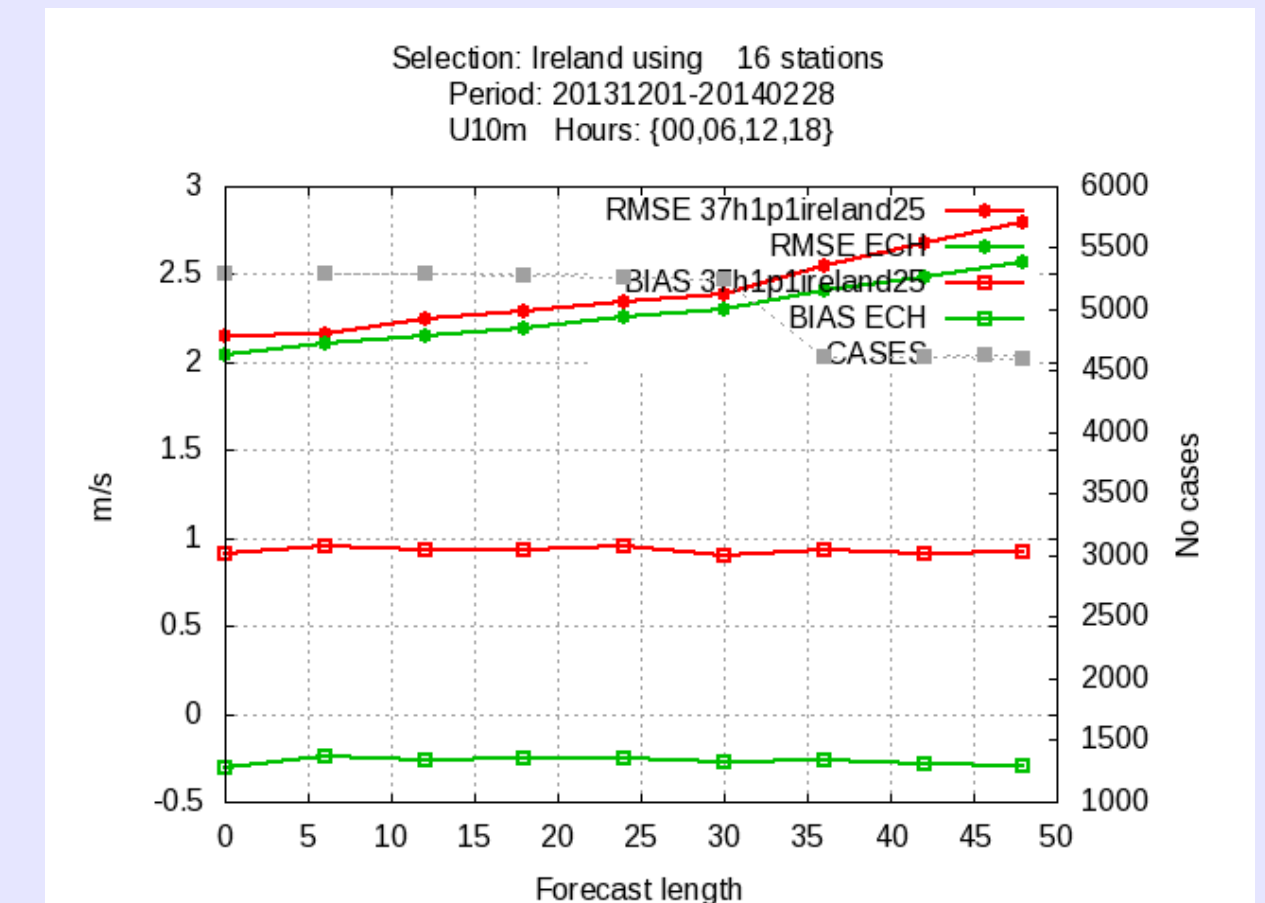


T2m (Ireland)

Harmonie verification: DJF 2013/2014: 37h1.1 vs IFS

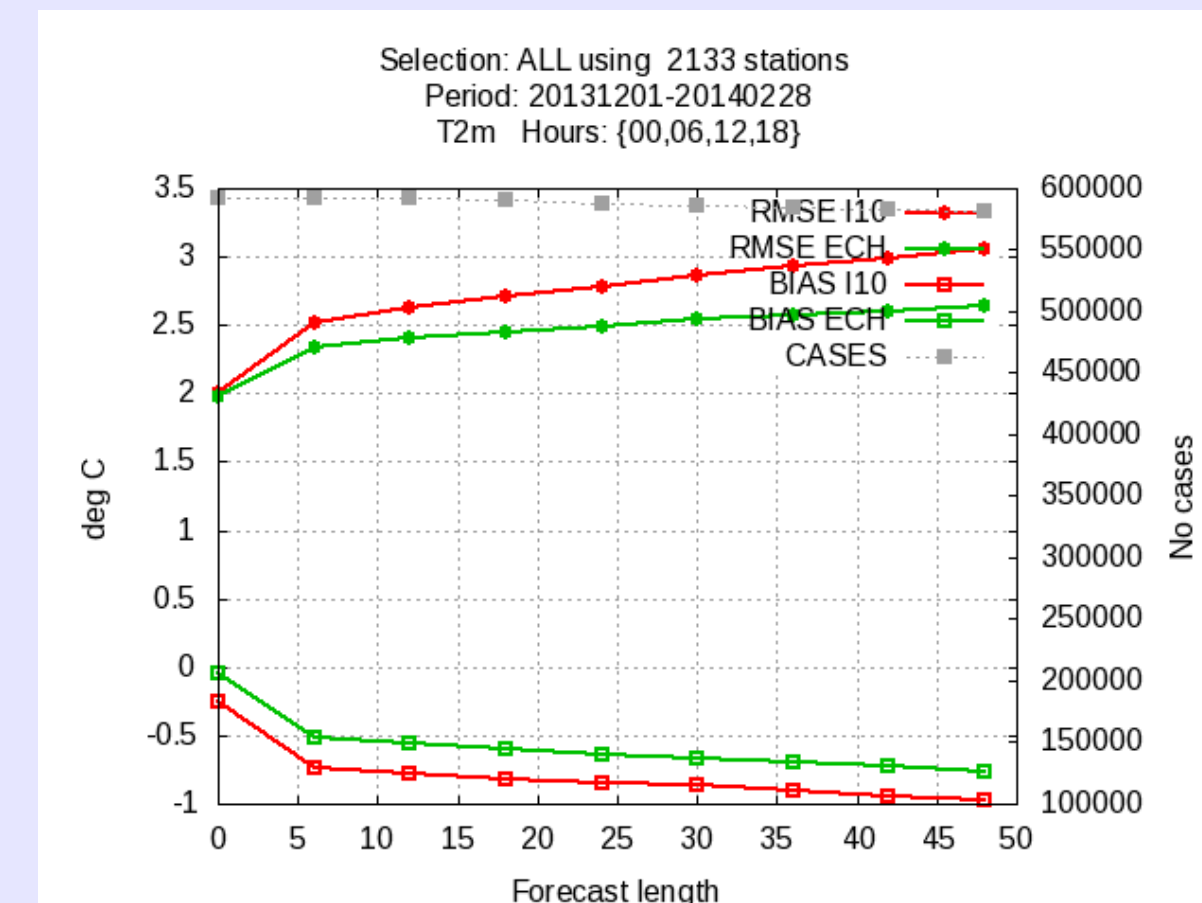


U10m (ALL)

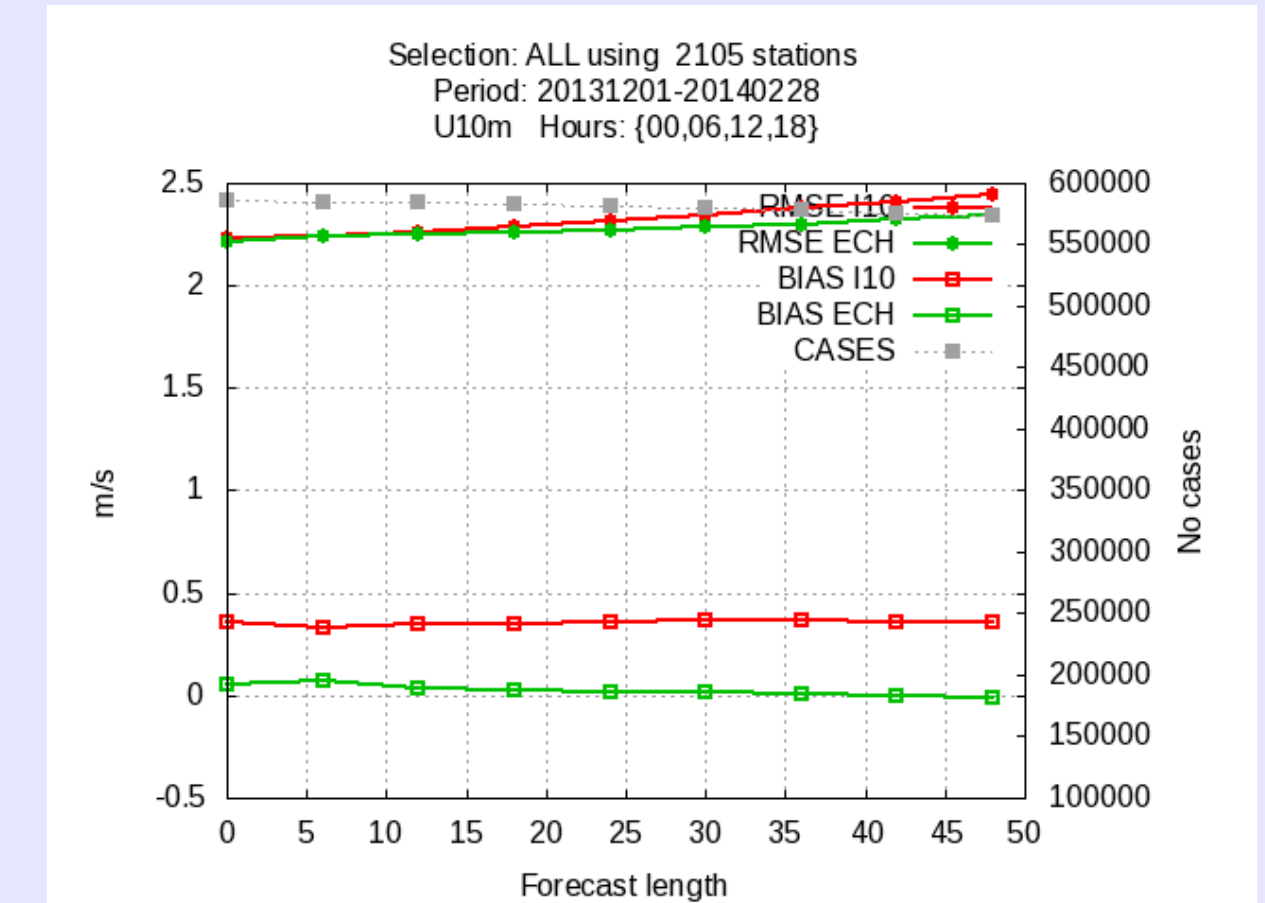


U10m (Ireland)

HIRLAM verification Winter (DJF) 2013/14: HIRLAM vs IFS



T2m



U10m