



Operational NWP at Met Éireann

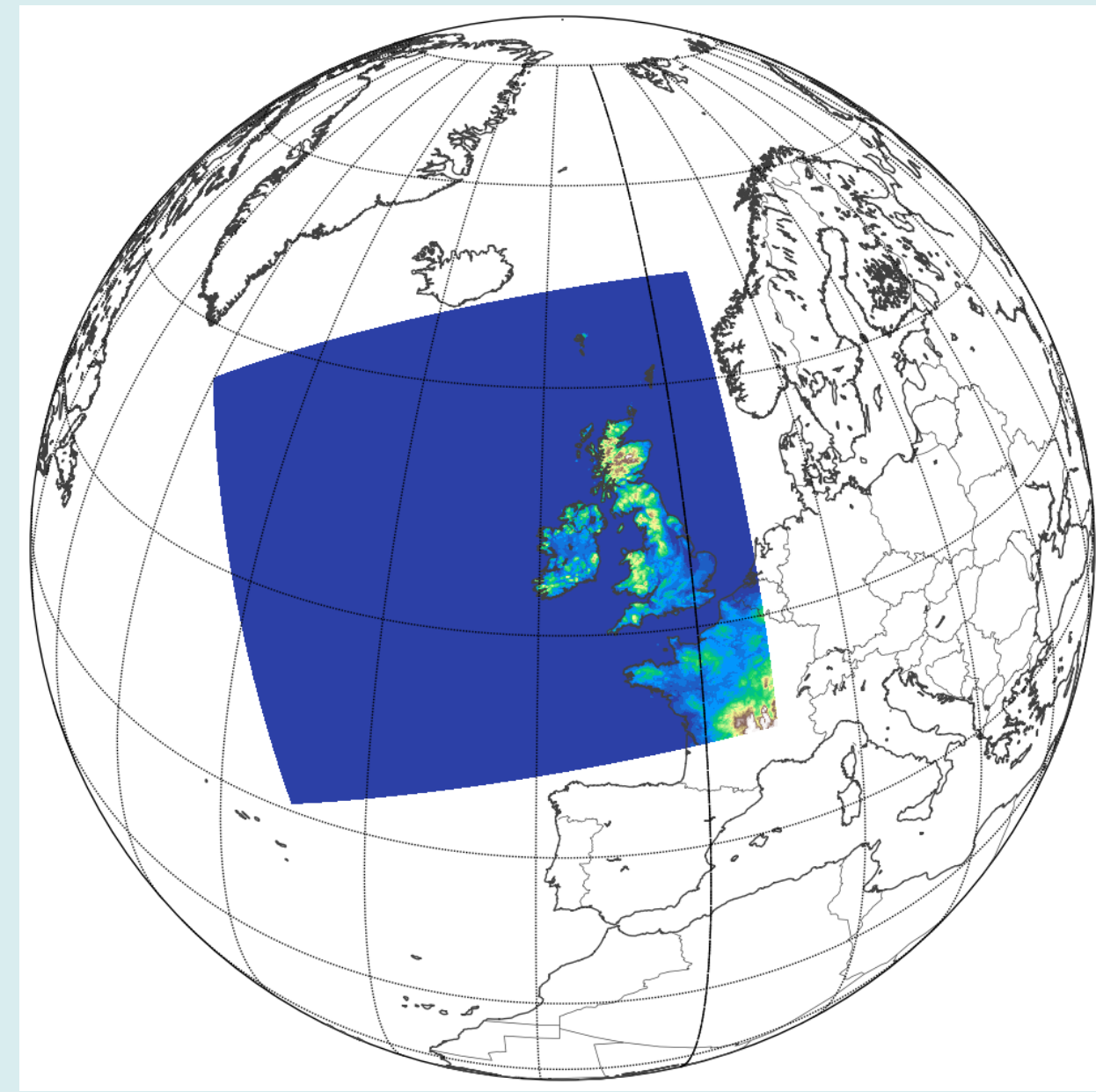
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NWP Overview

The HARMONIE-AROME configuration of cy40h1.1 is the basis of Met Éireann's operational NWP suite, called IREPS. The IREPS configuration is summarised in the table below.

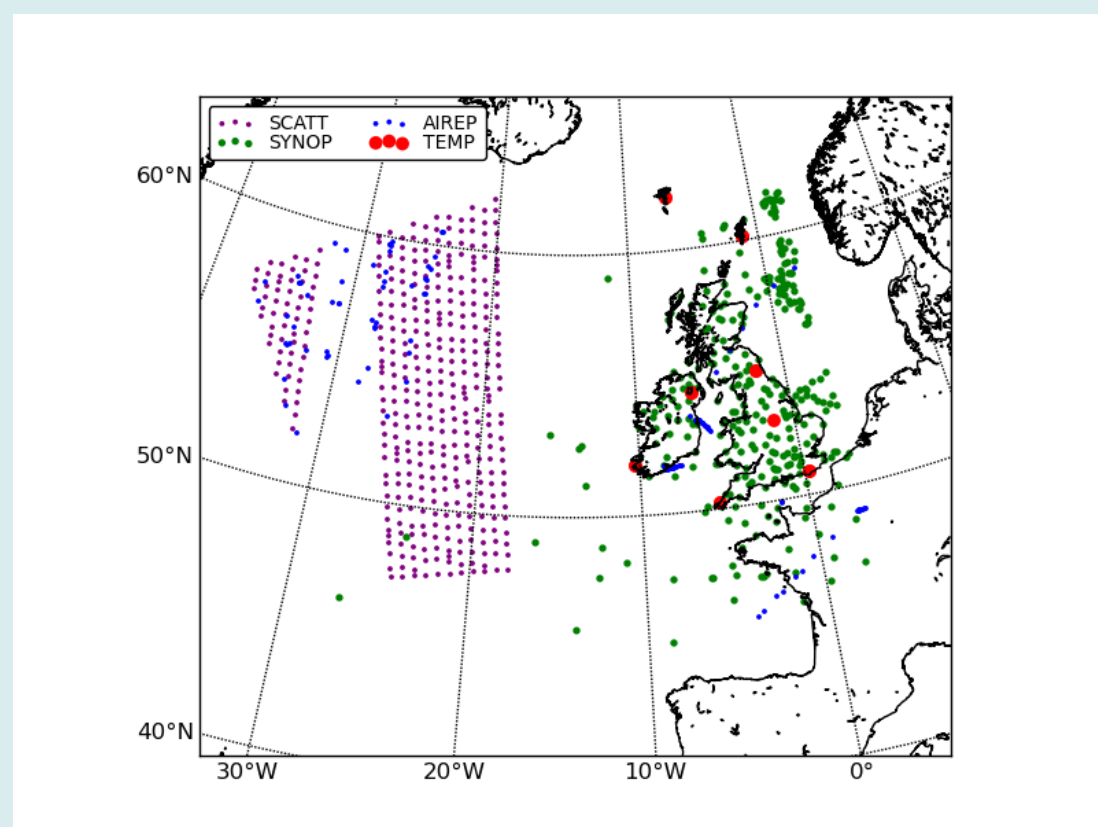
Code	HARMONIE-40h1
Domain	1000×900 ×65
Model top	10 hPa
Grid spacing	2.5 km
Cut-off	45 minutes
Observations	SYNOP, SHIP, AIREP, BUOY, TEMP & ASCAT
Data assimilation	Surface OI & 3D-Var
Configuration	HARMONIE-AROME
Cycle	3-hourly: 54 hour forecasts at 0000/0600/1200/1800 UTC
LBCs	IFS-HRES
EPS	1+10 members
Perturbations	SLAF and surface



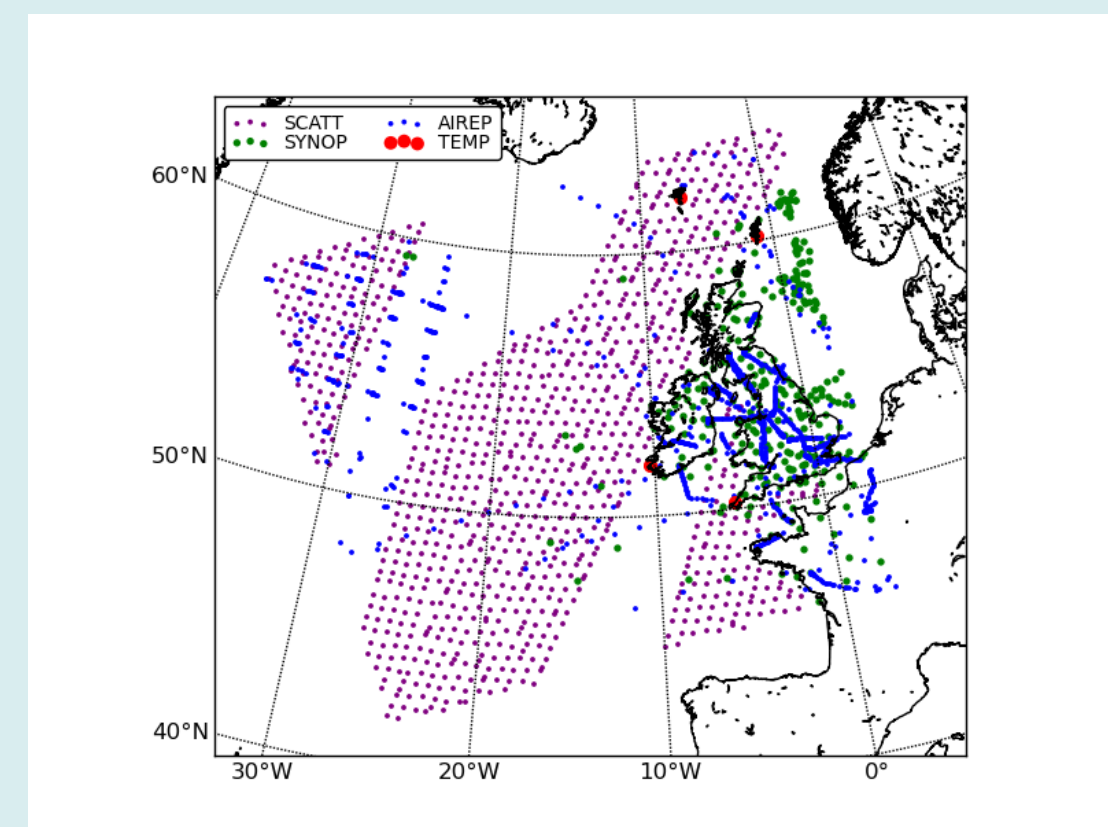
IREPS domain

Observation Usage

3D-Var data assimilation is applied by the control member of IREPS. The assimilation of ASCAT winds was introduced in October 2018. Typical observation usage plots for 0000 UTC and 1200 UTC are shown below.



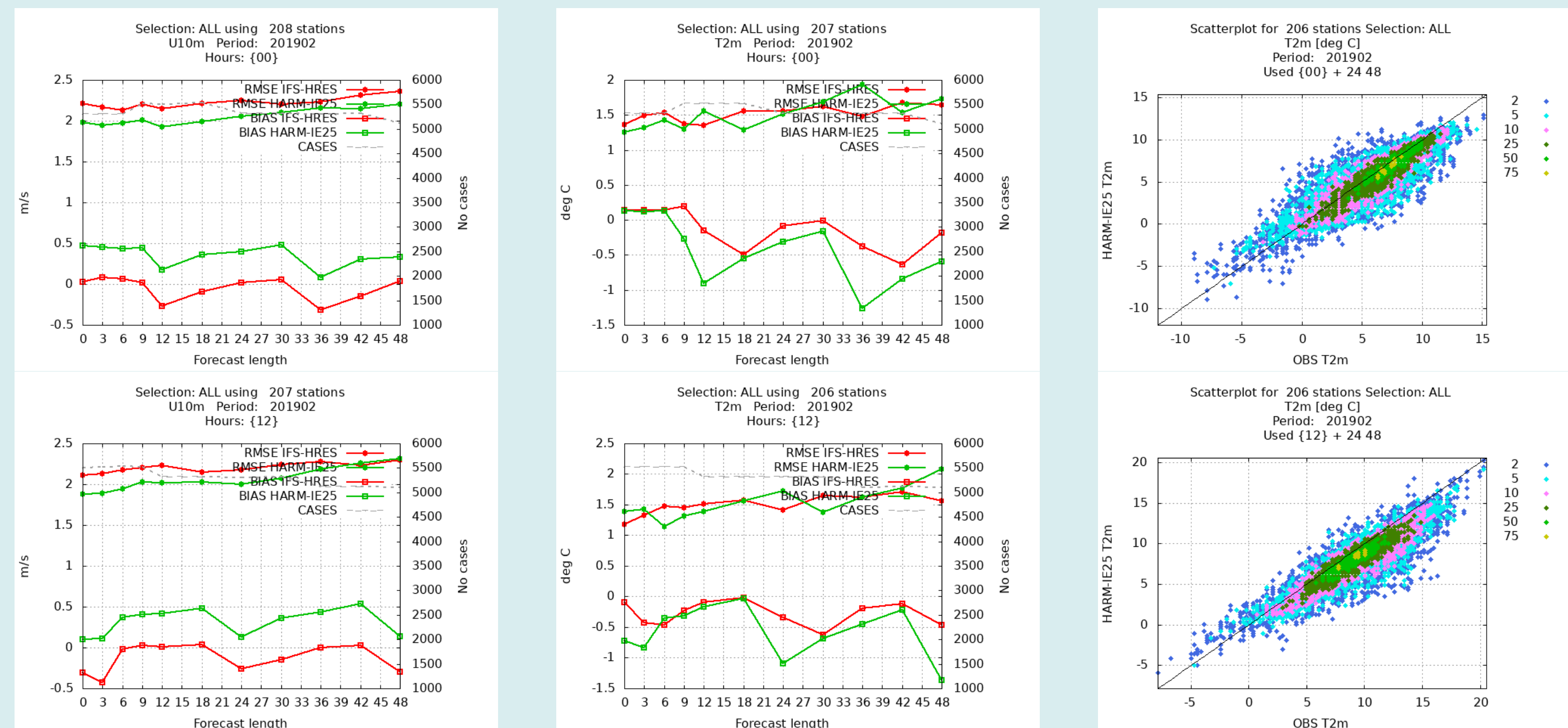
Typical observations usage for 0000 UTC



Typical observations usage for 1200 UTC

Deterministic Verification

Point verification of the operational HARMONIE-AROME forecasts for February 2019 are shown below, and compared with IFS-HRES. The model continues to exhibit a cold bias, particularly noticeable at night.



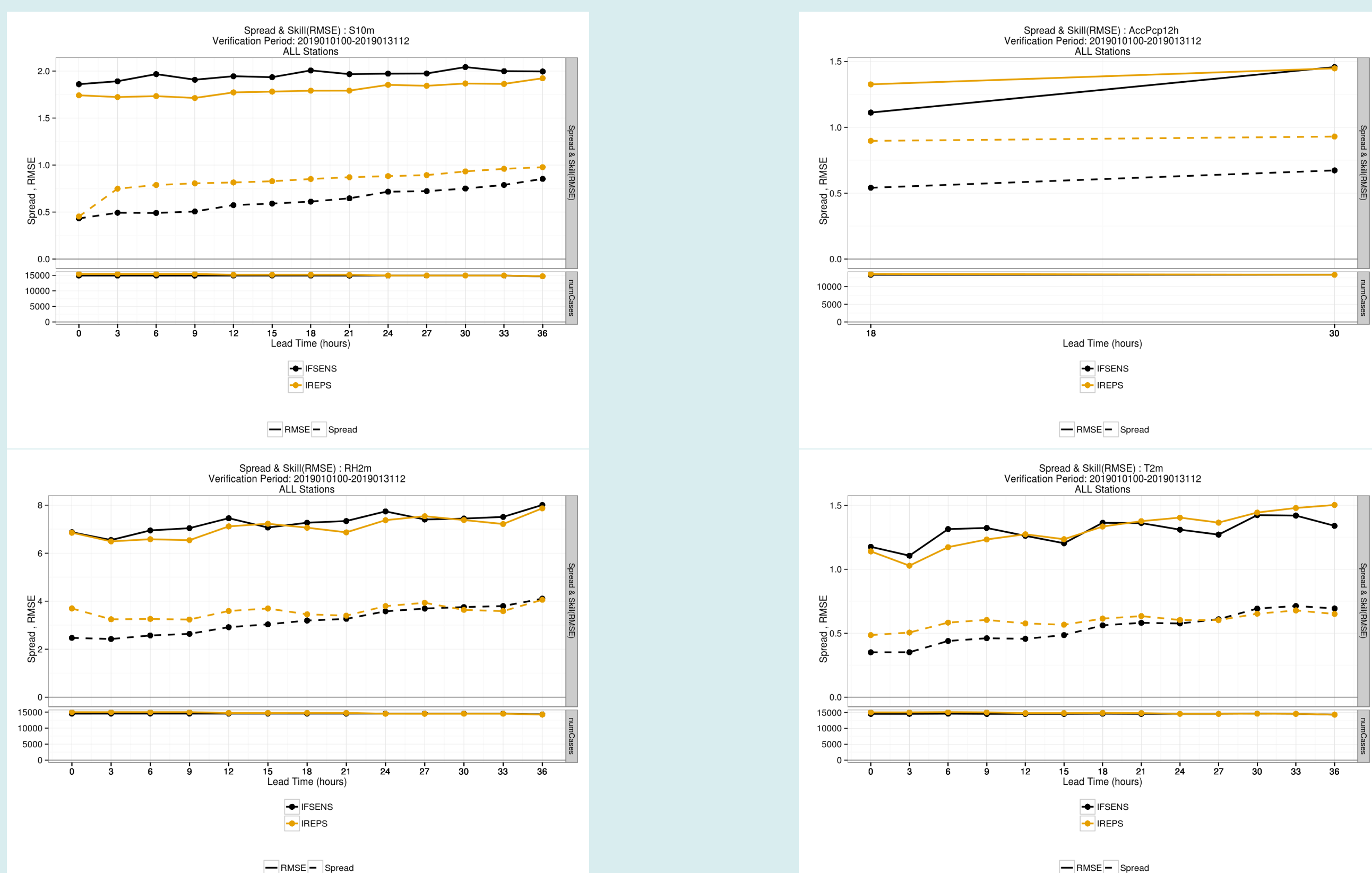
Verification of 10 m windspeed for February 2019, 0000Z (top) and 1200Z (bottom) forecasts.

Verification of 2 m temperature for February 2019, 0000Z (top) and 1200Z (bottom) forecasts.

HARMONIE-AROME forecasts against observations for 2 m temperature for February 2019, 0000Z (top) and 1200Z (bottom) forecasts.

IREPS

In October 2018, Met Éireann implemented the Irish Regional Ensemble Prediction System (IREPS). IREPS is an 11 member high-resolution ensemble prediction system. The Scaled Lagged Average Forecasting (SLAF) method is used to create perturbed boundaries for each of the members. Uncertainties related to the surface physics are represented through perturbations applied to certain parameters in the surface physics code. IREPS is run twice daily at 0000 UTC and 1200 UTC out to +36 hours.

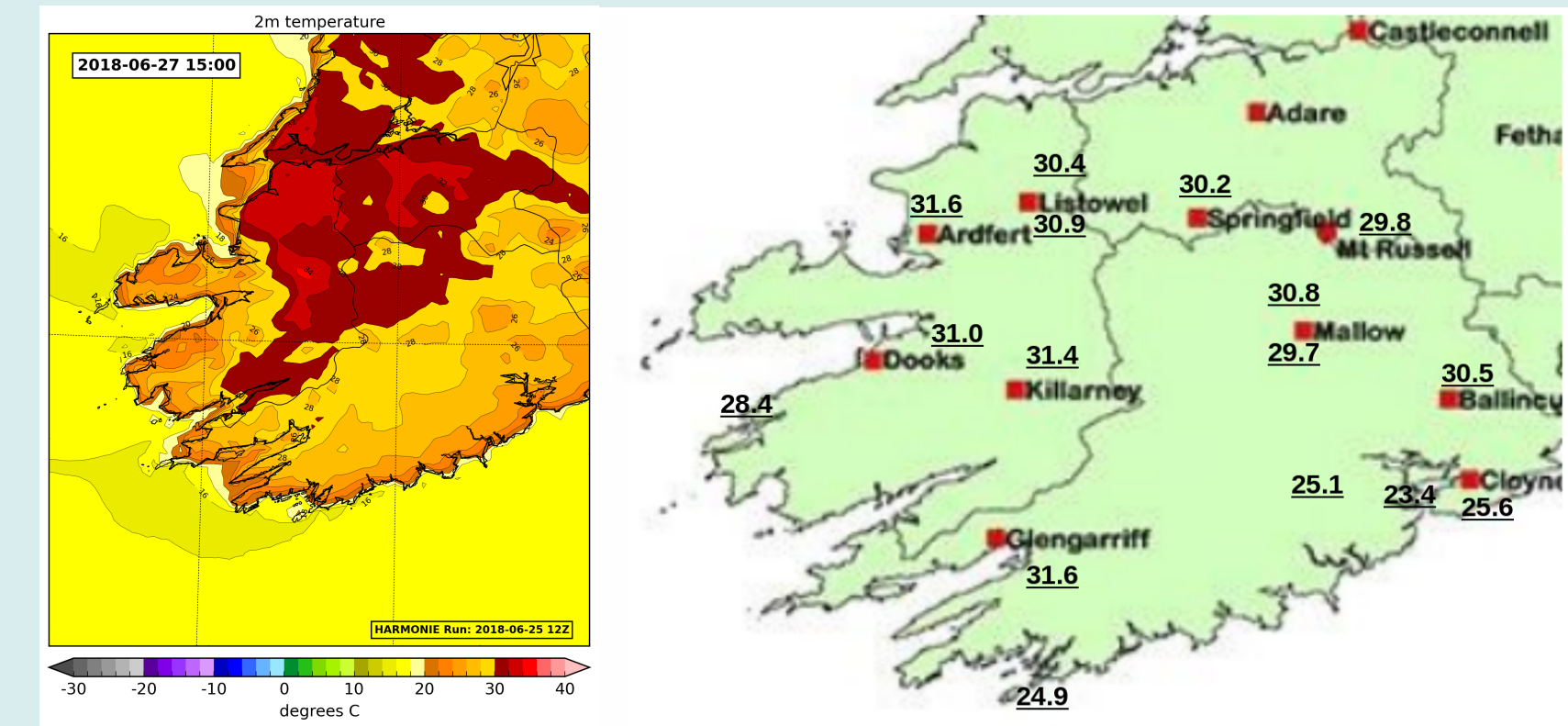


Spread/Skill plots for 10 m wind speed and 2 m relative humidity

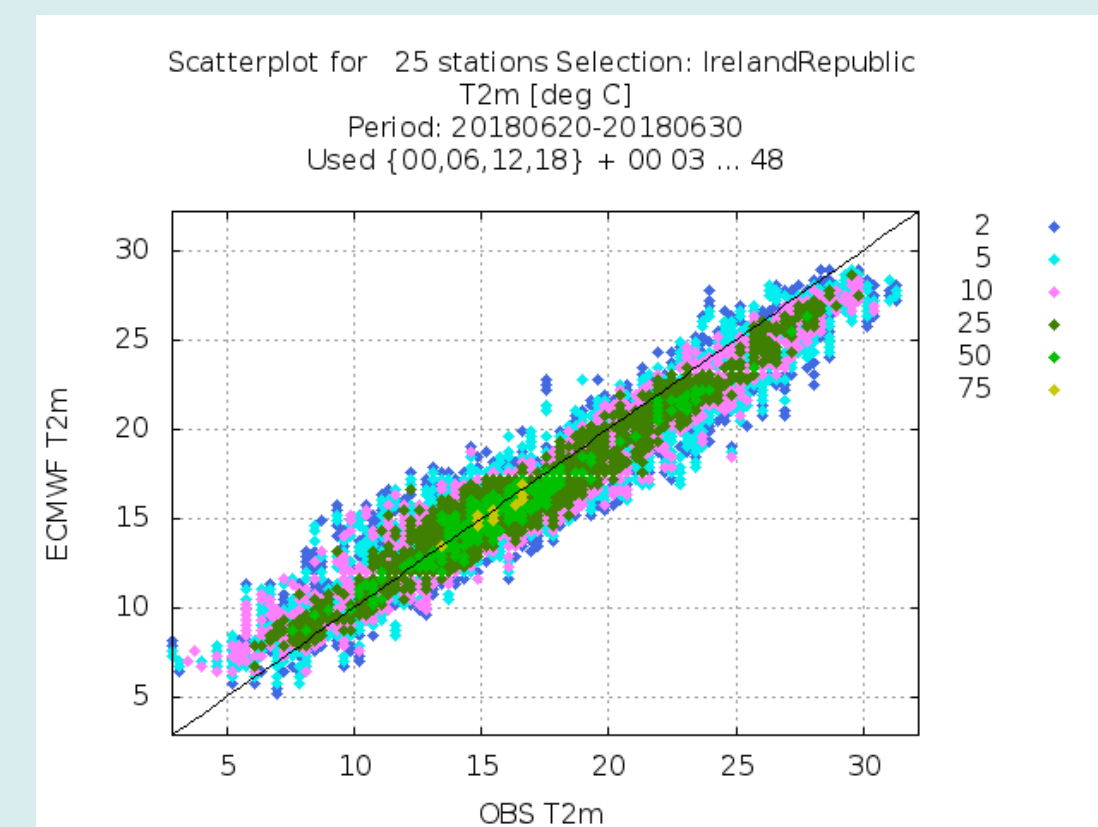
Spread/Skill plots for 12 h accumulated precipitation and 2 m temperature

High Temperatures: June 2018

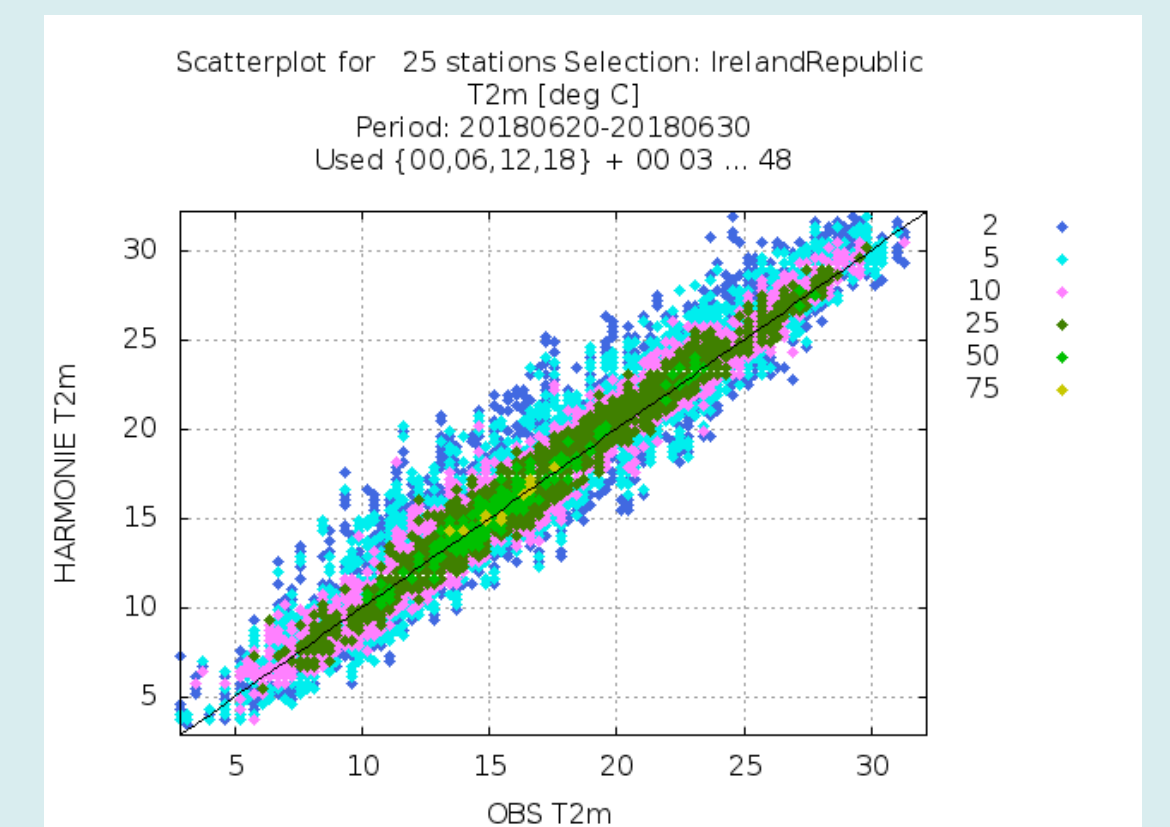
Ireland experienced heatwave and drought conditions during summer 2018.



Left: Sample forecast showing high afternoon 2 m temperatures in the south-west of Ireland during June 2018. Right: Maximum temperatures for June recorded by the climatological network.



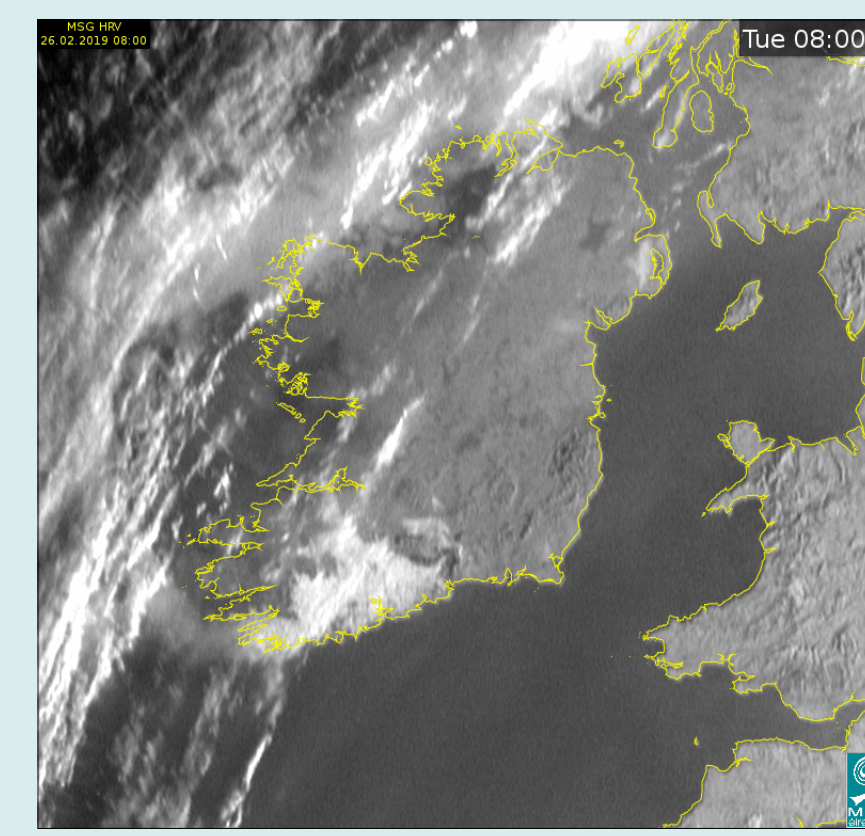
Verification of IFS-HRES forecasts of 2 m temperature for the period of 20th to 30th of June 2018.



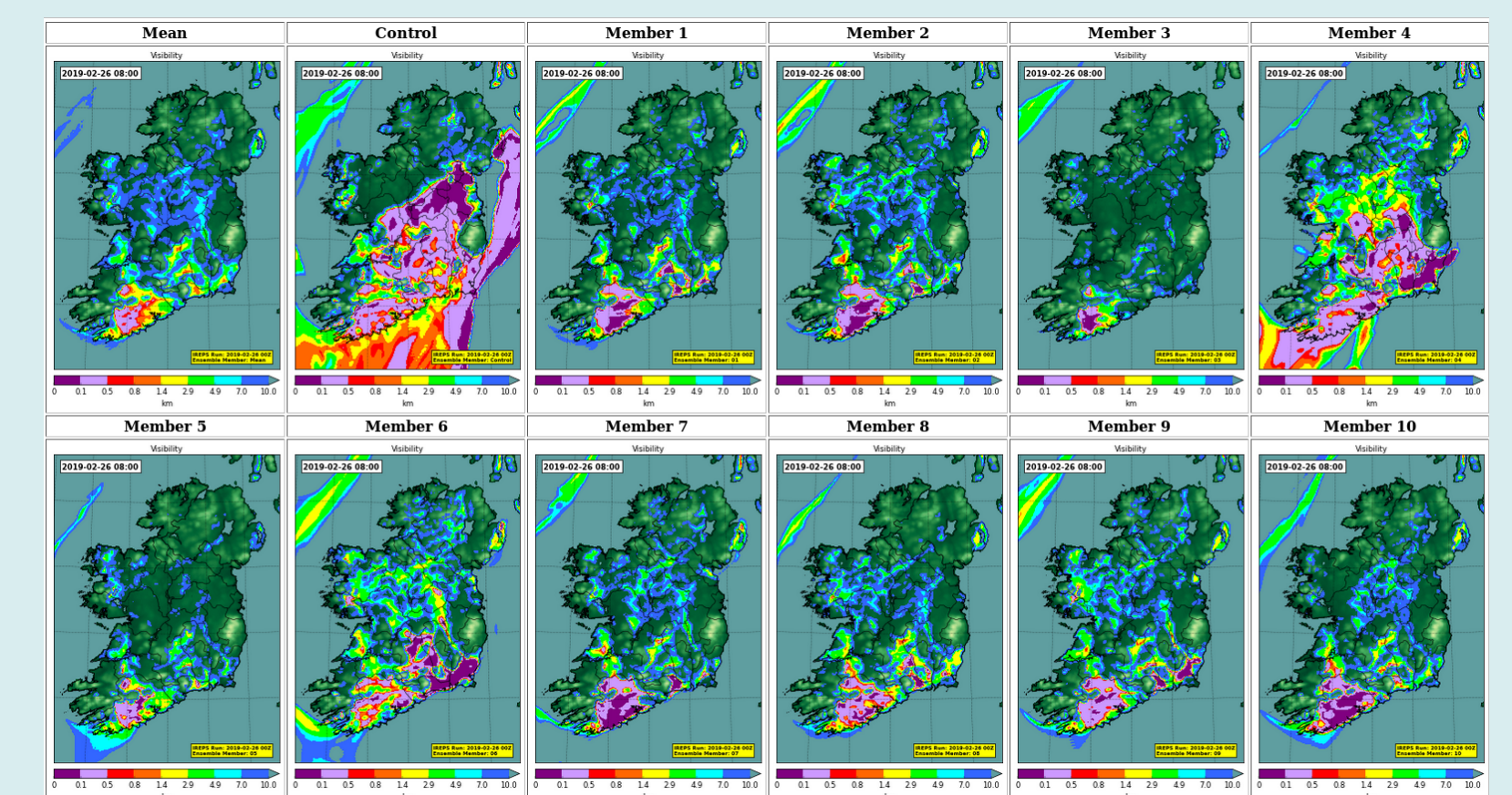
Verification of HARMONIE-AROME forecasts of 2 m temperature for the period of 20th to 30th of June 2018.

Visibility: 26th of February 2019

The prediction of low cloud and fog is an ongoing challenge for IREPS.



Satellite image over Ireland at 0800 UTC on 26th of February 2019

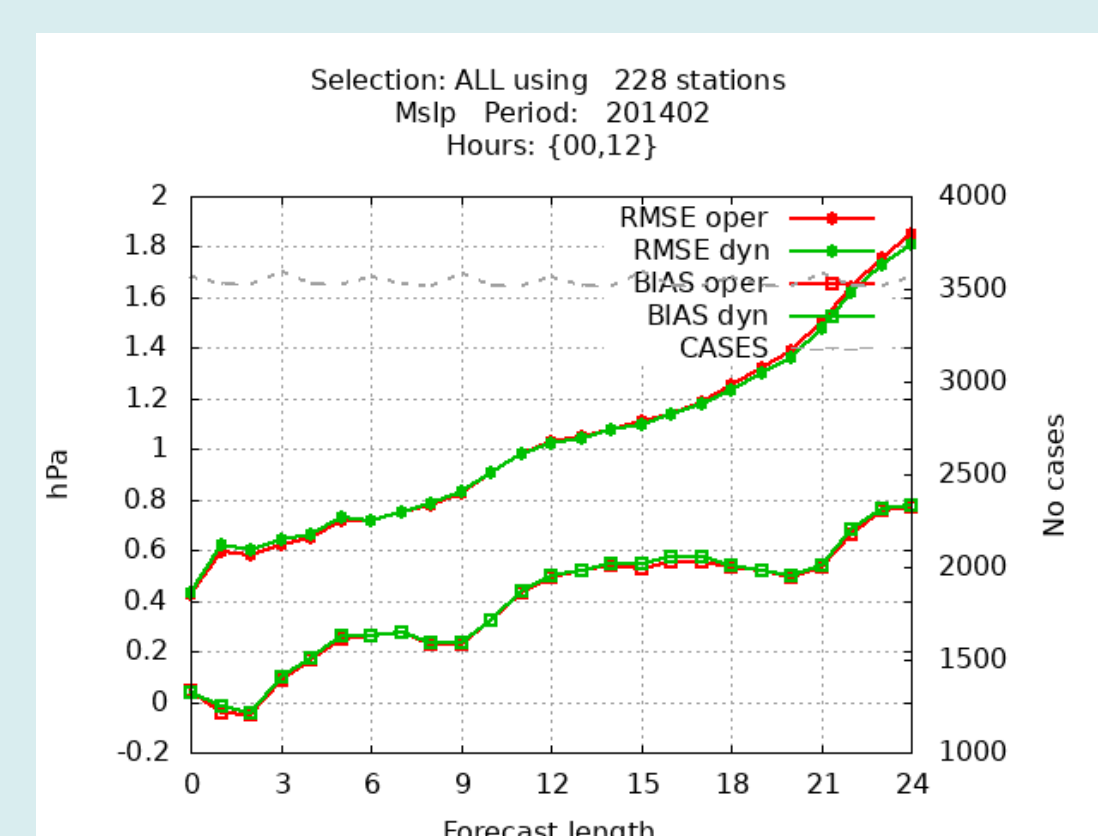


Predicted visibility from the 0000 UTC IREPS forecast on 26th of February 2019. In this case the control member gave poor guidance; some of the members were more successful.

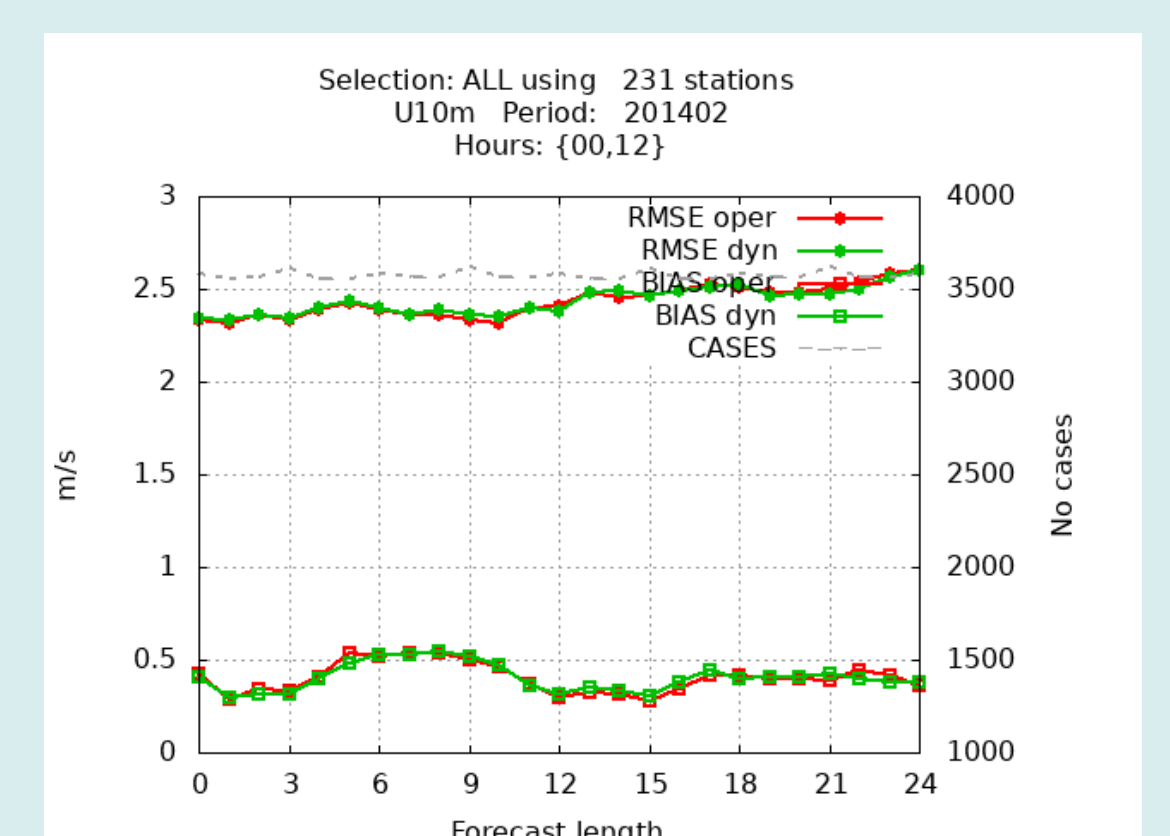
E-Suite (Spring 2019)

Met Éireann are preparing a technical upgrade to IREPS. An e-suite is running at ECMWF with operational implementation planned for April 2019. The e-suite changes include:

- Updated SLAFLAG values for the generation of the IREPS members along with re-tuned SLAF coefficients.
- Use quadratic grid (instead of linear).
- Change to Semi-Lagrangian settings to avoid model noise/resonance.

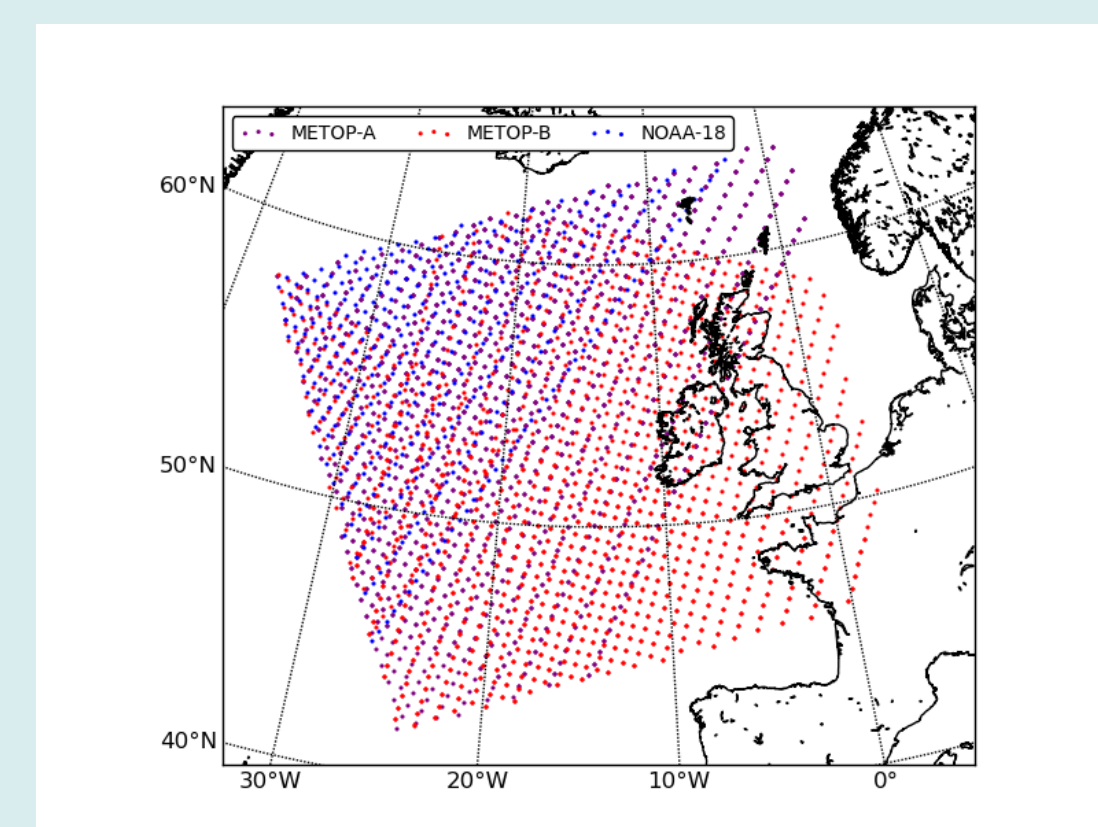


Verification of MSLP for a two-week period in February 2014. Comparison between the current operational configuration (red) and the proposed dynamics changes (green).

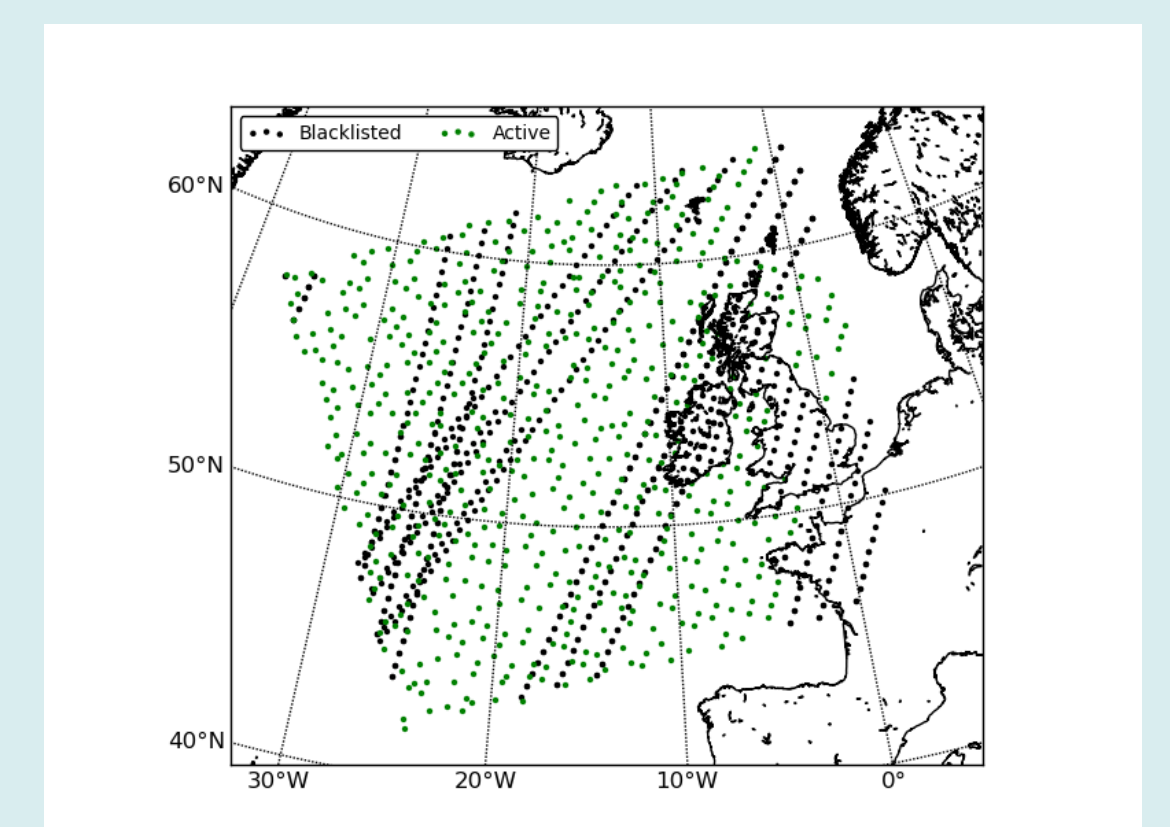


Verification of 10 m wind speed. Comparison between the current operational configuration (red) and the proposed dynamics changes (green).

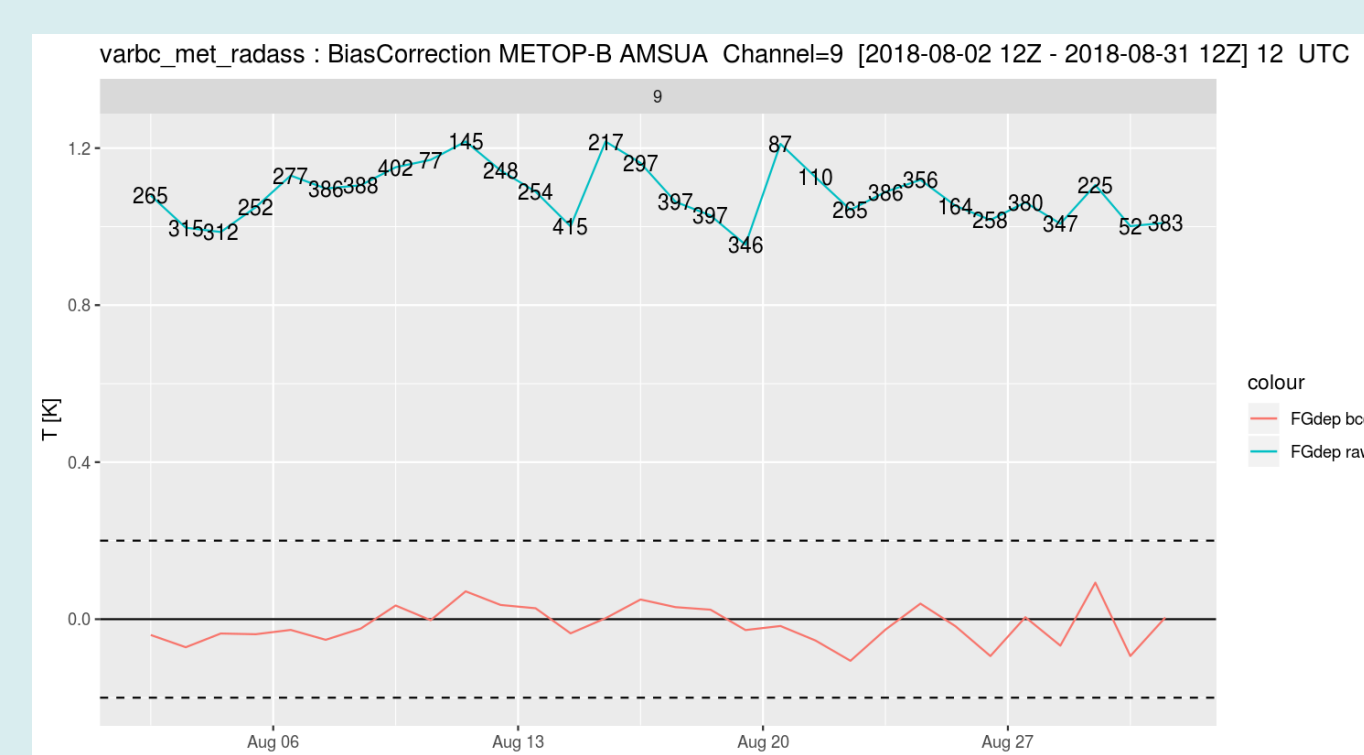
- Enable the assimilation of radiances from polar orbiting satellites



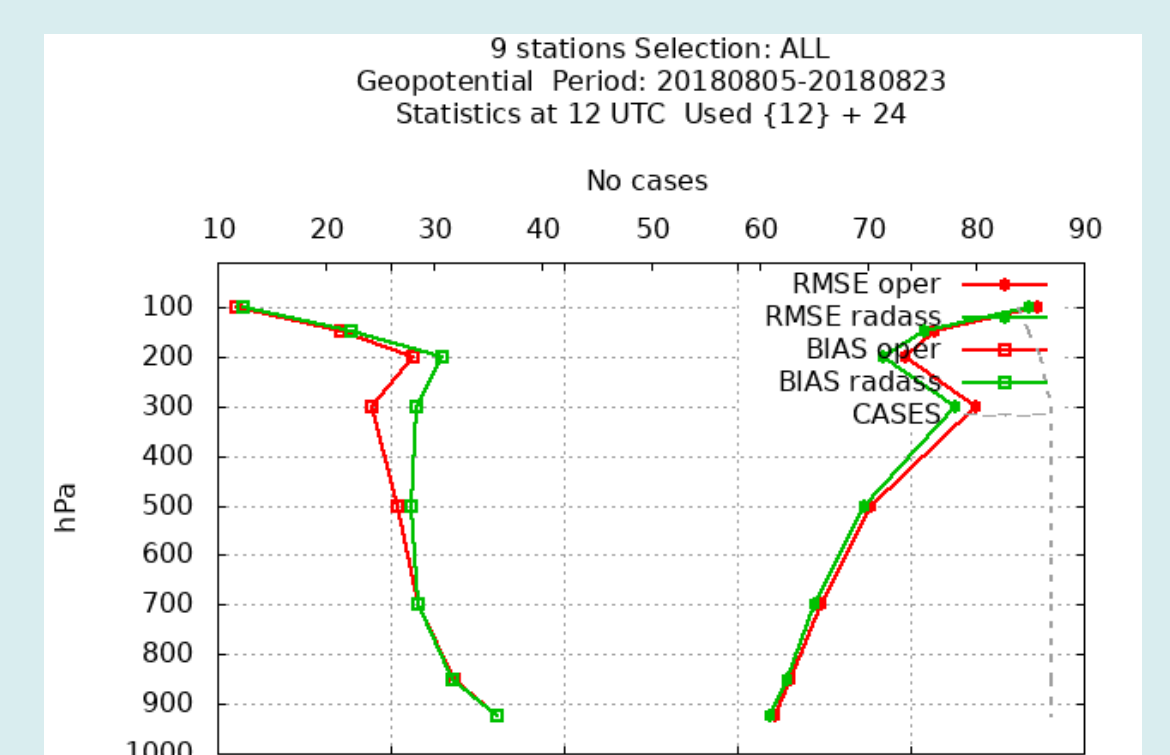
AMSU-A observations assimilated at 1200 UTC



Observations usage map for AMSU-A at 1200 UTC



Bias correction of METOP-B AMSU-A channel 9 observations at 1200 UTC. "Raw" first-guess departures are shown in blue. "Corrected" first-guess departures are shown in red.



Verification of 24 hour forecasts. Operational forecasts (oper) are shown in red and tests with assimilation of AMSU-A, MHS and IASI observations (radass) are shown in green.