

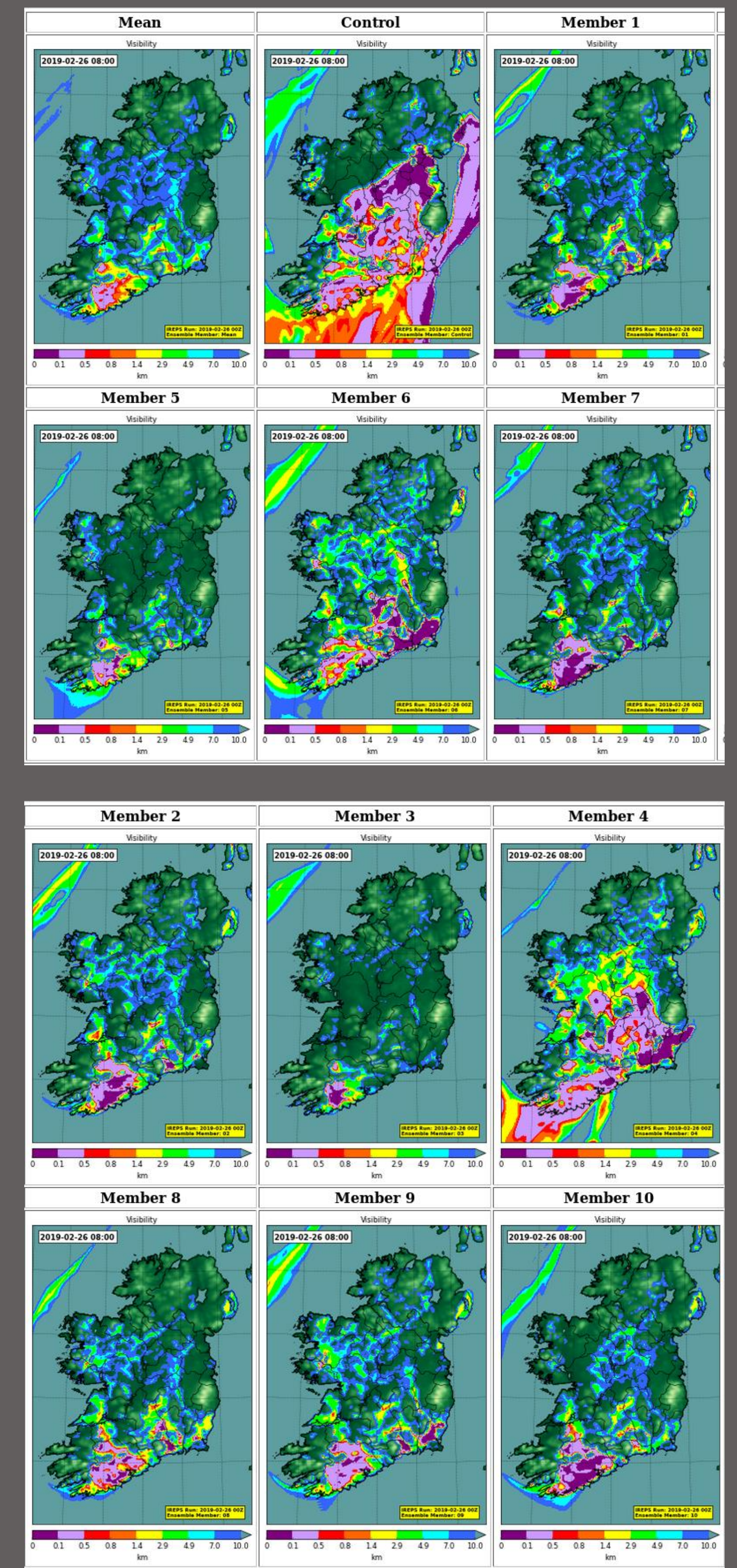
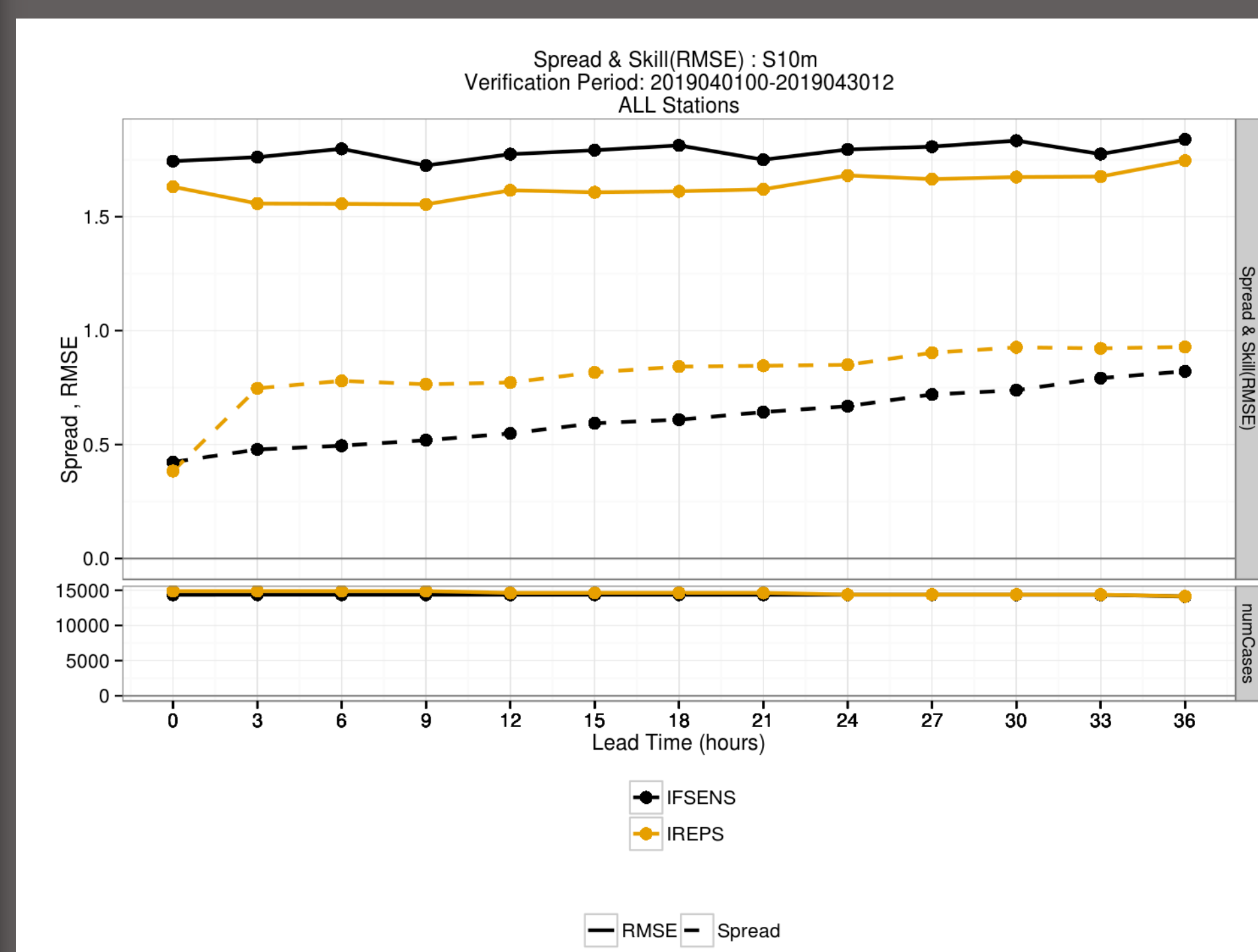
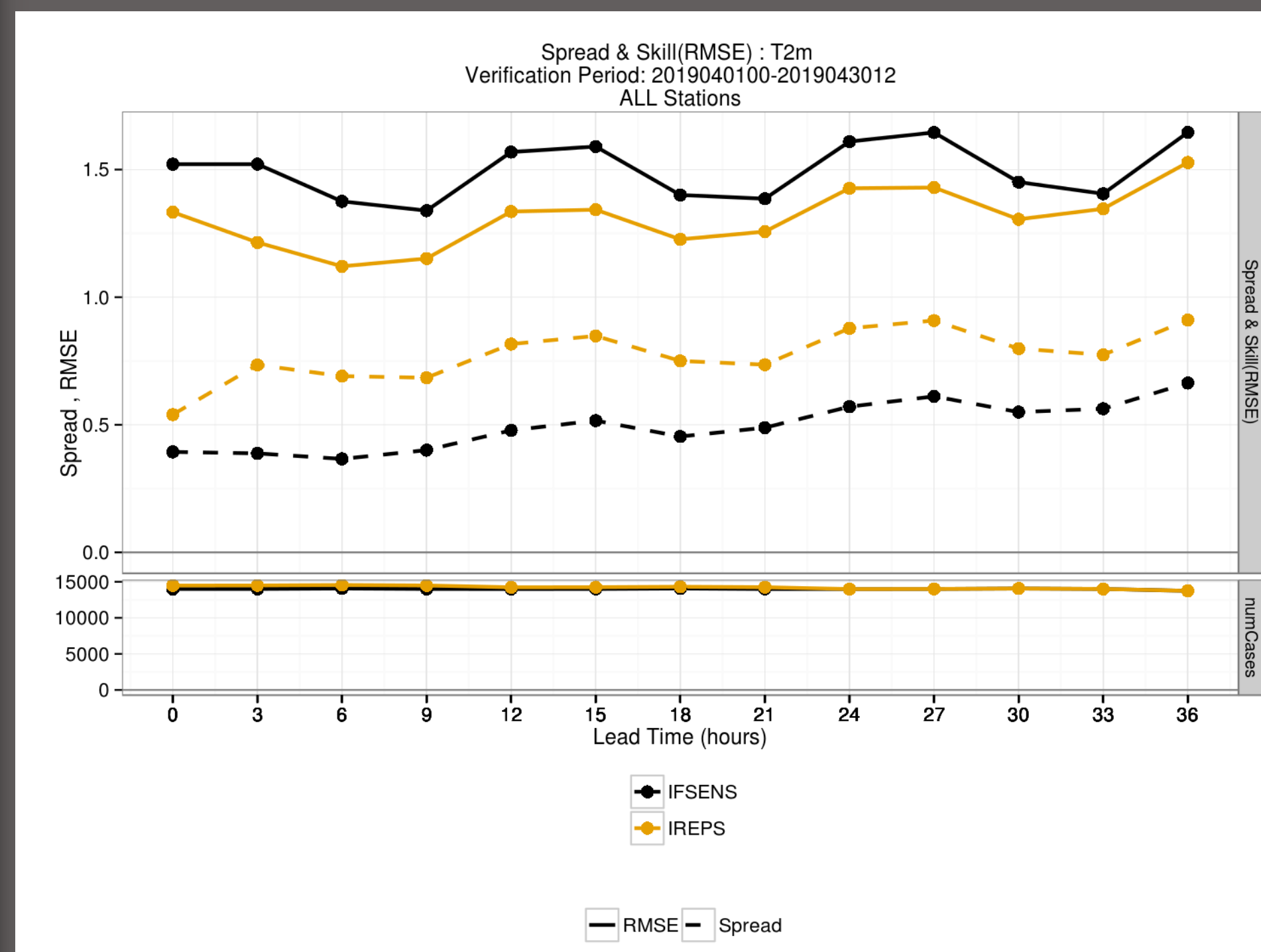
NWP Overview

- The HARMONIE-AROME cy40h1.1 configuration of the shared ALADIN-HIRLAM NWP system is the basis of the Met Éireann operational NWP suite, which we call IREPS – Irish Regional Ensemble Prediction System. The IREPS configuration is summarised in the table below:

IREPS	
Domain	1000 × 900 × 65
Model top	10 hPa
Grid spacing	2.5 km
Cut-off	45 minutes
Observations	SYNOP, SHIP, AIREP, BUOY, TEMP, ASCAT, AMSU-A, MHS, IASI
Data assimilation	Surface OI and 3D-Var
Configuration	HARMONIE-AROME
Cycling	3 hourly: 54 hour forecasts at 00, 06, 12 and 18 UTC
LBCs	IFS-HRES
EPS	1+10 members, 36 hour forecasts at 00 and 12 UTC
Perturbations	SLAF and surface

IREPS vs ECMWF-ENS

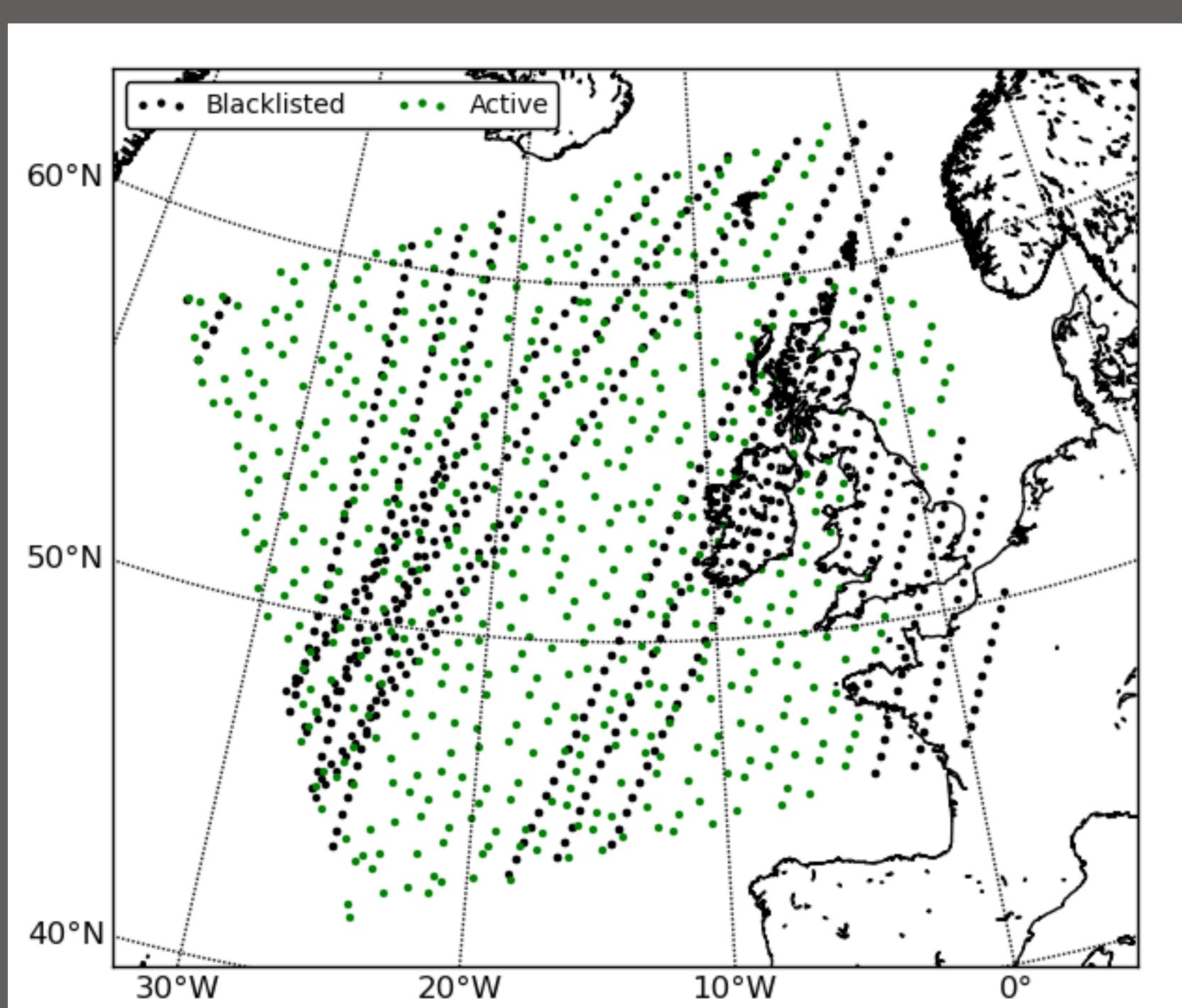
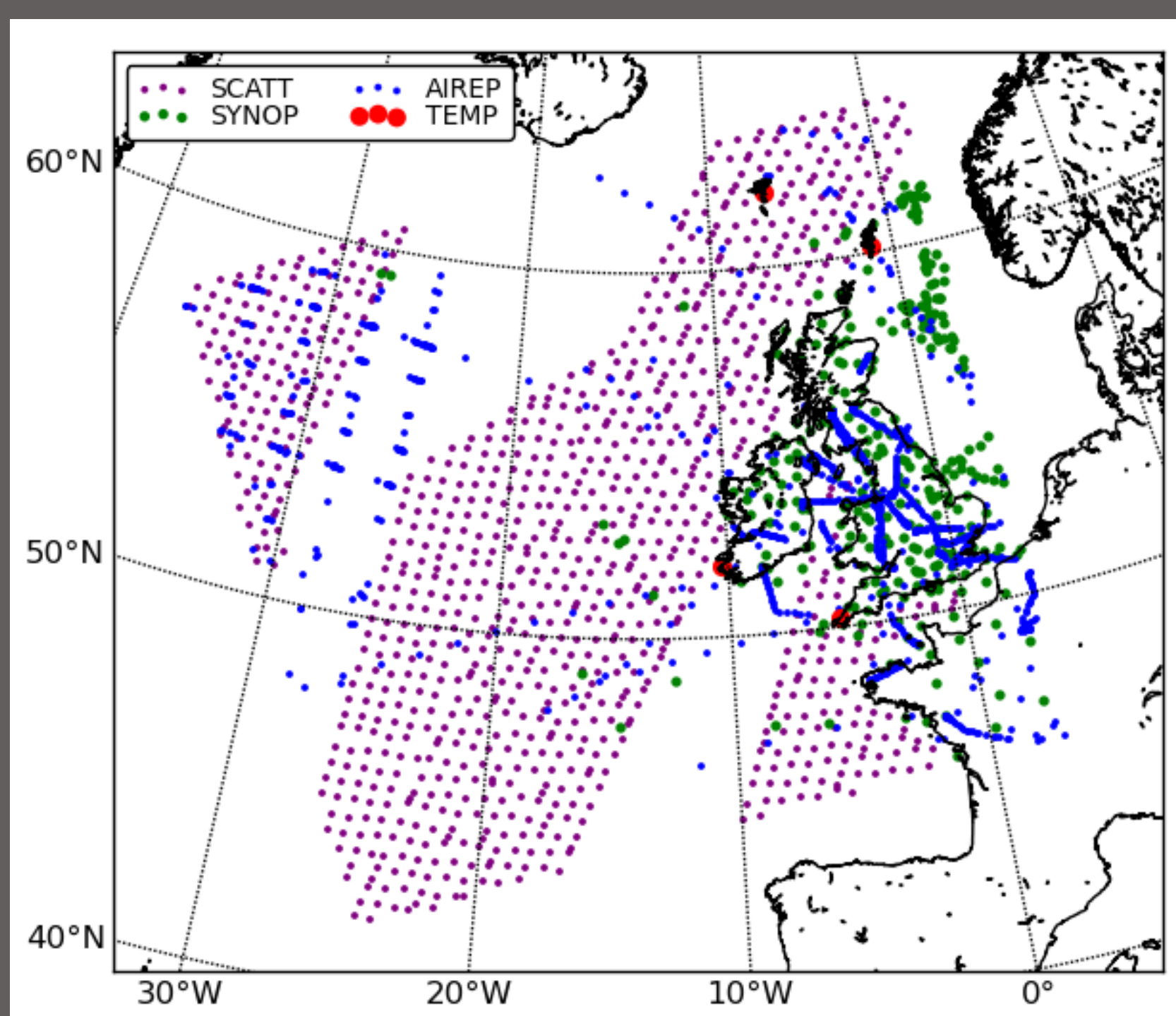
- IREPS is an 11-member high-resolution ensemble prediction system run daily at 00 UTC and 12 UTC out to +36 hours
- The Scaled Lagged Average Forecasting (SLAF) method is used to create perturbed boundaries for each of the members
- Uncertainties related to the surface physics are represented through perturbations applied to certain parameters in the surface physics
- Sample spread/skill plots for T2m (top) and U10m (bottom) are shown below which highlight the benefit of running a high-resolution ensemble:



- Predicted visibility from the 00 UTC IREPS forecast on 26th of February 2019.

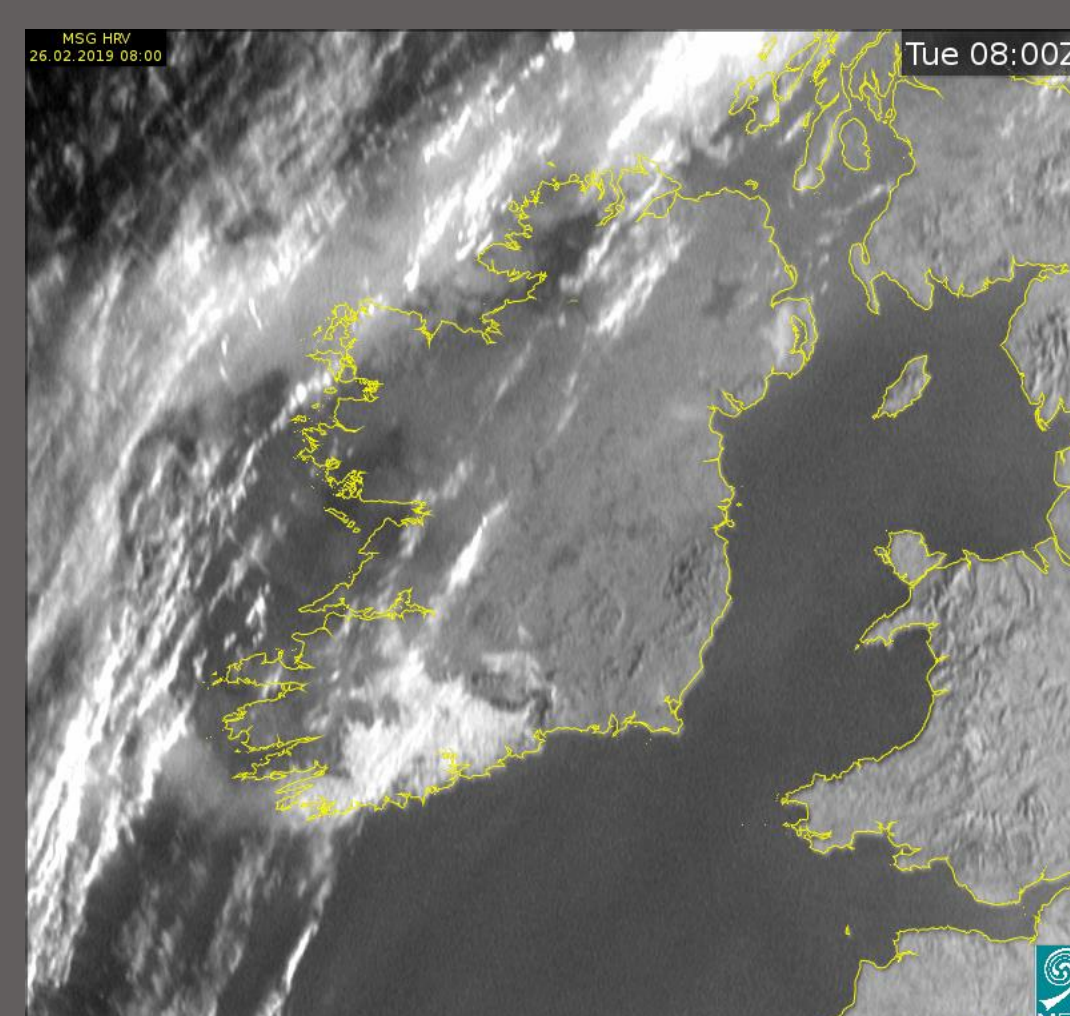
Observation Usage

- Cycle 40h1.1 of HARMONIE-AROME has been running operationally at Met Éireann since May 2018
- In October 2018 we introduced our ensemble system IREPS and the assimilation of ASCAT winds
- Our latest upgrade in August 2019 brought the assimilation of radiances from AMSU-A, MHS and IASI satellite instruments and METOP-C ASCAT winds
- 3D-Var data assimilation is only applied to the control member of IREPS. Typical observation usage plots for 12 UTC are shown below. Top: synoptic, aircraft and radiosonde observations. Bottom: AMSU-A radiances



Forecasting Challenges

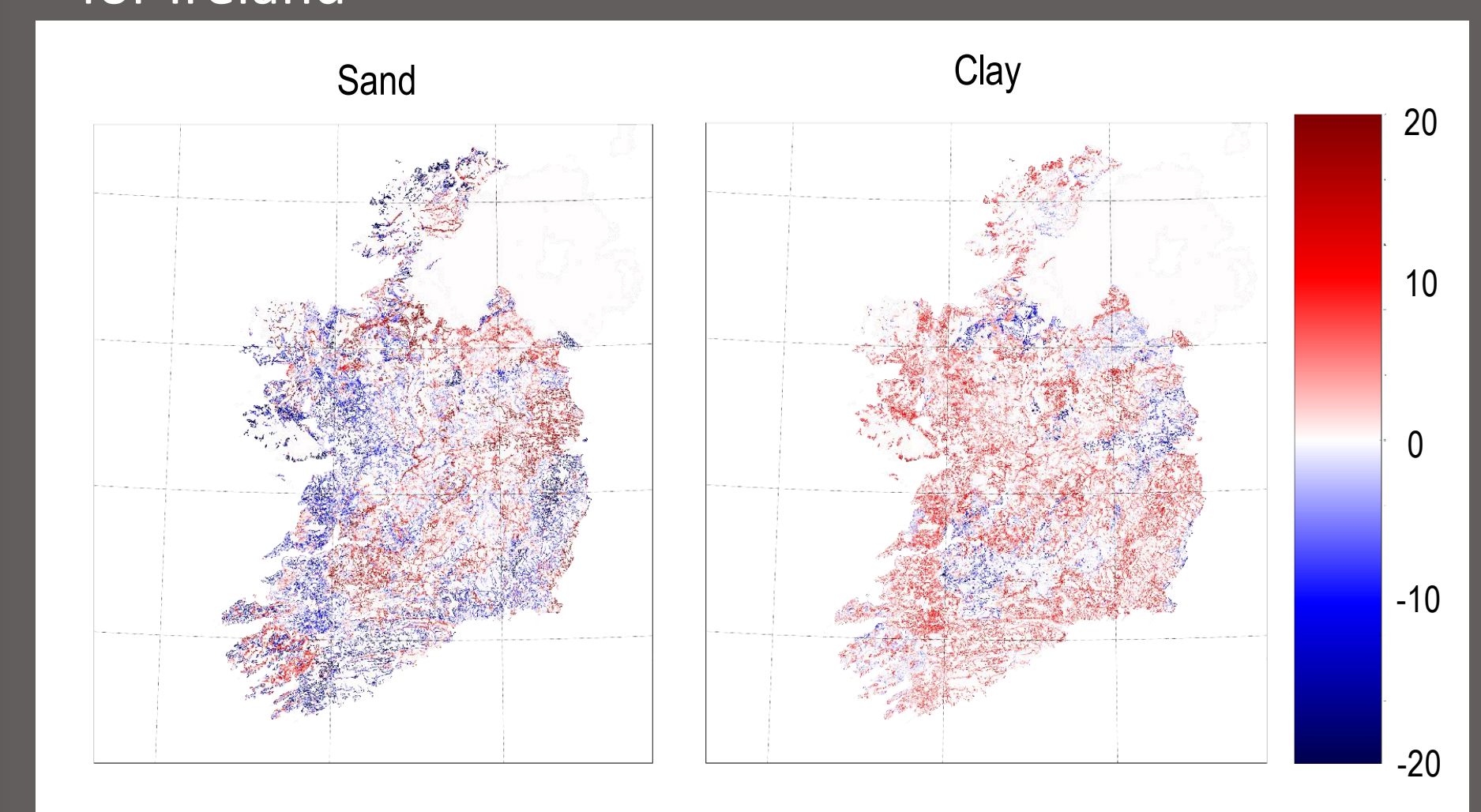
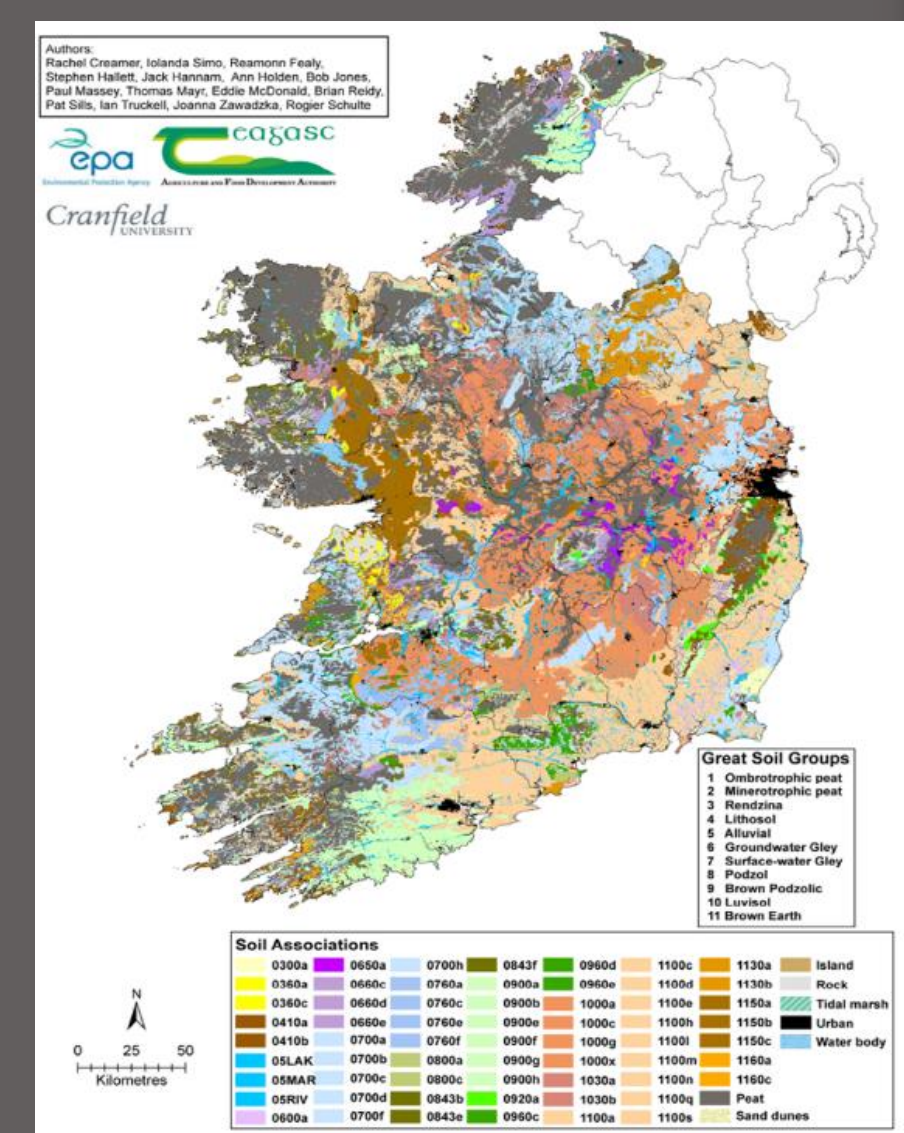
- We hold monthly NWP user/develop meetings to exchange information with, and to get feedback from, forecasters, the main users of our NWP data
- The most common issues that arose over the past year or two include: over and under-prediction of fog and low cloud, forecasting of temperature maxima and how many ensemble members need to show a signal in order for forecasters to trust the output
- A fog/low cloud case is shown below as an example. In general, improving fog prediction is a high priority among HIRLAM countries
- The next few images show a case of low cloud/fog on the morning of the 26th of February 2019. In this particular case the control member displayed a large over-forecast of fog while the other ensemble members gave a more correct forecast.



Visible satellite image over Ireland at 08 UTC on 26th of February 2019

Physiography

- We have looked at local soil and clay databases compared to those in HARMONIE-AROME (FAO, HWSO and SOILGRID)
- The Irish soil map metadata contains information on the vertical profiles of clay/sand fractions.
- Weighted averages of these were used to produce sand/clay maps for Ireland at the required resolution
- The local dataset was then blended with the reference datasets in HARMONIE-AROME.
- Similar techniques will be applied to update ECOCLIMAP for Ireland



- Differences between the soil and clay fractions in SOILGRID and SOILGRID blended with our local dataset are shown above
- Overall a decrease in clay fraction in many areas in SOILGRID blend (plot shows SOILGRID-SOILGRIDblend)
- See accompanying poster by Bessardon and Gleeson, dedicated to physiography