



Use of Ensemble Forecasts at Met Éireann

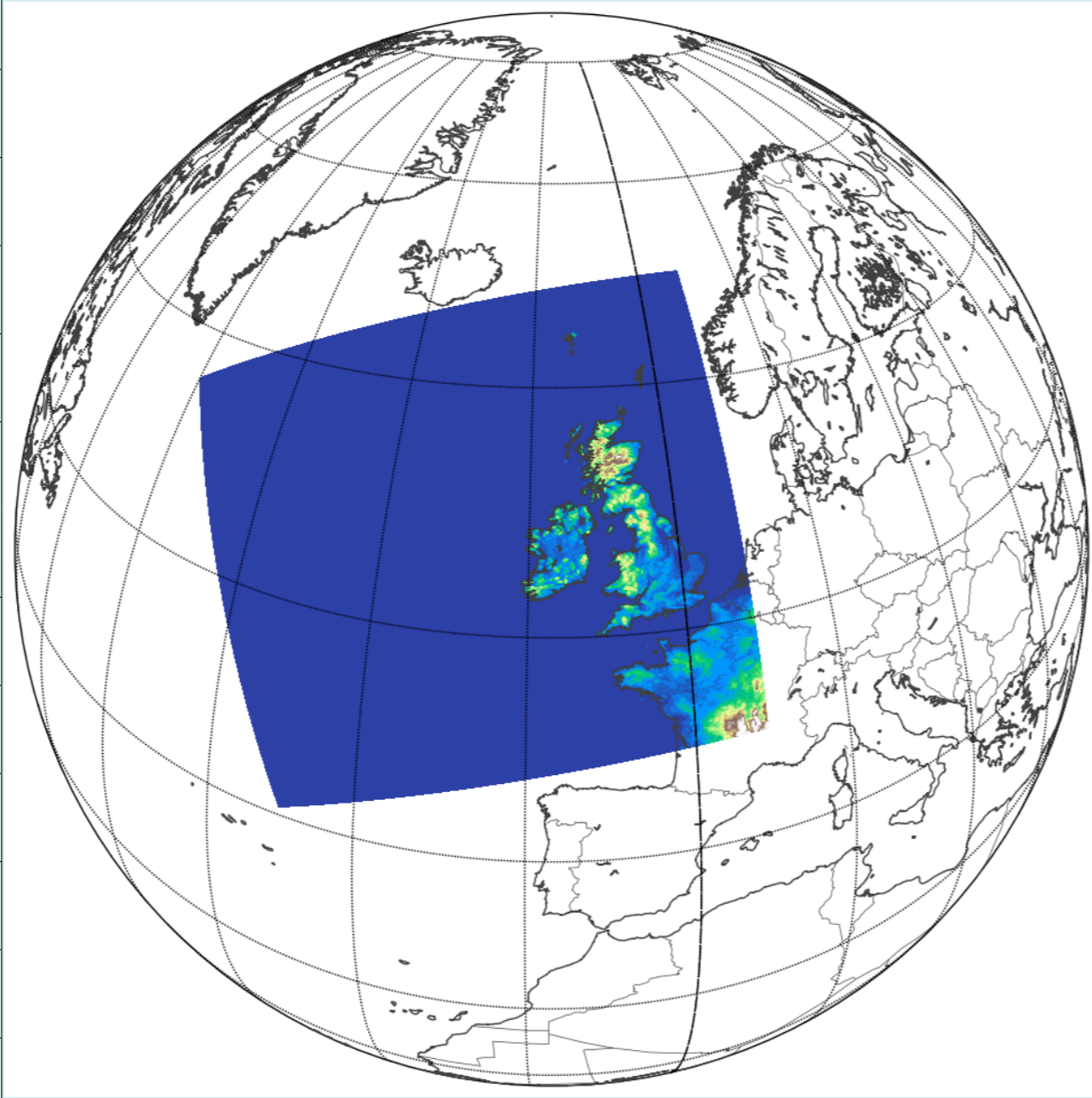
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IREPS - Irish Regional Ensemble Prediction System

Cycle 43h2.1 of the HARMONIE-AROME configuration of the shared HIRLAM-ALADIN code is the basis of Met Éireann's operational Numerical Weather Prediction suite, called IREPS. The IREPS configuration is summarised in the table below.

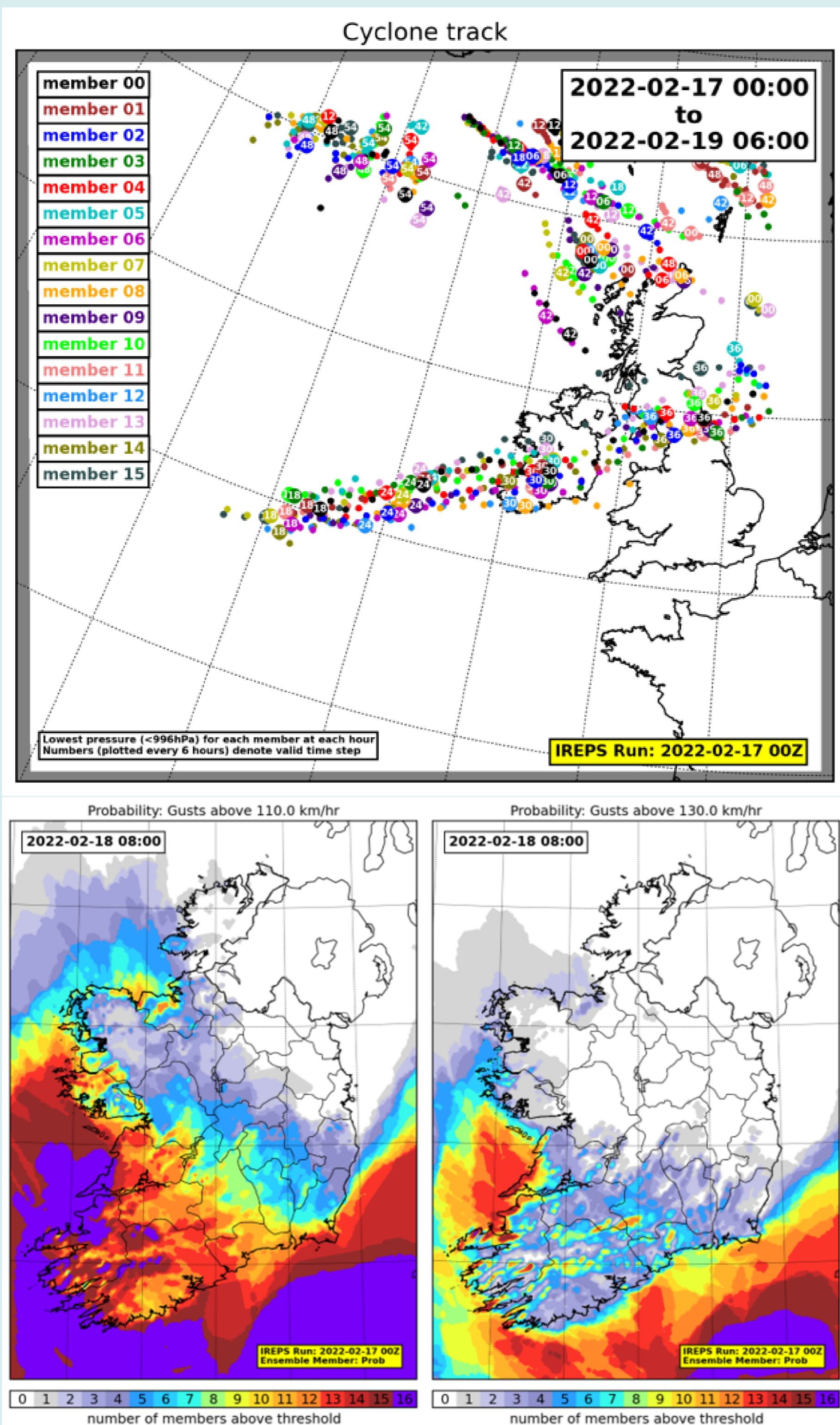
Code	HARMONIE-AROME-43h2.1
Domain	1000×900 ×65
Model top	10 hPa
Grid spacing	2.5 km
Cut-off	45 minutes
Observations	SYNOP, SHIP, AIREP, BUOY, TEMP & ASCAT
Data assimilation	Surface OI & 3D-Var
Configuration	Lagged/Semi-Continuous
Cycle	3-hourly
LBCs	IFS-HRES
EPS	1+15 members
Perturbations	SLAF, surface & Multi-physics



IREPS domain

IREPS: Storm Eunice - February 2022

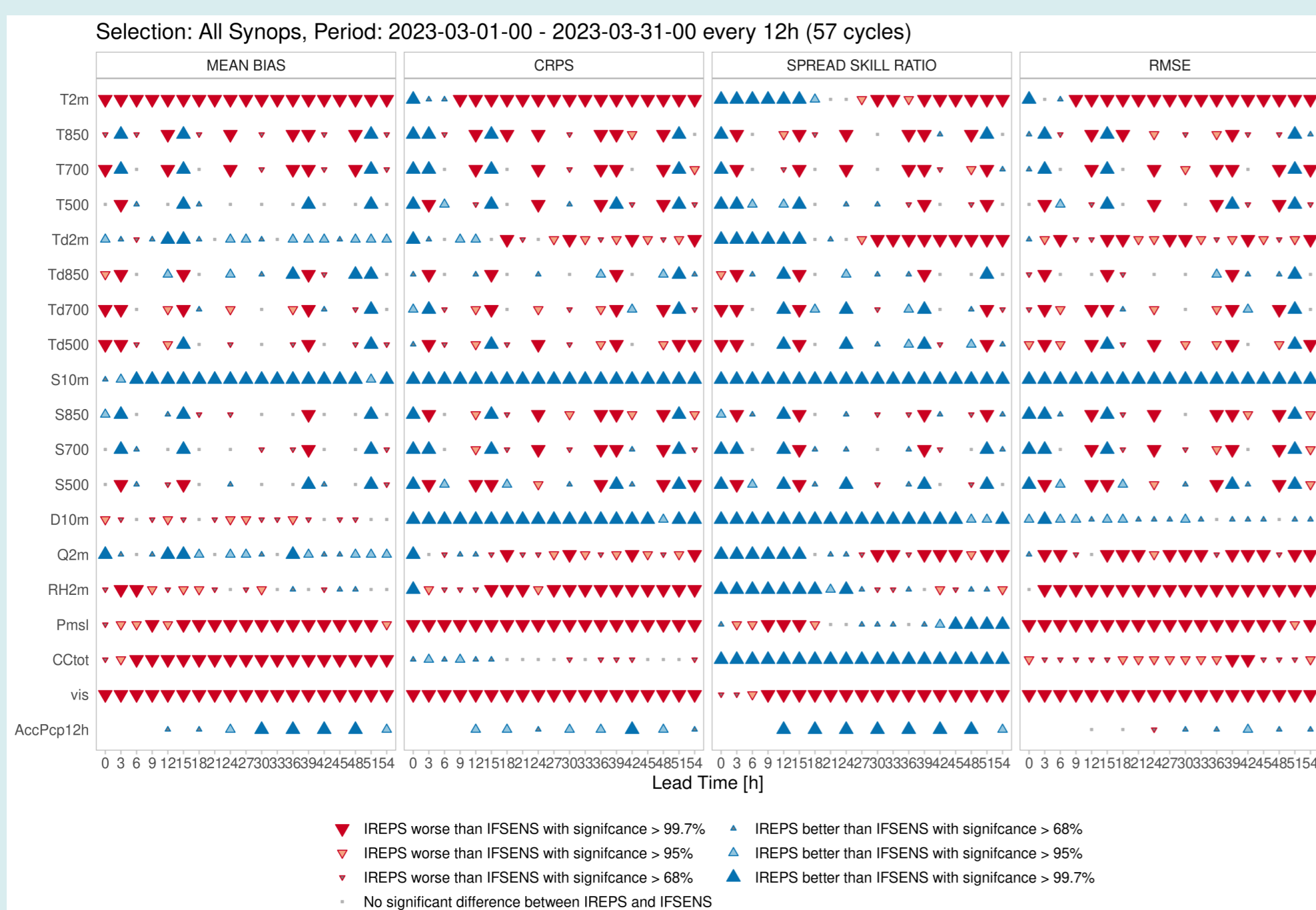
February 2022 was a particularly stormy period across Ireland, with 3 named storms impacting the island in the space of a week. Storm Eunice, the second of these, led to red wind warnings being issued for a number of locations on the 18th of February.



Top: Track of centre of Storm Eunice as forecast by individual IREPS members 36-hours ahead. Bottom left: Probability threshold map from IREPS run at 0000UTC on 17th of February for gusts exceeding 110km/hr. Bottom right: Probability threshold map from same IREPS run but for gusts exceeding 130km/hr.

IREPS background and performance compared to ECMWF EPS

In October 2018, Met Éireann implemented the Irish Regional Ensemble Prediction System (IREPS). IREPS is a 16 member high-resolution ensemble prediction system. The below scorecard demonstrates the improved performance of IREPS over ECMWF EPS for 10 m wind speed (S10m), 10 m wind direction (D10m) and 12-hourly accumulated precipitation (AccPcp12h) for all verification metrics. ECMWF EPS outperforms IREPS for mean-sea-level pressure (Pmsl) and 2 m temperature (T2m). Other parameters illustrate mixed results, e.g. an improved spread/skill ratio for total cloud cover (CCtot) for IREPS, but a worse bias.



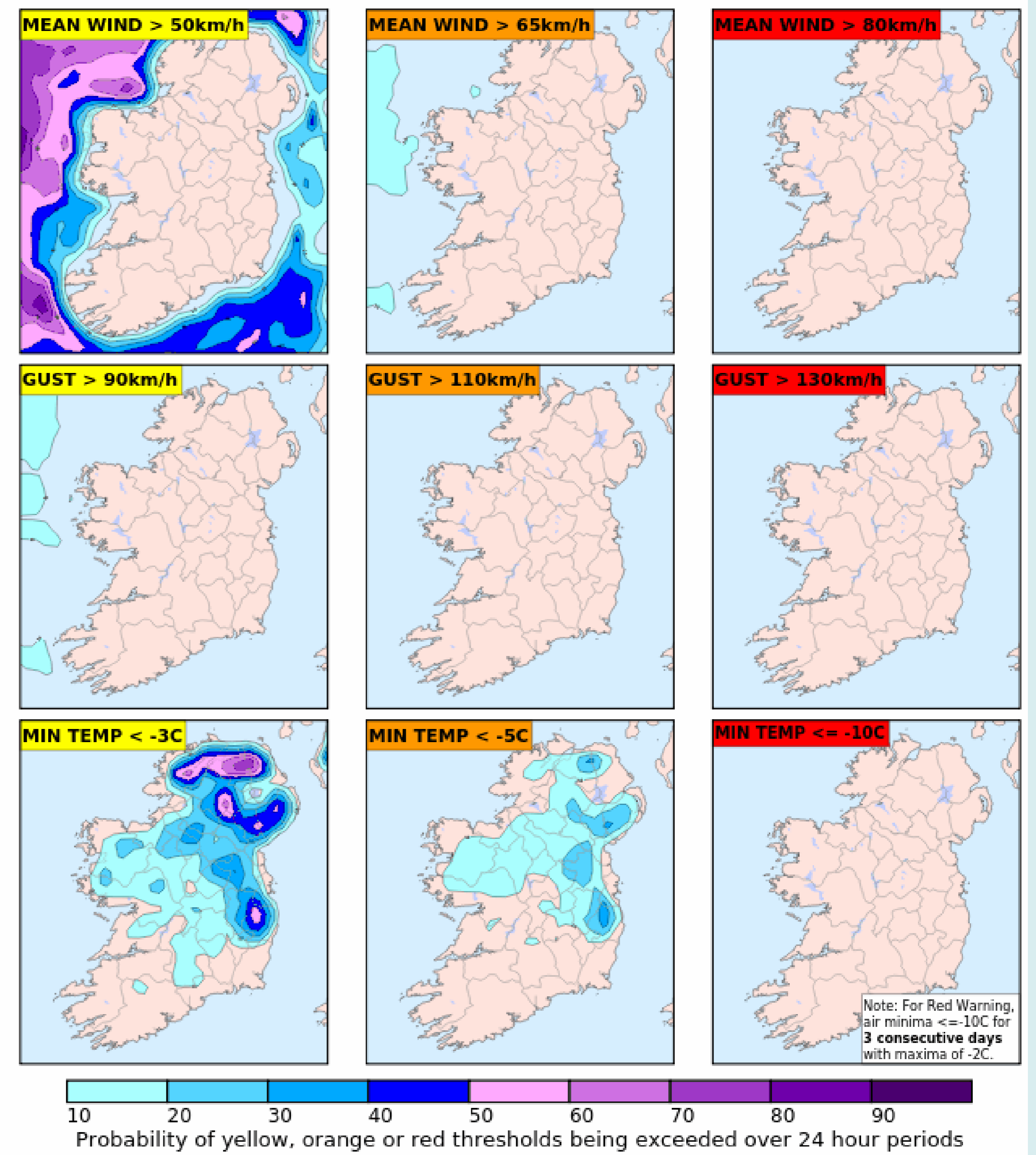
Verification scorecard for the month of March 2023 demonstrating the performance of IREPS versus ECMWF EPS for a number of parameters. The blue (red) colour indicates improved performance of IREPS (ECMWF EPS).

ECMWF EPS: Weather Warning Probability

ECMWF EPS is used for generating probabilities based on yellow, orange and red warning thresholds, for a range of variables including precipitation, wind speed and gusts, and temperature (min in winter, max in summer).

24hr Warning Probability Charts for Run 08-Mar-2023 00Z

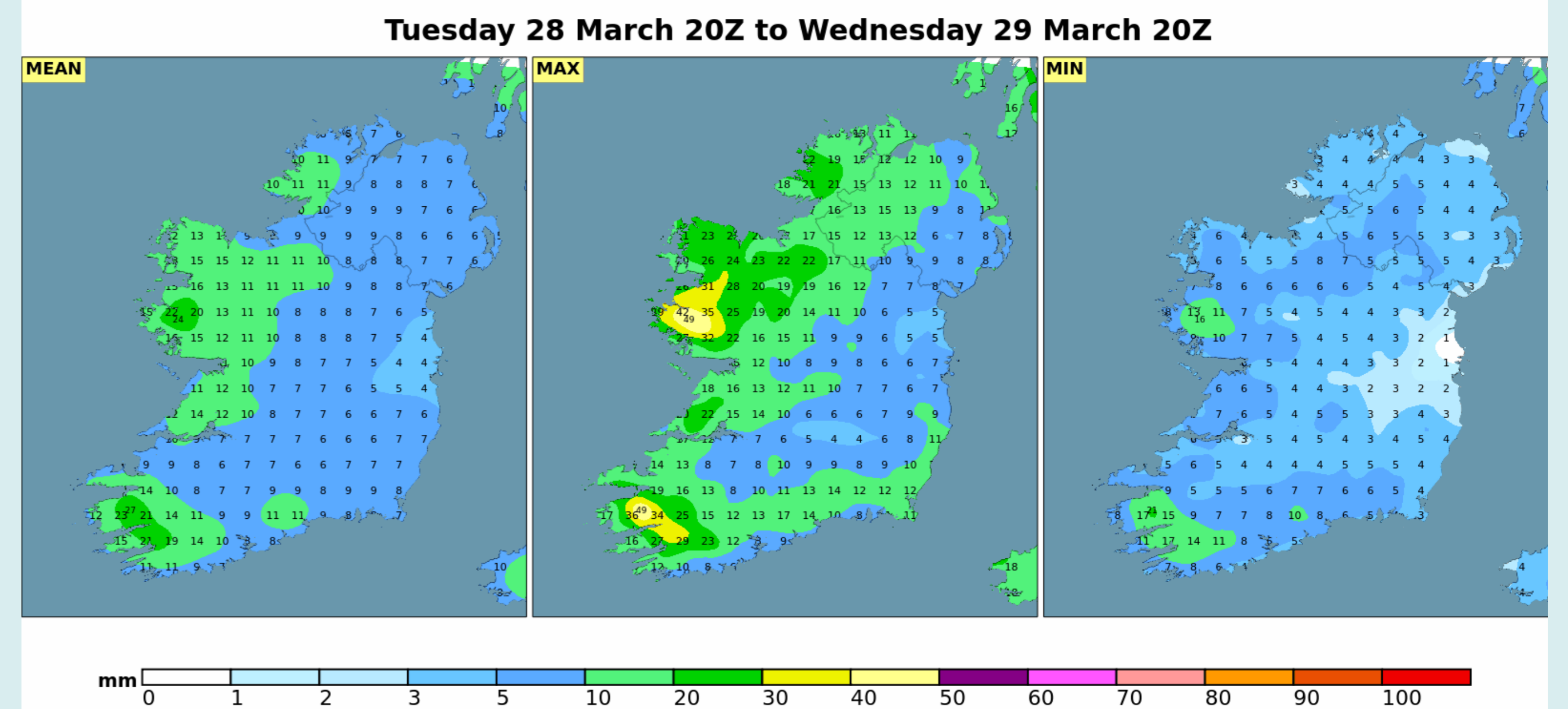
Saturday 11 March (0000Z to 2400Z)



ECMWF EPS: 24 Hour Precipitation

Forecasters utilise a full-suite of products from the ECMWF EPS, including the ensemble mean, maximum and minimum of precipitation over various time intervals. An example of this for a 24-hour period is shown below.

ECMWF ENS 24hr Precipitation (mm). Run: 27/03/2023 00Z.



ECMWF EPS: Forecast Rainfall

Combining cumulative station-based rainfall observations from the past 3 weeks, with a 10-day forecast of ECMWF EPS, gives forecasters a better indication of things like flood-risk, soil moisture, potential and weather warnings. The long-term average is indicated by the straight line and puts the rainfall into context above and below what can be expected. This graph shows rainfall at Sherkin Island off the south-west coast of Ireland.

