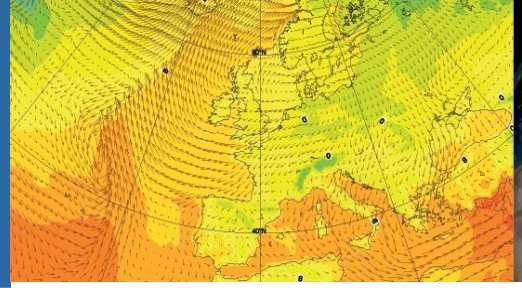




ECMWF product development

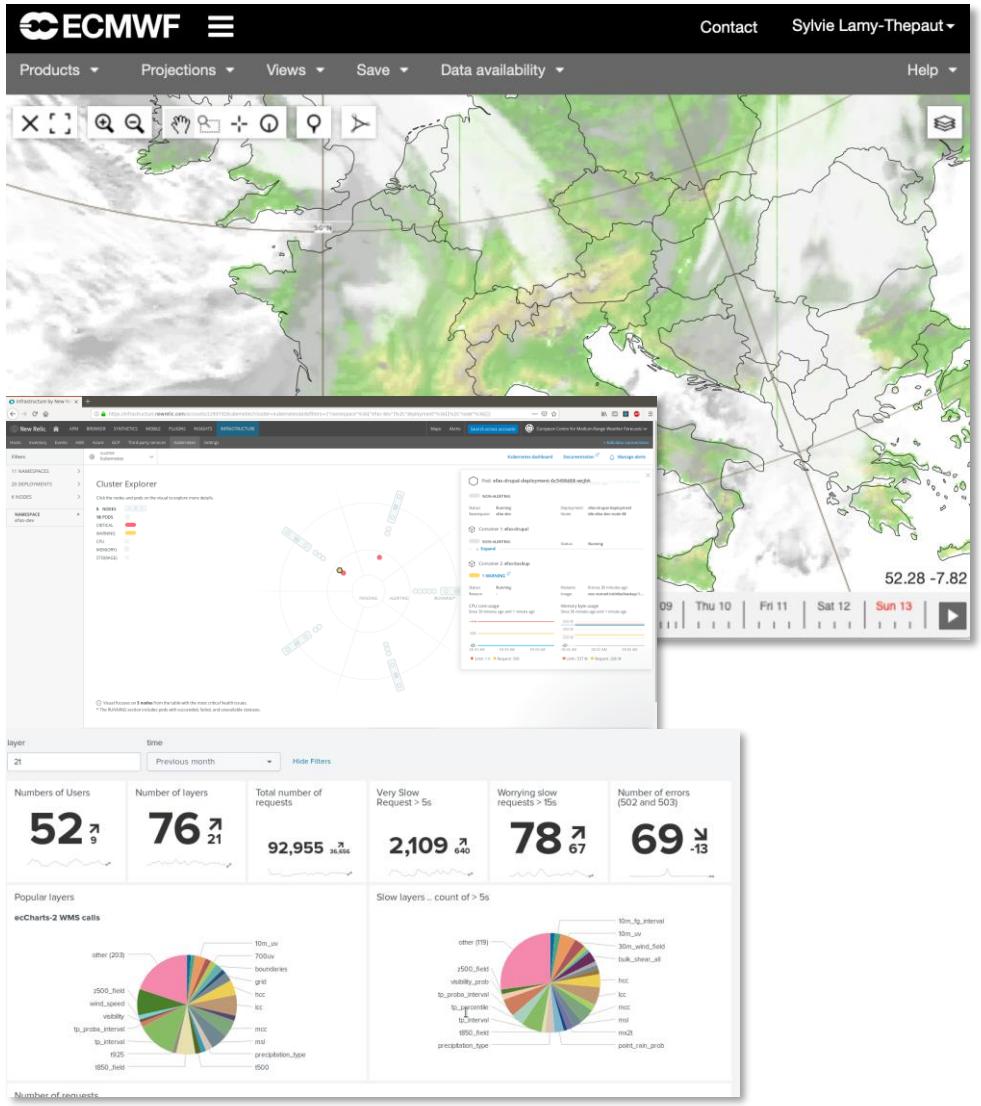
David Richardson
Head of Evaluation Section, Forecast Department, ECMWF

david.richardson@ecmwf.int

Input from many ECMWF colleagues

ECMWF

Services for users - visualisation



"Thank you for implementing a new version of the ecCharts service. It is way faster than the old one and now it can be used properly." DWD

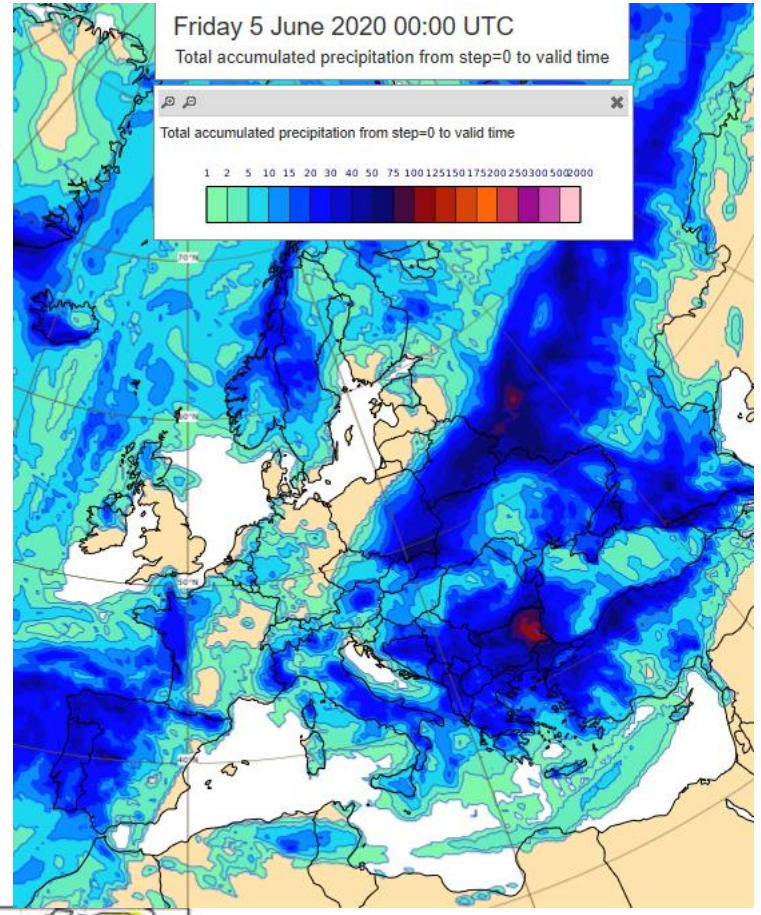
"The feeling among those of us who've used ecCharts-2 is that it is faster, an improvement we welcome." MetOffice

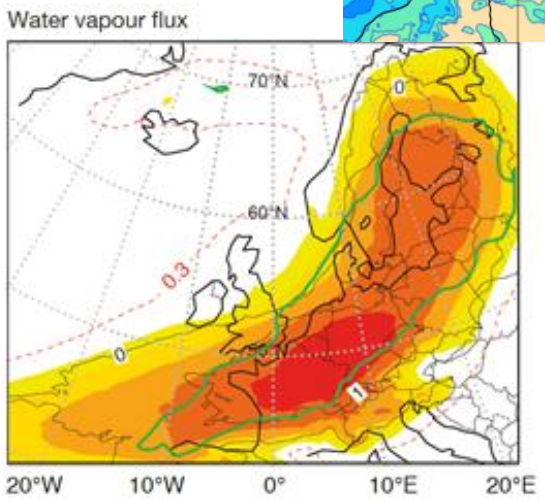
- ecCharts2
  - available as beta version since May,
  - Replaced ecCharts in November
  - Performance greatly improved
  - Improved Dashboard and Charts Browser to come
  - Improved extended range products in preparation
- Migration to Kubernetes
  - Scalable
  - Tailorable
  - Web Services will be BOND ready
- **Mars access for Members States and commercial customers through a dedicated service**

New ecCharts products

- Main changes Nov 2019
  - High resolution forecast
    - 1000 hPa wind vectors, 1000 hPa wind speed
    - Total accumulated precipitation (From step=0 to the selected valid time)
  - Ensemble forecast
    - EFI for Water vapour flux
    - 2m min/max percentiles
  - Extended range forecast
    - EFI for 2 m temperature
    - EFI for total precipitation
    - 2m temperature shift of tails (SOT) at quantile 10, 90
    - Total precipitation shift of tails (SOT)

Forecast from Friday 29 May 00 UTC

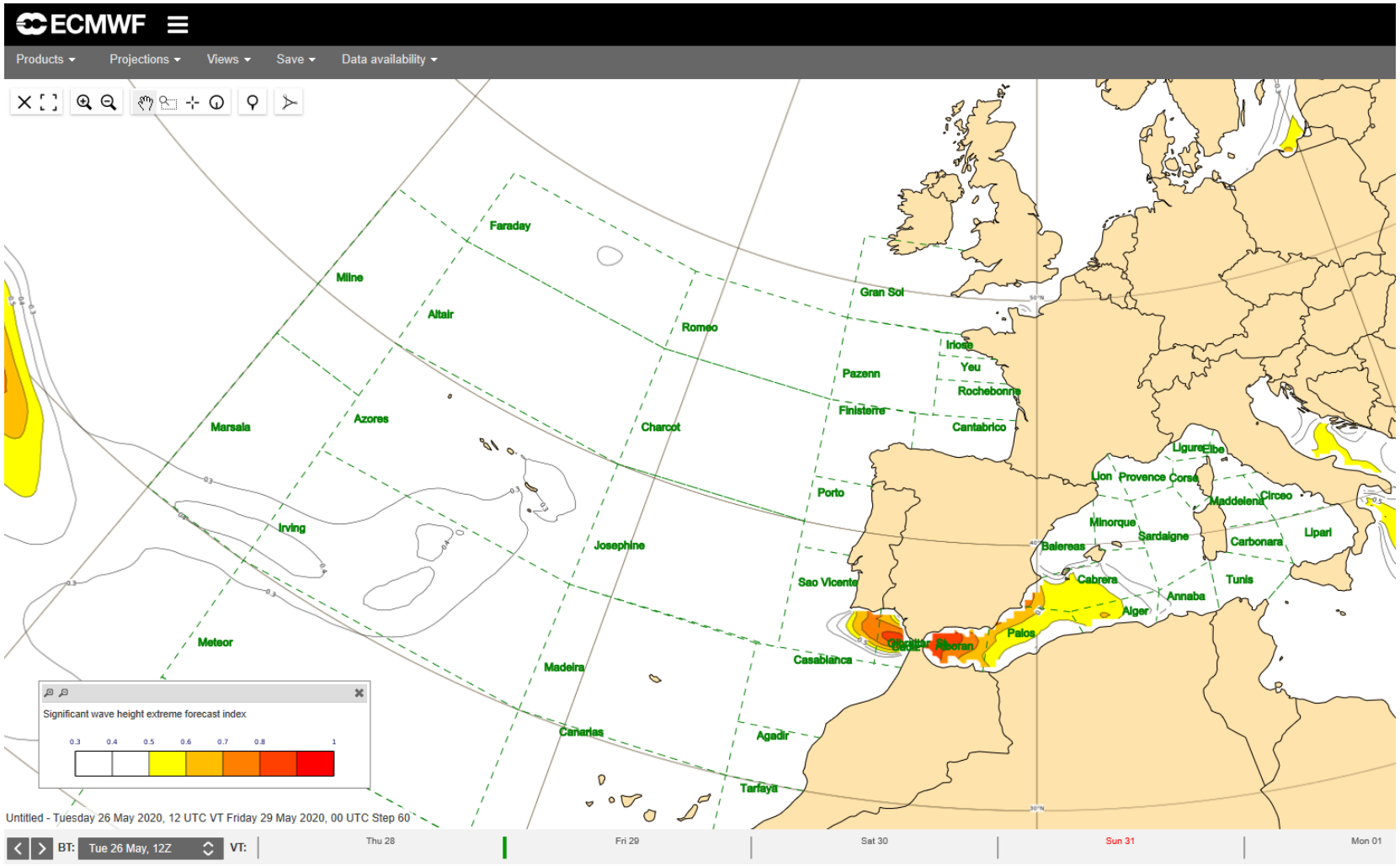




New ecCharts products

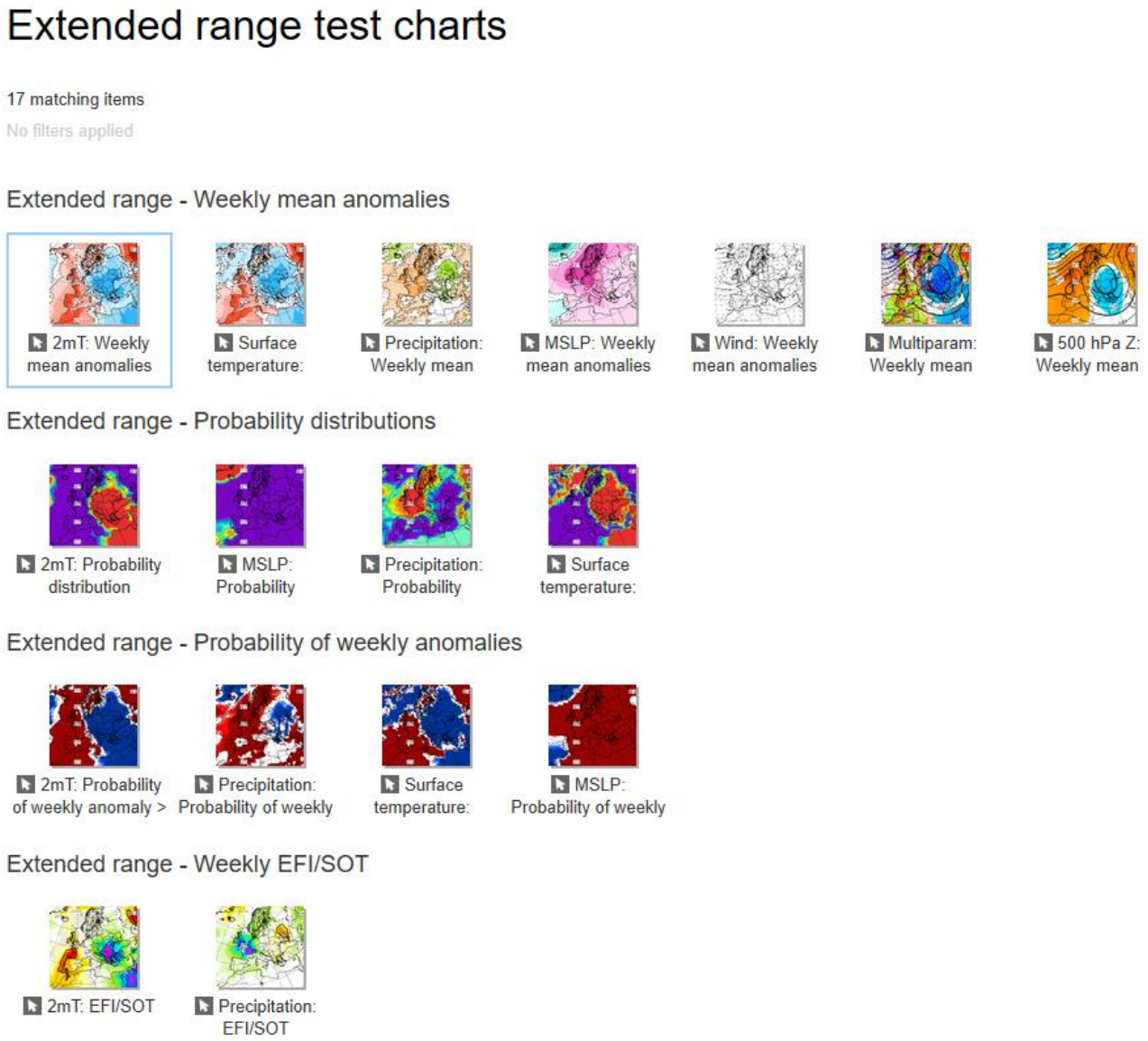
Tuesday 13:50-15:00 UTC. User Voice corner

- A new layer in progress (marine areas over oceans)



Revision of extended-range web charts

- New extended range www charts on the way
  - many more areas
  - More steps (to 6 weeks)
  - new plot styles
  - new products: event probability for deciles and quintiles, the EFI/SOT and CDFs
  - clickable features
- planned for June/July



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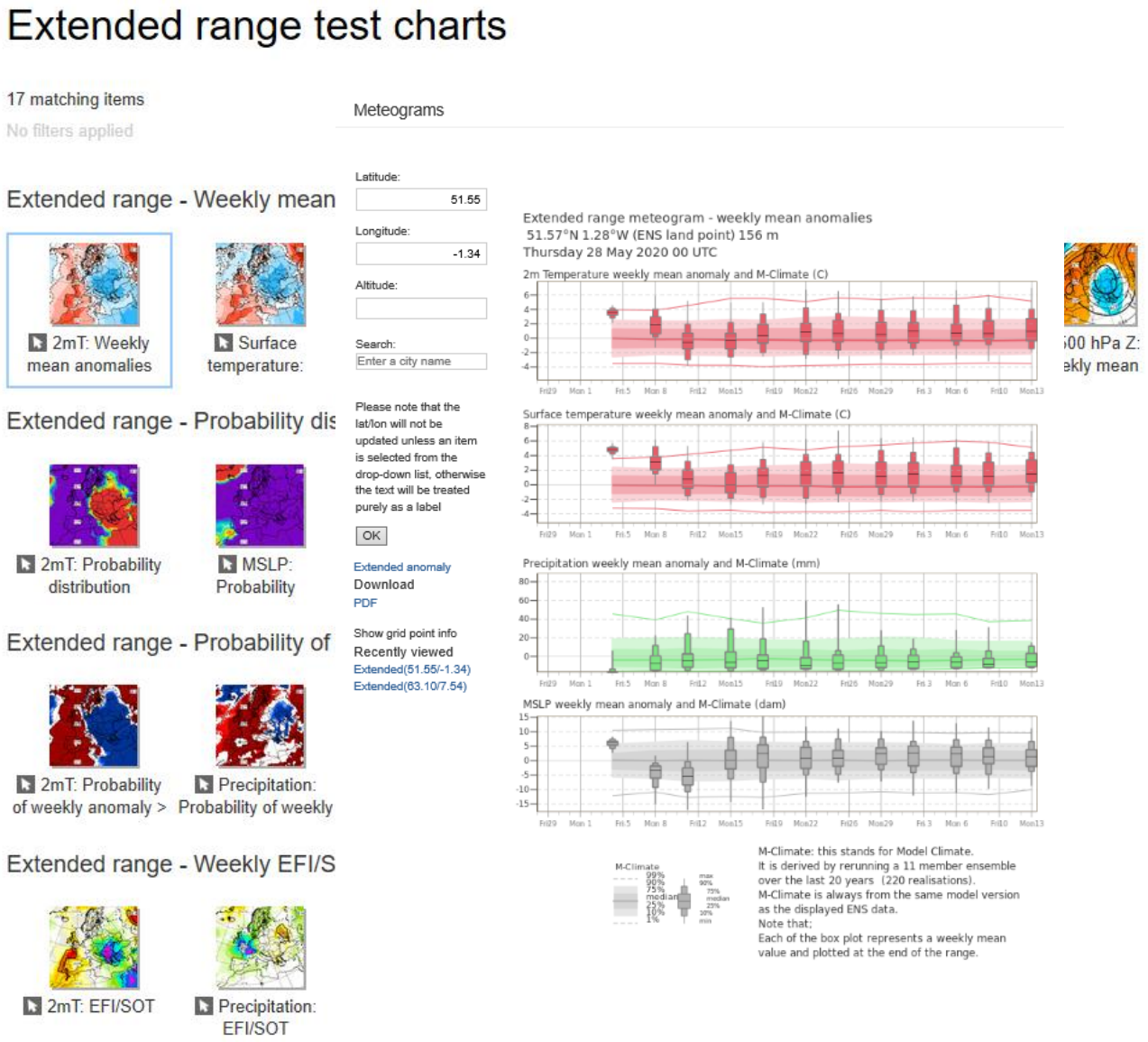
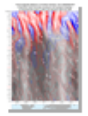


Tuesday 13:50-15:00 UTC. User Voice corner

Extended-range web charts

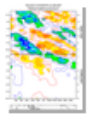
Time-longitudes diagram of ensemble mean



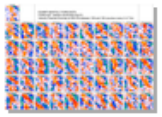
Time-longitudes diagram - Extended

MJO

MJO index - Extended range

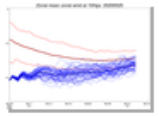


Time-longitudes sections - Extended



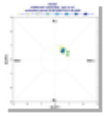
Time-longitudes sections of

Zonal mean zonal wind



Extended Zonal mean zonal wind at

Probability density function



Extended 2-dimensional PDF

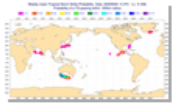
Extended range plumes

Monthly forecast plumes - Extended

Extended range stamp maps

Mean sea level pressure and z500

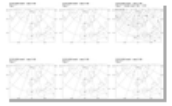
Extended range tropical storm activity



Tropical storm probabilities -

Tropical storm frequency -

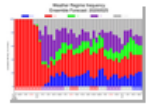
Extended range cluster



Weather regime clusters - Extended

Weather regime time series -

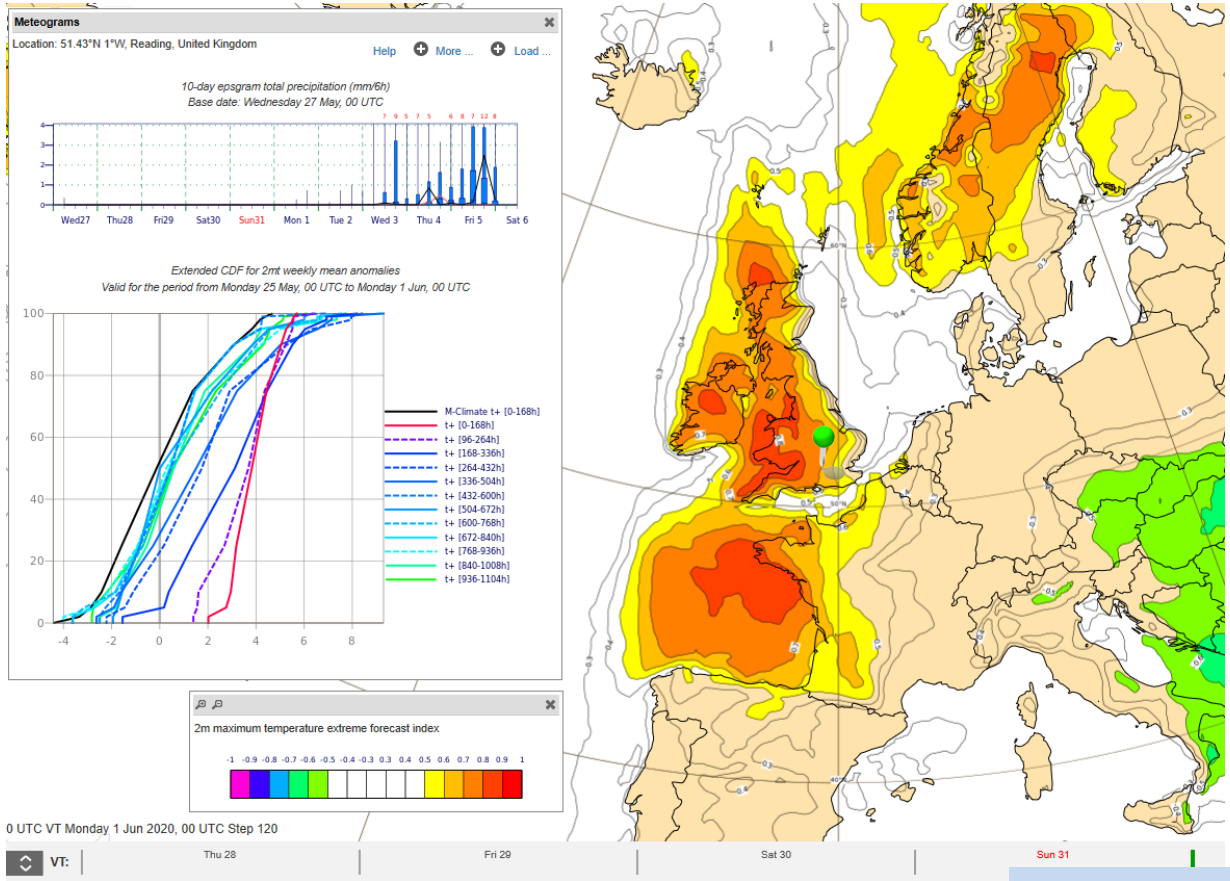
Weather regimes probabilities

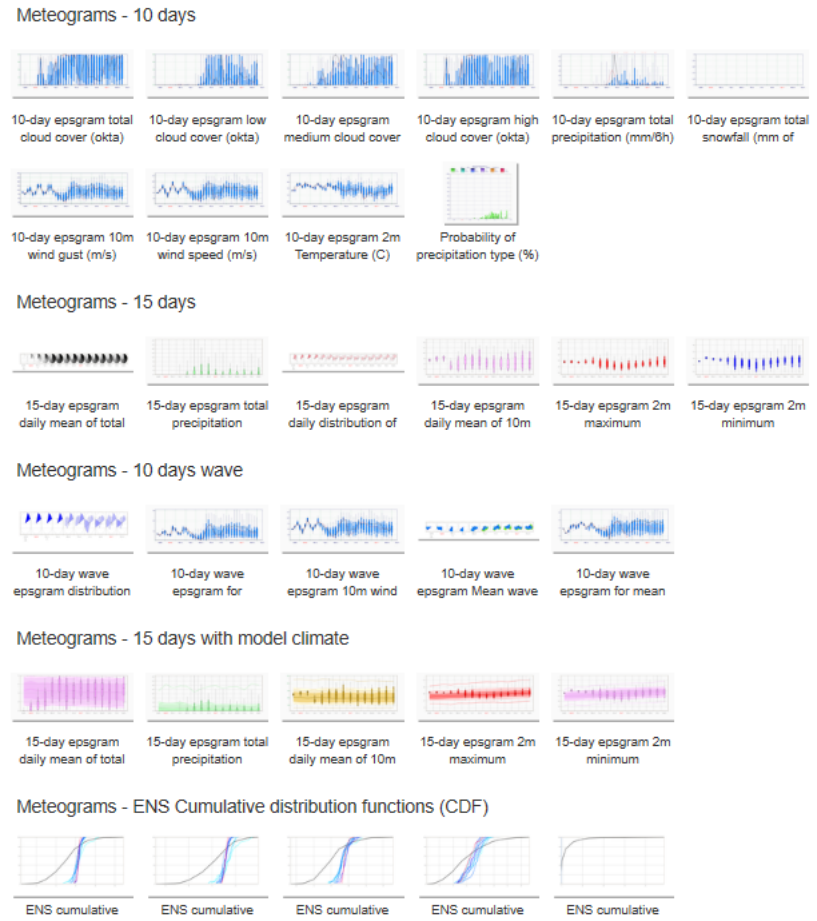


Weather Regimes probabilities

Review of point databases – meteogram products

- Improved access/parameters based on feedback we receive in UEF survey
- first priority is to improve speed on access to service
- planned for later this year





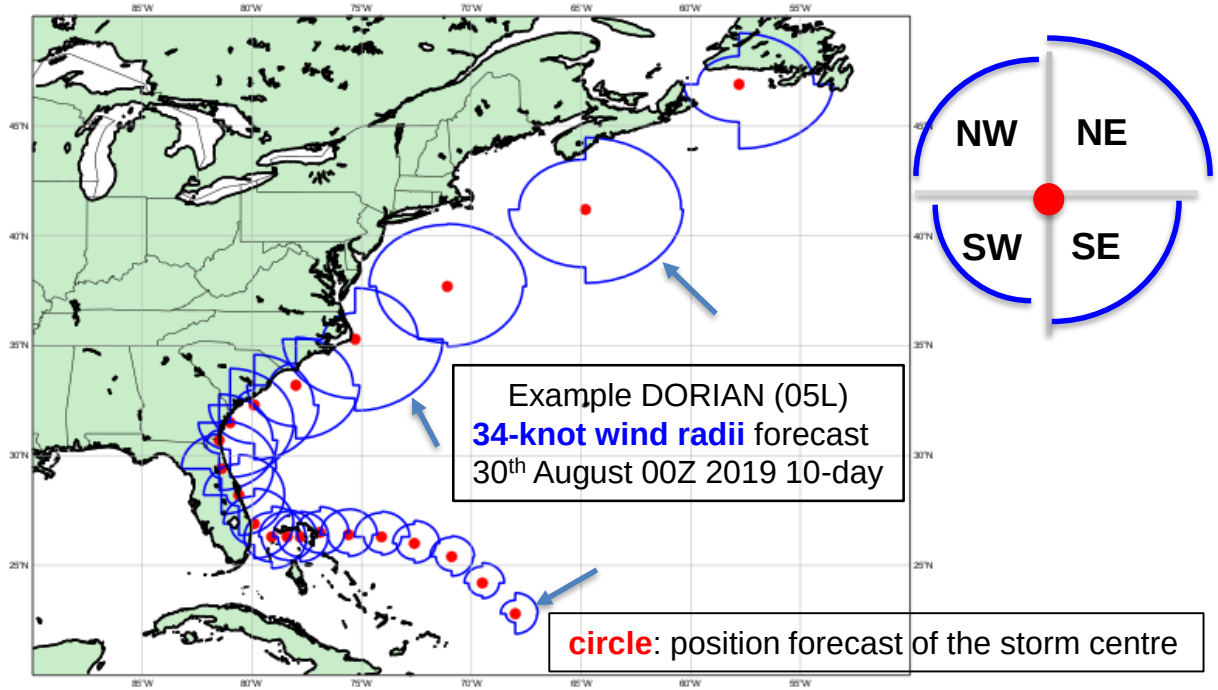
Wednesday 12:40-13:45 UTC. Speakers corner (Cihan)
Tuesday 13:50-15:00 UTC. User Voice corner

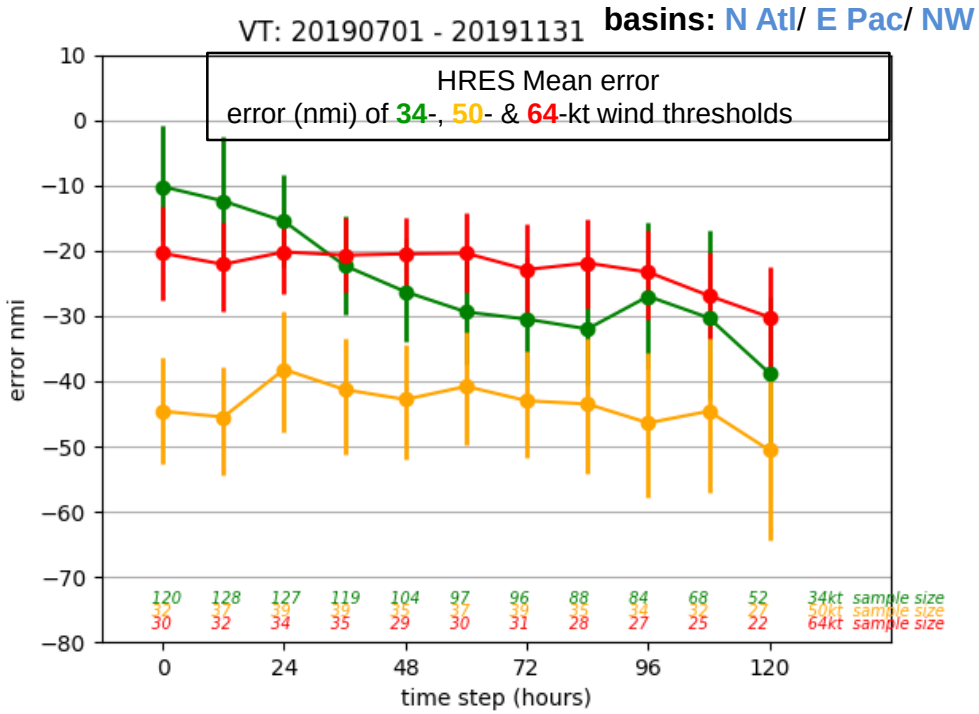
New model version 47r1 (30 June)

https://confluence.ecmwf.int/display/FCST/Implementation+of+IFS+Cycle+47r1

Tropical Cyclone Size: Wind Radii (34-, 50- & 64-kts)

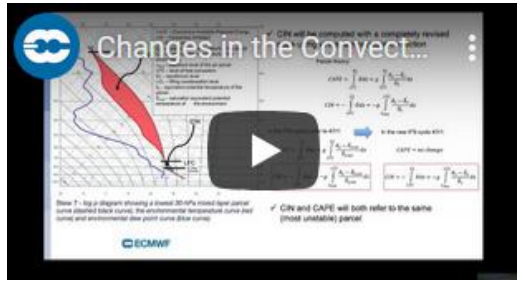
Radii: maximum extent of 10-m wind thresholds (34-, 50 & 64-kt) in each quadrant (NE, SE,SW & NW) from the TC centre (products are freely available)



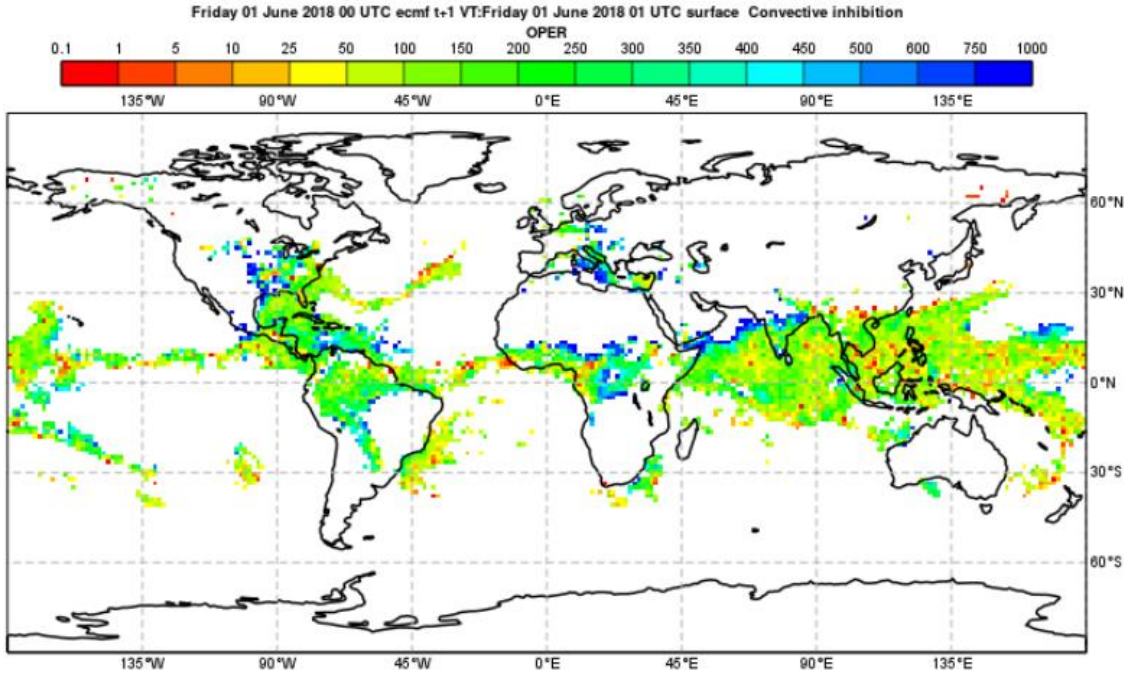


- Product available for the HRES and ENS (all TCs in analysis and those that develop during the forecast –'genesis')
- Can be helpful to 1) identifying coastal areas potentially affected by winds of TS strength or higher; 2) ship routing forecast
- More information in https://confluence.ecmwf.int/display/FCST/New+Tropical+Cyclone+Wind+Radii+product

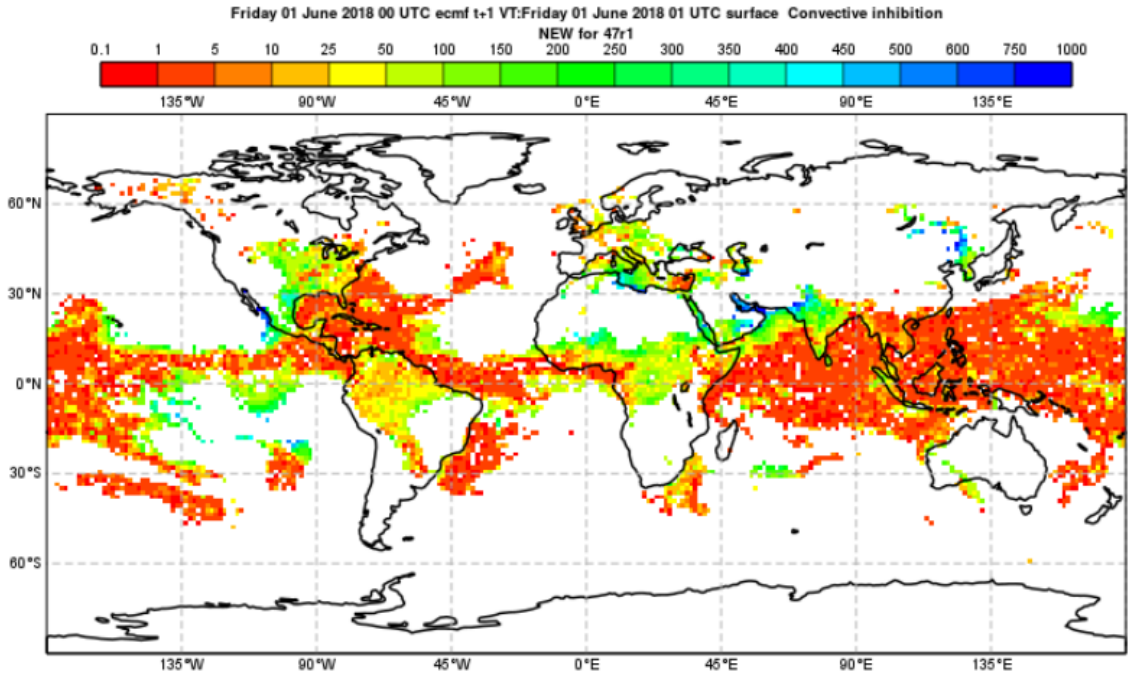
Convective inhibition diagnostic (CIN)



46r1



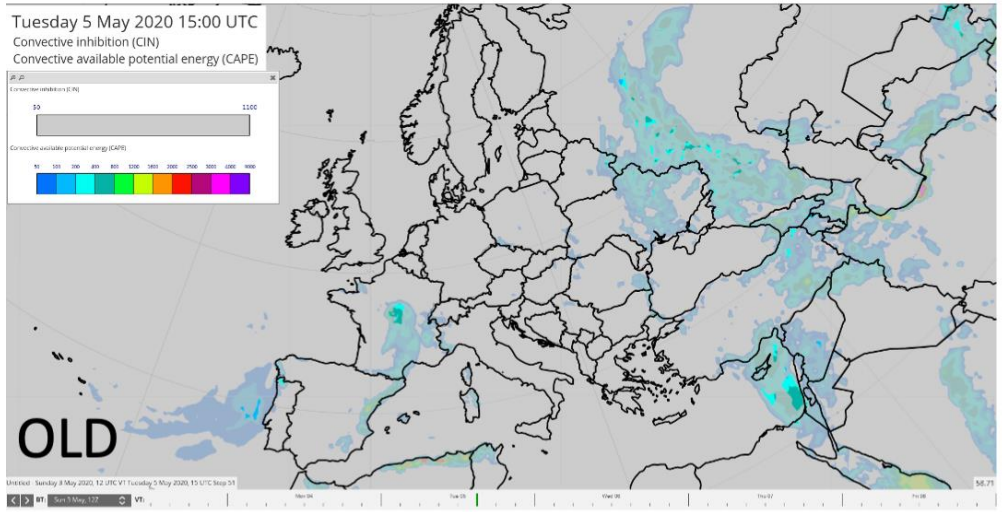
47r1

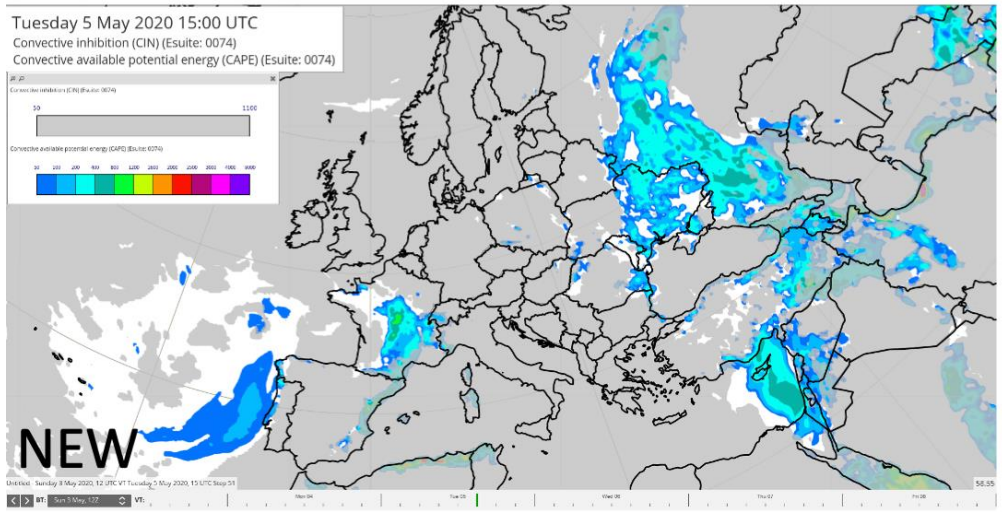


- CIN has been revised to use virtual potential temperature instead of equivalent potential temperature
- Considerable reduction in average CIN values

Convective inhibition diagnostic (CIN)

Wednesday 12:40-13:45 UTC. Speakers corner (Ivan)





Technical Memo

ECMWF
European Centre for Medium-Range Weather Forecasts

852

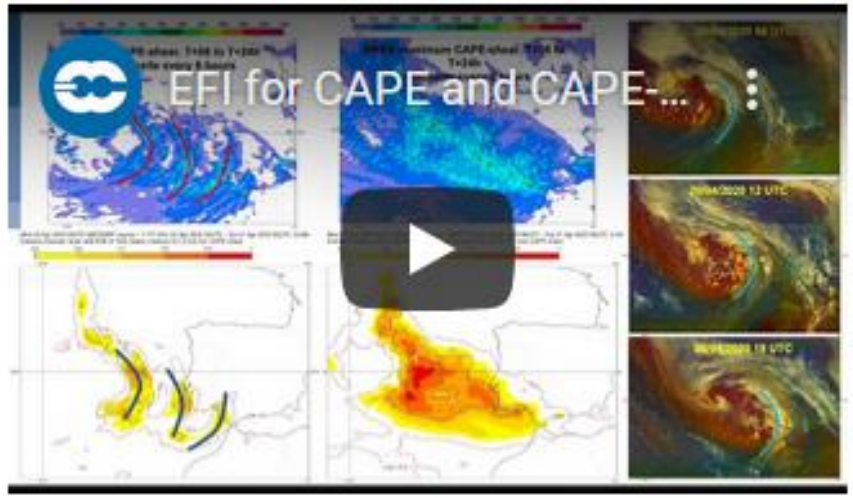
An overview of Convective Available Potential Energy and Convective Inhibition provided by NWP models for operational forecasting

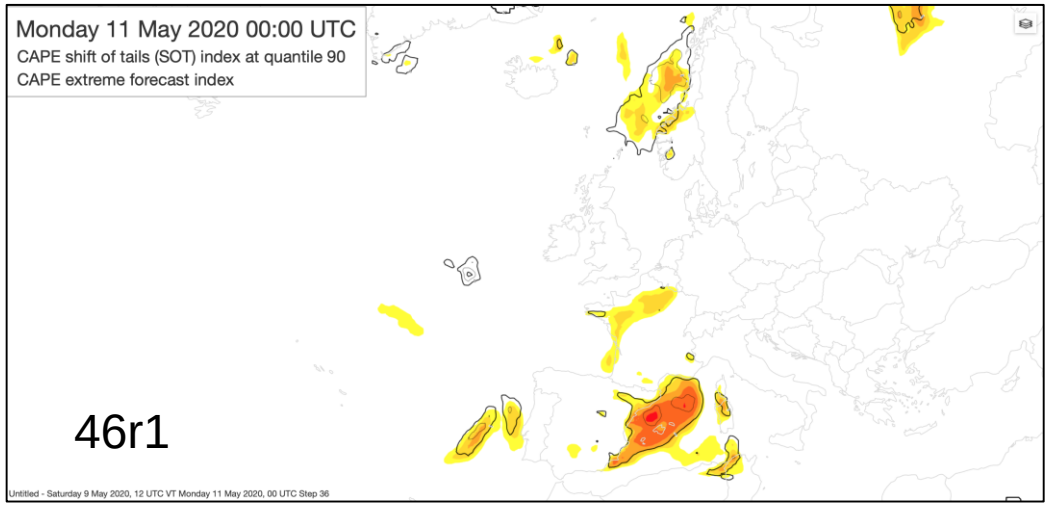
Pieter Groenemeijer[1], Tomáš Púčik[1], Ivan Tsonevsky[2], Peter Bechtold[3]
[1] European Severe Storms Laboratory (ESSL)
[2] ECMWF Forecast Department
[3] ECMWF Research Department

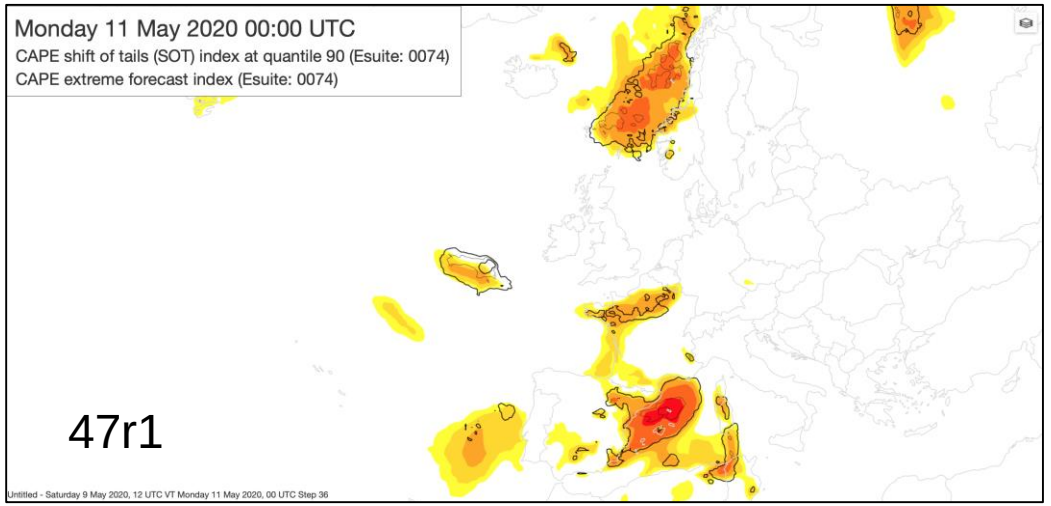
November 2019

Changes in EFI for CAPE and CAPE-shear

Improve the representation of 24-hour maxima by better sampling (maximum of hourly over previous 6 hrs)







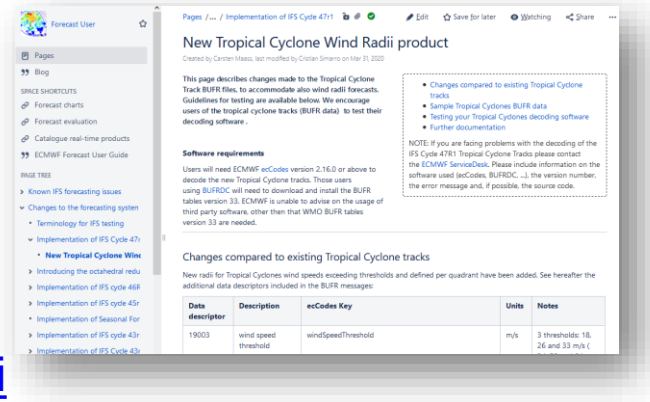
Changes in parameters formats

Technical change to GRIB headers of Event Probabilities (type EP) for tropical storms

Param ID	Short name	Name	Units
131089	pts	Probability of a tropical storm	%
131090	ph	Probability of a hurricane	%
131091	ptd	Probability of a tropical cyclone	%

Technical change to BUFR messages of Tropical Cyclone Tracks in HRES and ENS

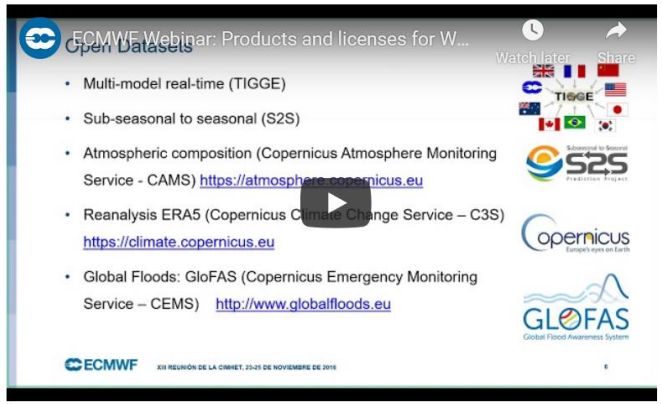
Obstype	Name	BUFR edition
32	Tropical Cyclone track	3/4

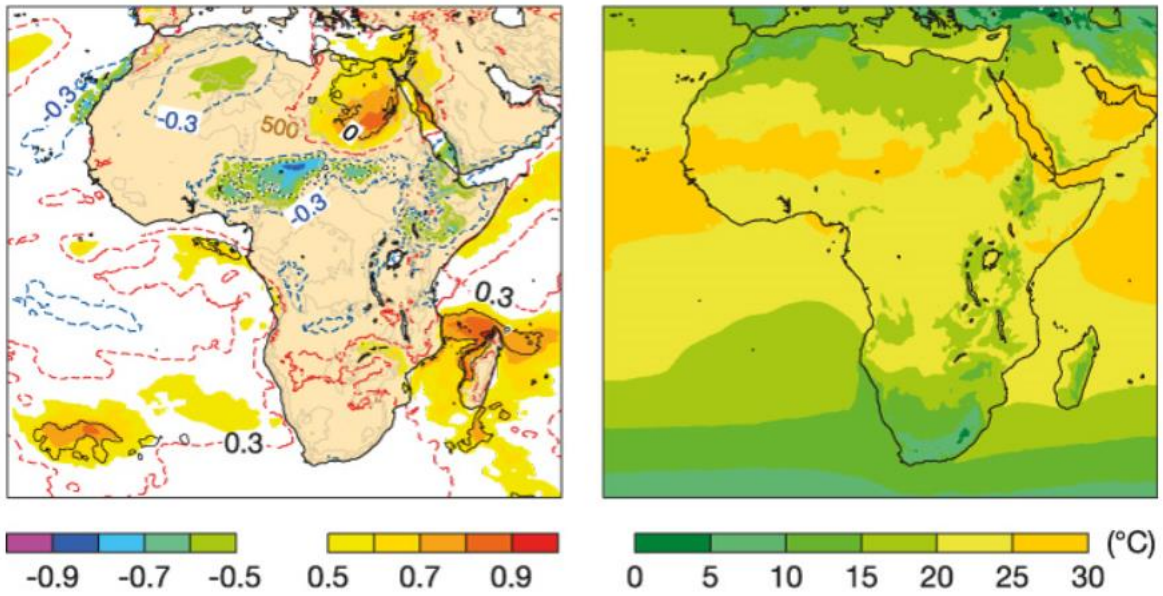


For details see https://confluence.ecmwf.int/display/FCST/New+Tropical+Cyclone+Wind+Radii+product

Products for WMO Members

- All the static web charts and the Ensemble Meteogram on the ECMWF website are now available free of charge to all WMO Members.
- Reduced licence fee for WMO Members to access web products for non-commercial use and introduced a cheaper alternative to the ‘full’ non-commercial licence
- https://www.ecmwf.int/en/about/media-centre/news/2019/more-ecmwf-products-made-freely-available-wmo-members



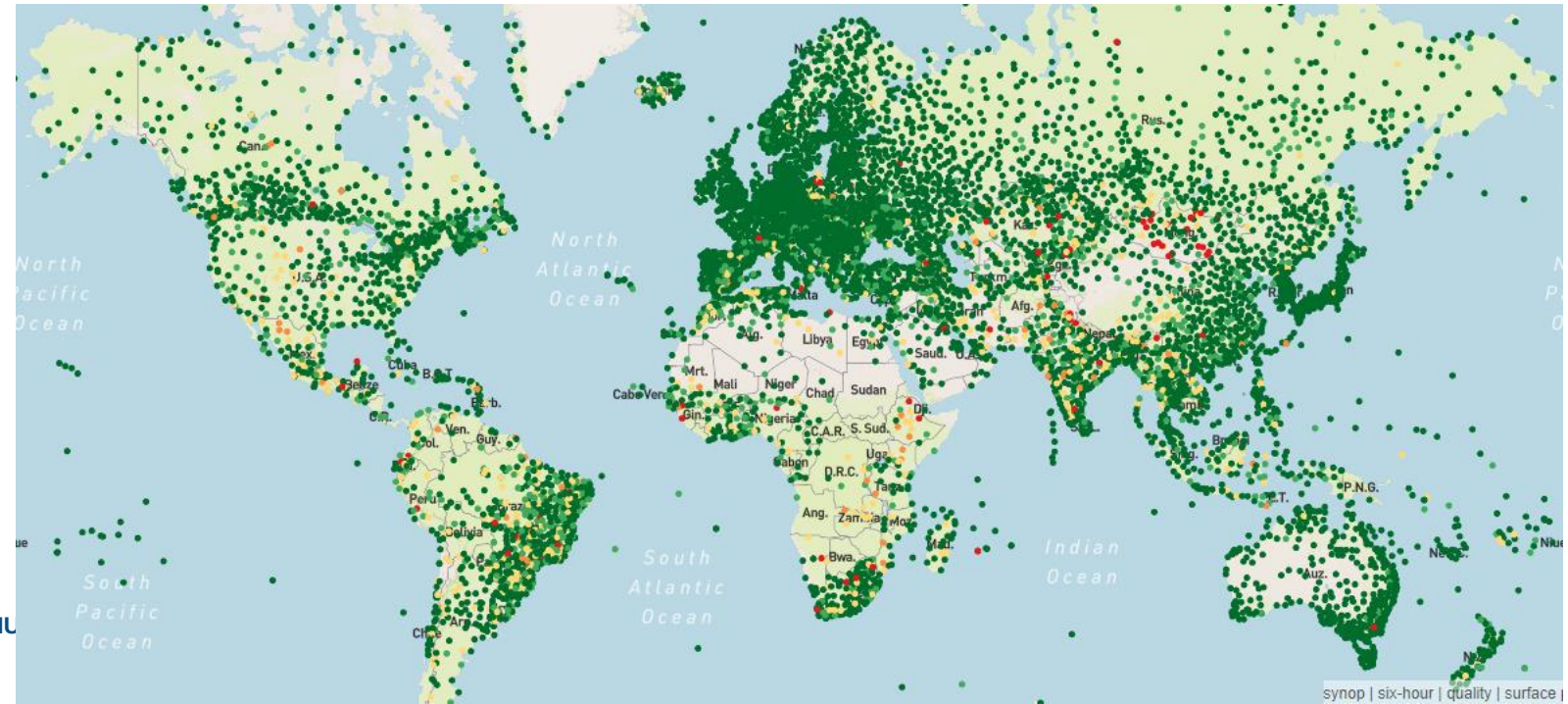


Extreme Forecast Index for temperature. The left-hand panel shows the EFI (shading and dashed contours) and the Shift of Tails (SOT) (solid contours) from 00 UTC on 2 October 2019 for 72-hour 2 m mean temperature valid from 8 to 11 October 2019. The right-hand panel shows the 99th percentile of the corresponding model climate for those days (i.e. on 1 in 100 occasions the 2 m mean temperature is less than the value shown).

WMO WIGOS Data Quality Monitoring System (WDQMS)

- WDQMS monitors the availability and quality of land-based surface and upper-air observations
- based on near-real-time monitoring information provided by four participating global numerical weather prediction (NWP) centres:
  - German national meteorological service (DWD)
  - ECMWF
  - Japan Meteorological Agency (JMA)
  - US National Centers for Environmental Prediction (NCEP)

wdqms.wmo.int



User guide to ECMWF forecast products

- https://software.ecmwf.int/wiki/display/FUG/Forecast+User+Guide

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SPACE SHORTCUTS

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Pages

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Forecast User Guide

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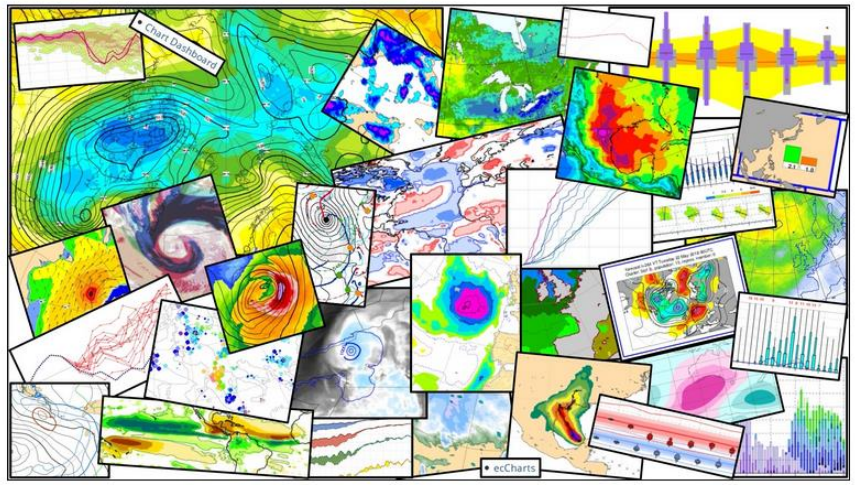
"Behind good forecast practices are often hidden good theories; equally, good theories should provide a basis for good forecast practices." Professor Tor Bergeron, personal communication, 1974



The aim of this User Guide is to help meteorologists make the best use of the forecast products from ECMWF - to increase understanding of the ensemble forecast process, to develop new products, to reach new sectors of society, to satisfy new demands. The User Guide presents the Integrated Forecasting System (IFS) and advises on how best to use the output, not least on how to build up trust in the forecast information. A good forecast that is not trusted is a worthless forecast. The emphasis is on the medium-range forecast products, as this is ECMWF's primary goal, and because medium-range NWP output generally differs significantly from dealing with short-range or seasonal NWP.

This guide is intended to give an outline of structure and use of the ECMWF IFS and how the high-resolution forecast (HRES), ensemble forecast (ENS), extended range forecast and seasonal forecast models inter-depend and interact. Links to more detailed descriptions of processes are given, mainly at the end of each section, whilst separate online ECMWF training resources are also available to explain aspects of the ECMWF IFS more visually. Education is a key component of the work at ECMWF and further educational material is available through the web site (e.g. Webinars (recordings), Slidecasts (slides and audio recordings), Tutorials, Training lectures (presentations in PDF))

Thanks for all your feedback!