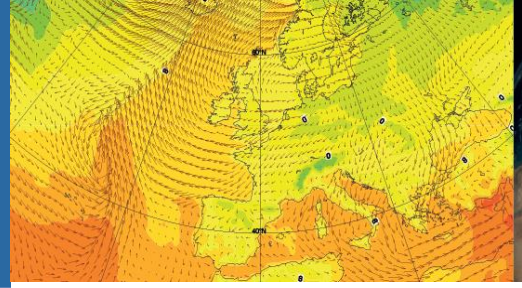



ECMWF product development

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ECMWF

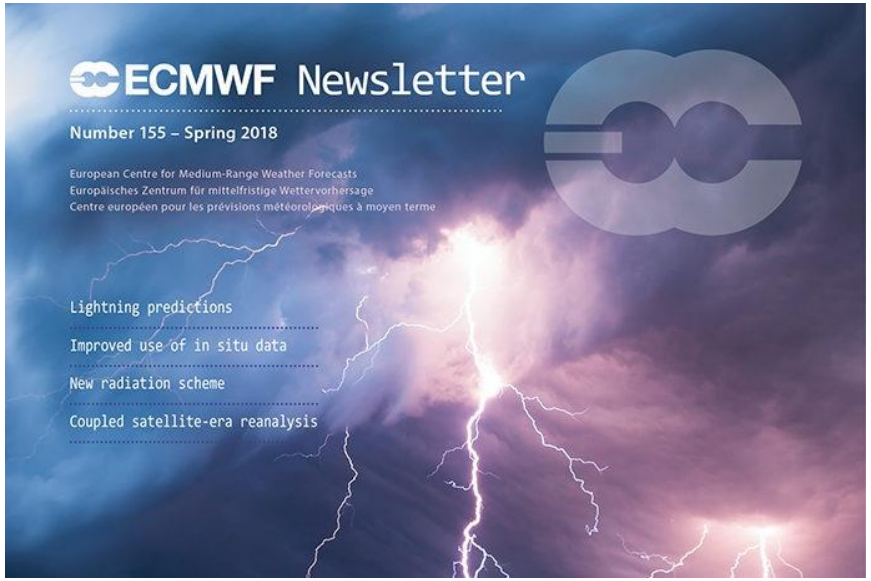
Outline

Review the efforts made by ECMWF to address feedback and requests from users of ECMWF forecasts

- New forecast output fields:
  - lightning
  - Integrated water vapour transport
  - Max CAPE/CAPES
- Additions to ecCharts – vertical profiles, extended-range forecasts
- Updated www
- New edition of User Guide to ECMWF Forecast Products

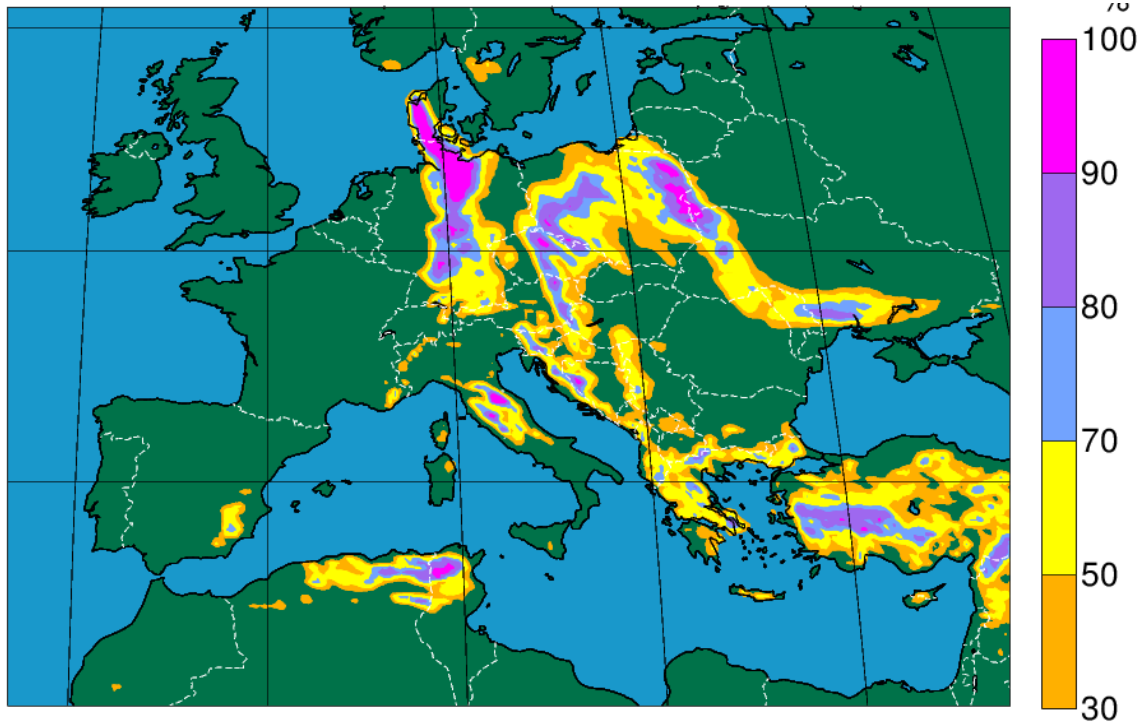
New lightning parameters (June 2018)

- Four lightning density parameters introduced with IFS cycle 45r1:
  - Instantaneous total lightning flash density (litoti)
  - Averaged total lightning flash density in the last hour (litota1)
  - Averaged total lightning flash density in the last 3 hours (litota3)
  - Averaged total lightning flash density in the last 6 hours (litota6)
- “Total” - cloud-to-ground and intra-cloud flashes
- Parametrization in IFS convective hydrometeor amounts, CAPE and convective cloud base height
- Instantaneous - flash density during one model time step of the model (so prone to larger errors)

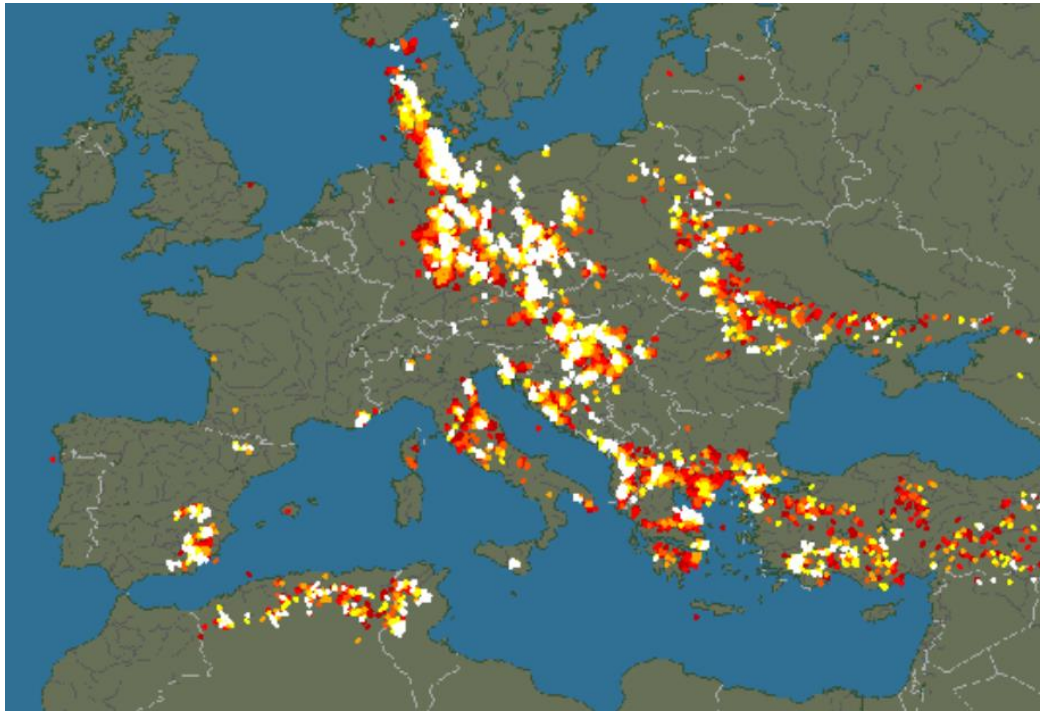


New lightning parameters (June 2018)

Ensemble forecast from 45r1 esuite
Prob(flash density) > 0.1 fl/100km2/h
10 May 2018 00 UTC, range: 12-15 hours



Observed lightning strikes (Blitzortung.org)
10 May 2018 12 to 15 UTC



New lightning parameters (June 2018)

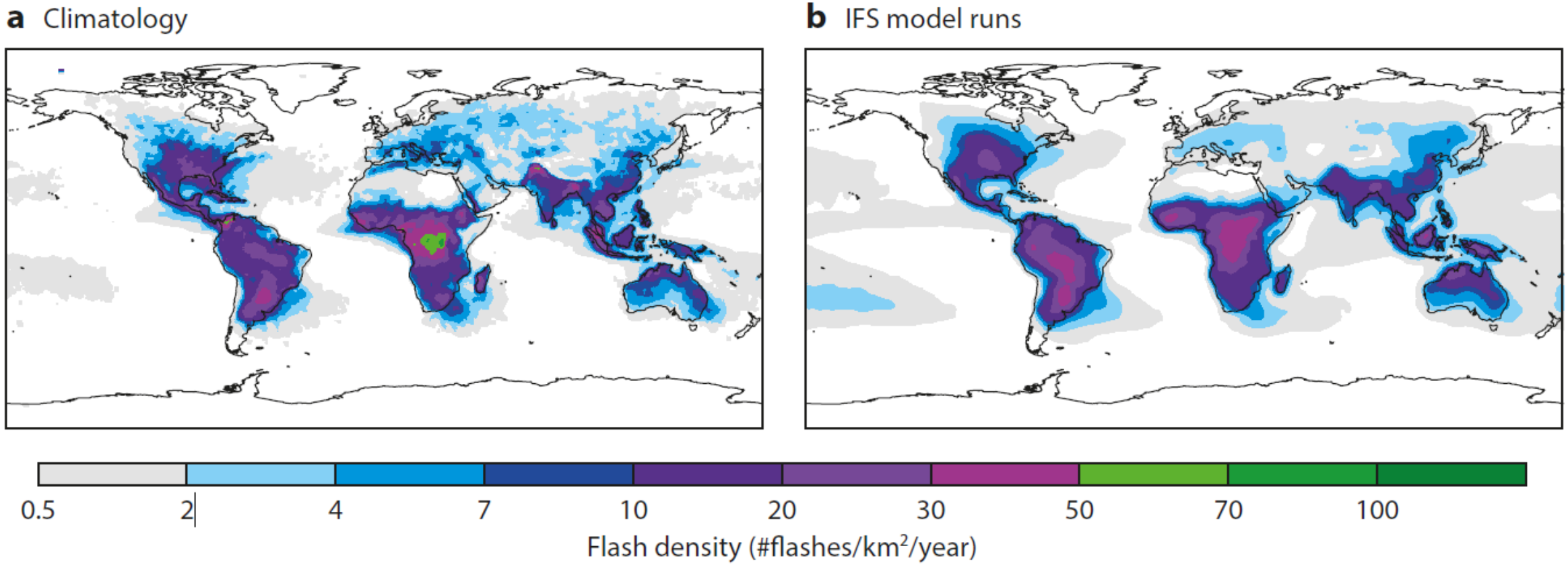
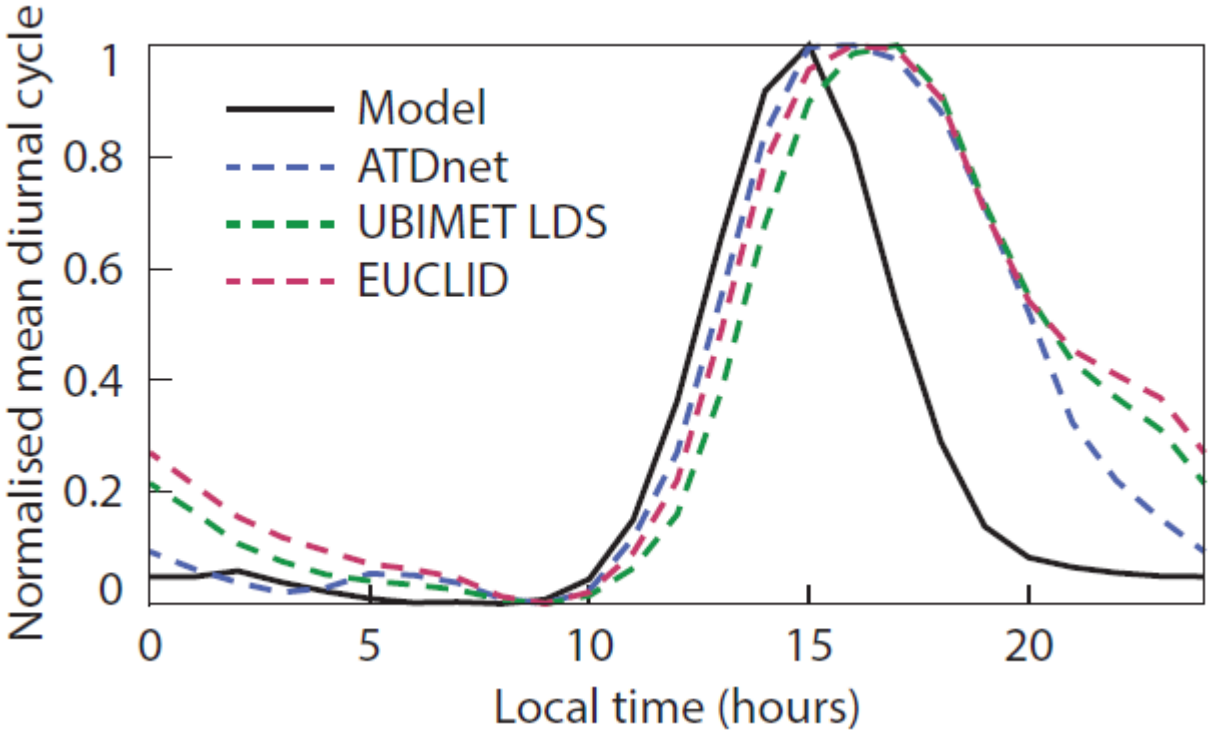


Figure 3 Annual mean lightning flash densities from (a) the LIS/OTD satellite climatology and (b) ten one-year-long IFS model runs, both at 80 km resolution. Note that panel (a) shows the same field as Figure 2, but at a coarser resolution.

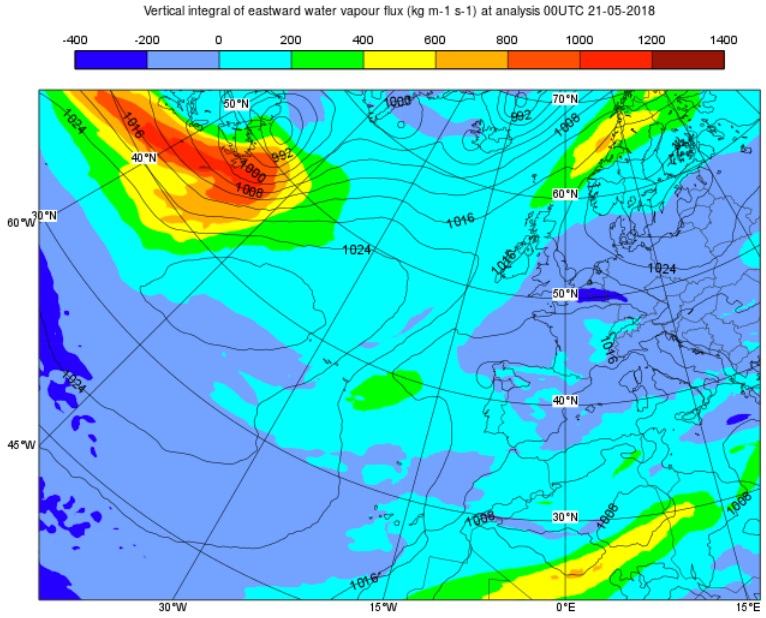
New lightning parameters (June 2018)

Mean diurnal cycle of lightning activity (normalised between 0 and 1) from IFS short-range forecasts at 18 km resolution and from three European ground-based networks of lightning sensors (ATDnet, EUCLID and UBIMET LDS) over the summer of 2015.

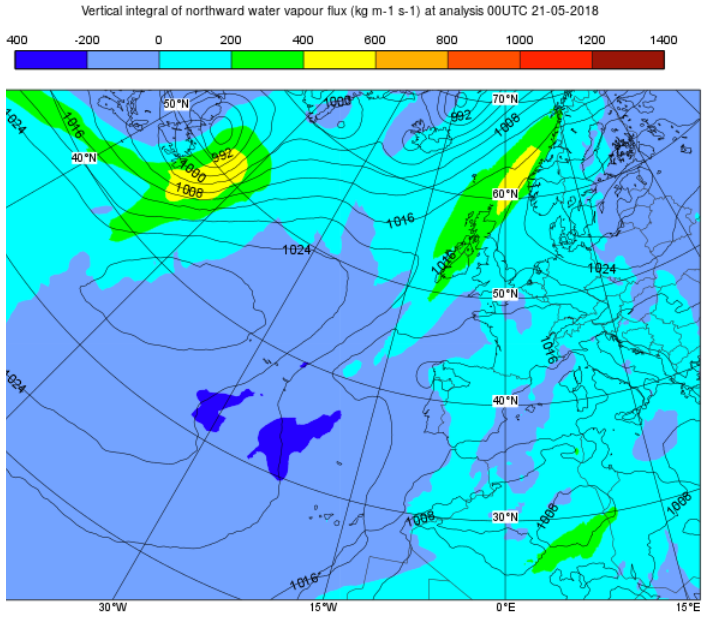


Vertical integral of eastward and northward water vapour flux (June 2018)

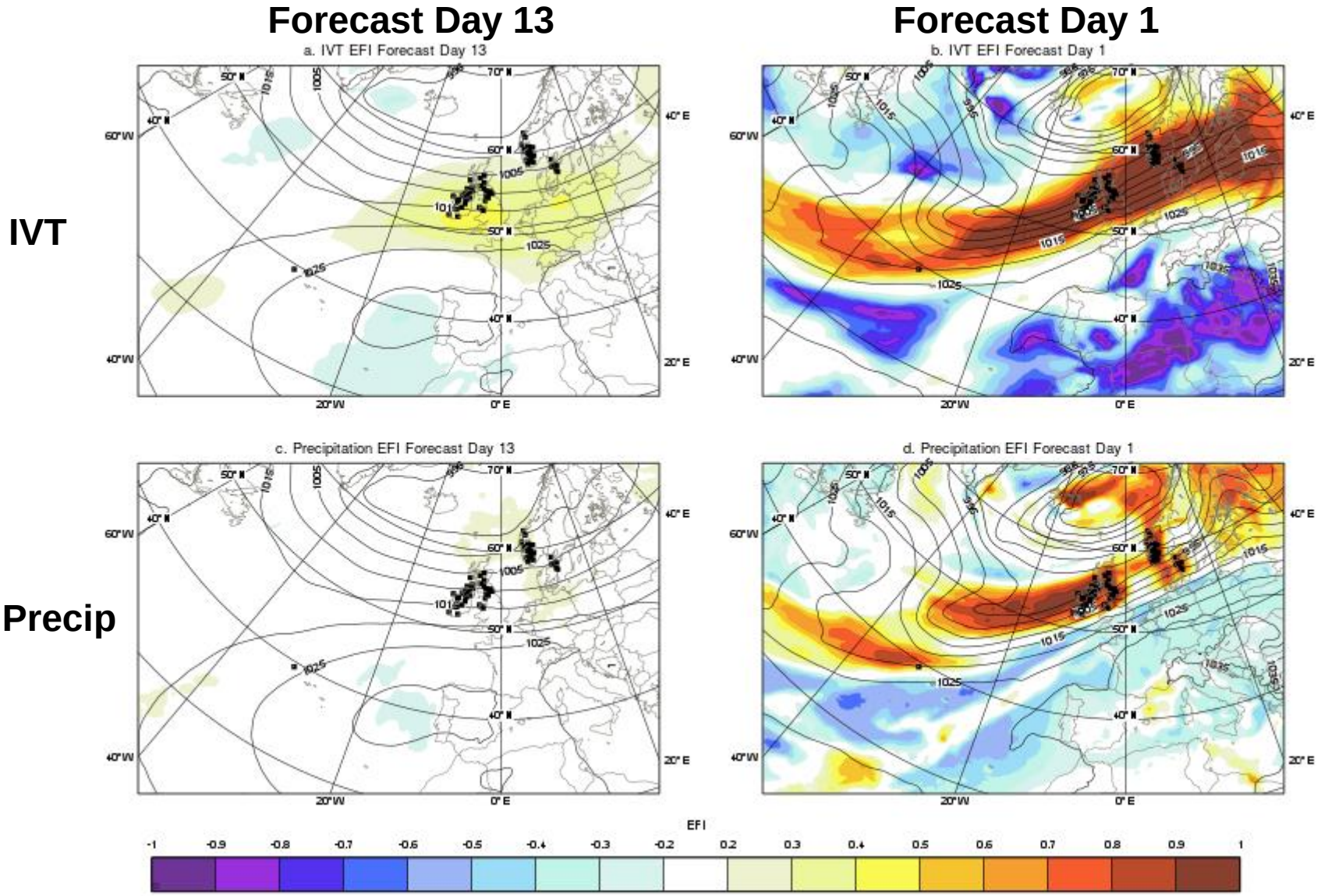
Eastward Flux



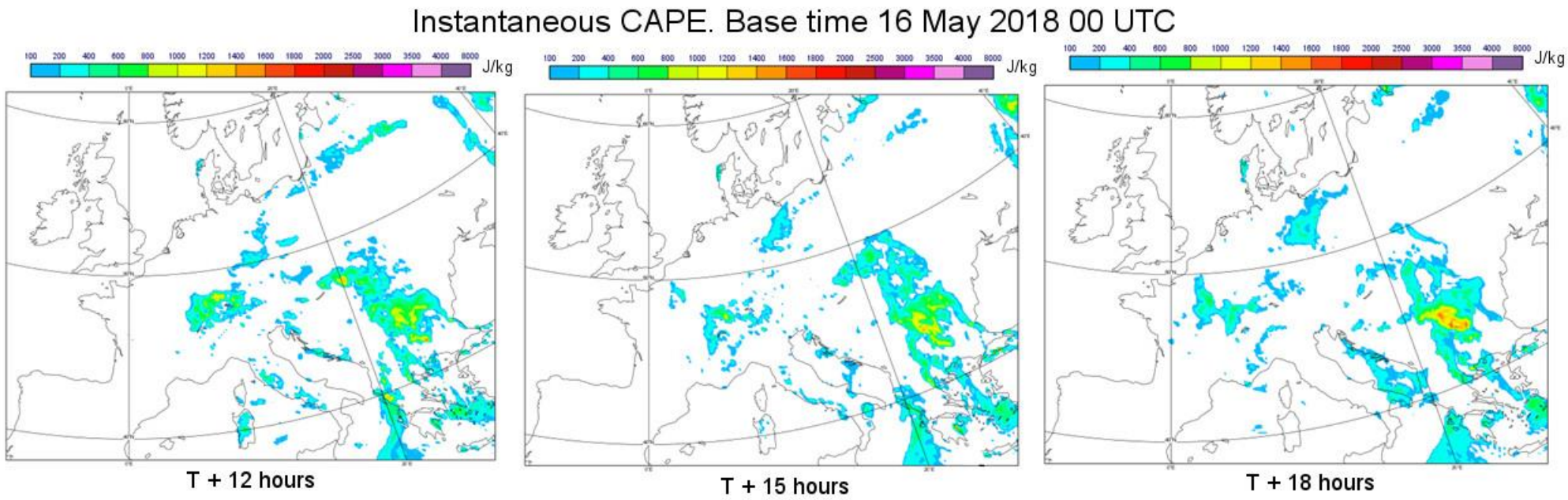
Northward Flux

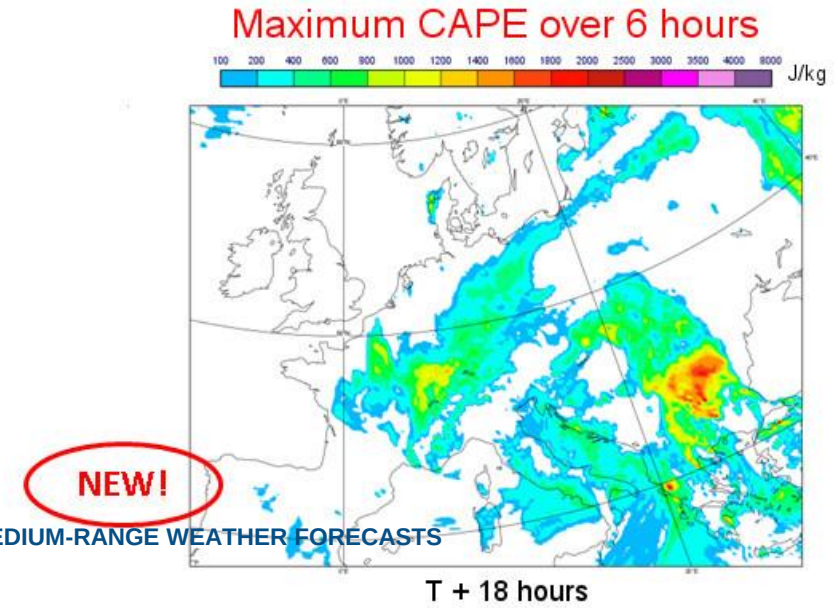


Vertical integral of eastward and northward water vapour flux

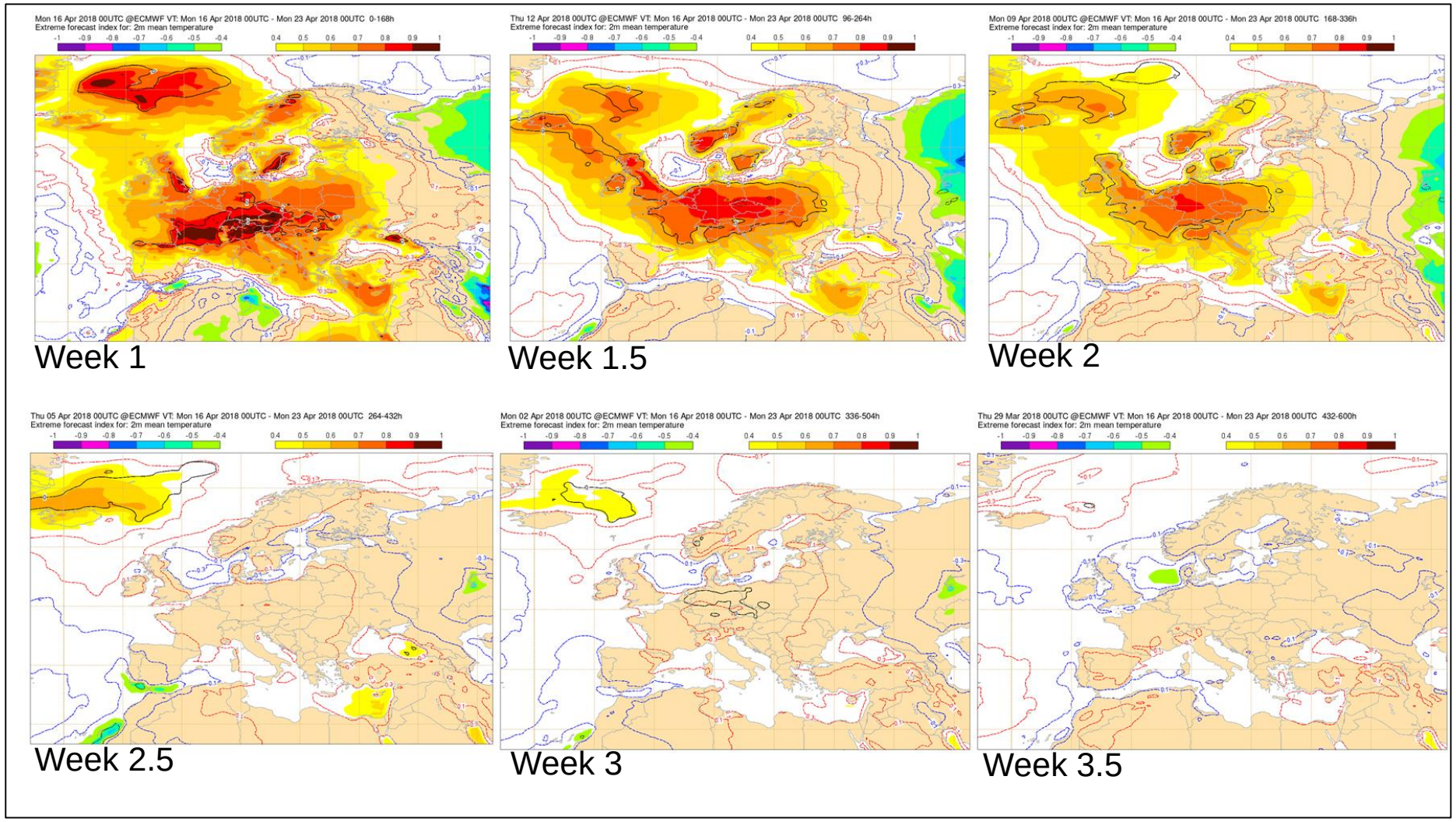


Max CAPE,CAPES in last 6 hours (June 2018)



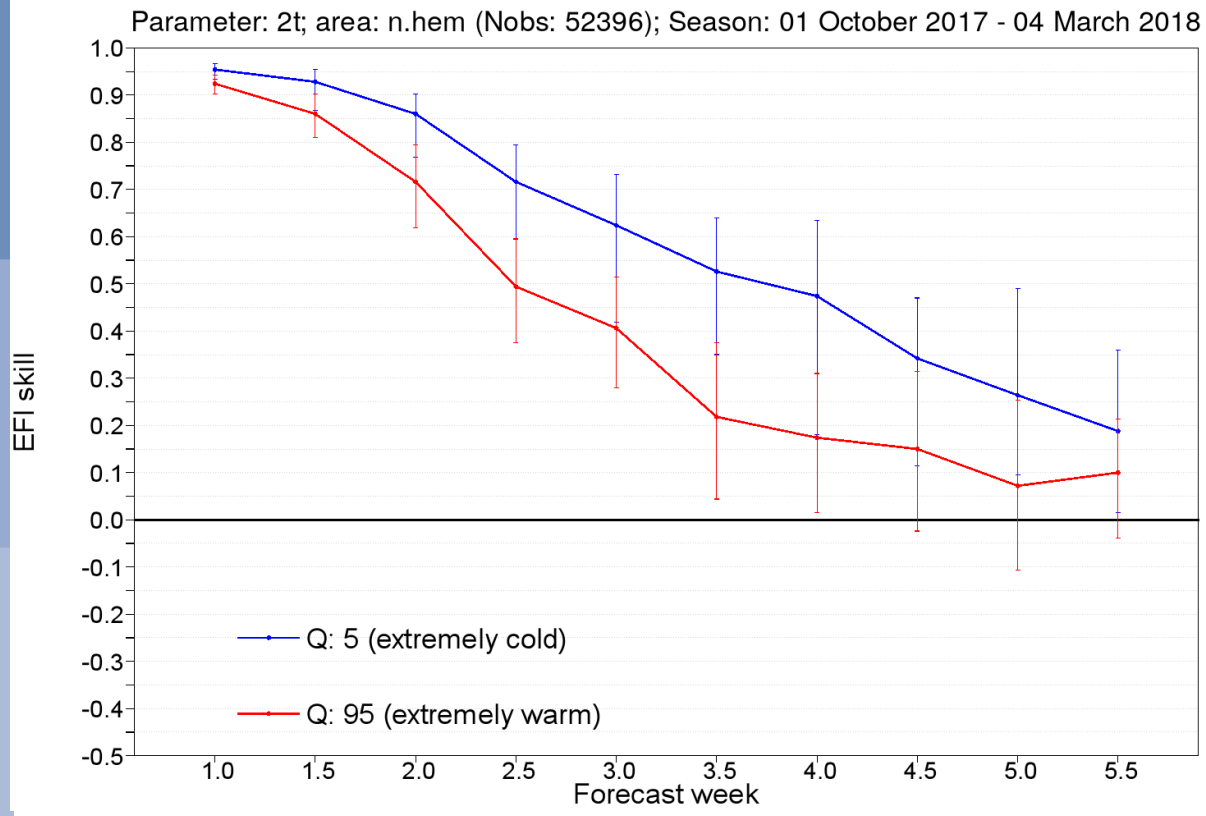


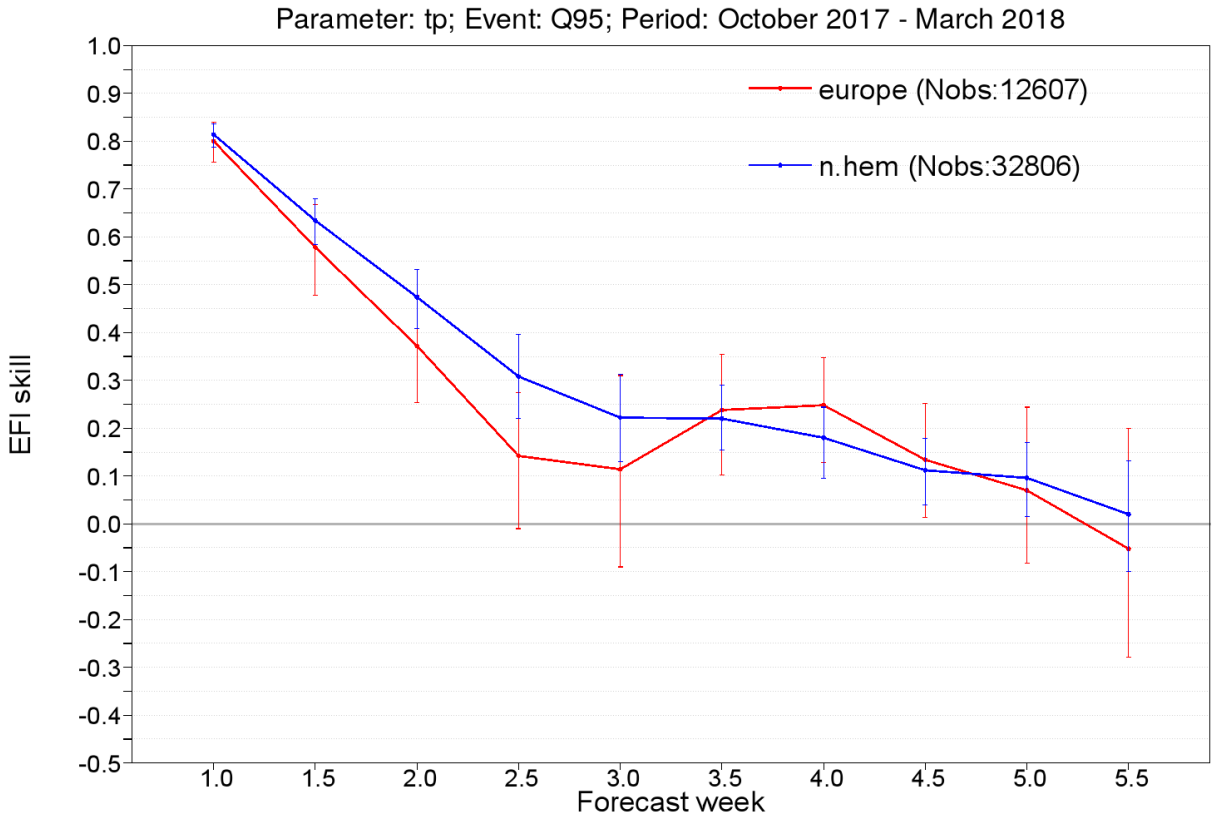
Extended-range EFI/SOT (under test)



2018 Spring Heatwave

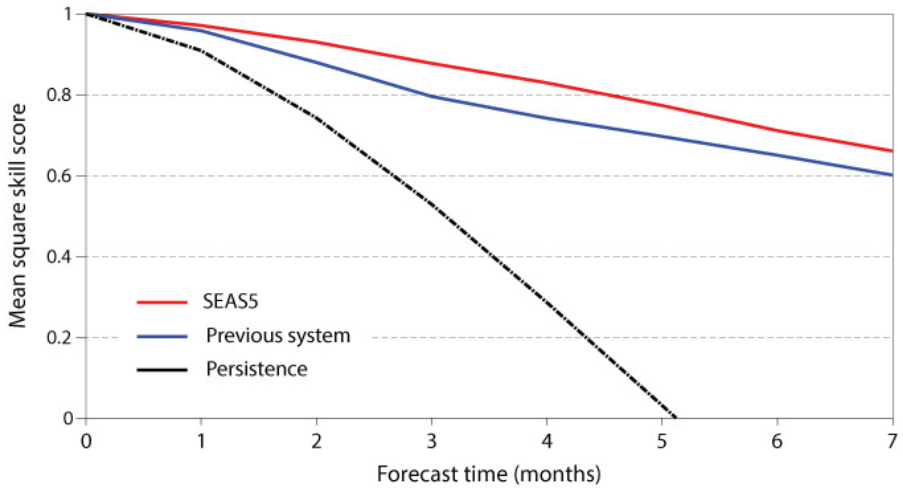
Extended-range EFI

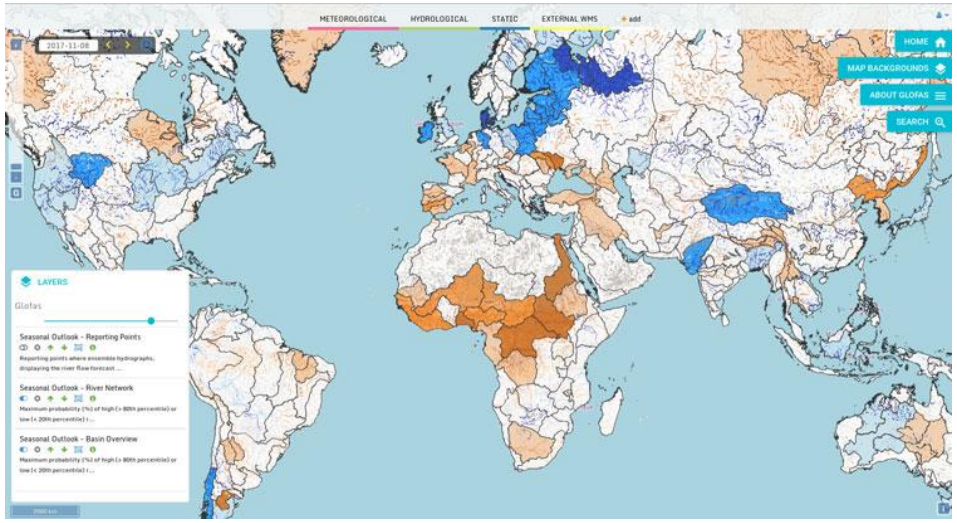




New seasonal forecast SEAS5

- SEAS5 (Nov 2017)
  - Sea ice
  - Release date from 8th to 5th,
  - Reforecasts 36 years (was 30), 25 members (was 15)
  - New chart layout
    - Verification grouped in separate families (based on 1981-2016 reforecasts)
    - Added SST anomaly plumes for Nino 1+2 region
    - NB charts (2m temperature etc) are anomalies relative to 1993-2016 (consistent with C3S)





Extended-range in ecCharts

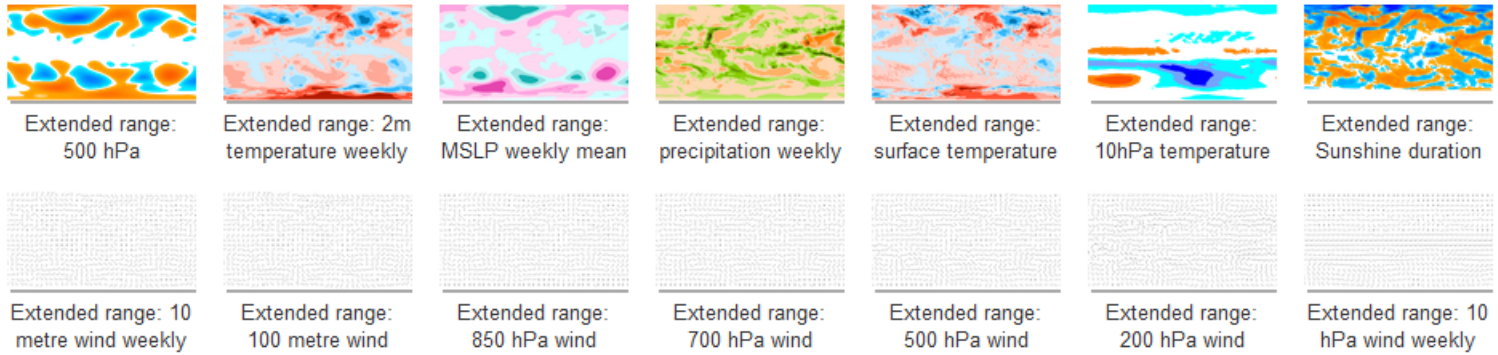
Layer select

Select from these ECMWF Layers to add to your personal list, or double click to view

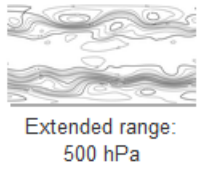
extended

23 matching items

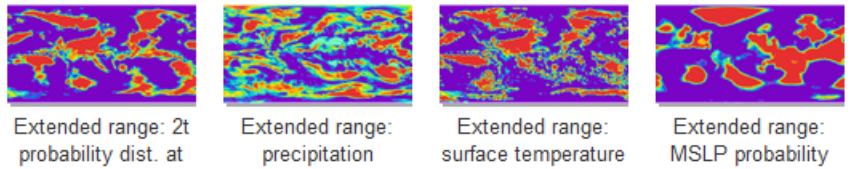
extended



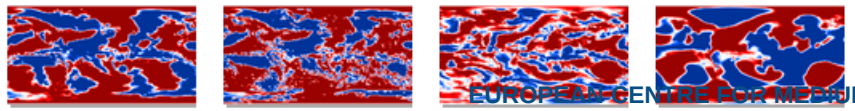
Extended range: Weekly mean



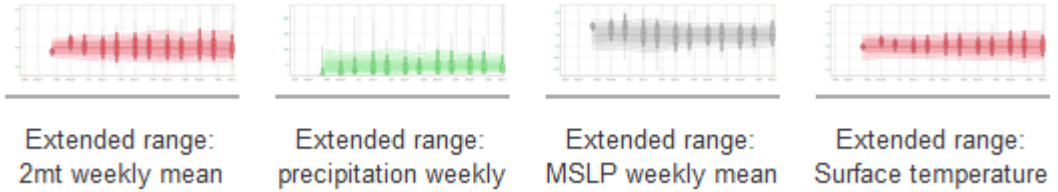
Extended range - Probability distribution



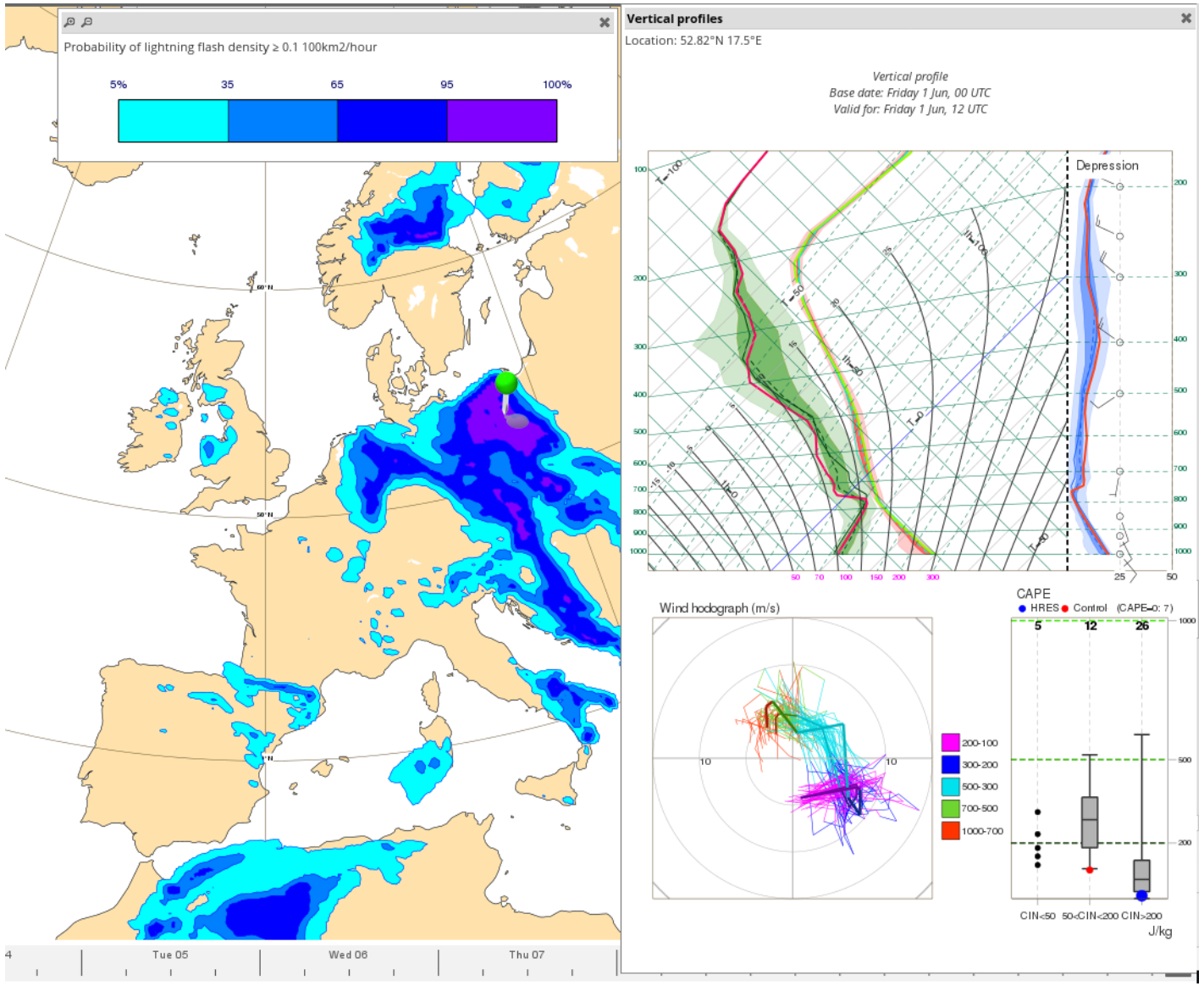
Extended range: Weekly anomaly probability



Meteograms - Extended range weekly mean anomaly



New ecCharts products – vertical profiles



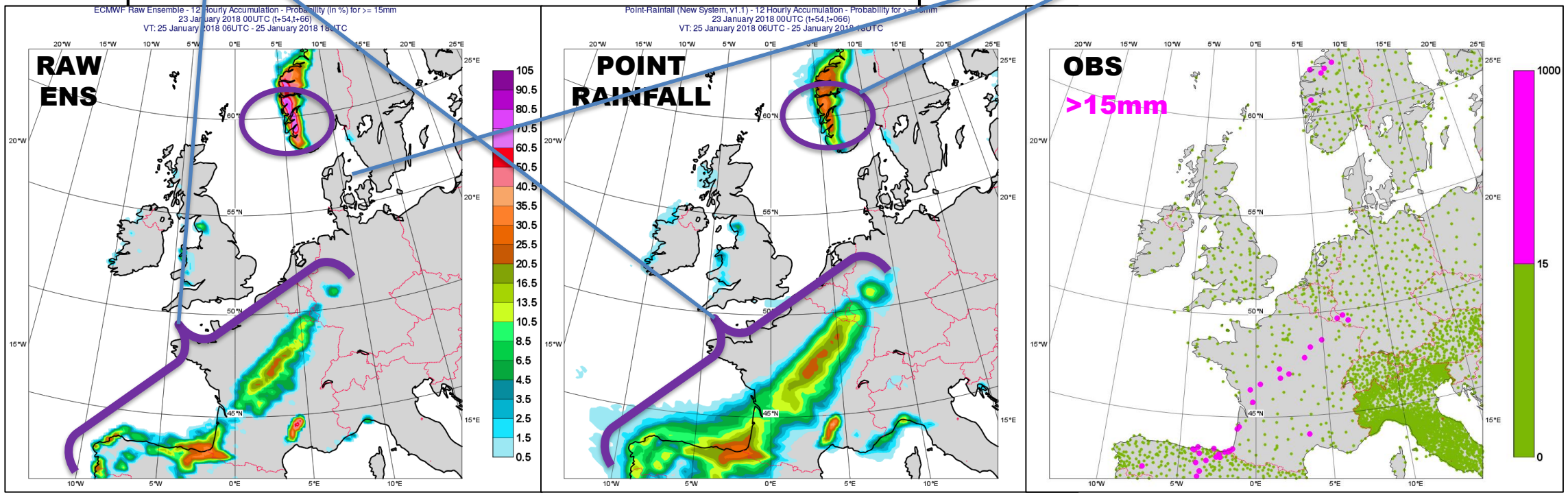
Point Rainfall (“ecPoint”) – new Experimental Global Product

- Post-processed fields delivering probabilities for rainfall at points and not for “gridbox averages”
- Situation-dependent adjustment of probabilities

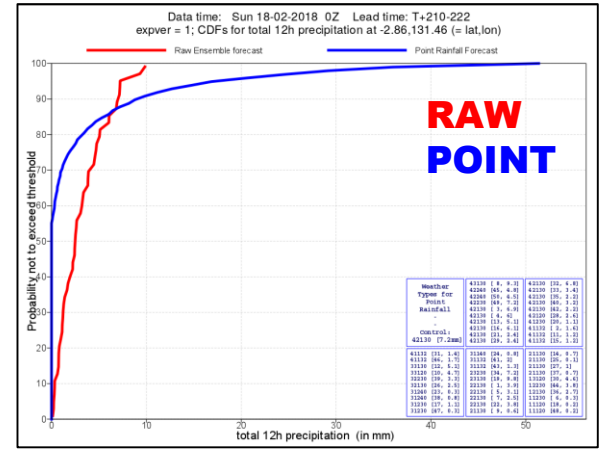
Probabilities mostly increased
Main reason: Sub-grid variability
expected in this weather scenario

Probabilities reduced
Main reason: IFS over-prediction
expected in this weather scenario

Probabilities for **>15mm/12h** (D3, VT 25 Jan 2018)



Point Rainfall - Benefits for Users

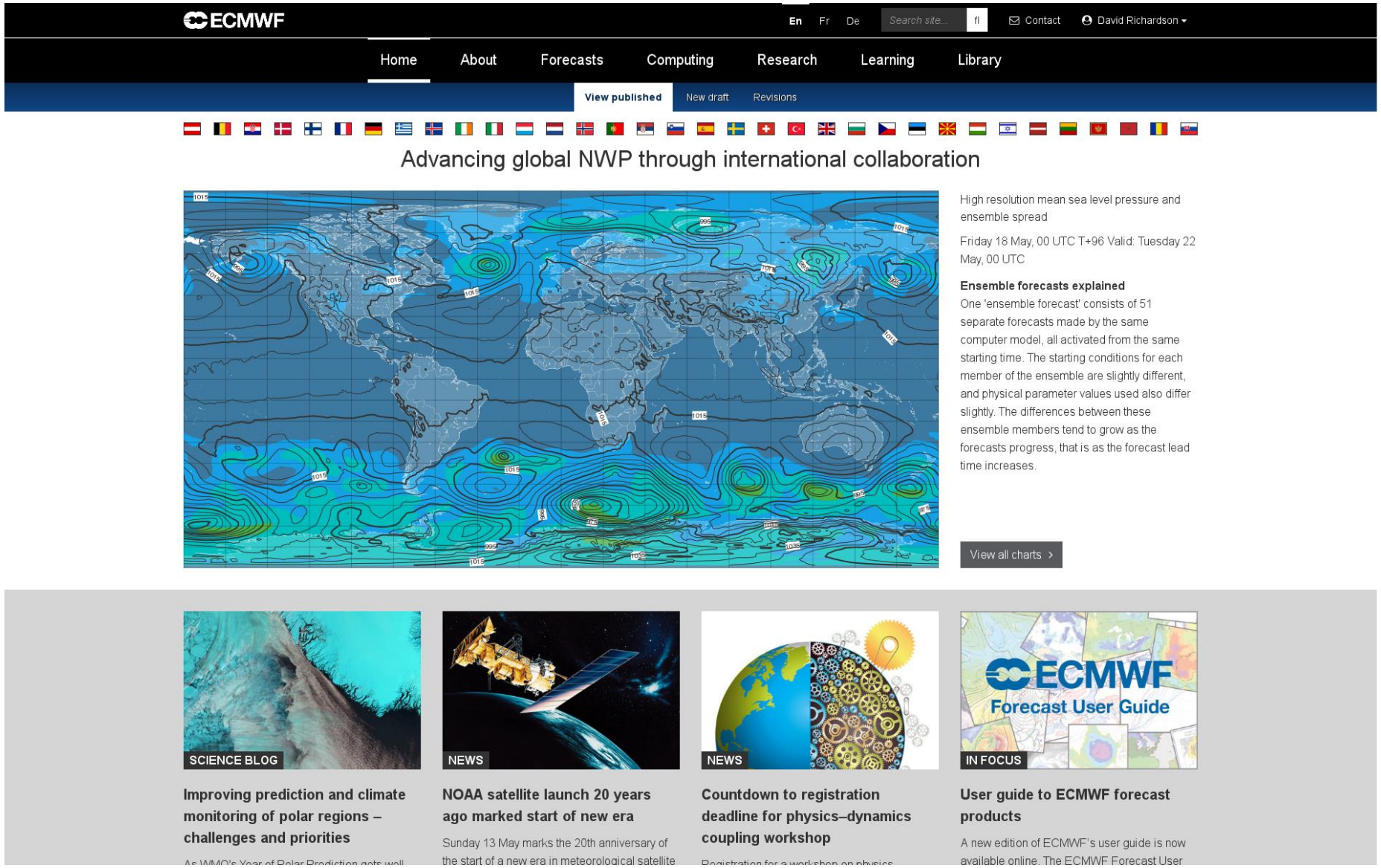


- Consistently better probabilistic forecasts of rainfall for individual sites
  - With larger spread than the raw ENS, which is under-dispersed (for sites)
- Bias correction of the PDF mean appropriate to the meteorological / geographical situation
  - Range of ~ x0.35 to x2.5
  - Could improve hydrological forecast inputs
- The probability distribution has a longer “wet tail” in most situations
  - Extremes predicted in convective situations can be much higher (very low probability) – flash flood applications
  - Extremes verifiy much better than for the raw ENS (e.g. for 50mm/12h D5 as good as D1 in Raw)
- Much more reliable forecasts of zero rainfall – again notably in convective situations

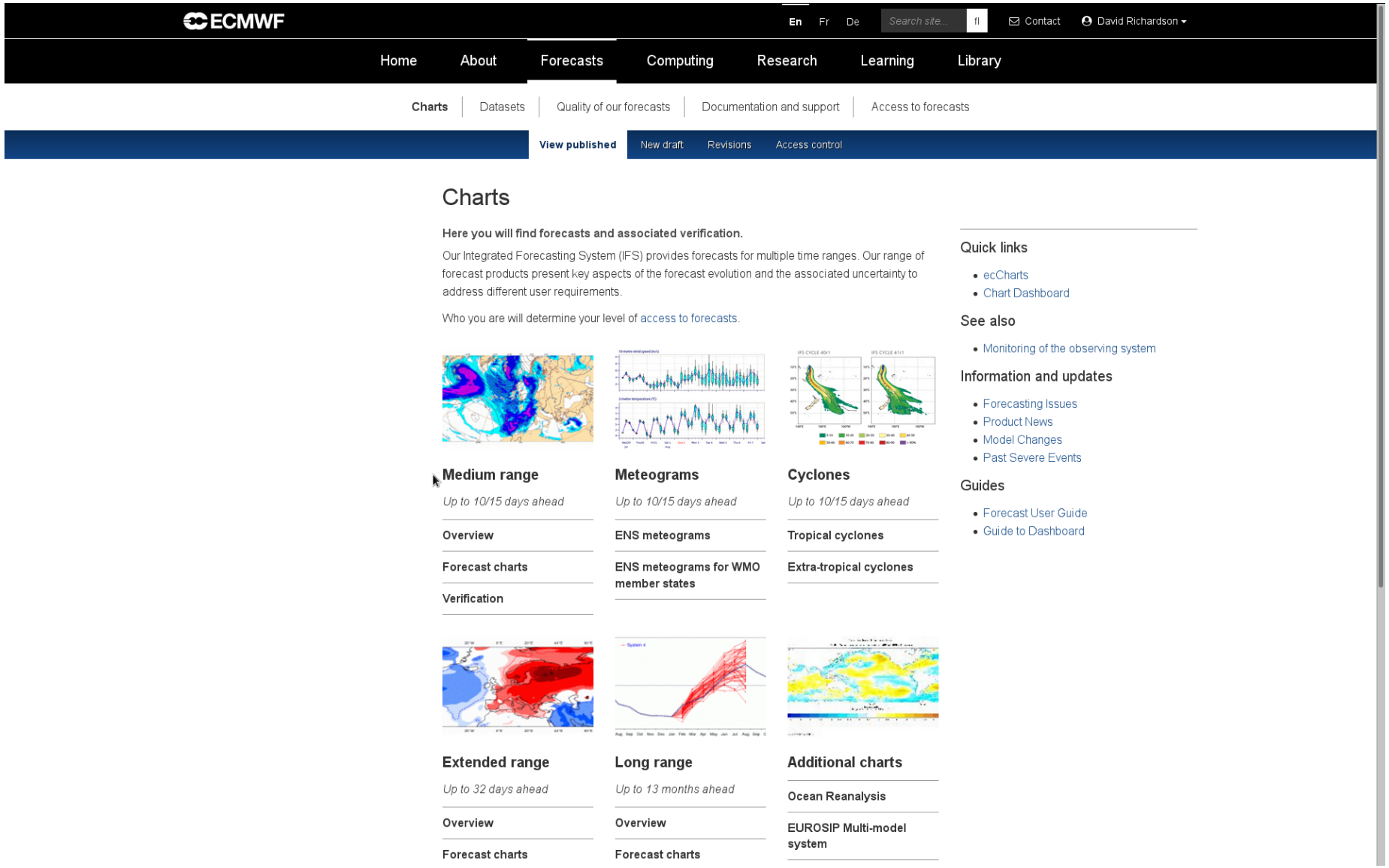
Point Rainfall - Status

- Will become an “Experimental product” in ecCharts during the summer – feedback welcome! Not yet in catalogue.
- Co-operation agreements reached with various NMHSs around the world to test this product out – (Ecuador, Canada, Hungary, Costa Rica,…). Regional point rainfall forecast grib files being provided via ftp in real time, in exchange for feedback reports (and also extra observations - precipitation totals, discharge - for non-European countries).

ECMWF website



ECMWF website



User guide to ECMWF forecast products

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

ECMWF Spaces Calendars Create Search

Forecast User Guide

SPACE SHORTCUTS

Forecast User Home

PAGE TREE

- 1 Introduction
- 2 The ECMWF Integrated Forecasting System - IFS
- 3 Availability and Interpolation of NWP output
- 4 NWP Evolution versus Reality
- 5 Forecast Ensemble (ENS) - Rationale and Construction
- 6 Using Deterministic and Probabilistic Forecasts
- 7 ENS Products - Dealing with Uncertainty
- 8 ENS Products - What they are and how to use them
- 9 Physical Considerations when Interpreting Model Output
- 10 Interfaces for displaying Model Output
- 11 Conclusion
- 12 Appendices

Space tools

Pages

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Forecast User Guide

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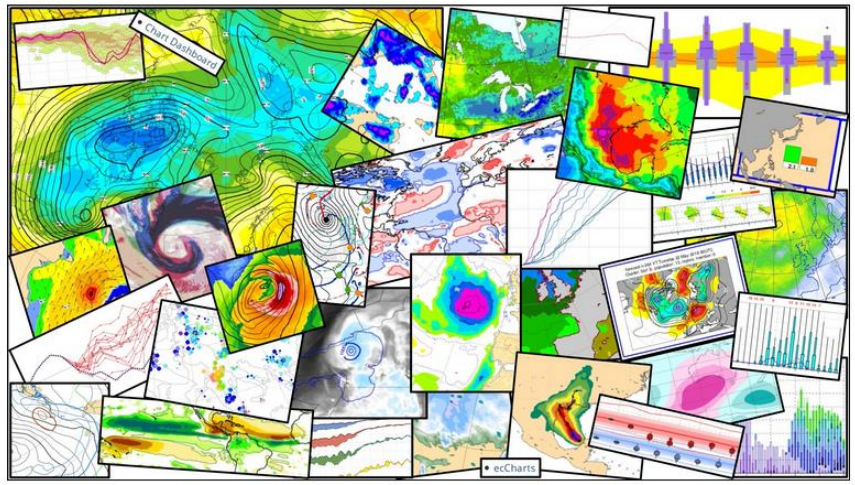
"Behind good forecast practices are often hidden good theories; equally, good theories should provide a basis for good forecast practices." Professor Tor Bergeron, personal communication, 1974



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))

Summary

Review the efforts made by ECMWF to address feedback and requests from users of ECMWF forecasts over the last year

- New forecast output fields:
  - lightning
  - Integrated water vapour transport
  - Max CAPE/CAPES
- Additions to ecCharts – vertical profiles, extended-range forecasts
- Updated www
- New edition of User Guide