

ecCharts

Introducing ECMWF's web charts applications

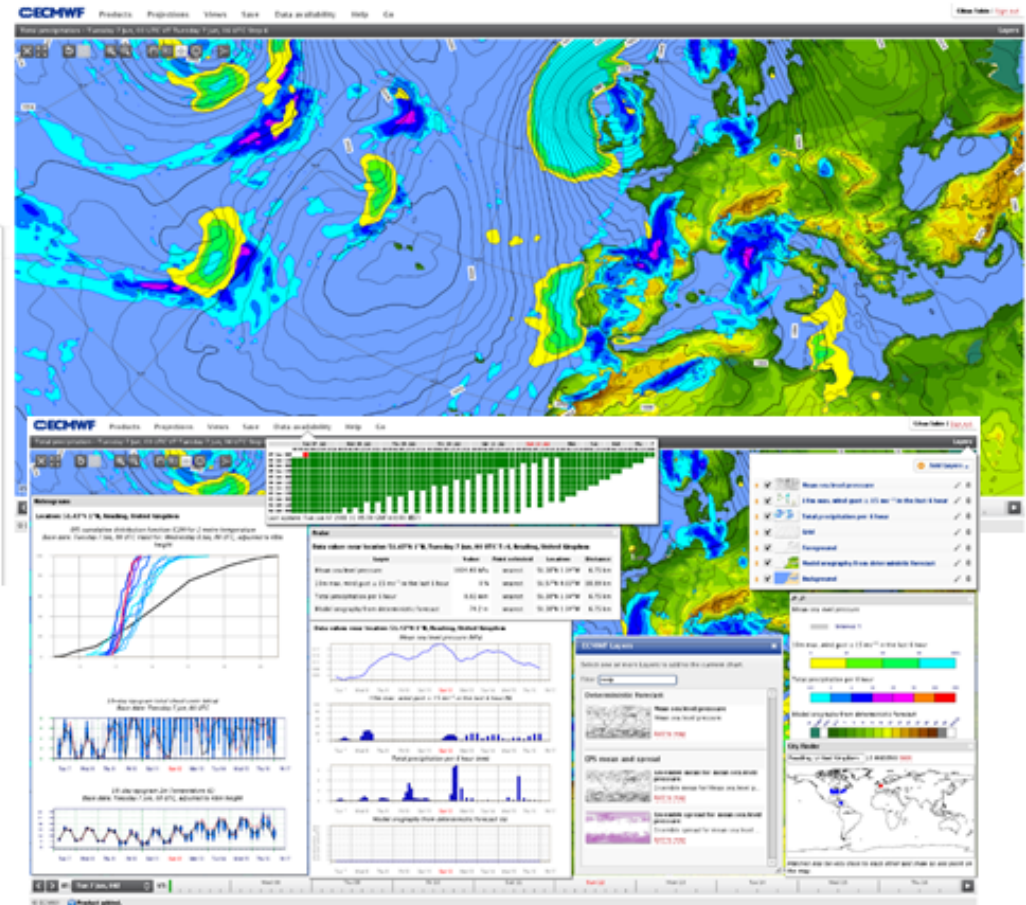
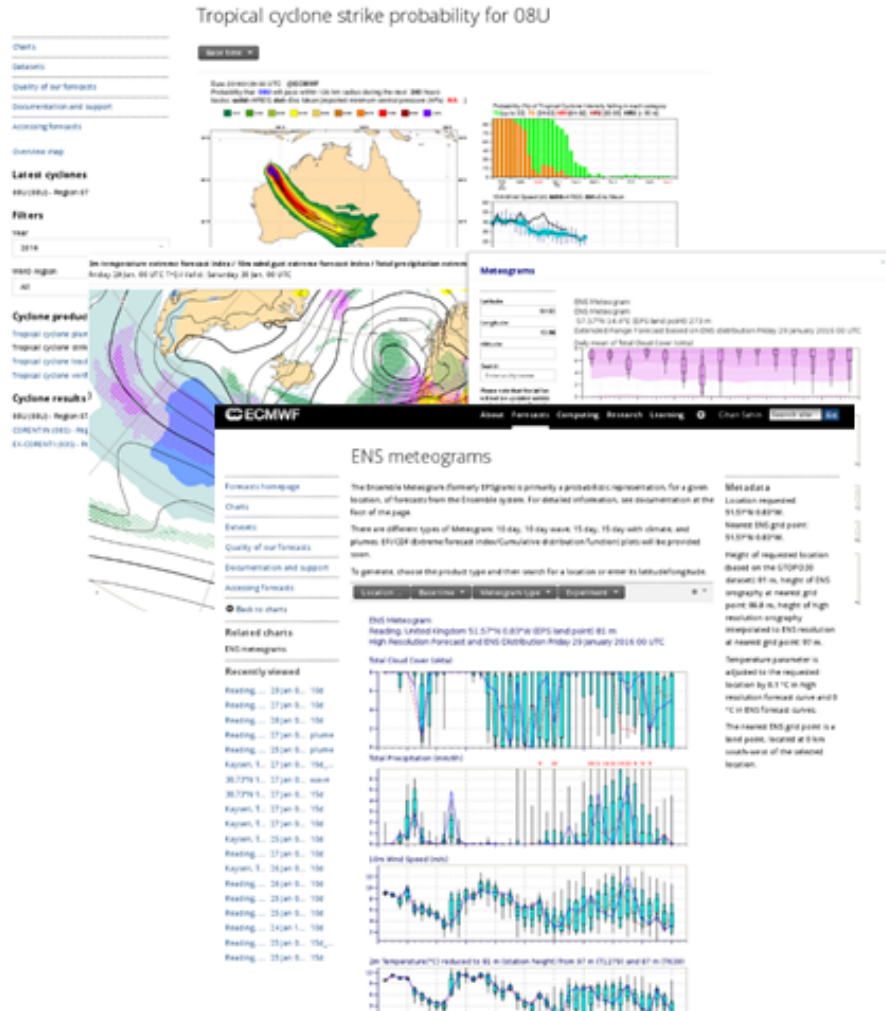
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ECMWF graphical products

Charts on www

ecCharts



WWW Charts

High resolution (HRES) forecast charts (Updated at 06:55 and 18:55)

Ensemble prediction system (ENS) charts up to 10 days (Updated at 7:40 and 19:40)

Ensemble prediction system (ENS) charts 10-15 days (Updated at 8:00 and 20:00)

Position generated time series from Ensemble, so called ENS meteograms.

Monthly forecast charts (Every Thursday and Monday)

Seasonal forecast charts (once a month)

Observation monitoring charts (Daily, monthly ...)

Research charts (Model climate based on different IFS cycles, Ocean reanalysis, special projects ...)

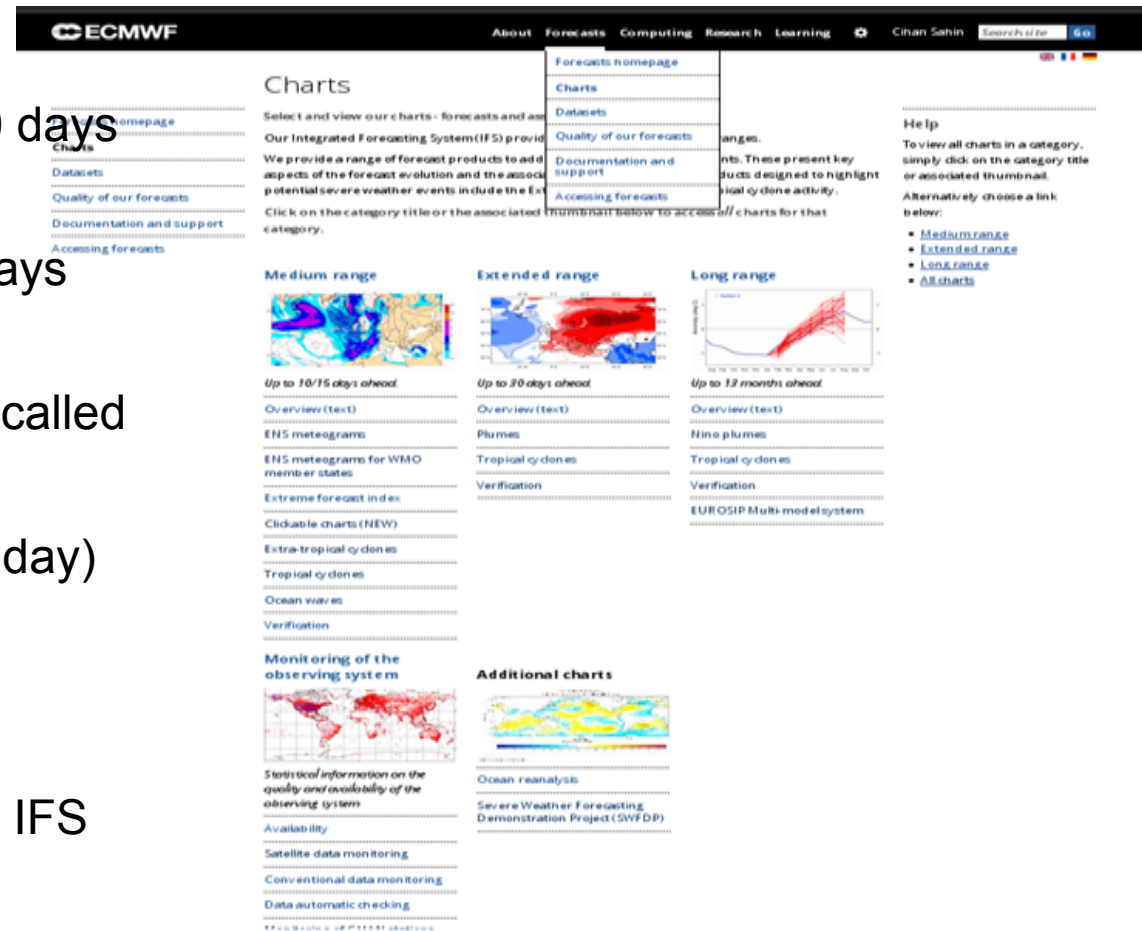
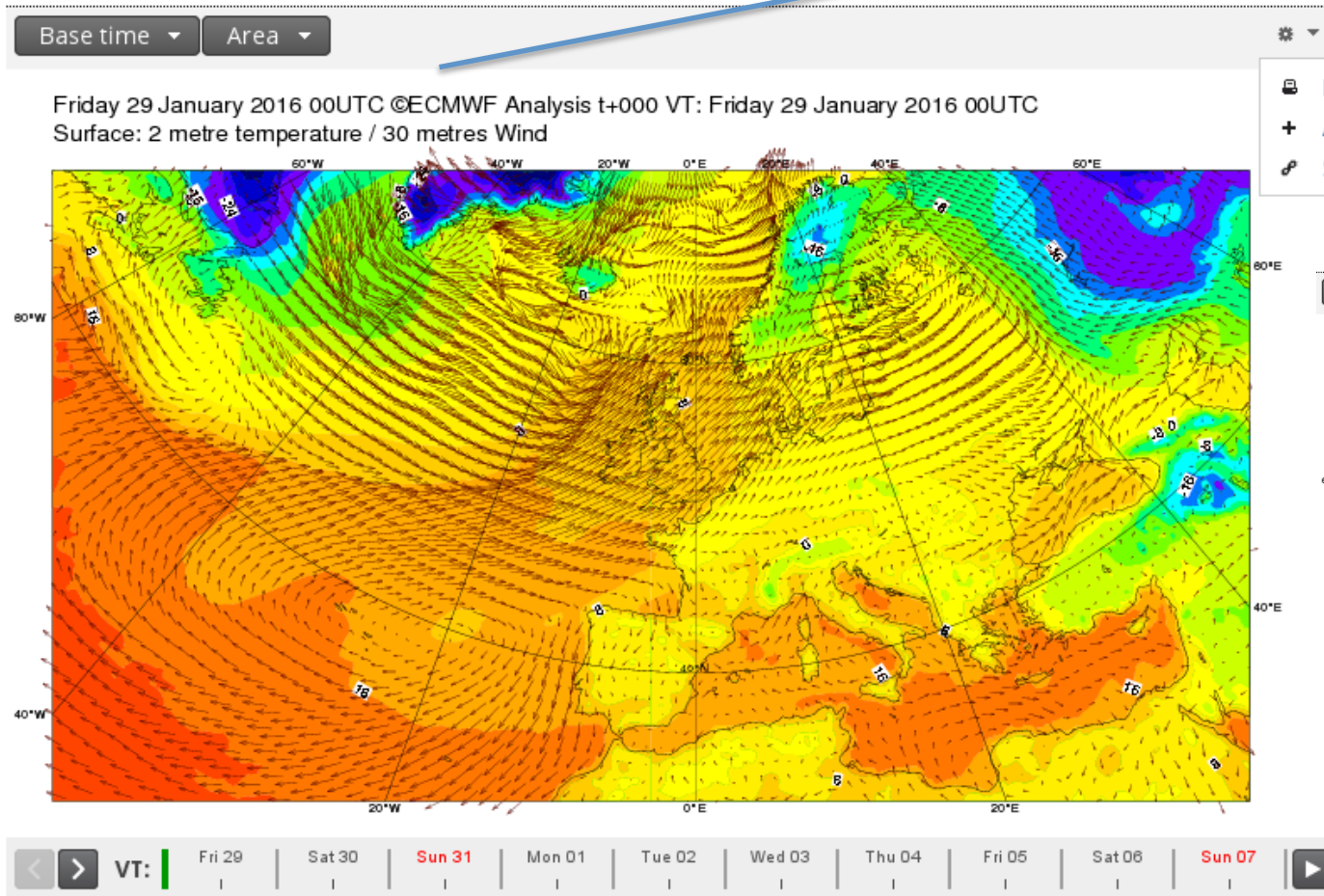


Chart functionalities

2m temperature and 30m winds

Chart options



Add to dashboard

- Print
- + Add to dashboard
- Share

URL for batch access to this chart

Base time ▾ Area ▾

Chart permanent link

The following URL can be used to download charts automatically

```
https://apps.ecmwf.int/plots/product-download/medium/w_t2m30mw/?time=2016012900,0,2016012900&area=Europe&token=c9affd84d43ff547cb6510c64ea2f42f&email=mot@ecmwf.int
```

Add '&format=pdf' to the end of URL if you wish to download PDF version.

Forecast steps / animation

Clickable charts

- Many medium-range charts are clickable.

- Charts
- Datasets
- Quality of our forecasts
- Documentation and support
- Accessing forecasts

Filters

Product type

- ENS (2)
- Extreme forecast index (1)
- HRES (1)

Medium range charts (Clickable)

4 matching items

No filters currently applied



Ensemble mean and spread for MSLP



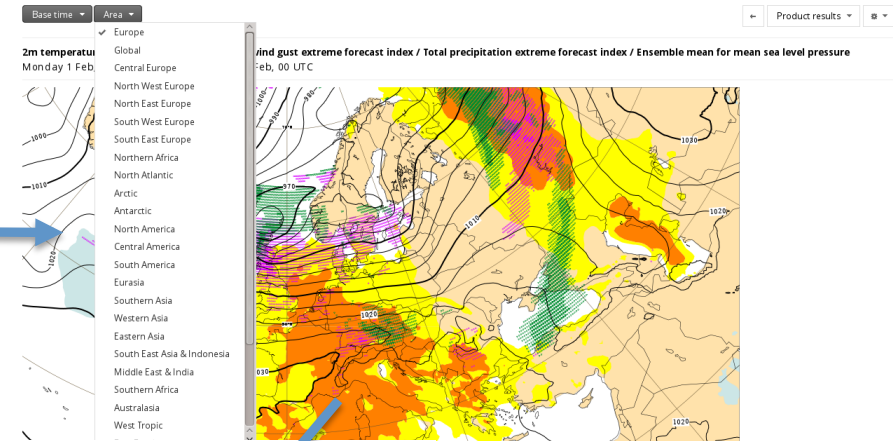
MSLP and rain from high resolution



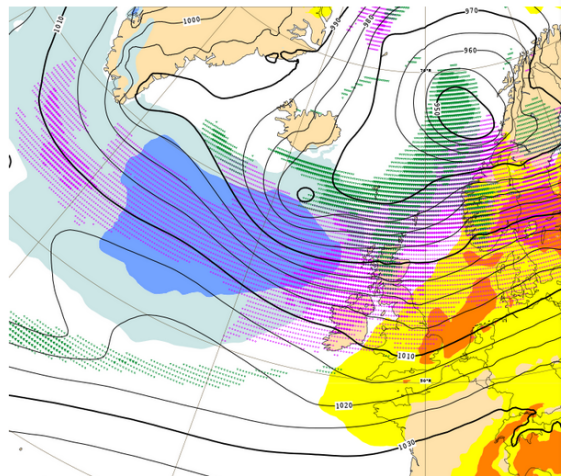
Multi-parameter EFI (24-h up to valid)



Total precipitation probability



2m temperature extreme forecast index / 10m wind gust extreme forecast index / Total precipitation extreme forecast index
Friday 29 Jan, 00 UTC T+24 Valid: Saturday 30 Jan, 00 UTC



Meteograms

Latitude: 57.53
Longitude: 13.98
Altitude:

Please note that the label will not be updated, unless an item is selected from the drop-down list, otherwise the text will be treated purely as a label!

- 10-day meteogram
- 15-day meteogram
- 15-day with climate
- Plume
- 10-day wave
- EFI-CDF

Download

PDF

Show grid point info

Recently viewed

- 15-day clim(57.53/13.98)
- 10-day(57.53/13.98)

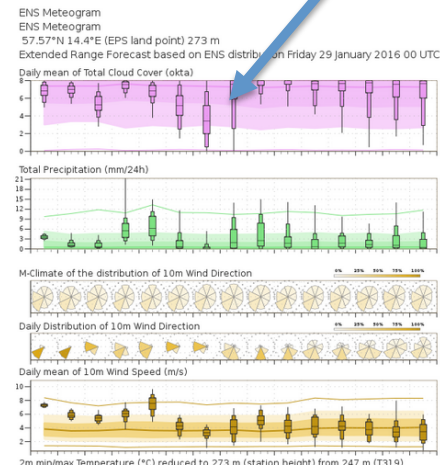


Chart dashboard

Organise multiple charts and meteograms in the same "page".

Access to chart dashboard

The screenshot shows the 'ENS meteograms' page. A blue arrow points from the text 'Add chart to dashboard' to a button labeled 'Add chart to dashboard' located in the right-hand sidebar. The main content area displays various weather charts for a location in Turkey, including Total Cloud Cover, Total Precipitation, and Wind Direction.

The screenshot shows the top navigation bar of the website. A blue arrow points from the text 'Access to chart dashboard' to a dropdown menu that is open, showing the 'Chart dashboard' link. Other navigation items include 'About', 'Forecasts', 'Computing', 'Research', 'Learning', and 'Log out'.

The screenshot shows a dashboard with several weather visualization widgets. At the top, there are navigation tabs for 'Extreme weather', 'Reading EPSGRAMS', 'Precipitation', 'Epsgrams', 'New epsgrams', and 'Reading temperature and cloud'. Below these are sub-tabs for 'Western Turkey', 'More meteograms', 'November 2014 update', and 'Location'. The main area contains several charts: 'Rainfall and MSLP' (a map), 'Cloud cover' (a map), 'ENS meteograms' (a multi-panel chart showing cloud cover, precipitation, and wind), 'All sky radiances from AMSR2' (a heatmap), 'Weekly probability anomaly' (a map), 'Probabilities, 2m temperature' (a map), and 'MJO index' (a map).

<https://software.ecmwf.int/wiki/display/FCST/Chart+dashboard>

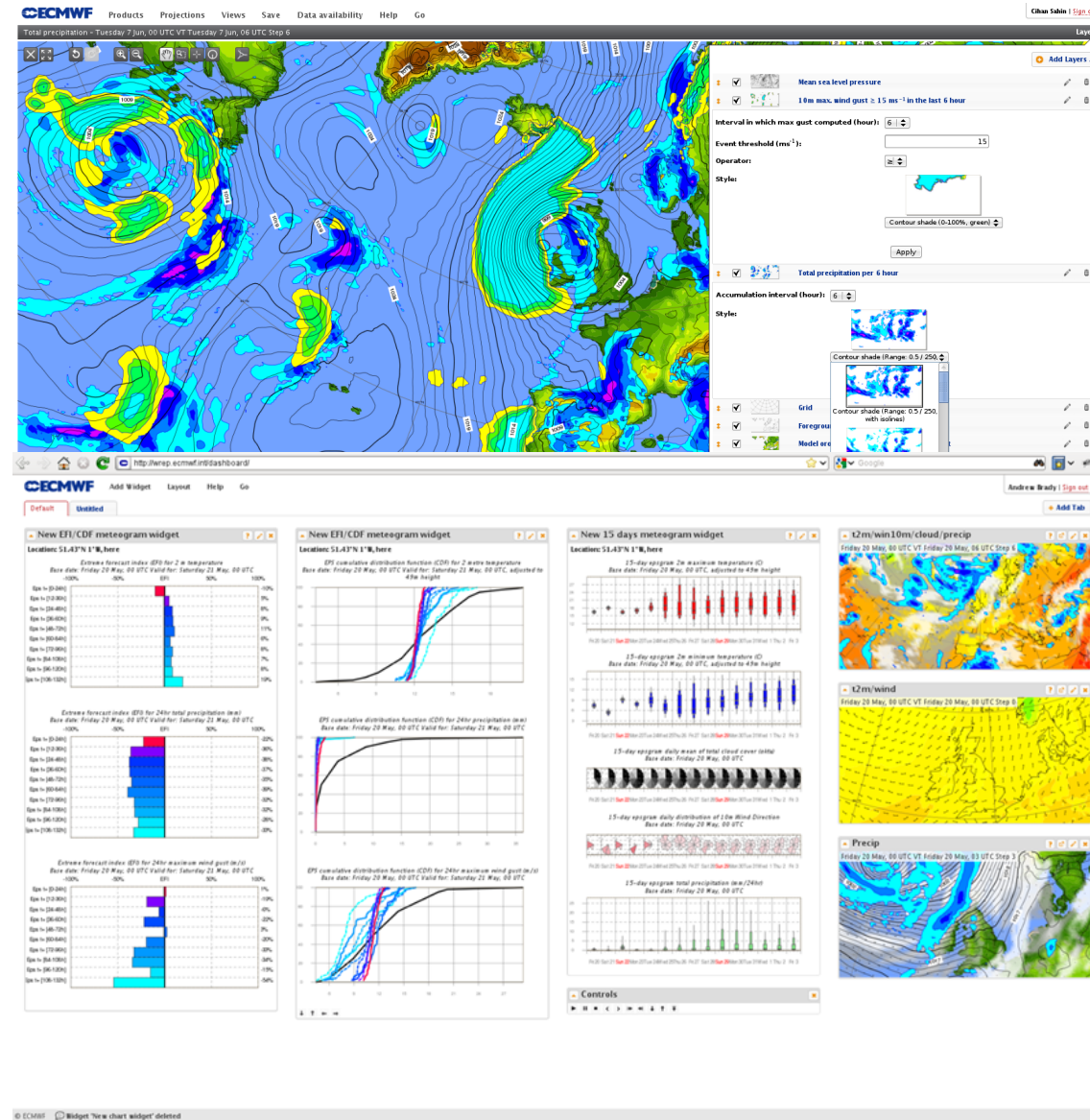
ecCharts

Web based application to inspect and visualize ECMWF medium-range and extended- range data (NEW !)

- Web based immediate access to charts
- Native data resolution
- Interactive features (zoom, pan, click, extract data information, ...)
- User controlled visualization
- Customisable parameters
- Download charts (through WMS)

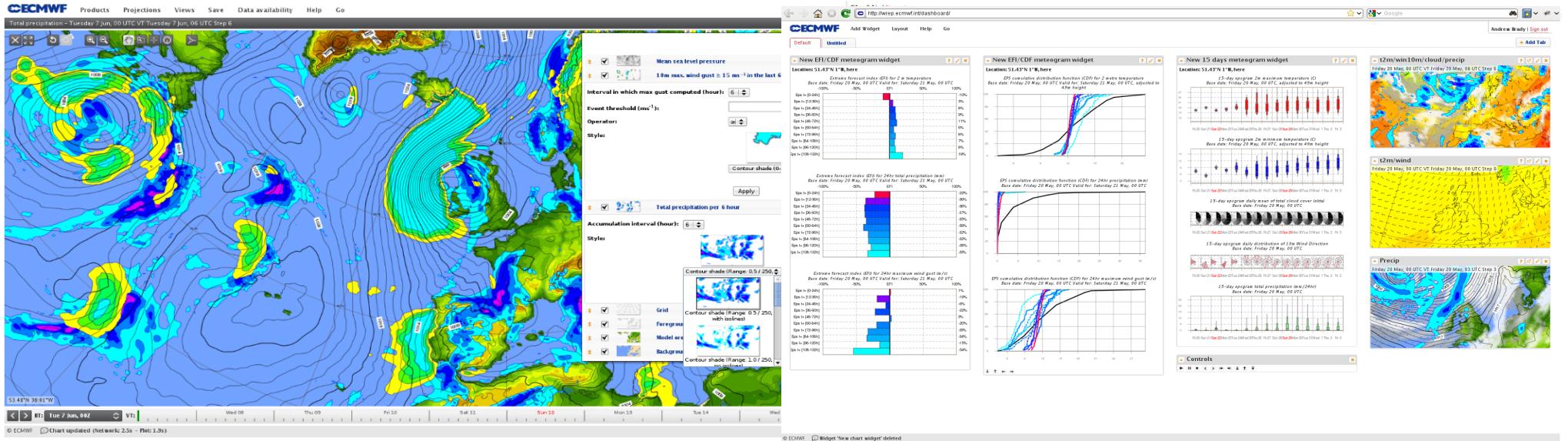
URL

eccharts.ecmwf.int/forecaster/

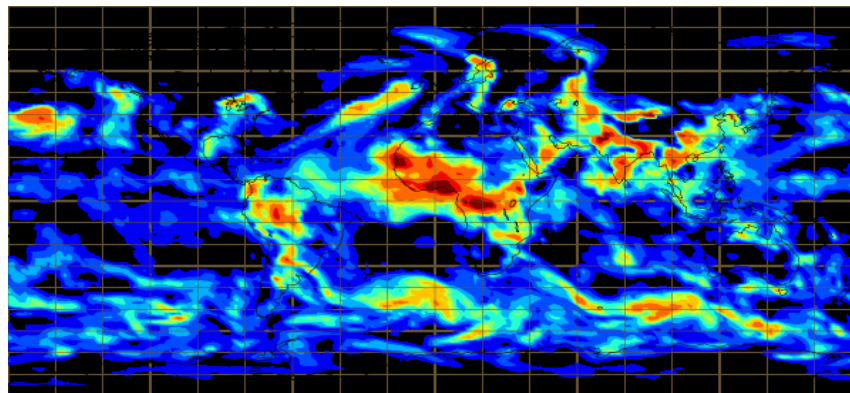


ecCharts user interfaces

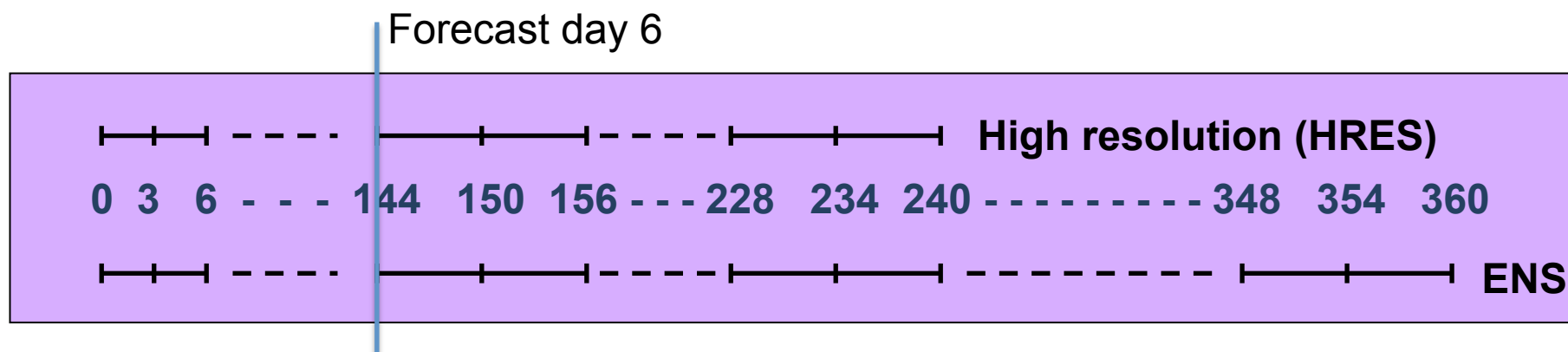
Forecaster / Dashboard / WMS



https://apps.ecmwf.int/wms/?token=public&request=GetMap&layers=composition_aod550,grid,foreground&width=600&bbox=-180,-90,180,90



Data in ecCharts



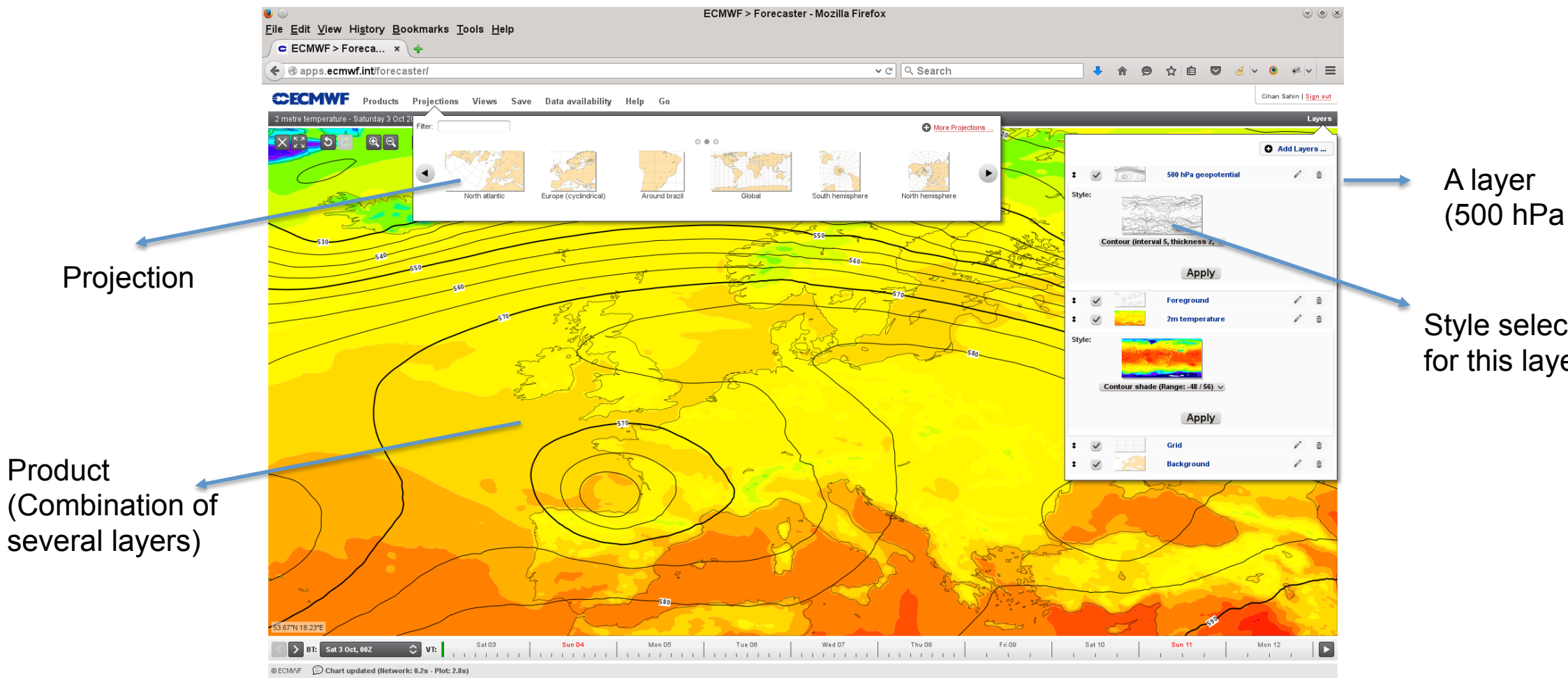
- High resolution and Ensemble model output (atmospheric & wave parameters)
- Point extracted data (for a given latitude/longitude)
 - Time series from all available parameters
 - ENS meteograms for a selected parameter set
- Ensemble derived data
 - Probabilities, Percentiles, EFI/SOTs, Model-climate, Ensemble mean and spread ...

NEW !

Extended range data, weekly mean anomalies updated twice a week (Monday/Thursday at 22:00 UTC)

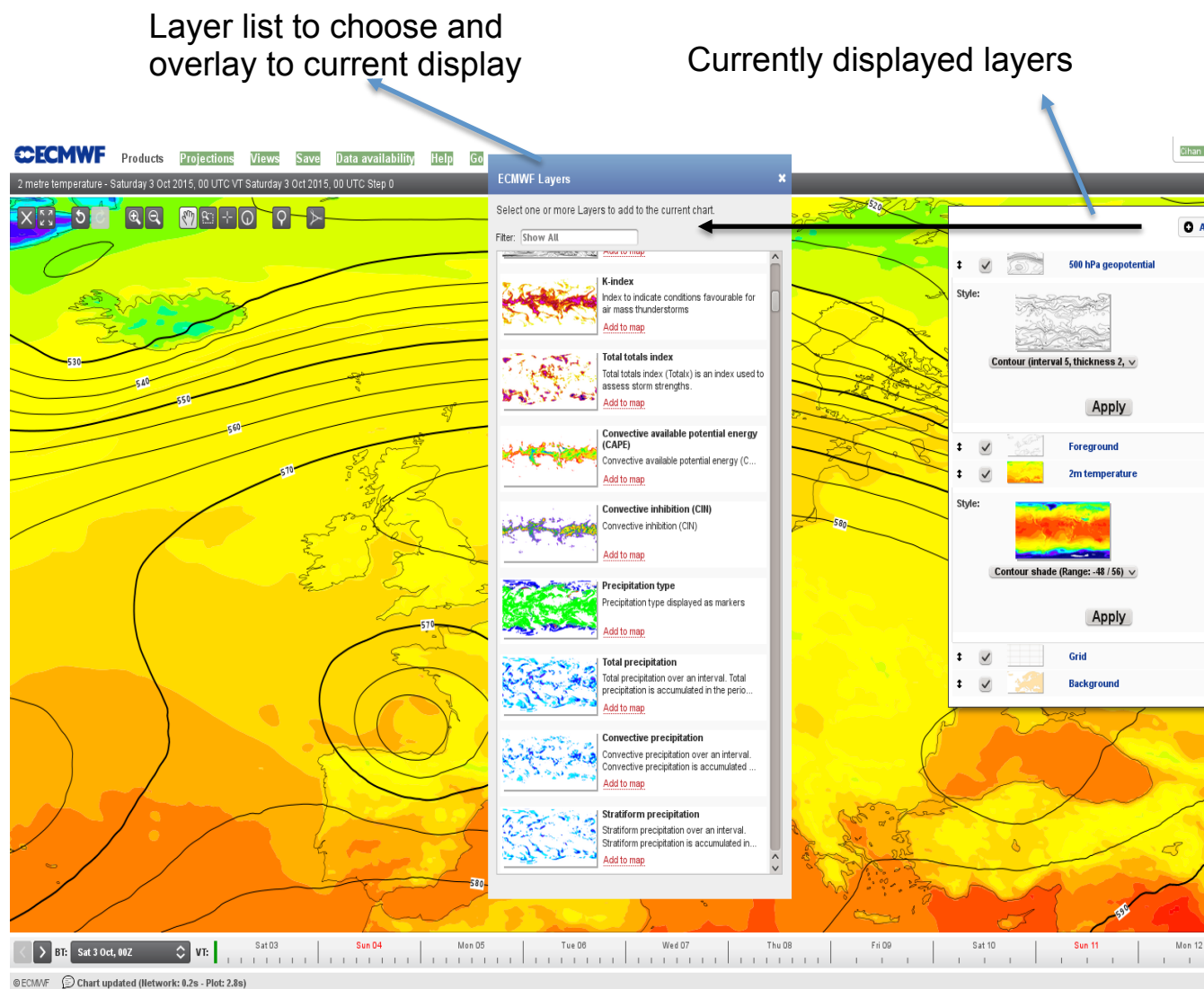
Basic ecCharts concepts

- Basic components to build a plot : Style, Layer, Projection
- What you have on your screen is combination of those components and is called a Product



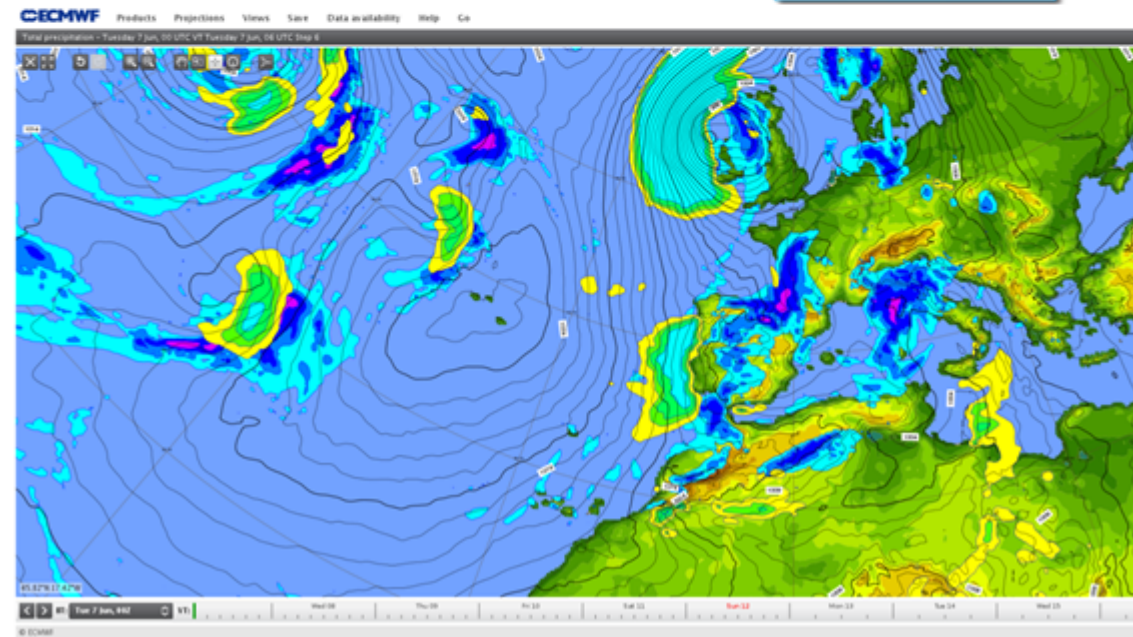
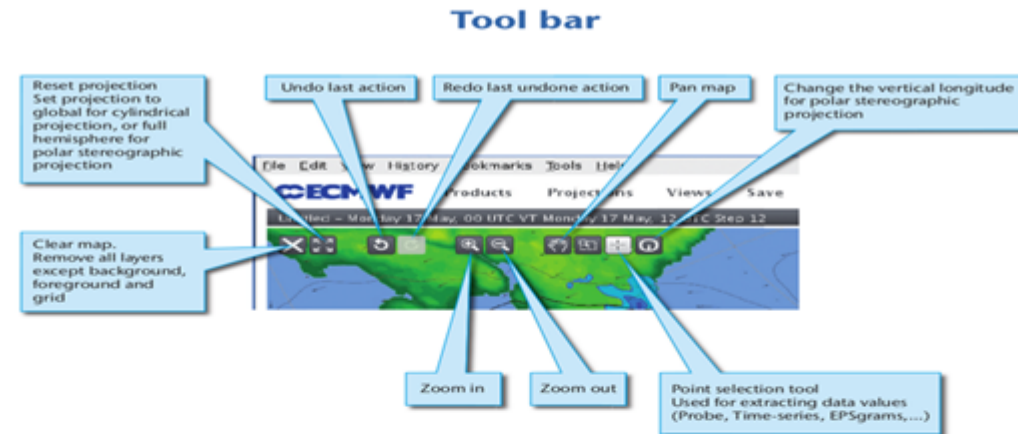
More on layers and products

- Layers are basic visual elements (meteorological parameters, result of complex computations, coastlines ...)
- Overlay-able
- Customisable (ie. Accumulation period for total precipitation, Event threshold and event operator for probability layers, Interval in which maximum wind gust computed ...)
- Can be re-ordered
- Final display is “Product”. Can be saved for re-use.
- A small set of pre-defined Products are available. But idea is that user creates products as they wish.



User interfaces – Forecaster tool

- Interactive (zoom, pan ...)
- Plot area maximised (See weather room ...)
- Work and create a product and save as your own.
- Data fields are global.
- Charts are clickable to extract information
- Overlay any combination of parameters (currently around 230) from HRES and ENS.
- Design and save as your “own” product to re-use.
- Control projection and time (animations ...)

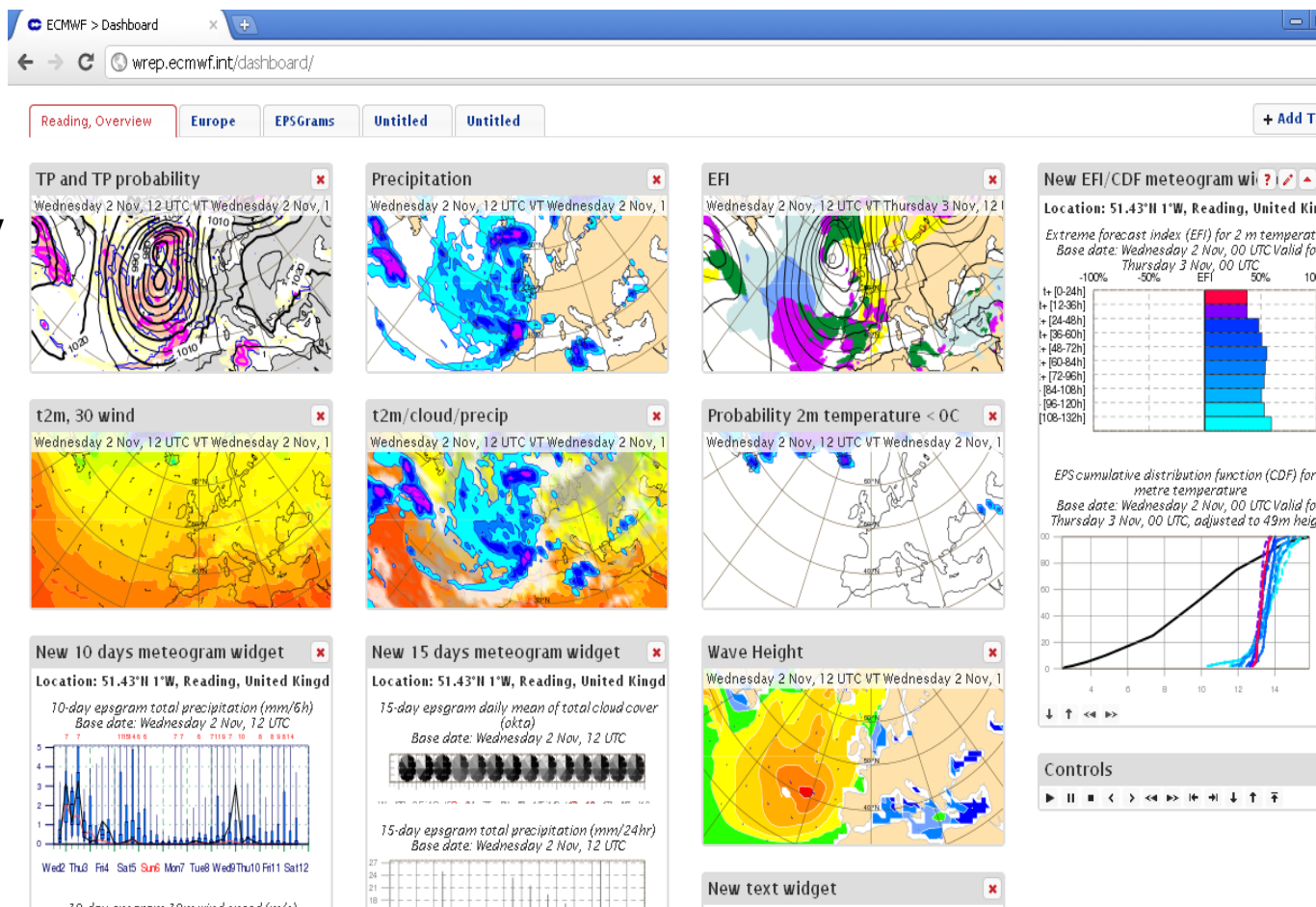


User interfaces - Dashboard

- Organise multiple charts and meteograms in the same “page”. Basic elements are called widgets.

- A chart widget is used to display a product either from ECMWF pre-defined set or your saved products.
- ENS meteograms widgets (10 days, 15 days, EFI/CDF)
- Control widget to apply collective actions for the charts on the same page ie. All charts in a tab animate simultaneously.

- User can create many tabs each containing many widgets.



More on Ensemble data

ecCharts provides an easy way to access and visualise ECMWF Ensemble data

Ensemble data = 50 perturbed forecasts (lower resolution) + Control forecast (No perturbation)

What is the probability of precipitation > 5 mm/ 6 hr ?
How about over 24 hr ?

Show ENS temperatures for 90th percentile ?

How about ENS distribution for a given point ?

What is the probability of precipitation > 5 mm/ 6 hr
AND wind speed > 10 m/s ?
How about over 24 hr ?

Customising charts is the key functionality to explore Ensemble data in detail.

- Charts need to be generated dynamically from raw data.

ENS Probabilities

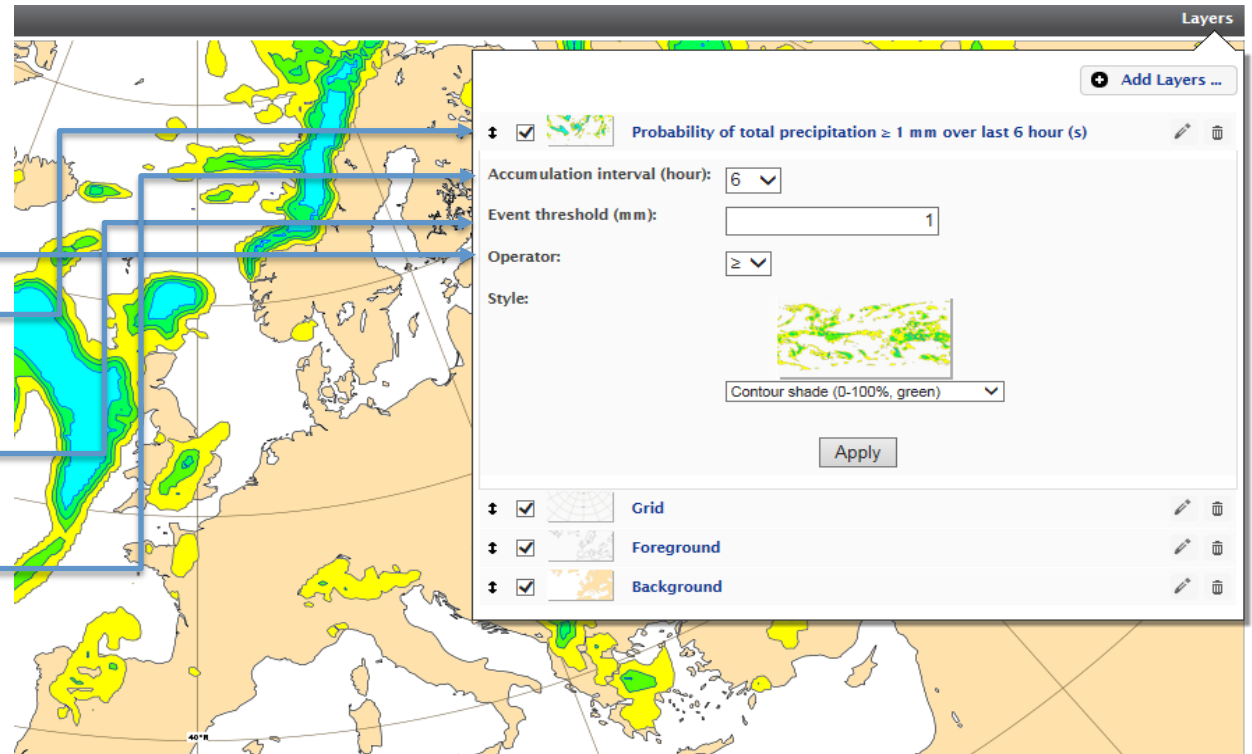
- To convey forecast uncertainty information by the probability of the occurrence of an event.

What is the probability of precipitation

>

5 mm/ 6 hr ?

How about over 24 hr ?



- Similar customisation applies for percentiles and probability of combined events.

Meteograms

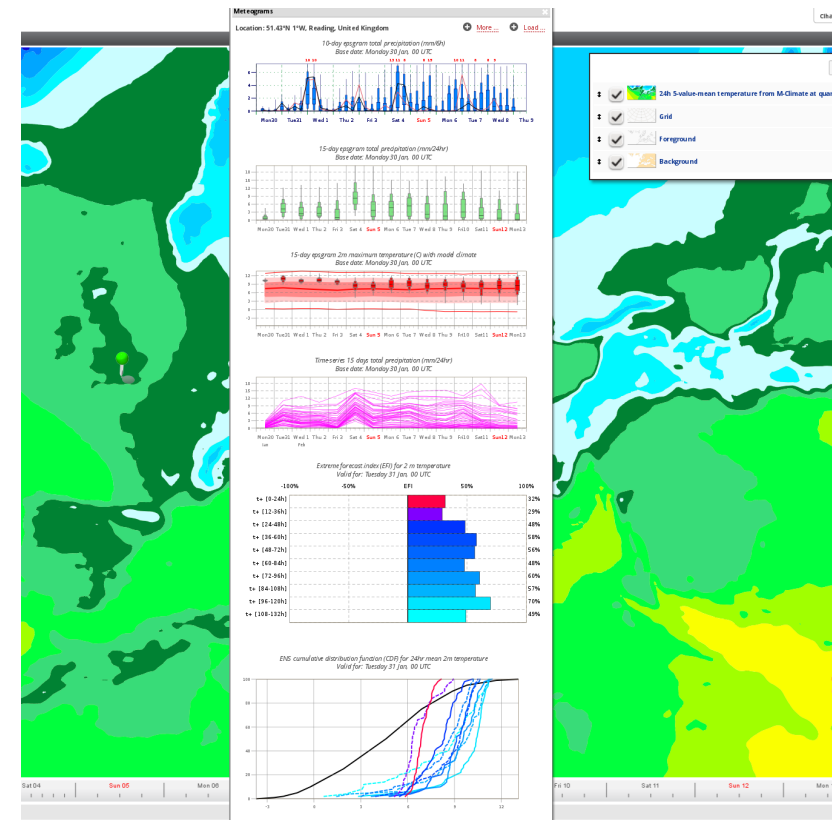
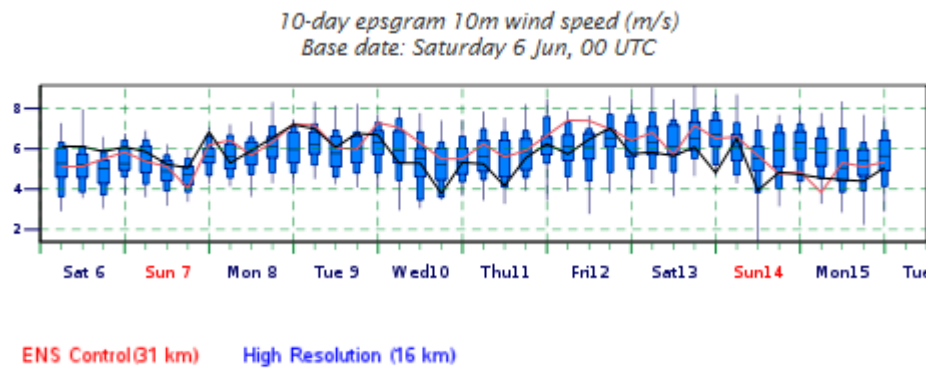
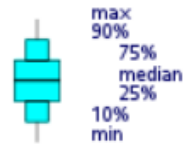
- Position based forecast plots displaying pre-defined ENS percentiles.

- Distributions are displayed using a box and whisker plot.

- Types of meteograms;

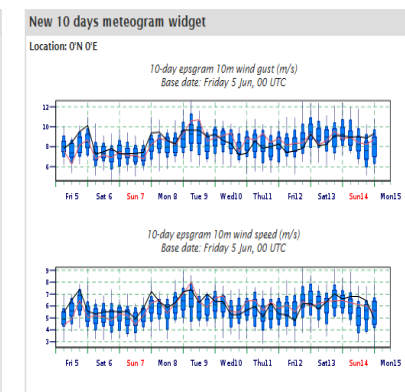
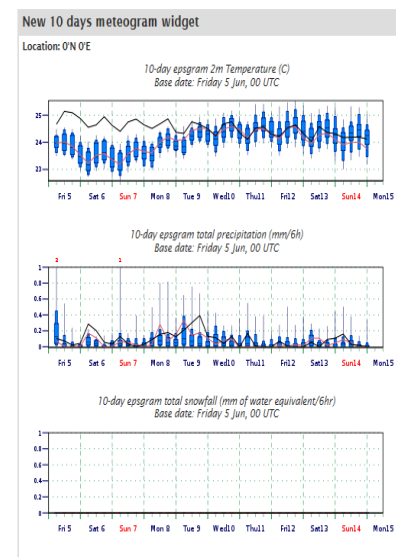
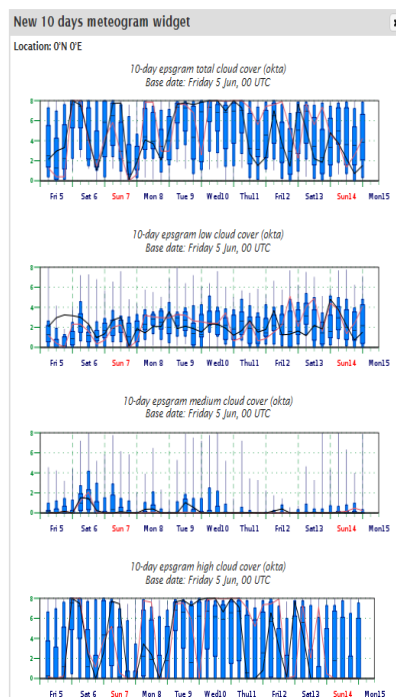
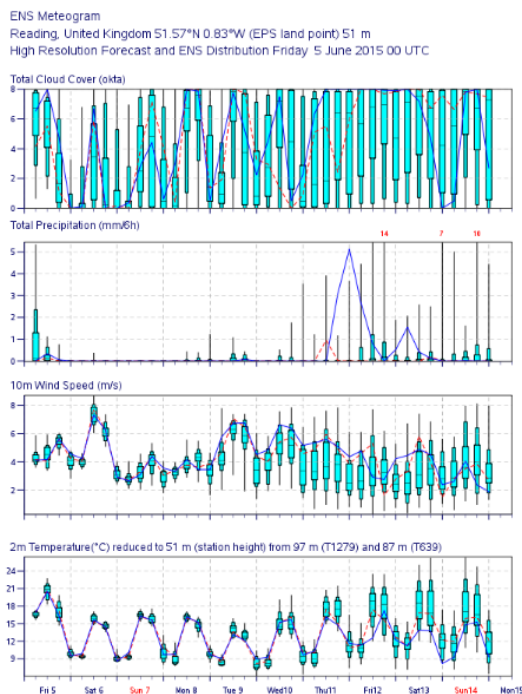
- 10-day meteograms
- 10-day meteograms for wave parameters
- 15-day meteograms
- 15-day meteograms with model climate
- Plumes
- ENS members (individual lines)
- EFI and CDF diagrams
- Extended range meteograms (Anomalies)

- All charts are clickable to show selected meteograms for a chosen location.



Meteograms – more parameters in ecCharts

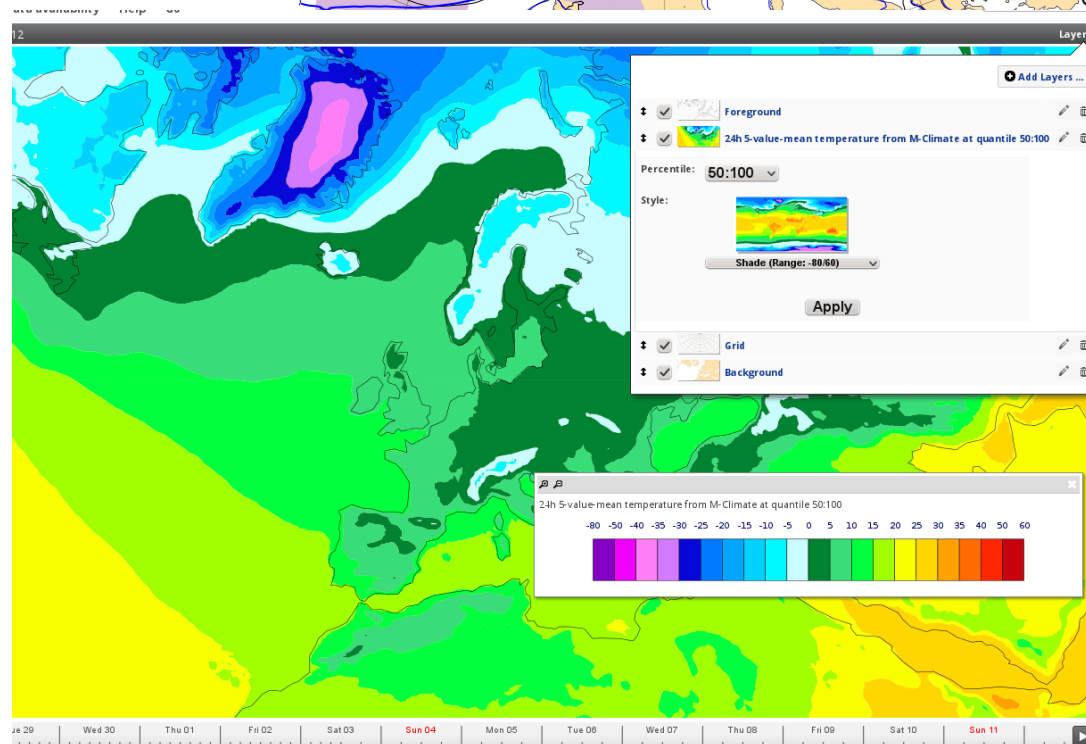
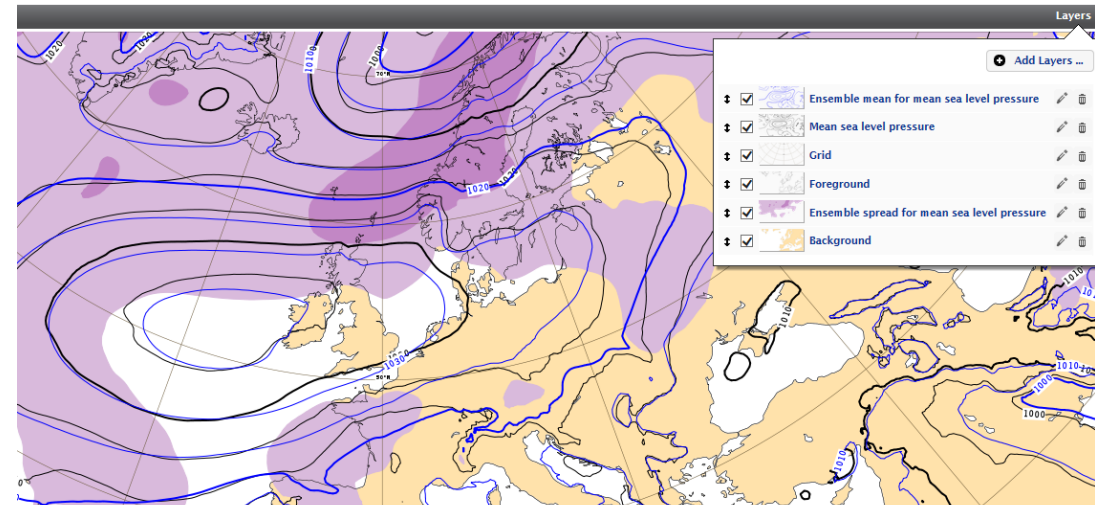
- Classical meteograms (as in www and clickable charts) have a limited number of parameters (4 for 1 day meteogram)
- ecCharts displays meteogram parameters individually. That allows users to customize and present Meteograms as they wish to.
- (2t, total precipitation, wind gust, low/medium/high/ total cloud cover, snowfall, wind speed, mean wave period/ direction, wave direction, significant wave height)



Other ensemble data

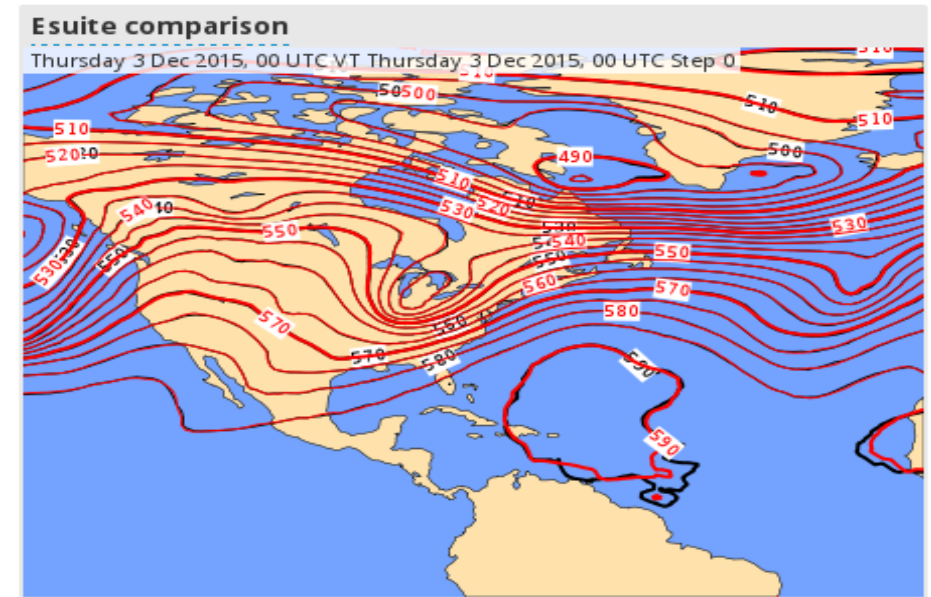
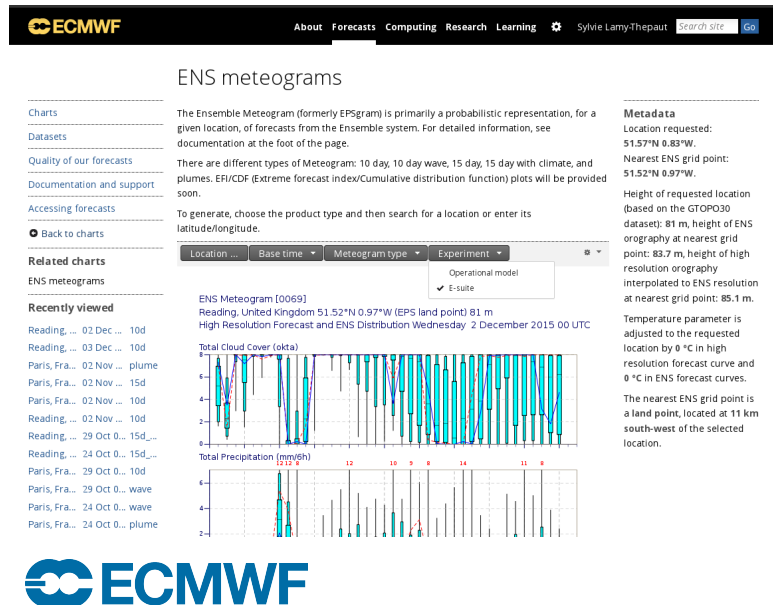
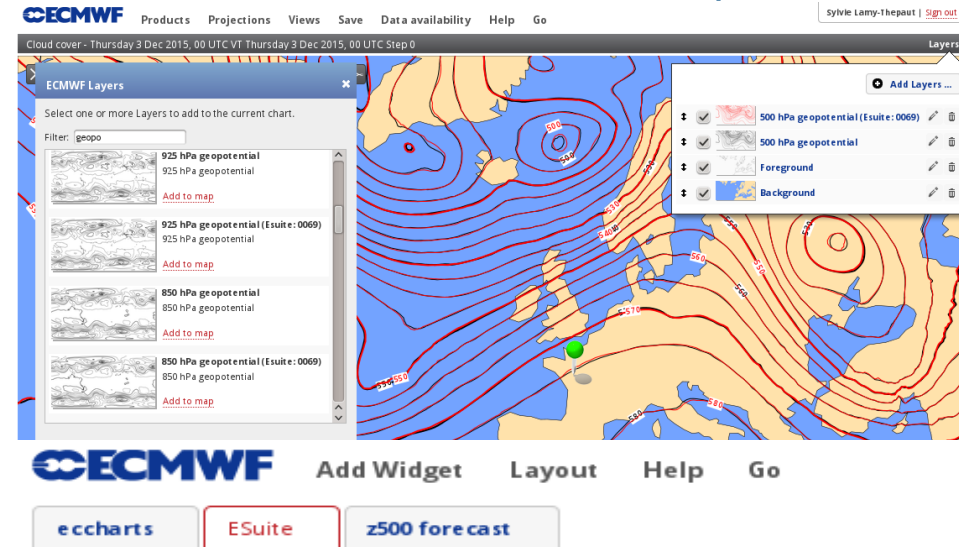
- Derived products

- ENS combined and weighted probabilities
- ENS mean and spread
- EFIs
- SOTs
- Cyclone strike probabilities
- Cyclone tracks
- Model-climate
- Spaghetti plots



ecCharts updates – IFS cycle updates (March and November 2016)

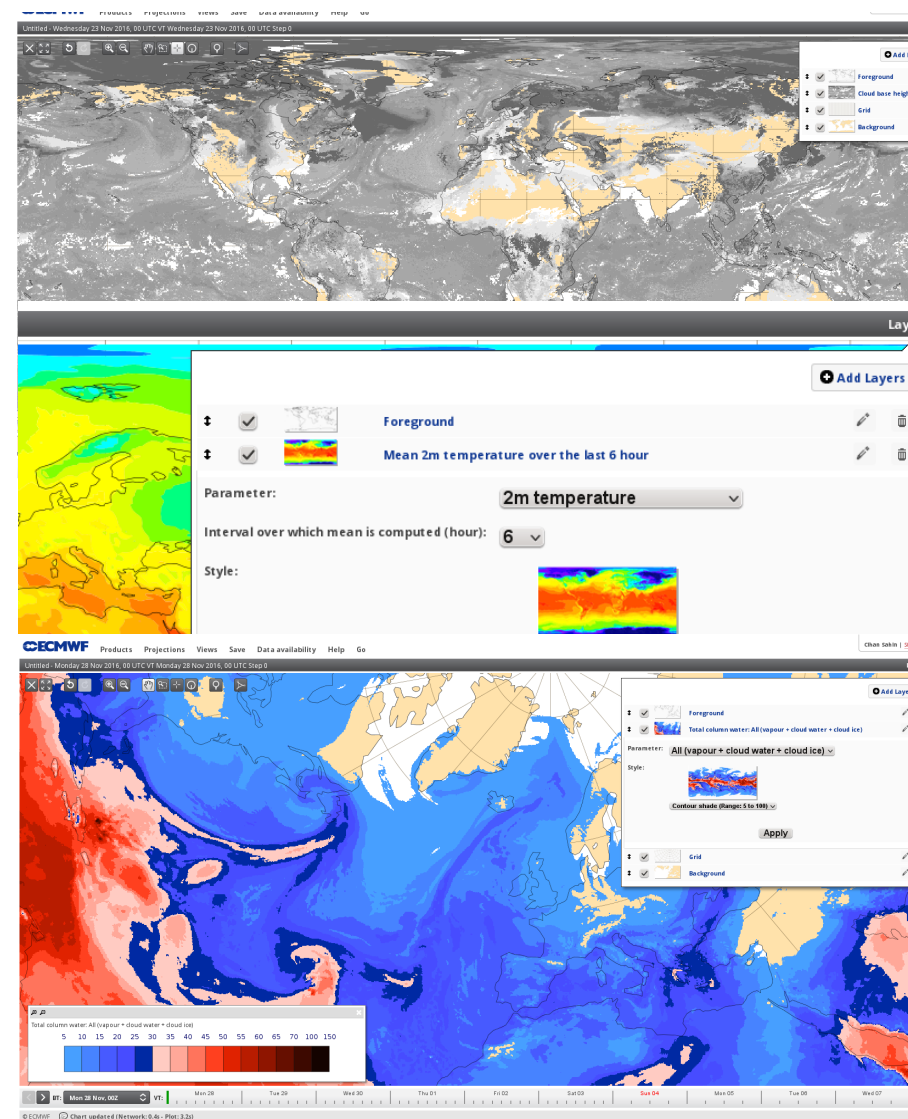
- Dedicated to new IFS cycle upgrades (e-suite cycle 41r2 and 43r1)
- All e-suite data/charts made available for ~2 months until implementation date.
- Operational layers were duplicated for e-suite to overlay/compare with operational data.
- Meteograms from e-suite were available on Meteogram page on www.



November 2016 update

- Implementation of new parameters (~25) (end of November) as requested by users;
 - Cloud base height, Mean 2T over a period, Total column water vapour, PV at various levels
 - Model climate parameters at various percentiles (2T min/max/mean, wind gust, wind speed, snowfall, total precipitation, wave height)
 - Parameters from new IFS version;
 - Height of zero/one degree Wet bulb temperature, height of convective cloud top, Ceiling, Wave energy flux, significant wave height with various periods
 - Meteograms (CDF plots for 2m min and max)
 - Province borders, style changes/updates

Full list available <https://software.ecmwf.int/wiki/display/ECCHARTS/ecCharts+updates+-+2016>



June 2017 update

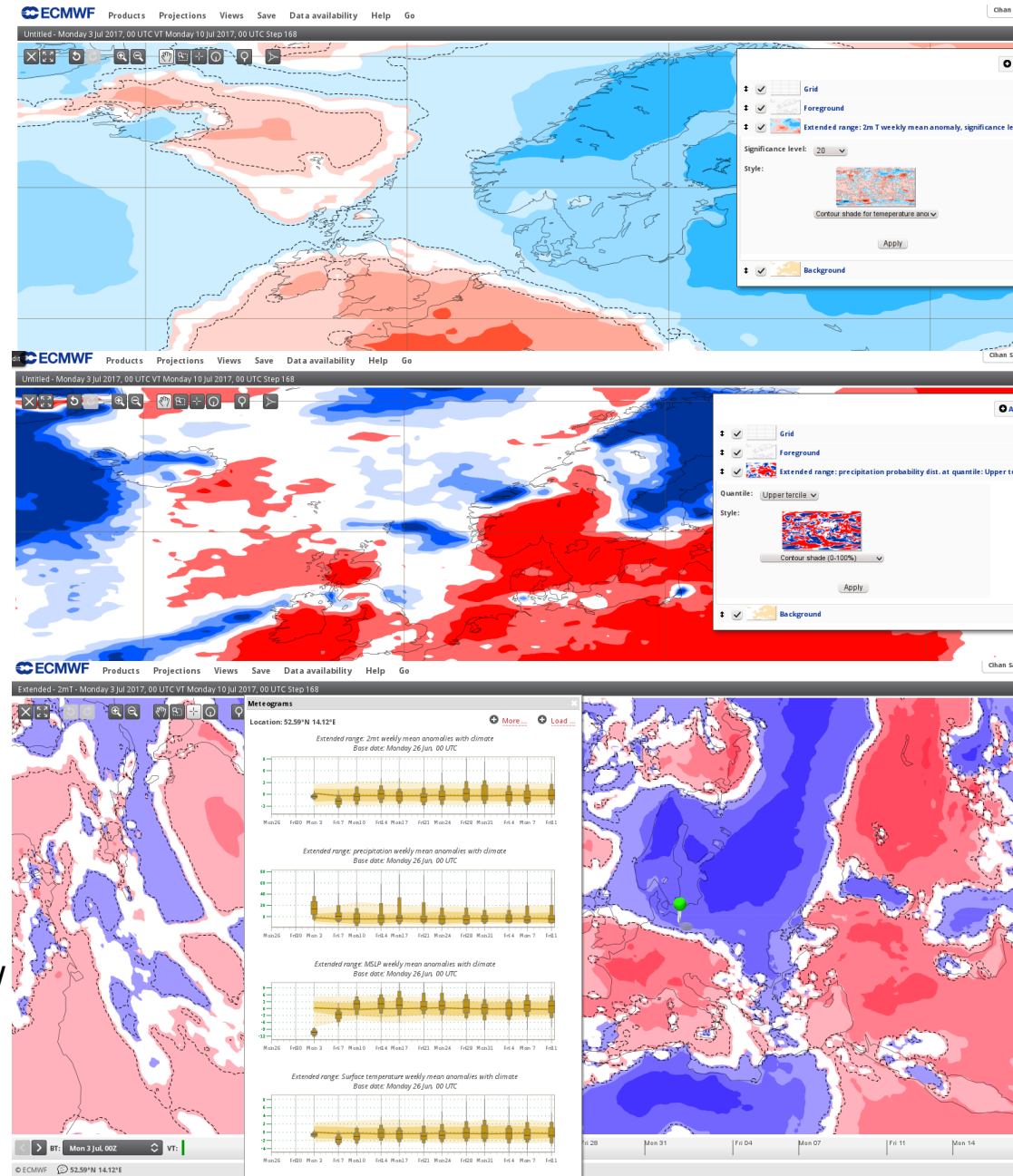
Dedicated to Extended-range forecast parameters (up to 6 weeks)

- Weekly mean anomalies (2mT, surface temperature, precipitation and MSLP) with controllable significance levels.
- Probability distributions for weekly mean anomalies (Same parameters)
- Extended range meteograms: Weekly mean anomalies with climate distribution (Same parameters)
- Updated twice a week: Monday/Thursday 22:00 UTC

NEWS

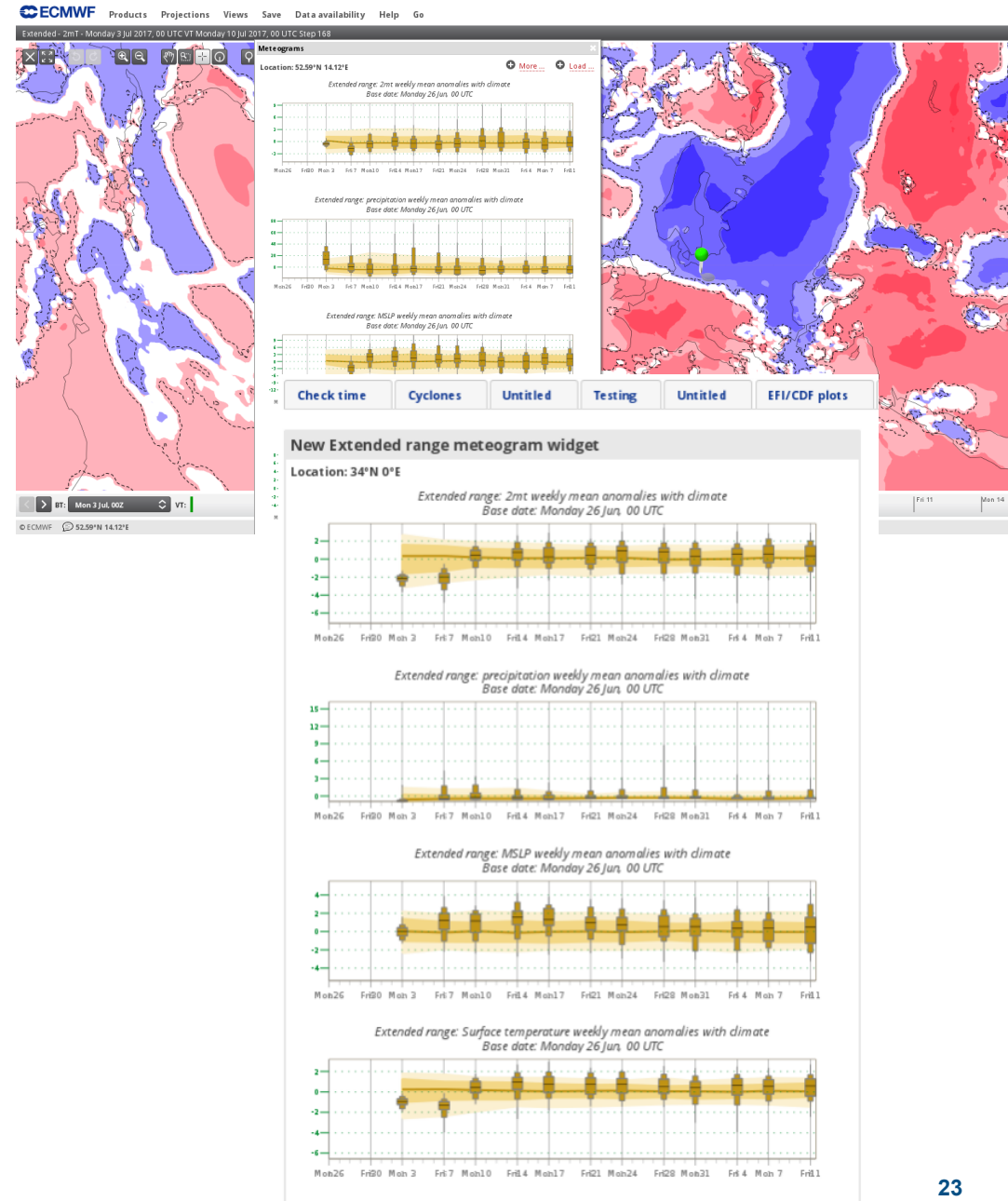
- SST and sea ice cover from Control forecast
- Speed improvements for Spaghetti plots

Full list available <https://software.ecmwf.int/wiki/display/ECCHARTS/Updates>



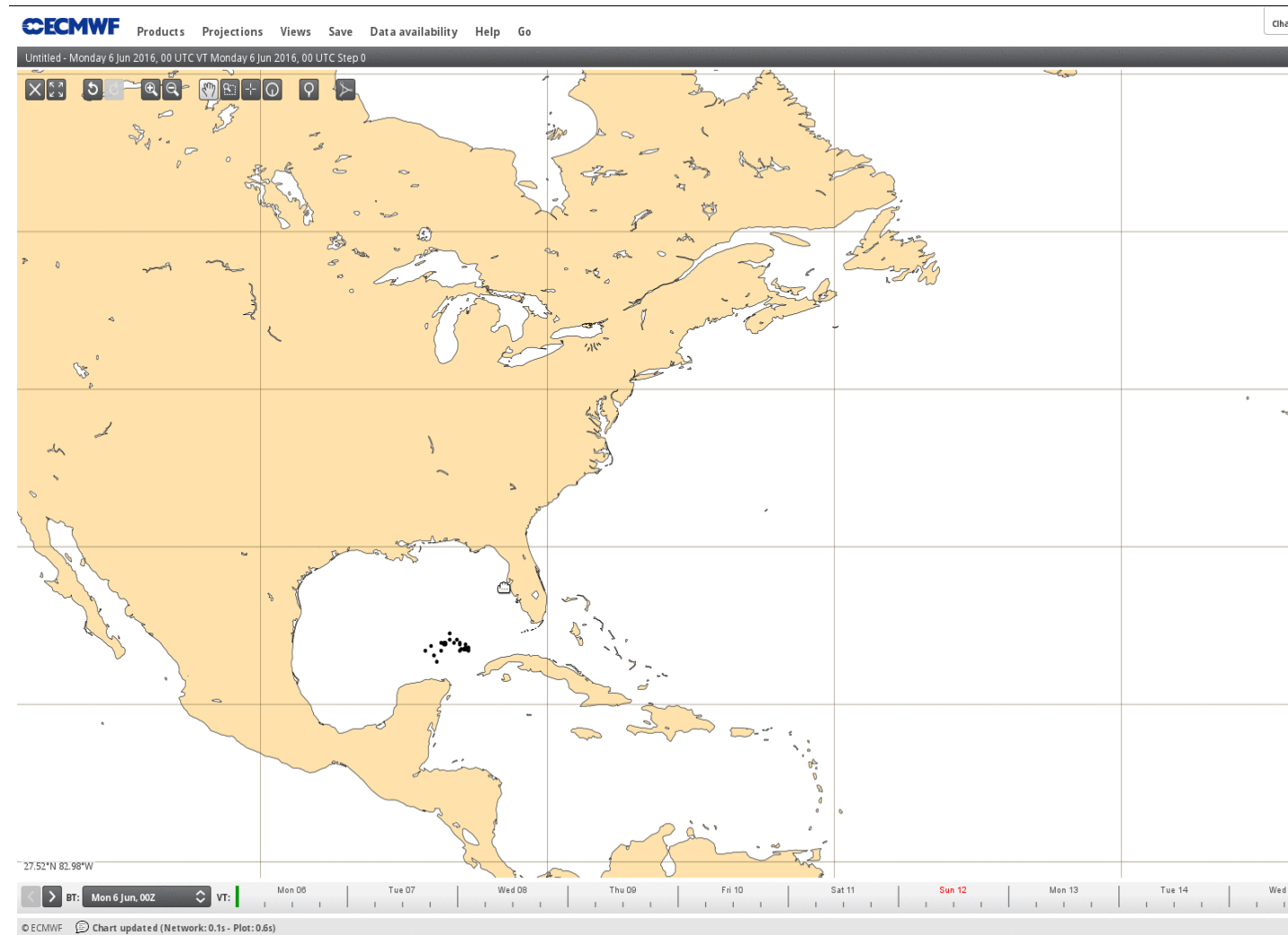
Extended range meteograms

- Weekly mean anomalies from real-time forecast (box plot) with Climate distribution (background shading)
- Forecast: Percentiles of weekly mean anomalies of 51 ENS members
- Climate: 20-year re-forecast (20 * 11 members = 220 samples) of weekly mean anomalies (Colour shading for percentiles)
- Parameters: 2m T, surface temperature, precipitation, mean sea level pressure
- Box plot is positioned on valid-time (Actually valid for a past week)



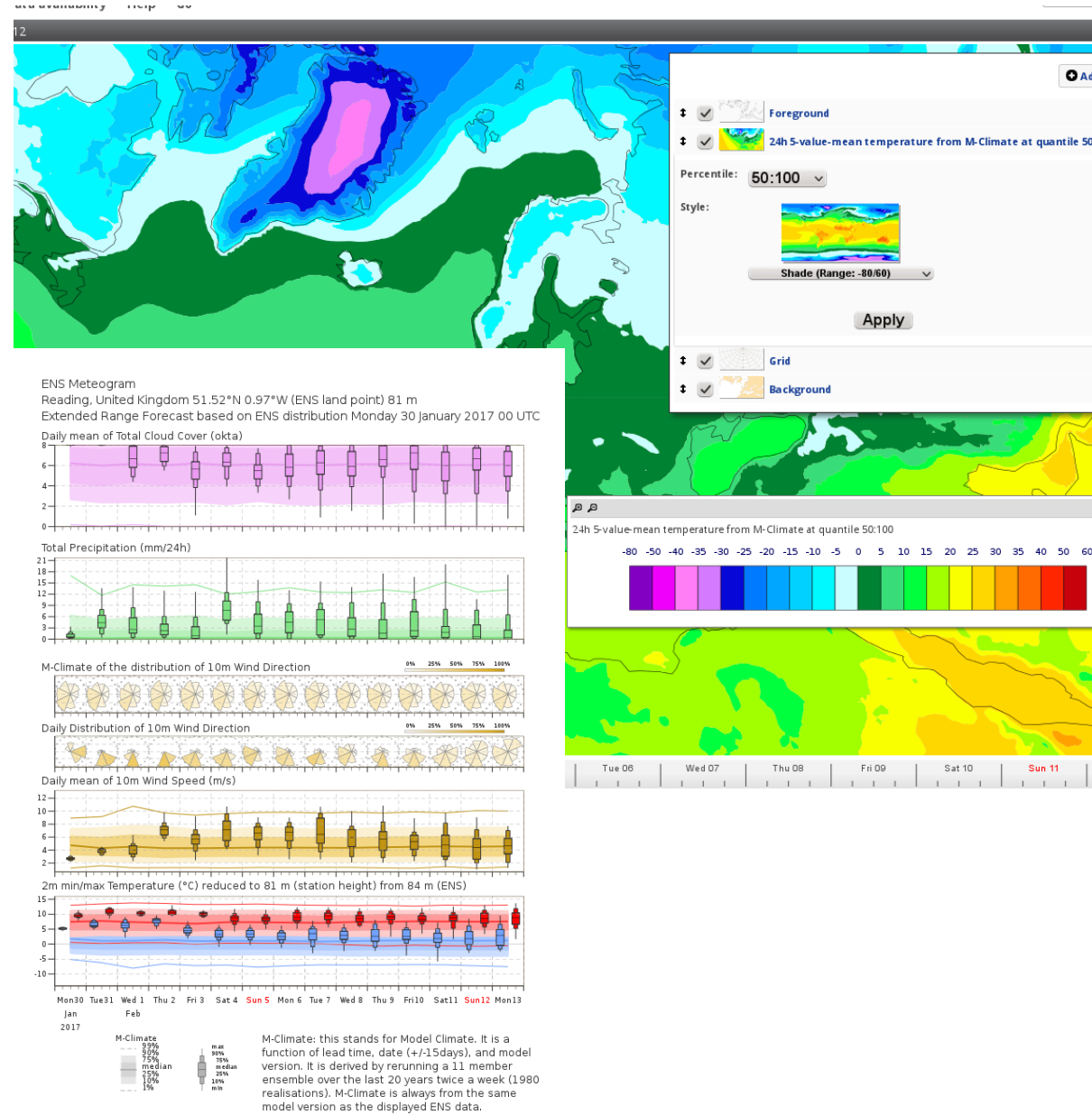
Tropical cyclone tracks

- Tracks are generated for all TCs that have been officially observed.
- 2 layers available
 - Named tropical cyclone (name and positions only)
 - Displays track positions (HRES and ENS members) and name
 - Named tropical cyclone tracks
 - Displays tracks of HRES and ENS members.
- Parameters to track
 - Minimum pressure
 - Maximum wind speed
- Various track visualisations available



Model-climate

- It is derived by rerunning a 11 member ensemble over the last 20 years twice a week (9 forecast * 11 members *20 years = 1980 realisations)
- M-Climature is always from the same model version as the ENS forecast fields.
- Used to derive EFI/SOTs and monthly forecast.
- M-climate is produced twice a week (every Monday and Thursday)
- M-Climature is also available as point forecast charts as Meteograms in ecCharts and www Meteograms.
- Parameters: Max wind gust, 2T (mean, min,max), CAPE, CAPE shear, wind speed, total snowfall, total precipitation, max. swh

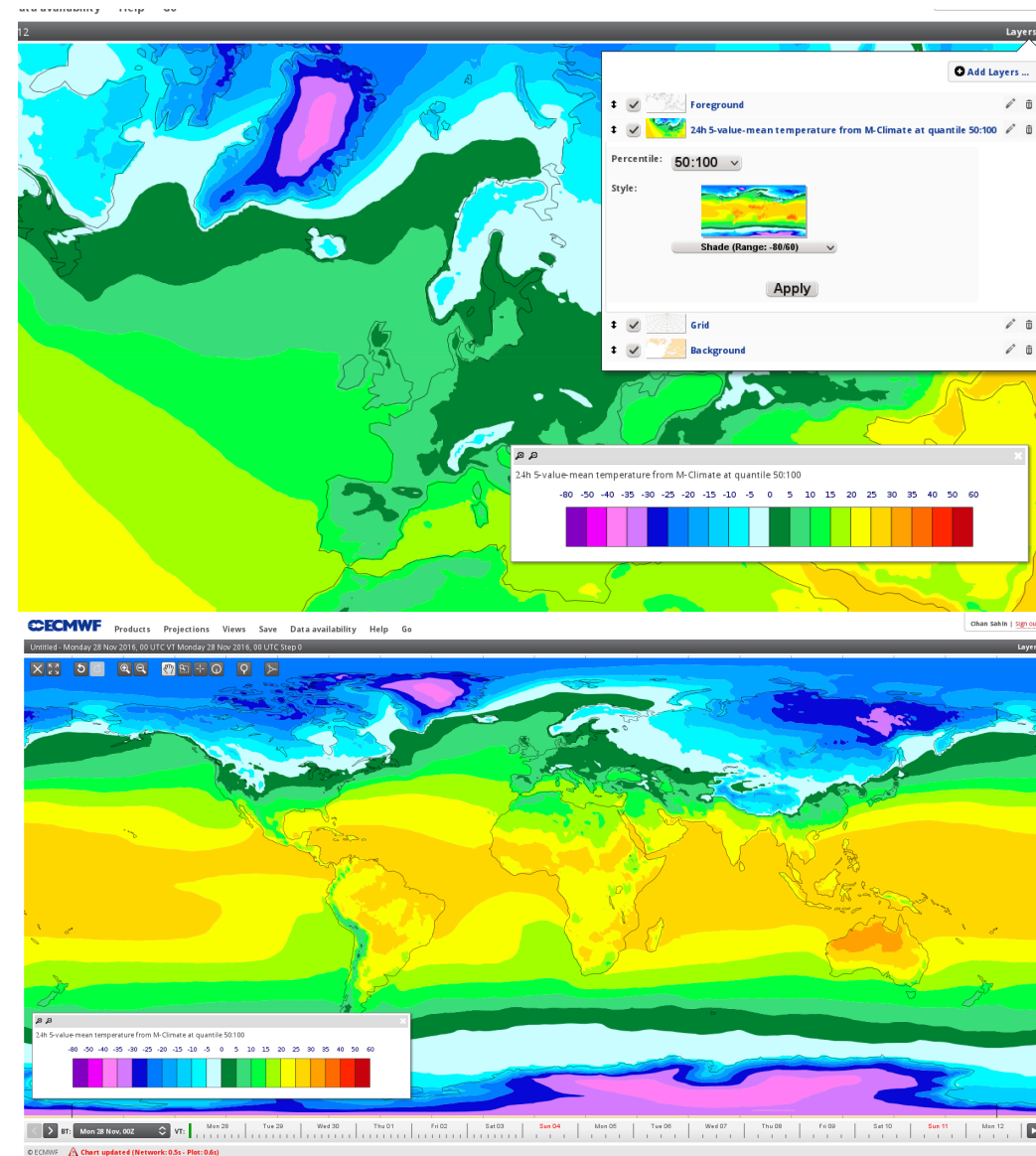


Model-climate in ecCharts

- Produced as “daily” values. In ecCharts, they are provided for all forecast runs and all time steps of a standard ENS field (3 hourly up to day 6 and 6 hourly up to day 15), which each time step of a day shows the same M-climate field to make it possible to overlay M-Climate fields with daily forecast fields.

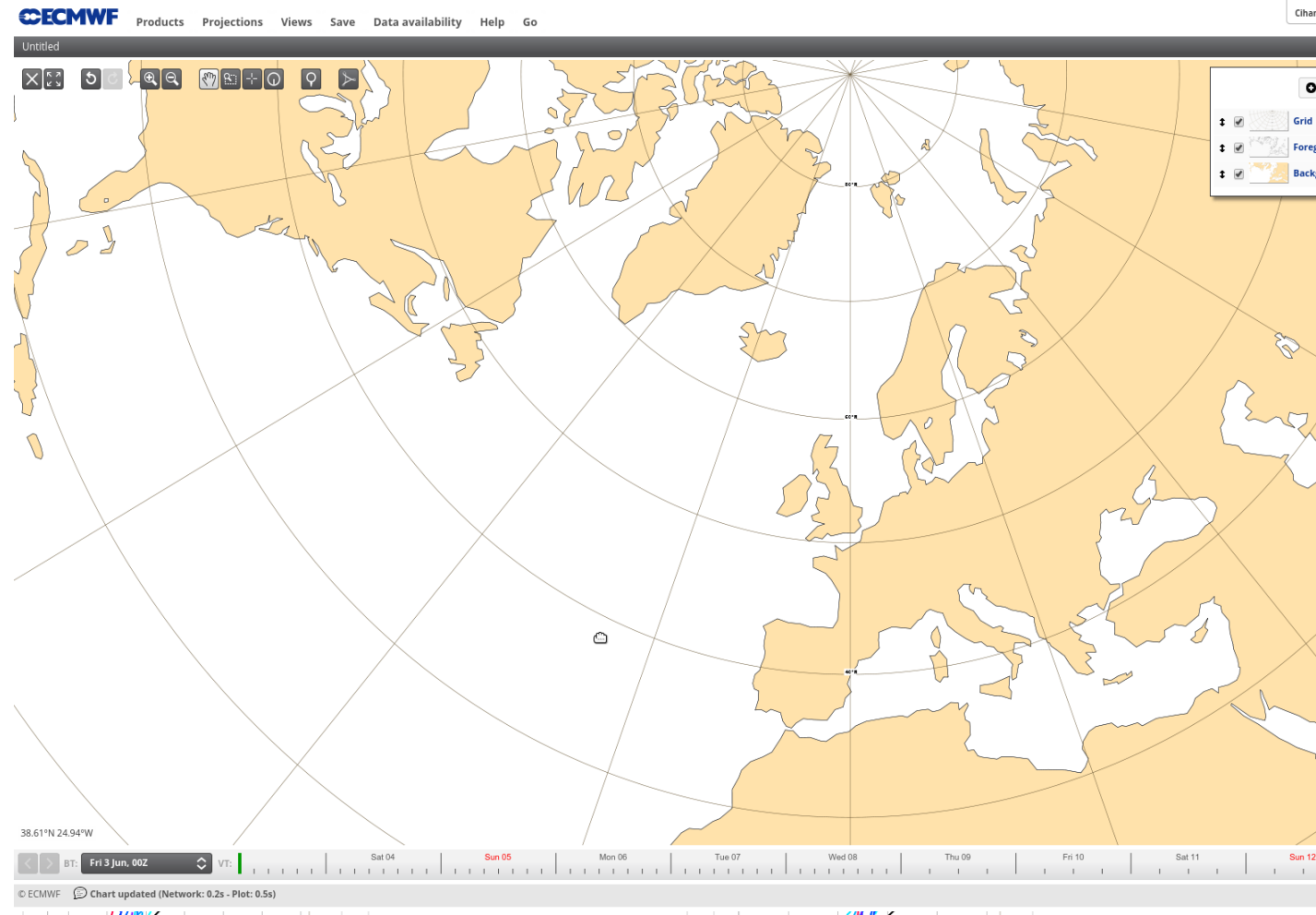
Steps T+0 to T+24 maps to Day 1 M-Climate
Steps T+27 to T+48 maps to Day 2 M-Climate
Steps ...

- Various percentiles are provided for each Model climate layer (0,1,10,25,50,75,90,99,100%)
- In layer list, search for “climate” to list all Model climate layers.



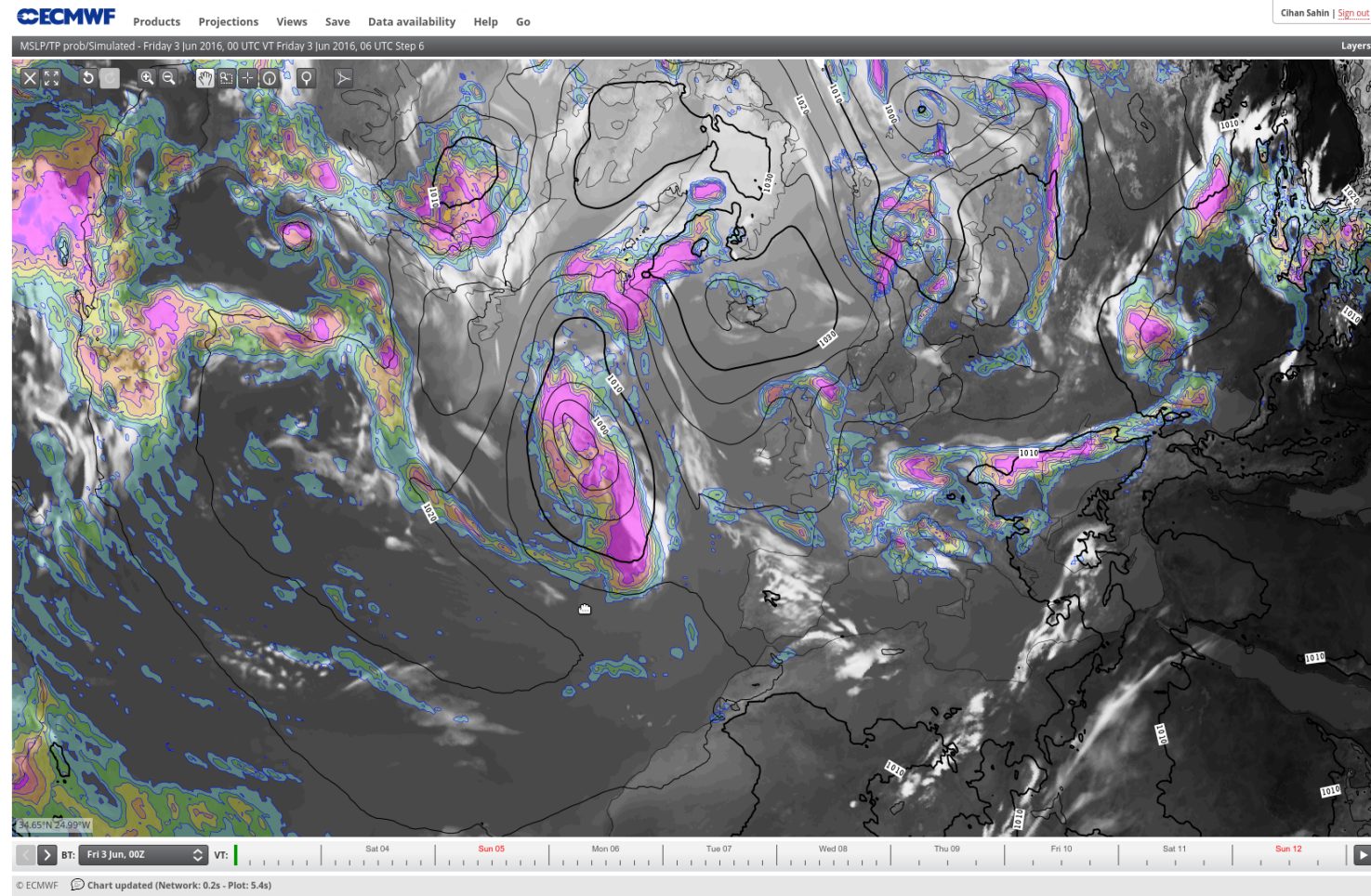
Use case: Make your own products

- Design your product
- Save as your own product
- Display in your Dashboard



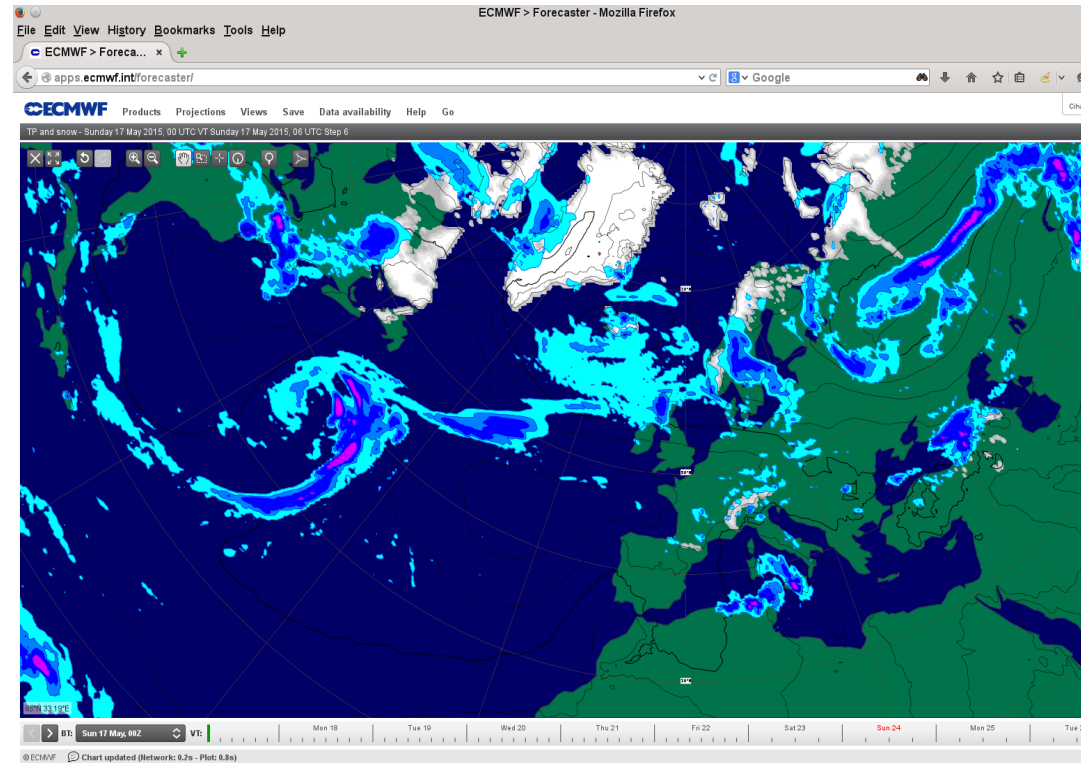
Use case: Explore data

- Display your product
- Probe data values
- Generate time series
- Display meteograms



Next update

- Adding more parameters based on user requests
 - Extended range forecast : more parameters, more products
 - Most probable precipitation type
 - Meteogram: most probable precipitation type
 - Provide IFS cycle upgrades (e-suites) when available
- Start looking at vertical profiles
 - Data preparation (computational challenges as ENS are involved)
 - Product design (Parameters, steps, levels ...)
- Next content update is end of November 2017.



Update procedure

- Product updates are done twice a year June and November.
- Requests are collected via meetings, requests coming to ECMWF documentation pages, e-mails, Training courses ...
- ecCharts will contain only parameters that are in [The Catalogue of ECMWF Real-Time Products](#)
- Full information available in ecCharts documentation pages.

You can follow the updates here;

<https://software.ecmwf.int/wiki/display/ECCHARTS/Updates>

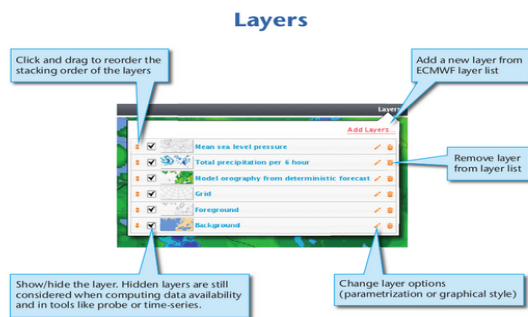
Please contact us if you wish to see additional parameters in ecCharts.

ecCharts documentation & feedback

- Documentation is under ECMWF wiki pages. Help > ecCharts on ecCharts user interface.
 - <https://software.ecmwf.int/wiki/display/ECCHARTS/Home>
- Request new product or feature
 - [Click here to make a new product or feature request](#)
- Report bug or general communication
- ecCharts updates
 - Follow recent and planned updates

Practicals

Please follow hands-on practicals



Overview

