

Updates on graphical products & applications

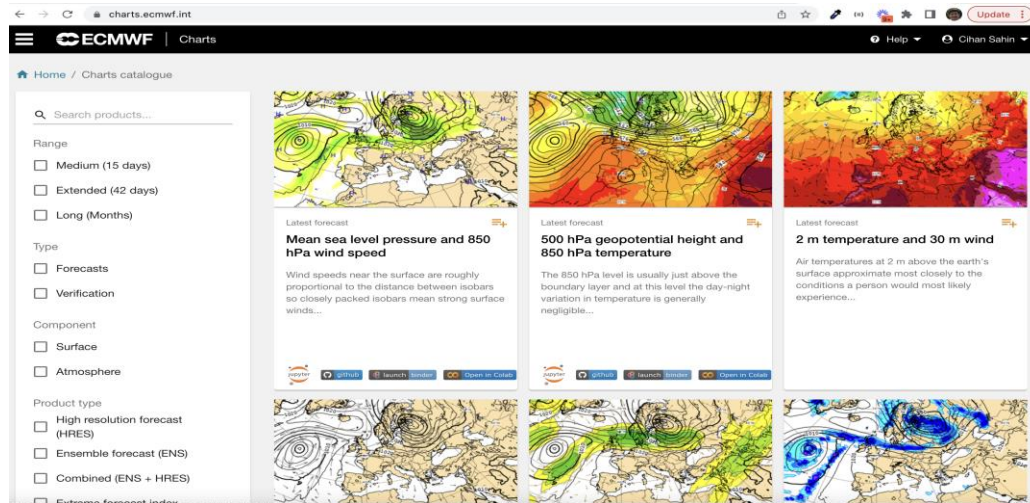
UEF – June 2024

Cihan Sahin (On behalf of Web Services Team)

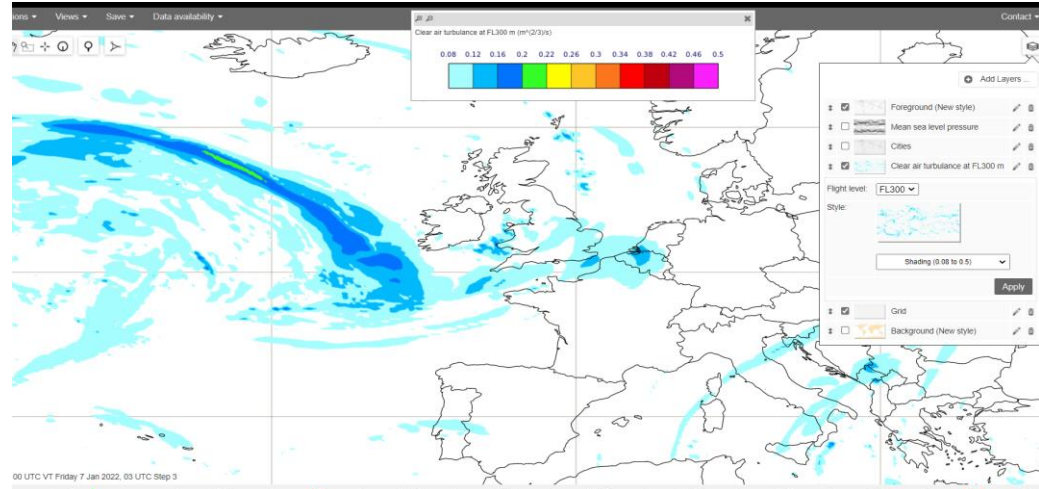
cihan.sahin@ecmwf.int

Access to graphical products (Chart applications)

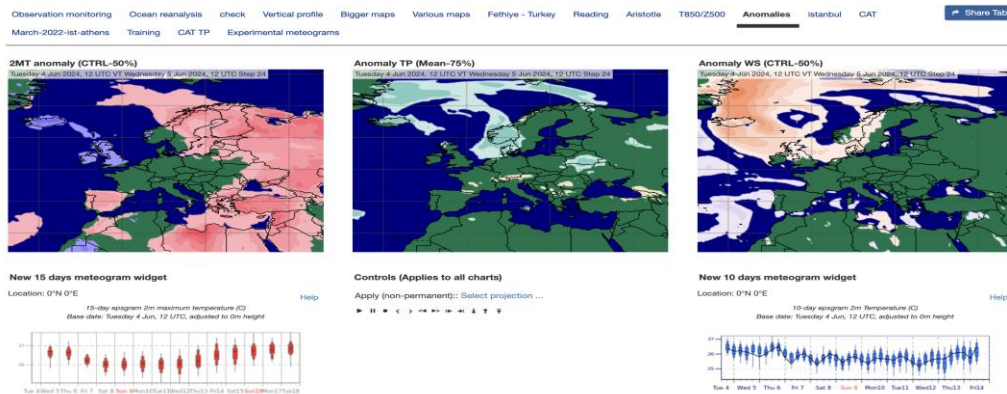
Opencharts (Public access)



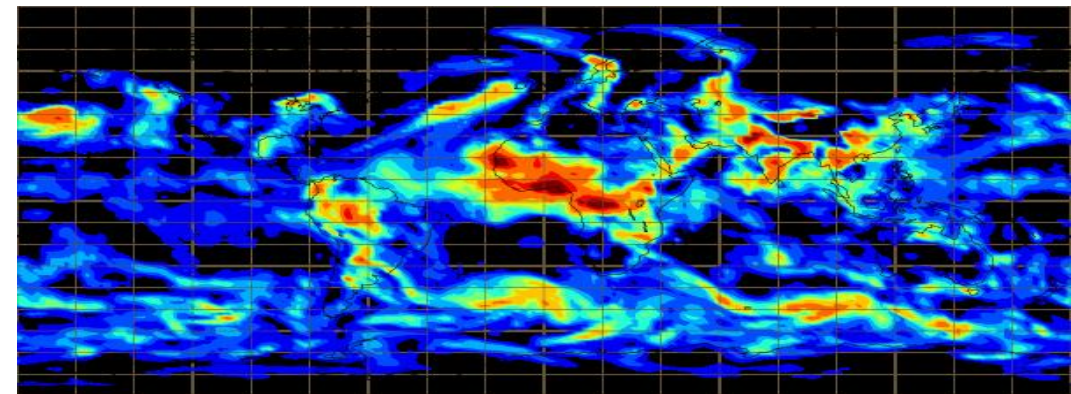
ecCharts (Restricted access)



Charts dashboard

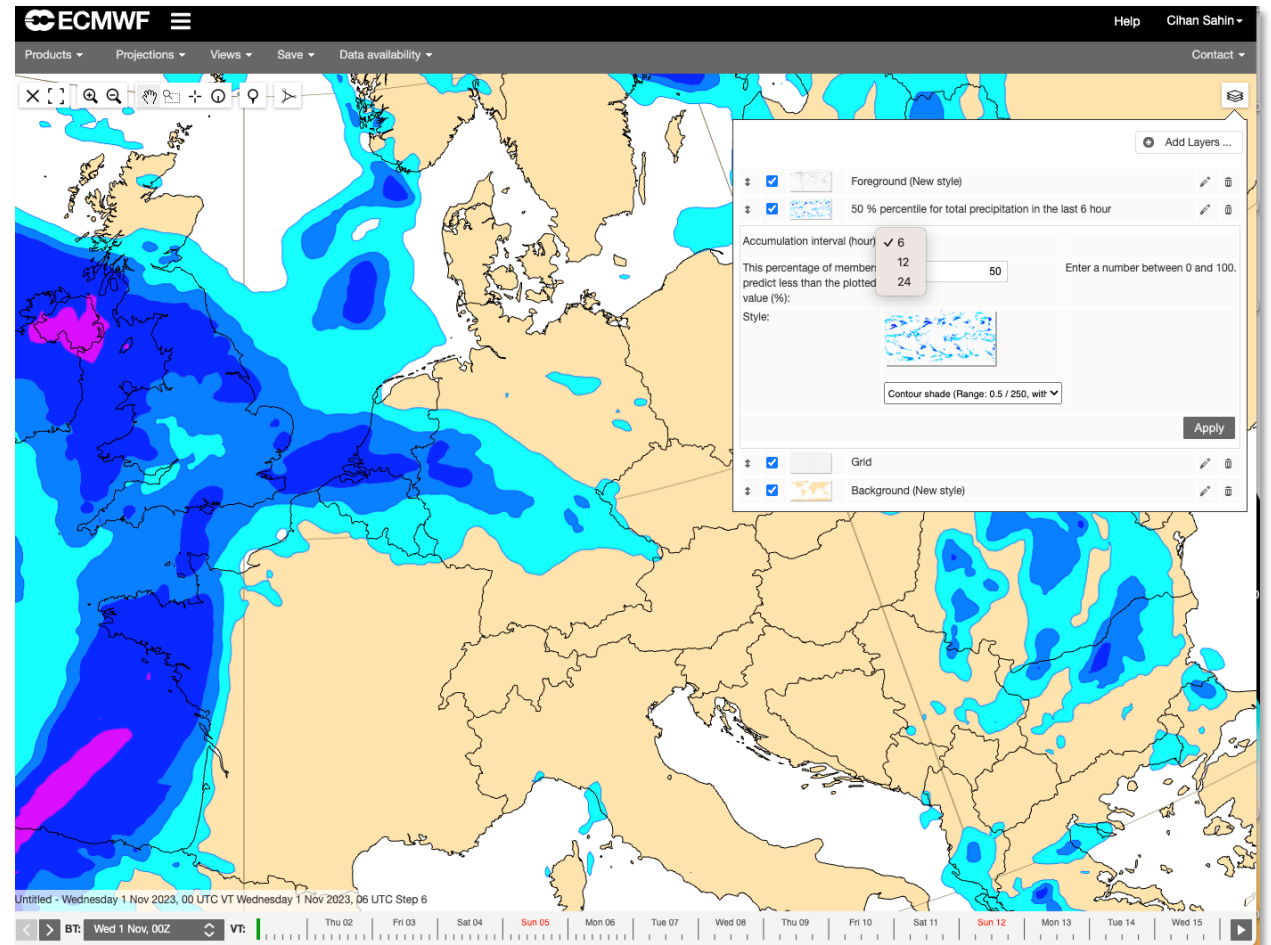
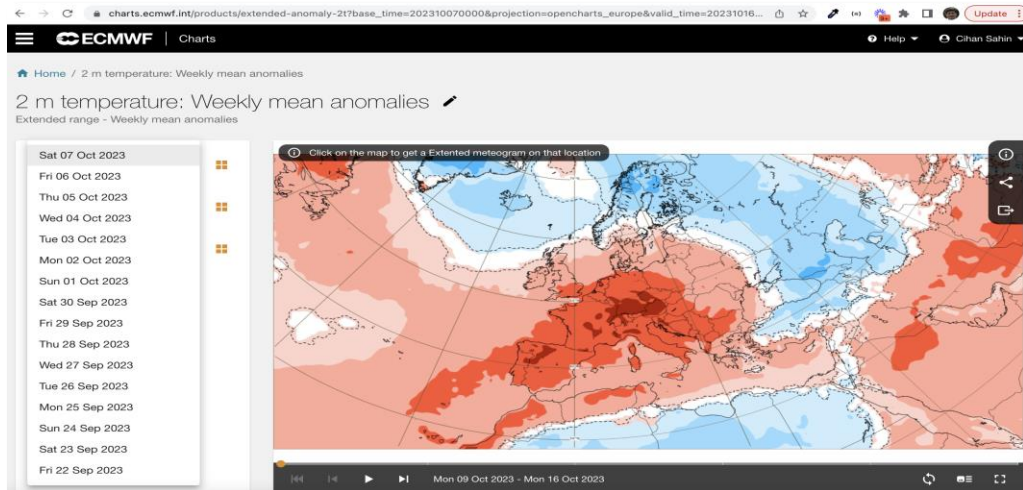


Web Map Service (WMS)



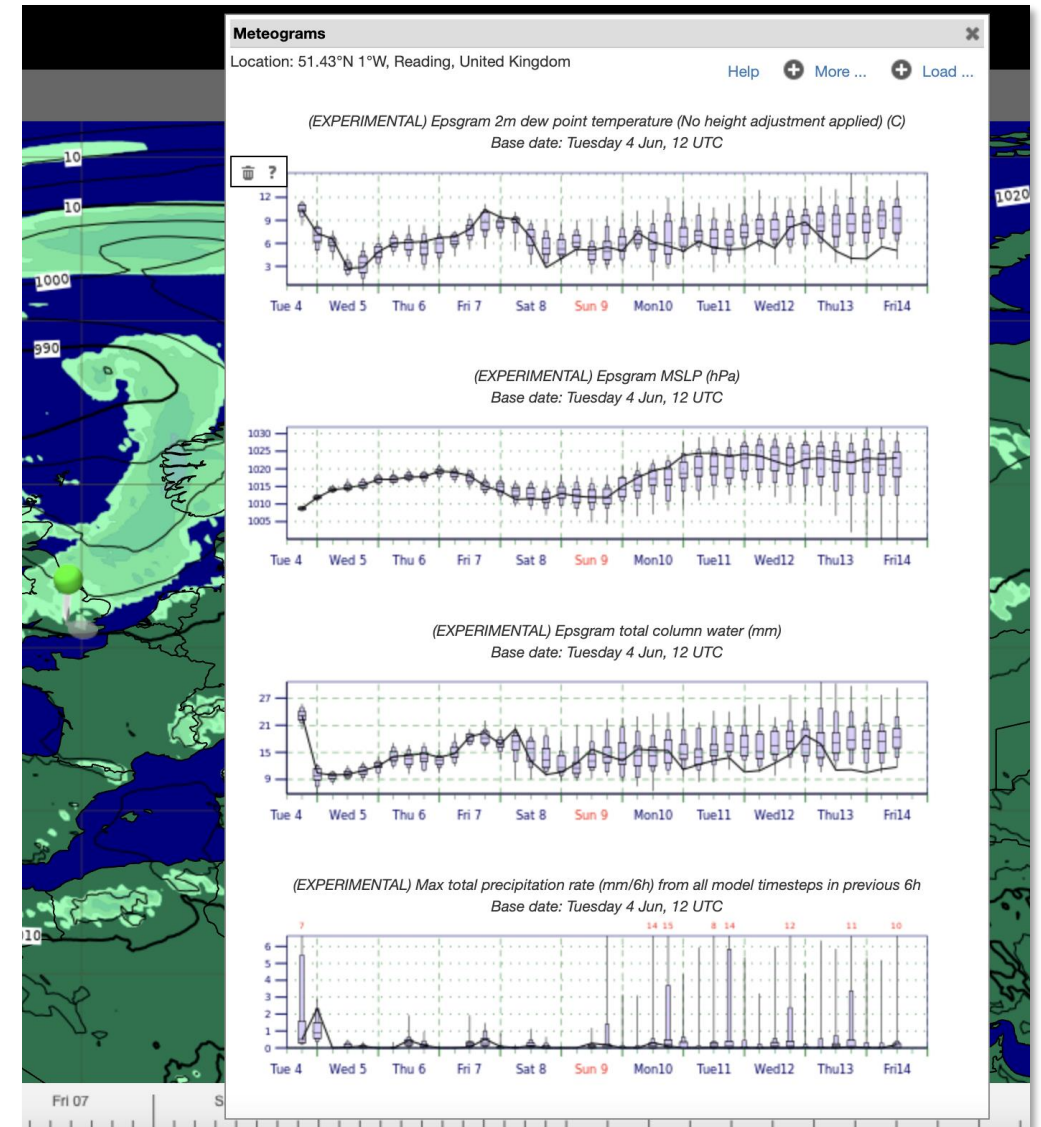
New products – IFS cycle 48R1

- ✓ Since October 2023
- ✓ High resolution ENS products
 - ✓ All ENS data on O1280 (~9 km)
 - ✓ All ENS meteograms on O1280
 - ✓ ENS Vertical profiles on O640 (~ 18 km)
- ✓ ENS percentiles in ecCharts much faster
 - ✓ ENS distributions pre-computed
- ✓ Extended range daily updates
- ✓ Additional precipitation type (Freezing drizzle)



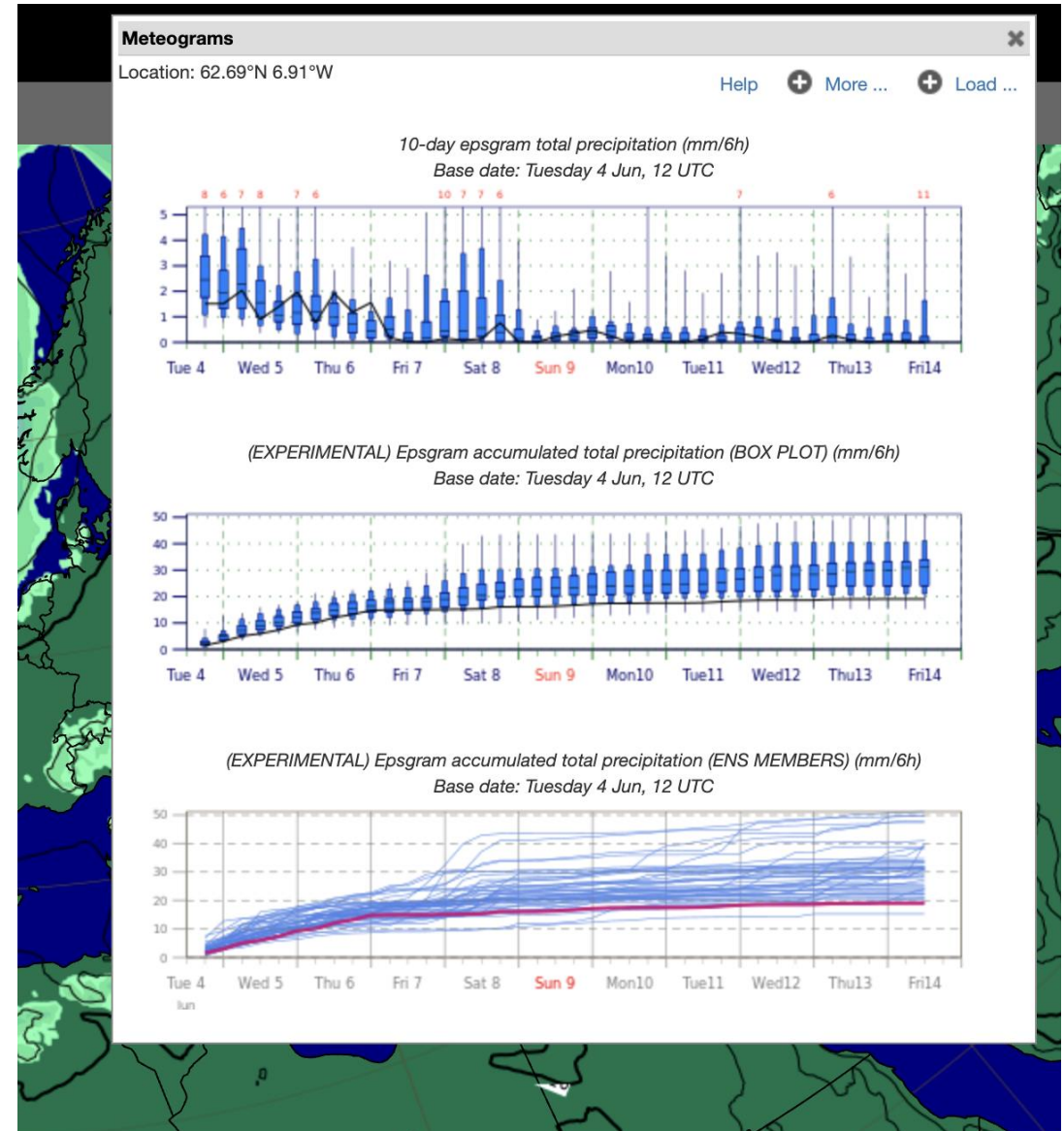
New products – Additional ENS Meteograms

- Experimental Ensemble meteograms result of a collaboration with DWD (thanks to Thomas Schumann and Franz-Josef Mole)
- Desire to improve forecast for convective activities
- Parameters;
 - ✓ 2m dew-point temperature
 - ✓ MSLP
 - ✓ Total column water
 - ✓ Max total precipitation rate
- Available in ecCharts and Chart dashboard
- Opencharts version to follow up



New products – Additional ENS Meteograms

- Accumulated total precipitation (6 hourly)
 - ✓ Temporal accumulation of precipitation per member.
 - ✓ Each Ensemble member
 - ✓ Percentiles as box-whisker plot



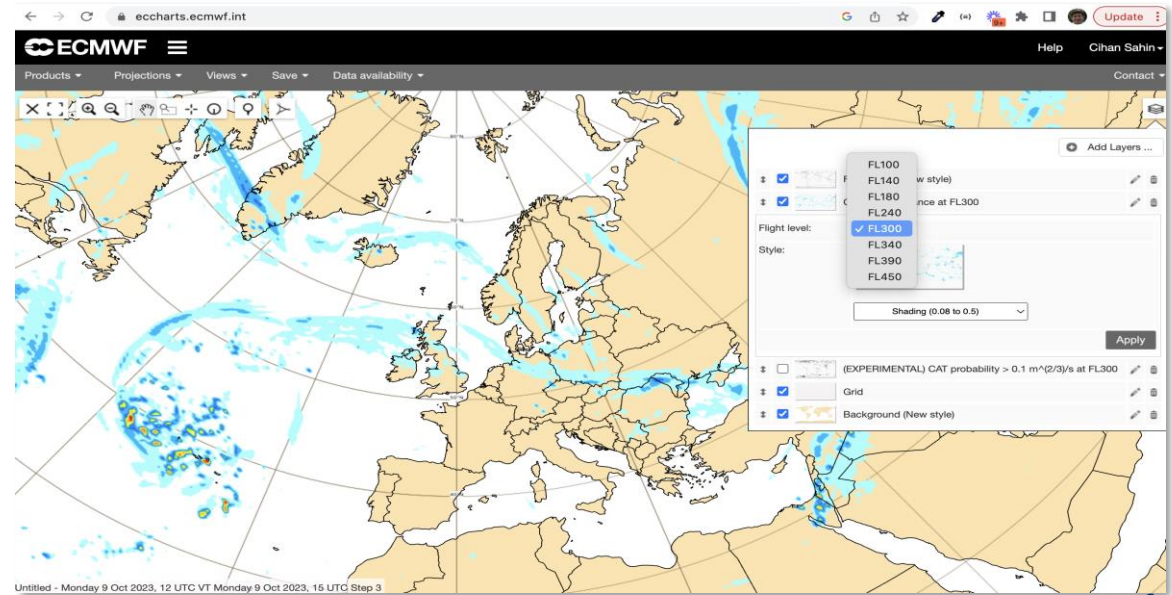
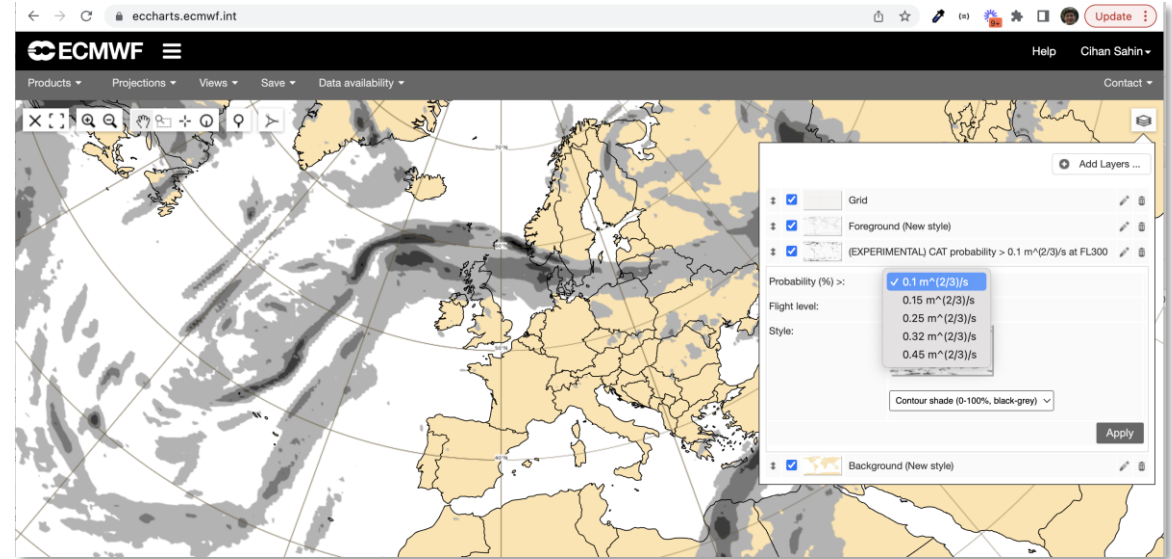
New products – Clear air turbulence (CAT)

- Conversion;
 - ✓ Model level > Height > Flight level
- CAT from HRES (available for a while)
 - ✓ Flight levels: 100, 140, 180, 240, 300, 340, 390, 450
- CAT probability at flight levels (Since 48r1)
 - ✓ Huge amount of data to handle
 - ✓ Flight levels: 100, 140, 180, 240, 300, 340, 390, 450
 - ✓ Thresholds: >0.1/0.15/0.25/0.32/0.45
- Available in ecCharts
- Opencharts versions (both HRES and ENS) coming soon.

Details in: ECMWF Tech Memo 874

ECMWF Newsletter No 168, summer 2021
Dörnbrack, Bechtold, Schumann, JGR 2022

<https://www.ecmwf.int/en/elibrary/81370-ifs-documentation-cy48r1-part-iv-physical-processes>



New products – SSD visible channels

- Simulated satellite data from visible channel
 - ✓ 0.81 microns
 - ✓ 0.635 microns
 - ✓ See Opencharts product page for description
- More channels on the way from cycle 49R1
- Watch 49R1 update pages

These charts are from the ECMWF early-run high resolution forecast (HRES).

Select desired base time and valid time using the drop down menu. Base times cover the past five days. The drop-down menu is also used to select different map areas, and reflectance at different wavelengths. Date/times can also be selected using the slider underneath the chart, or the chart can be animated using the play/pause symbols at the bottom left.

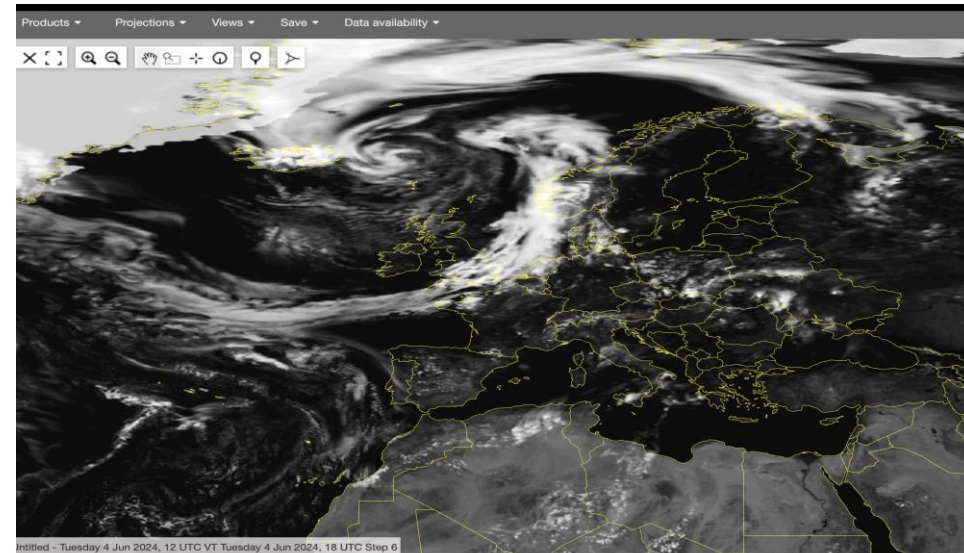
Simulated visible images show simulations of the upward flux of radiation (as would be detected by a weather satellite) derived from the model representation of temperatures and cloud layers. Forecast visible reflectances are generated from the model forecast fields. These reflectances produce pictures equivalent to visible images available from real satellites. But note: (i) the area of coverage includes high latitudes, (ii) every pixel is assumed to be an overhead (nadir) view, (iii) the sun (i.e. the solar illumination) is always assumed to be directly overhead. Point (iii) means that cloud structures can still be seen at locations and times even when in reality it is dark, but also that, unlike on real visible images, shadowing from clouds is never represented.

The products display cloud-related fields from the model in a format that is very familiar to forecasters and that they are used to interpreting. They can be easily compared with actual satellite imagery, but whenever comparing, forecasters need to be aware of points (i) to (iii) above.

The user can currently choose from two channels, 0.81 microns and 0.635 microns (from the dropdown menu). They produce similar results but the 0.81 micron channel is more sensitive to (model-based) vegetation.

In trials some discrepancies relative to model cloud fields (and relative to real satellite imagery) have been noticed. Sometimes low cloud does not show up in the way one would expect, so users are advised to also check model cloud fields to get a complete picture. These various discrepancies can arise because reflectance depends on optical depth, which can be in error, either because the amount of cloud condensate along the optical path is incorrect in the model, and/or because the optical path in the simulated image is not the same as the optical path in reality (because of assumptions (ii) and (iii) above).

Click on the middle icon to the bottom right for the reflectance scale. These simulated satellite images are produced out to ten days ahead.



(New!) Simulated images - visible channels
High resolution forecast

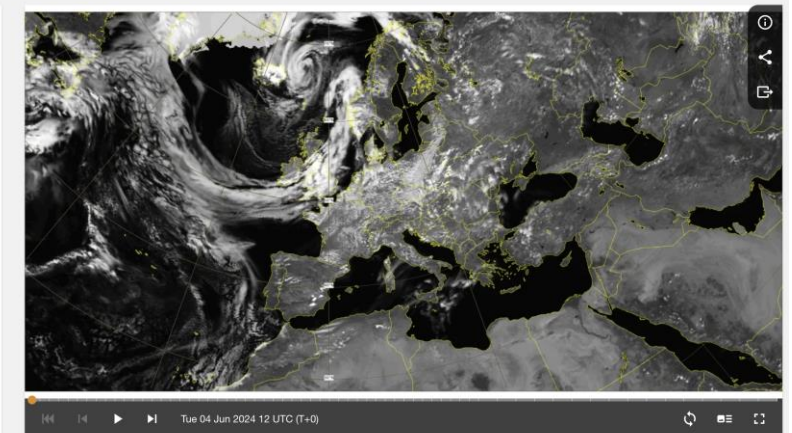
Base time
Tue 04 Jun 2024 12 UTC

Valid time
Tue 04 Jun 2024 12 UTC (T+0)

Area
Europe

Visible reflectance at 0.810 microns

Visible reflectance at 0.635 microns



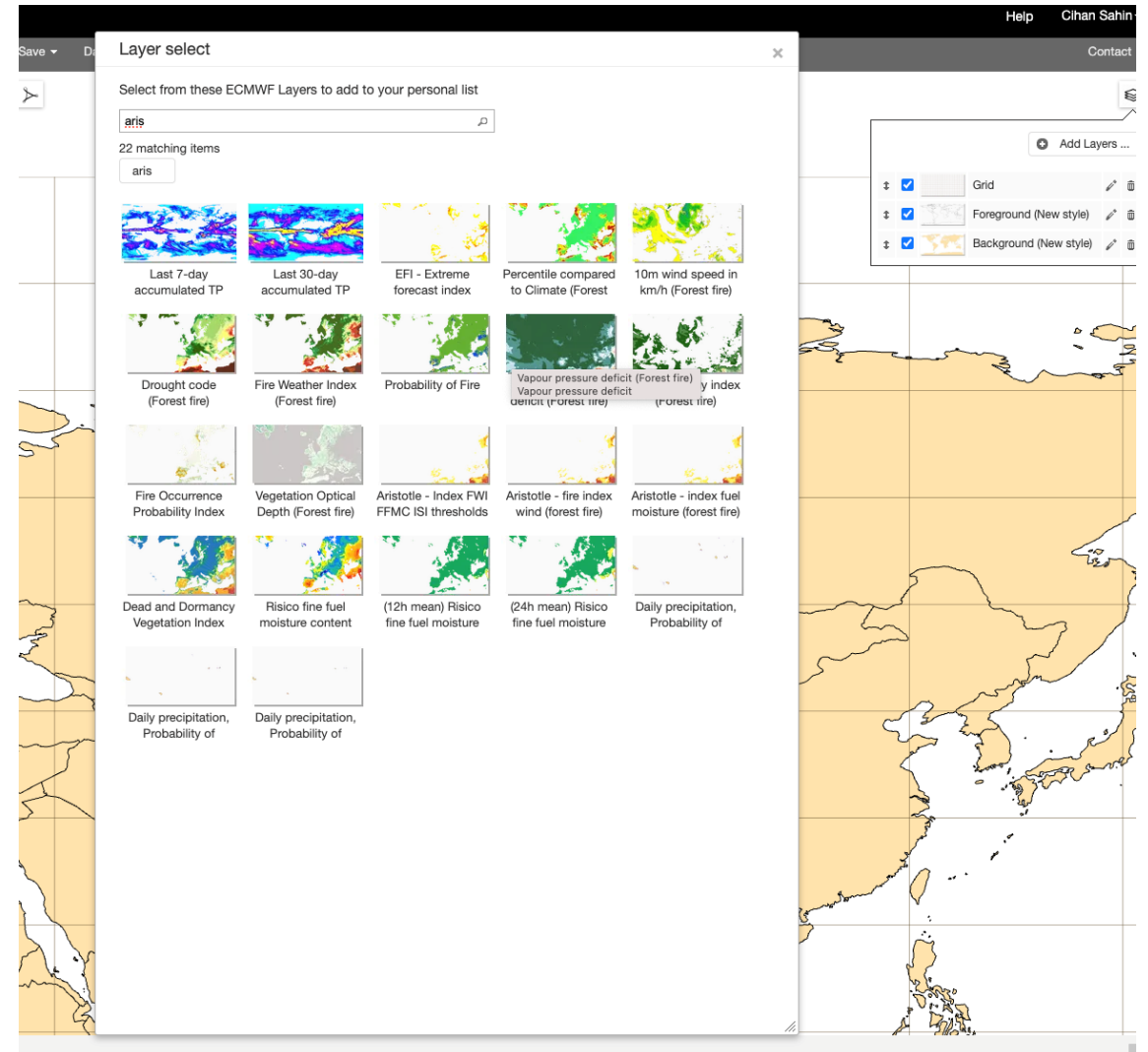
These charts are from the ECMWF early-run high resolution forecast (HRES).

New products – Output from Aristotle project

- Aristotle project provides “Forest fire” related layers to ecCharts users.
- In ecCharts layer list, search for “aristo” or “fire”

Some example layers;

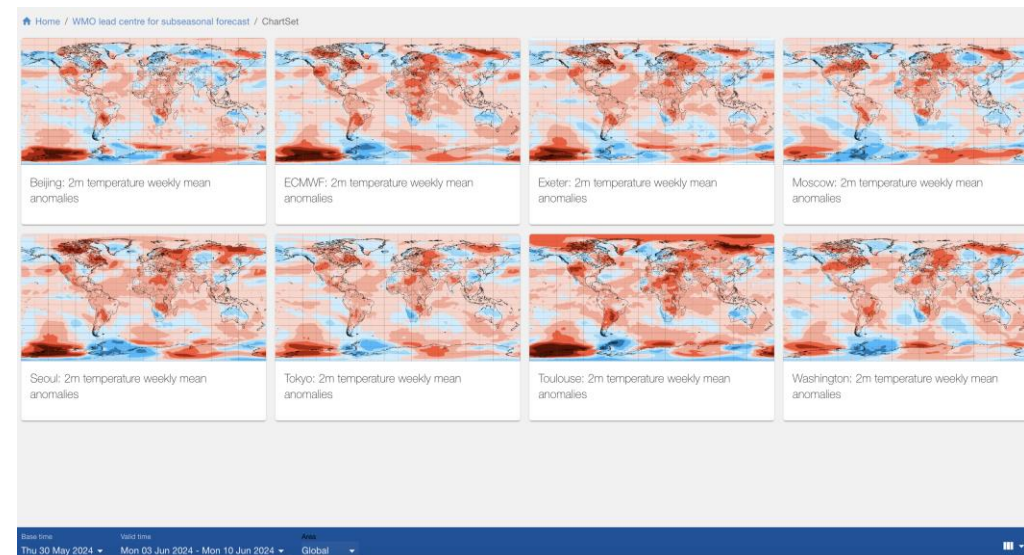
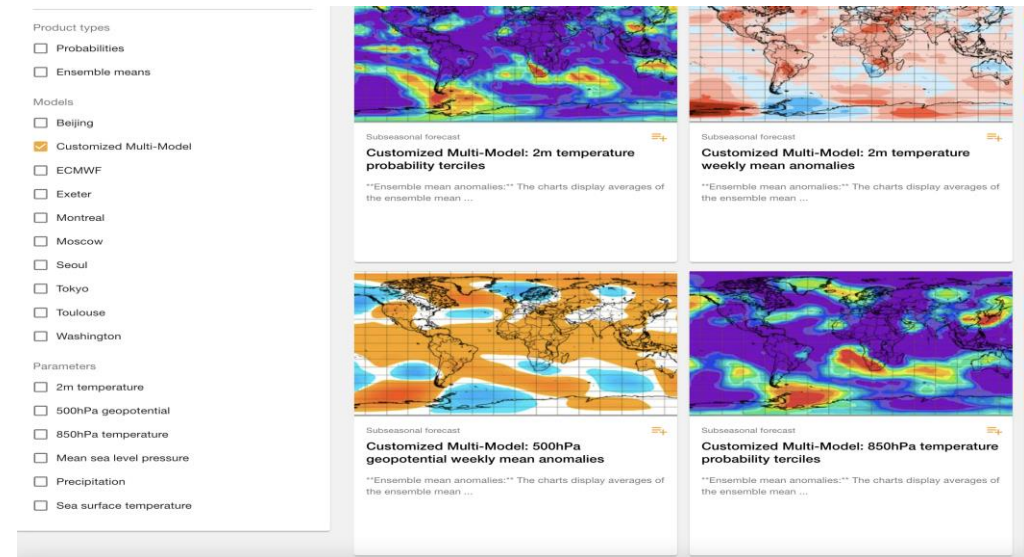
- **Vegetation Optical Depth:** Vegetation Optical Depth (VOD) is a measure that characterizes the density and water content of vegetation. It is particularly useful for assessing vegetation health and monitoring changes in plant biomass.
- **Fire Occurrence Probability index:** The FOPI is a new fire danger index developed at ECMWF. It combines the Canadian fire weather index (FWI) with remote observations of VOD to better predict landscape flammability. The FOPI is designed to improve fire danger predictions in all fuel-limited environments where fire is driven by the short-term drying of intermittently-available fuel.
- **Probability of Fire:** Pure ML model trained on observed fire activity will provide the probability of a fire to be detected given predicted weather and fuel conditions. It is given in terms of probabilities.



New products – S2S LC SSPMME website

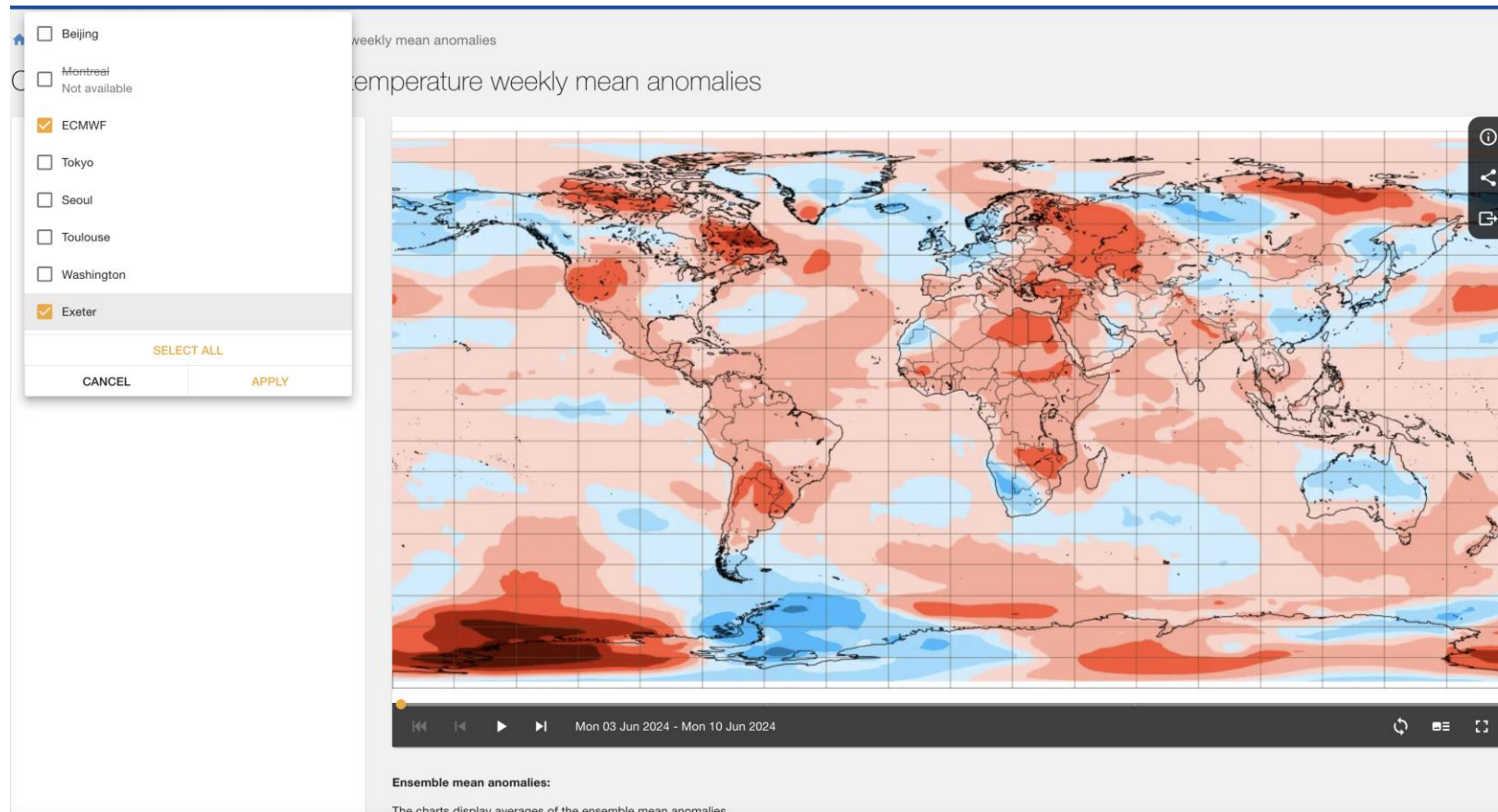
- WMO Lead Centre for Sub-seasonal Prediction Multi-Model Ensemble
- Sub-seasonal forecast (4 weeks) products made available from participating centres
 - ✓ Release time Mondays 12UTC
 - ✓ Forecast base time – previous Thursday
 - ✓ Ensemble means
 - ✓ Probabilities
 - ✓ Products from individual centres and multi-centre

charts.ecmwf.int/wmo



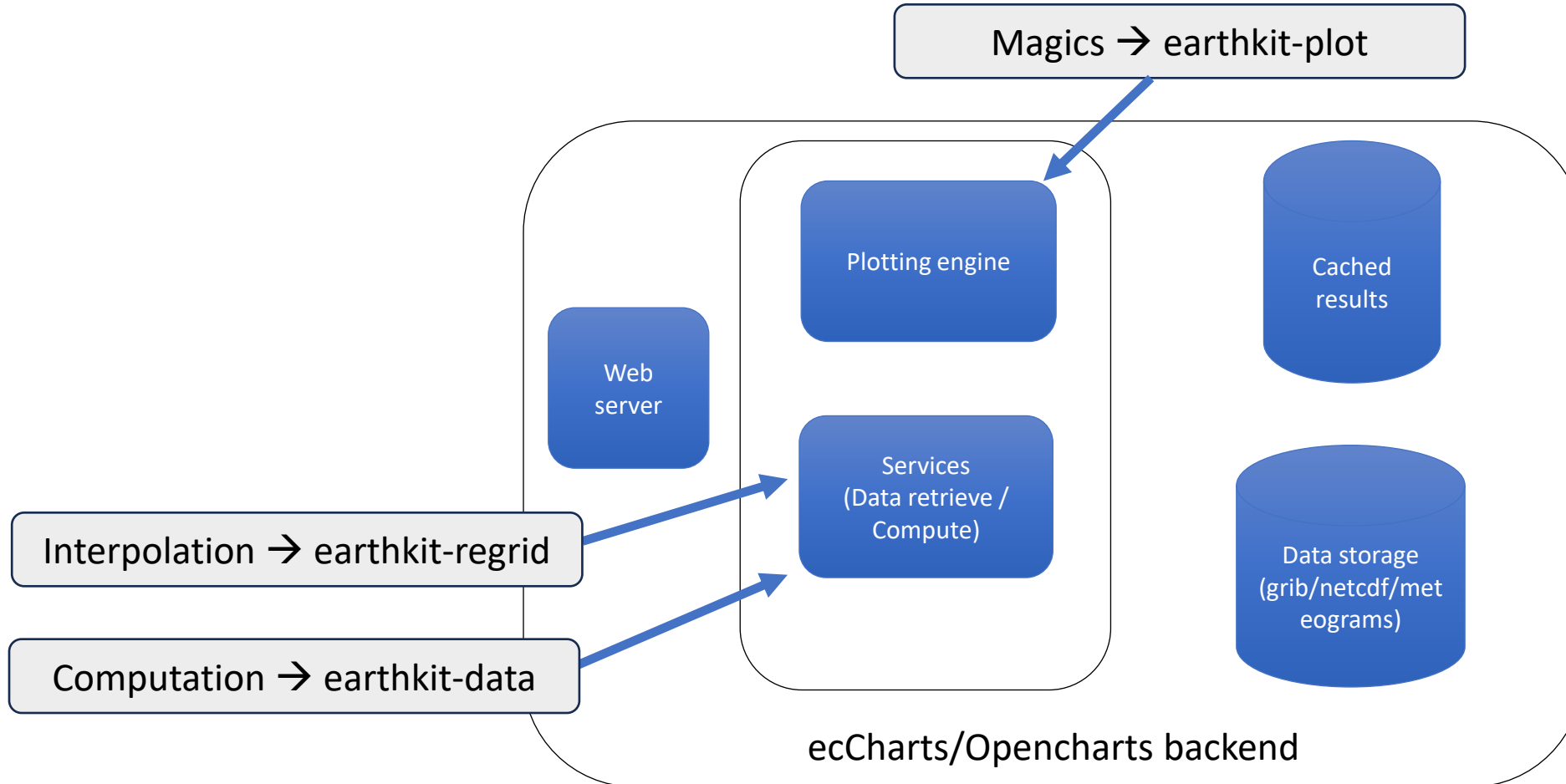
New products – S2S LC SSPMME website

Multi-centre on demand computation: User can select available centres to produce their “custom” multi-model.



Changes – under the bonnet

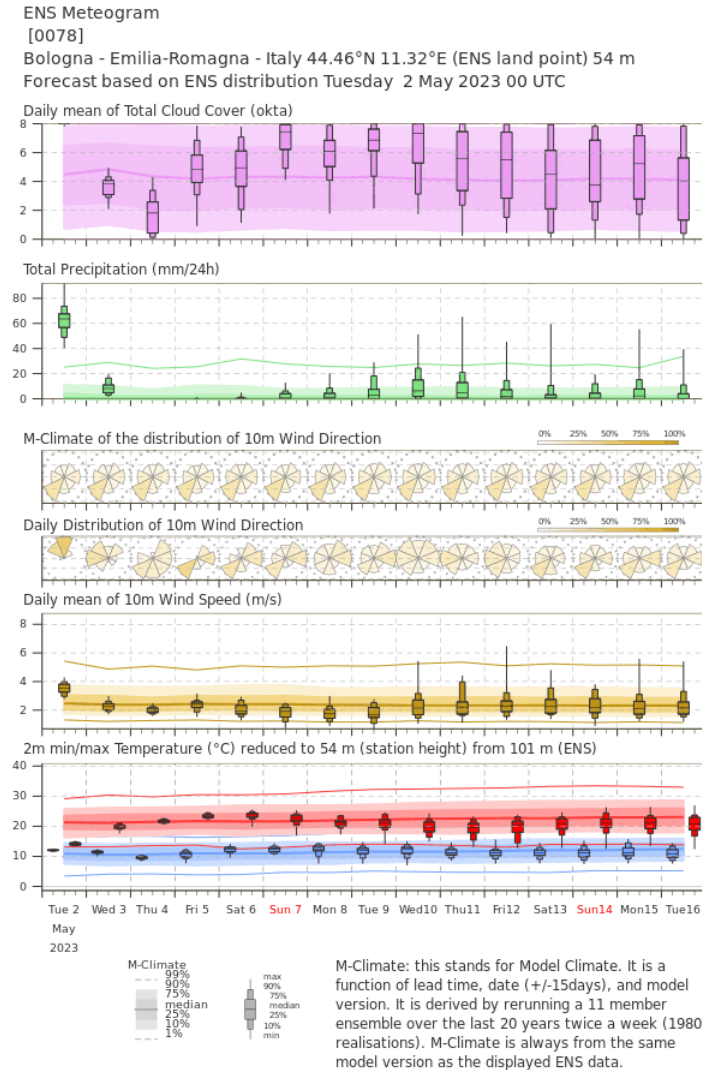
Major changes gradually happening at the backend to migrate to earthkit suite of applications.



- Data store ~ 80TB
- More data on the way
 - Requires infrastructure update

Upcoming: E-suite support – cycle 49r1

- ecCharts provides layers from next cycle in parallel (usually last few months before implementation)
- Meteograms are provided in Opencharts
- Revision of products (Harmonise HRES/CTRL)
- Please watch e-suite page for updates



Upcoming: Pre-computed probabilities

ENS probabilities still slow (~5-10 sec) (48R1)

- We plan to compute probabilities for a given set of thresholds
 - Scanning user DBs to find out all stored probabilities
- Pros: Much faster, less data
- Cons: Less flexible

Please provide feedback to set probability thresholds for each parameter.

Preset values ie:

>0.1 mm
>0.3 mm
>0.5 mm
>1. mm
>5. mm
>10 mm
>20 mm

Help Cihan Sahin

Contact

Add Layers ...

Foreground (New style)

Probability of total precipitation \geq 1 mm over last 6 hour (s)

Accumulation interval (hour): 6

Event threshold (mm): 1

Operator: \geq

Style: Contour shade (0-100%, green)

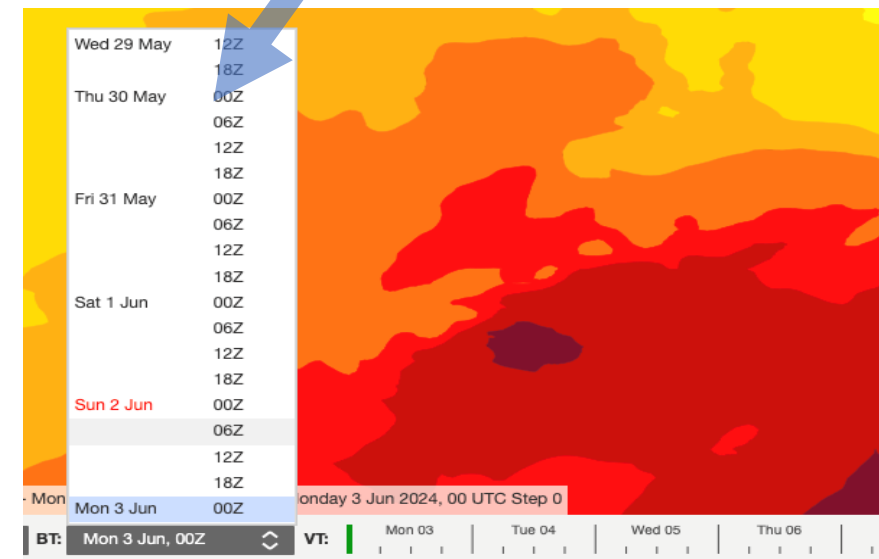
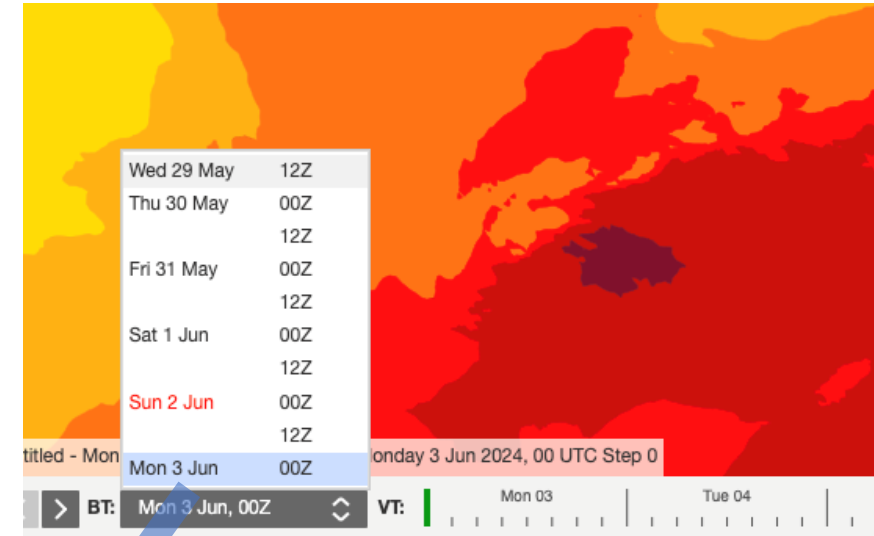
Apply

Grid

Background (New style)

Upcoming changes: BC data

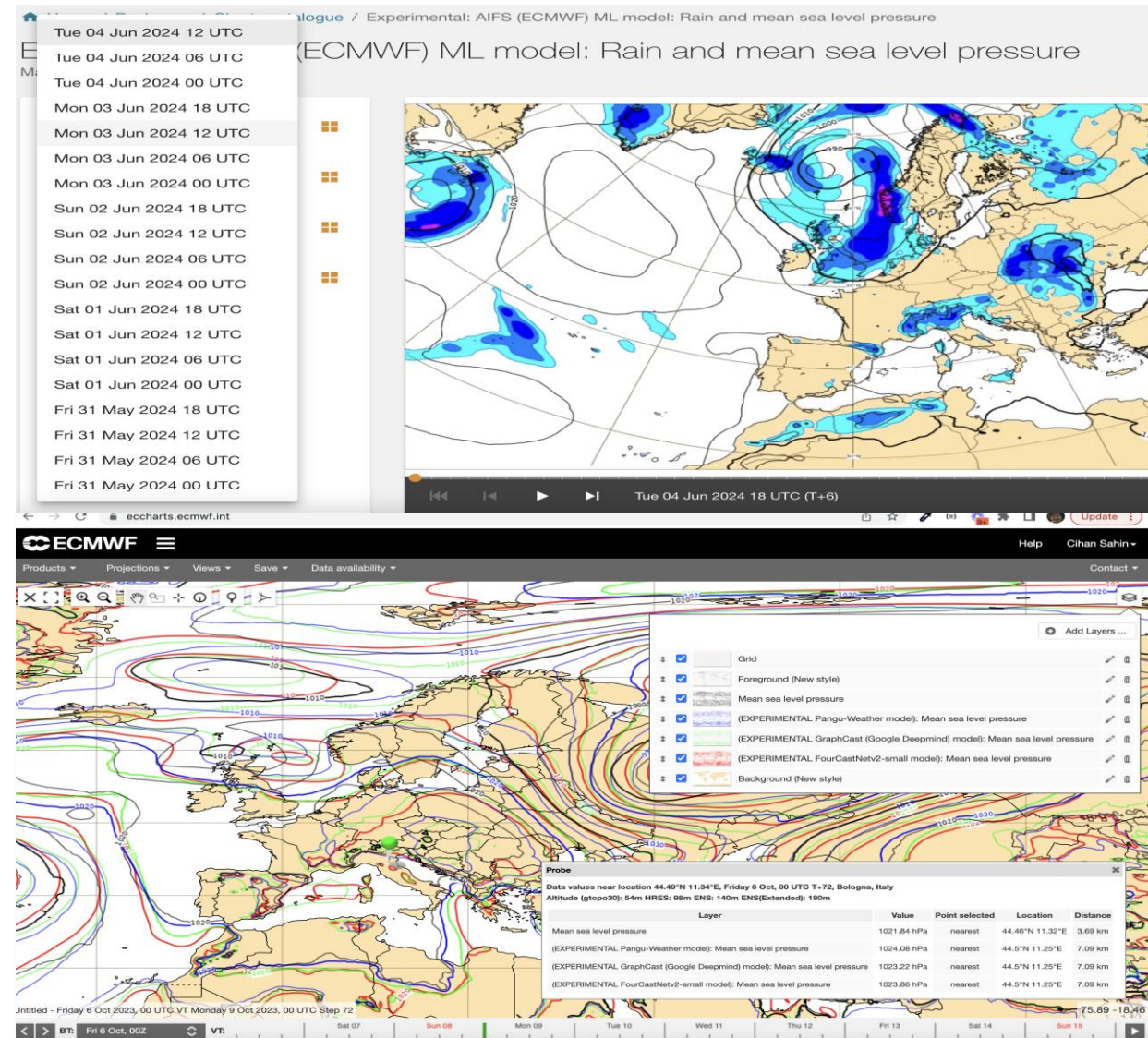
- Boundary Condition (BC) data in ecCharts
 - 06/18utc runs
- Next steps;
 - ✓ TAC recommendation
 - ✓ Testing different storage options (a lot more data on the way)
 - Infrastructure upgrade (2024 Q3)
 - Enable available HRES (deterministic) products
 - Adding Ensemble data & products when available



Upcoming: AIFS Ensemble data

- ✓ AIFS resolution upgraded to 0.25/0.25
- ✓ AIFS updates 4 cycles/day (00/06/12/18)
- ✓ AIFS output up to 15-days

- ML models TC tracks
- AIFS Ensemble output in progress
 - Spread, mean
 - Probabilities/percentiles
 - Meteograms



Thanks !

Opencharts/ecCharts services are user driven.

If you have requests, ideas that you believe will help your work, or wish to collaborate please let us know

