

Point Rainfall Update

Tim Hewson

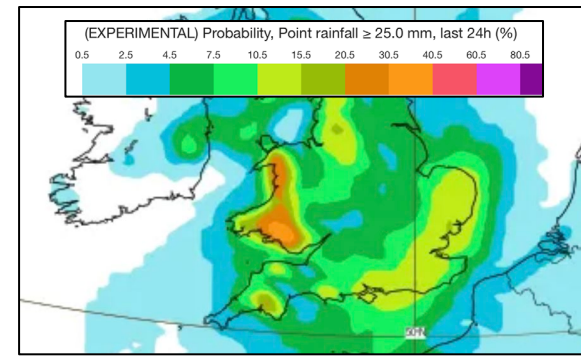
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What is Point Rainfall – aka “ecPoint” ?

- ecPoint is ECMWF post-processing which makes grid-scale **rainfall forecasts** from the IFS ENS **more accurate**, for both **gridscale** and **point-scale applications**
- It does this by adjusting rainfall forecasts to take account of
 - 1) **situation-dependant biases** (e.g. over-forecasting when there is dry air near the surface), and
 - 2) **situation-dependant sub-grid variability** (e.g. which is high when there is slow moving convection)
- The basis for the post-processing is a 1-year calibration activity, using millions of rainfall observations and Control run re-forecasts of the current cycle, in which learning is via **non-local techniques**
 - This has some parallels with how the AIFS can learn to predict extremes previously unseen at a particular location



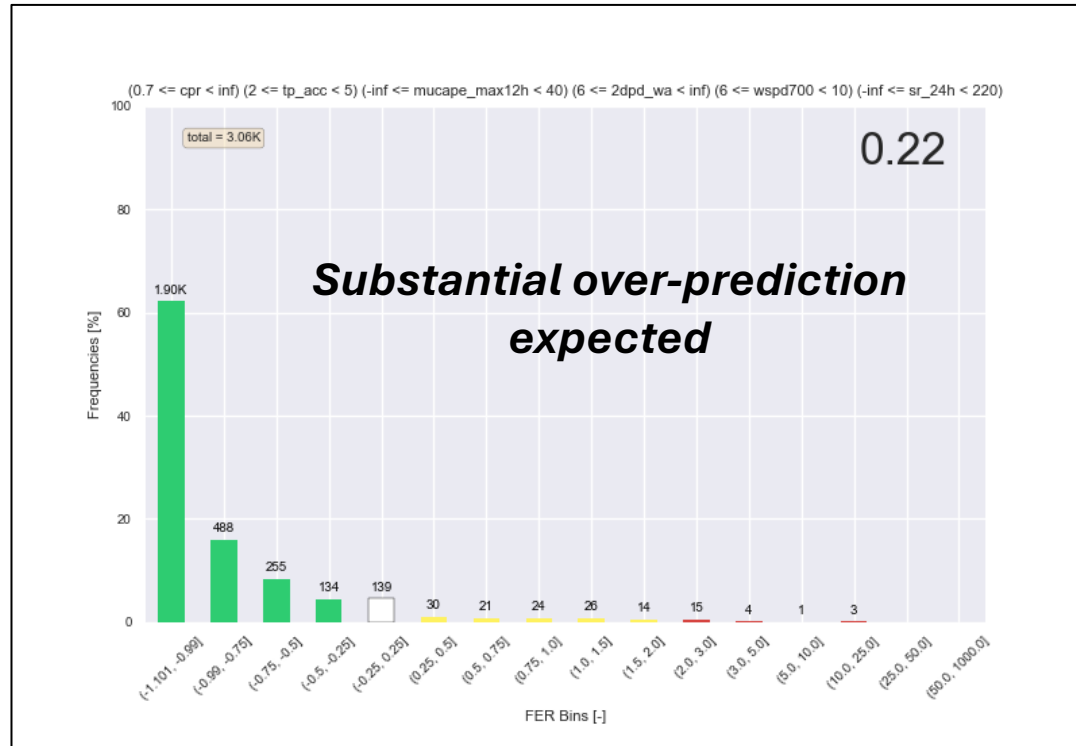
ecPoint has been around for a while – why the Update ?

- Cycle 50r1 incorporated substantial changes to the convection scheme
- Using AI coding agents we have substantially upgraded the calibration software
- User feedback / Case studies pointed to inclusion of new governing variables (e.g. dewpoint depression)
- A substantial software revamp, plus new WMO approved grib headers, mean ecPoint data is now stored in MARS
- We are now able to generate 6h and 24h rainfall periods, previously only 12h available

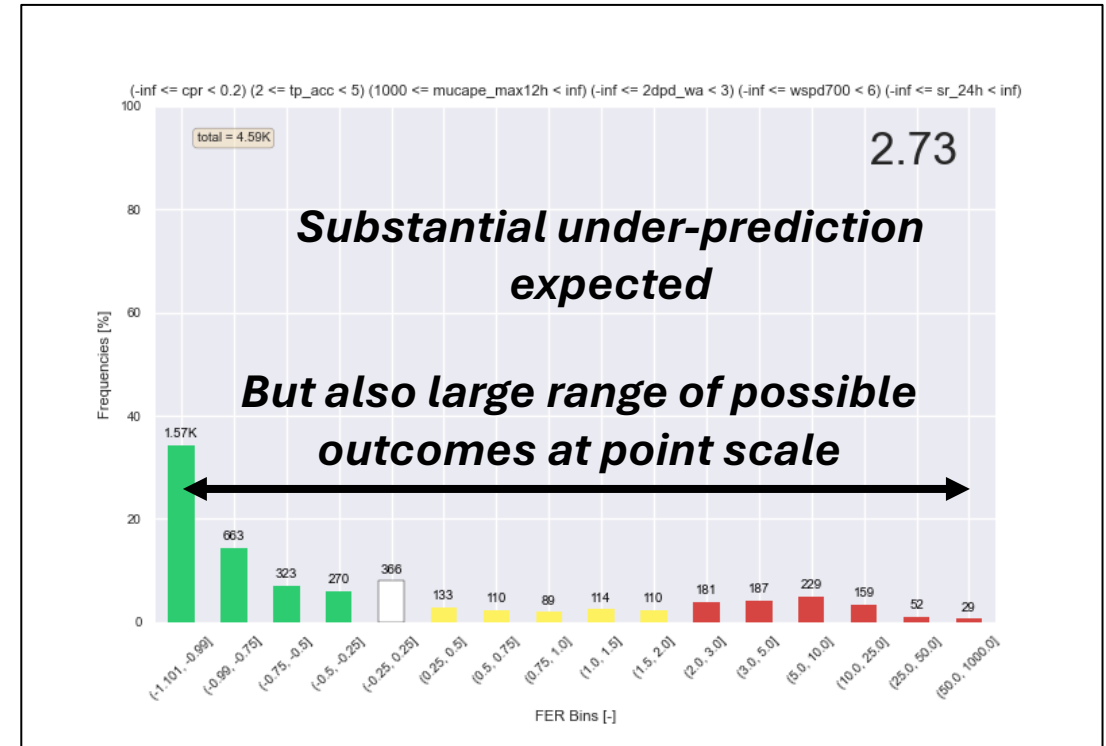
Brand new 50r1 calibration applied
– products much improved !!

Evidence for substantial situation-dependant biases

- From the calibration activity...histograms show $(Ob-FC)/(FC)$ in bins (Ob from raingauges)



- Mainly convective rainfall
- Low CAPE
- Large dewpoint depression at 2m

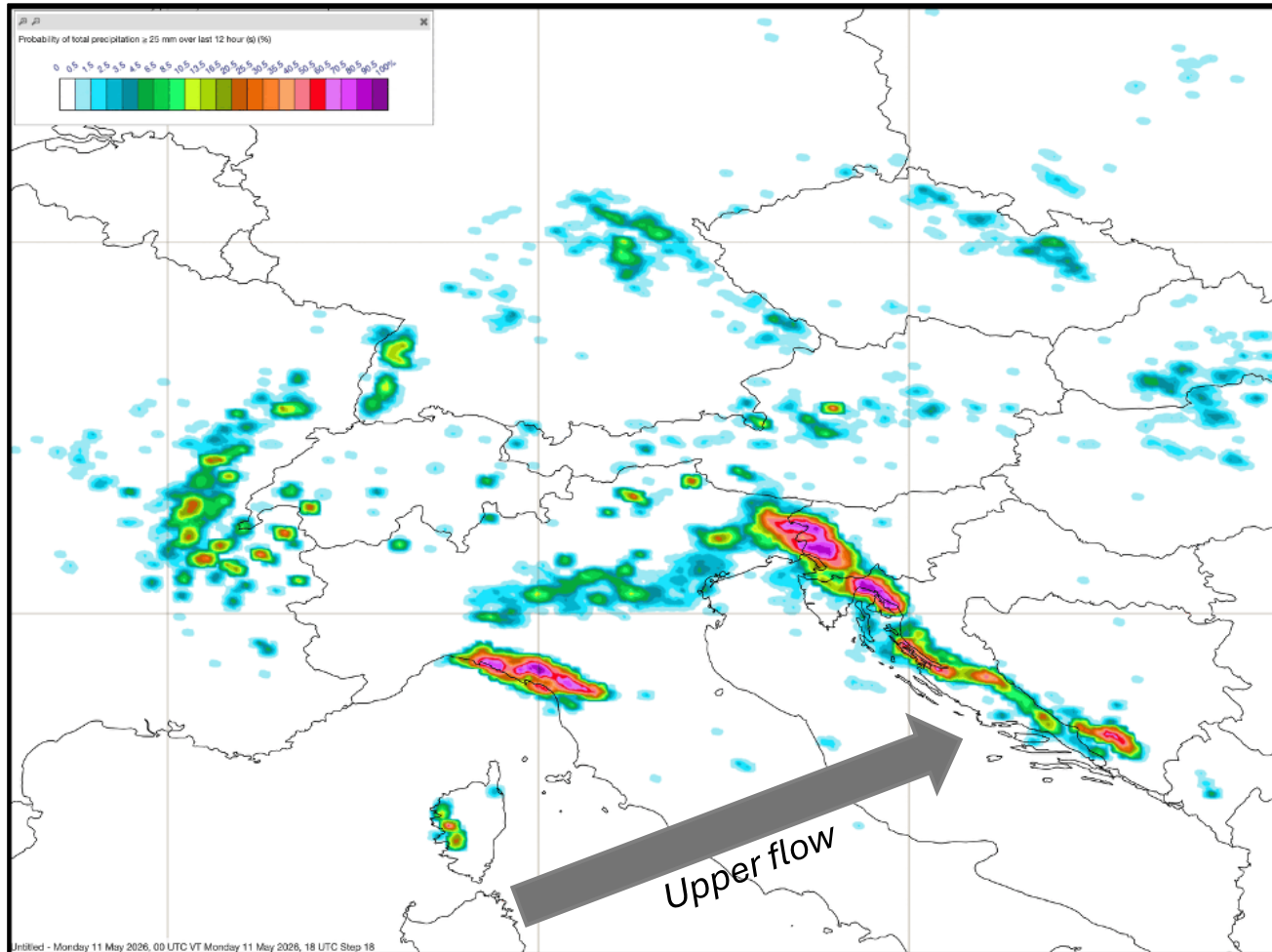


- Mainly large-scale rainfall
- High CAPE
- Small dewpoint depression at 2m

These are just 2 out of 1400 calibration scenarios used by ecPoint for 24h rainfall

Product creation

- Mapping function multipliers are applied to all gridboxes for all ENS members, using local scenario matching
- Products on OpenCharts and ecCharts show percentiles and probabilities (user defined thresholds)



EXAMPLE: 11 May 2026

49r1 versus 50r1

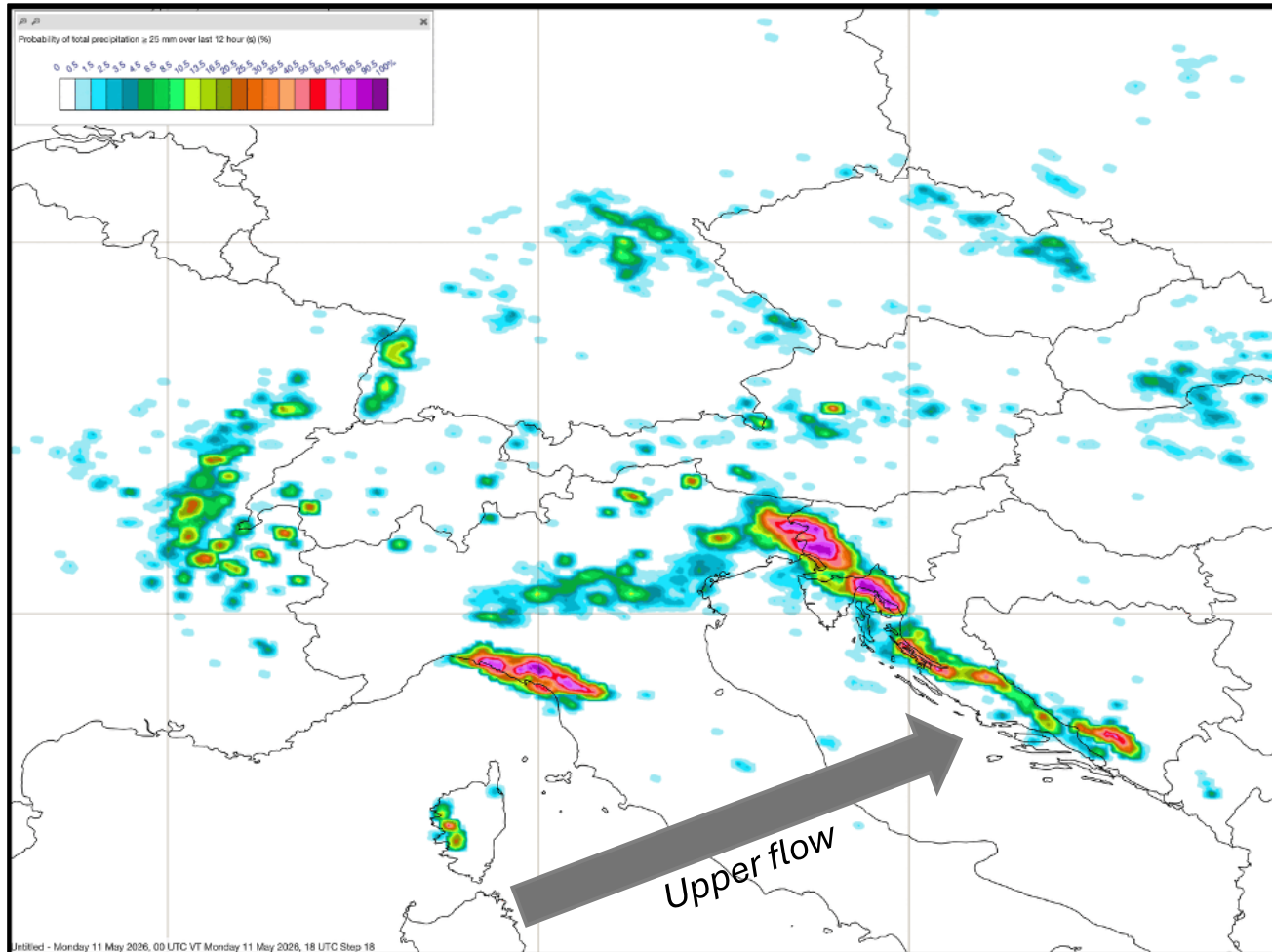
RAW MODEL

Probability of >25mm/12h

50r1 shifts signal
downstream
(convn. scheme)

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EXAMPLE: 11 May 2026

49r1

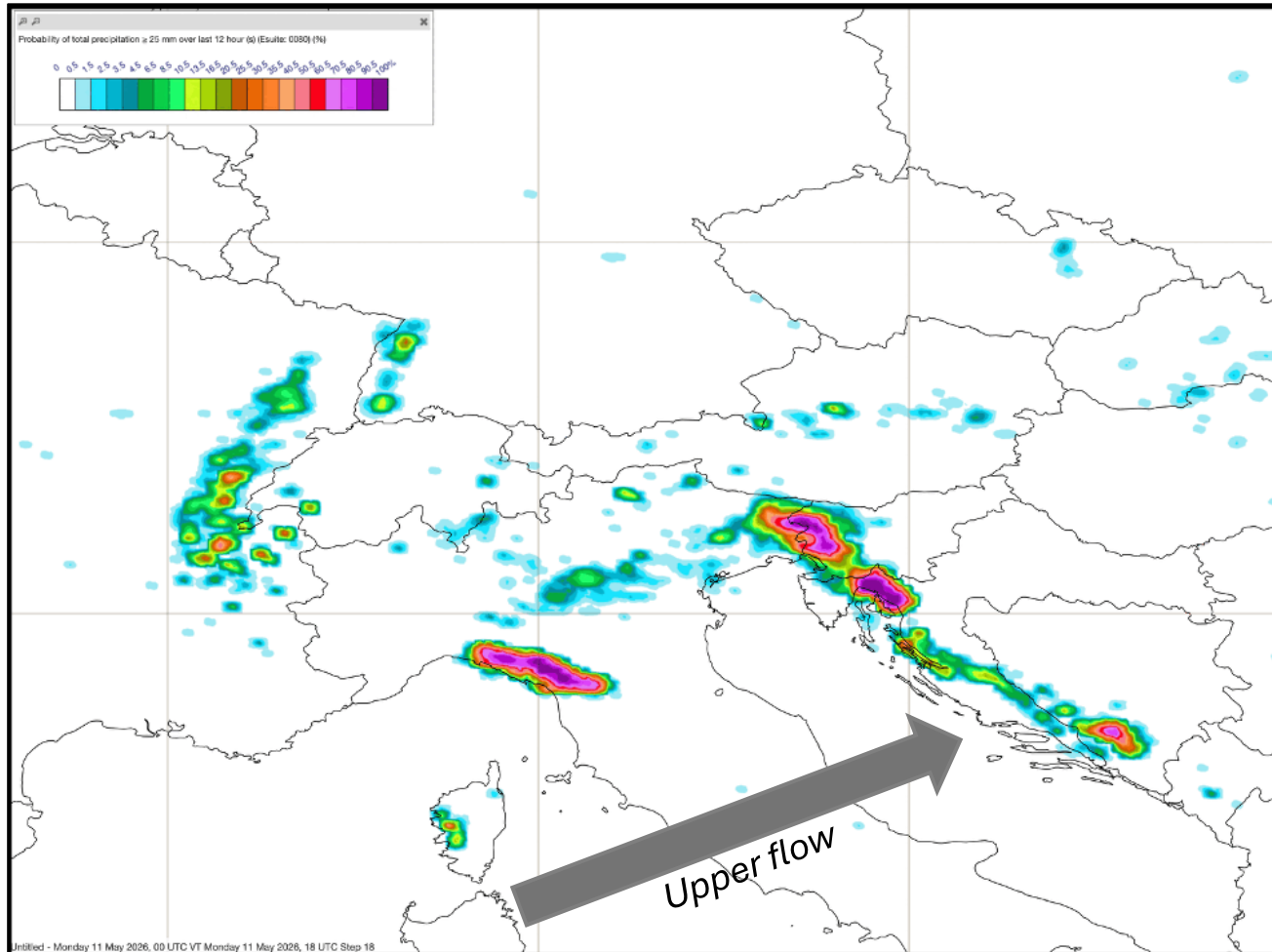
RAW MODEL vs ecPoint

Probability of >25mm/12h

ecPoint expands
& smooths risk
area

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EXAMPLE: 11 May 2026

50r1

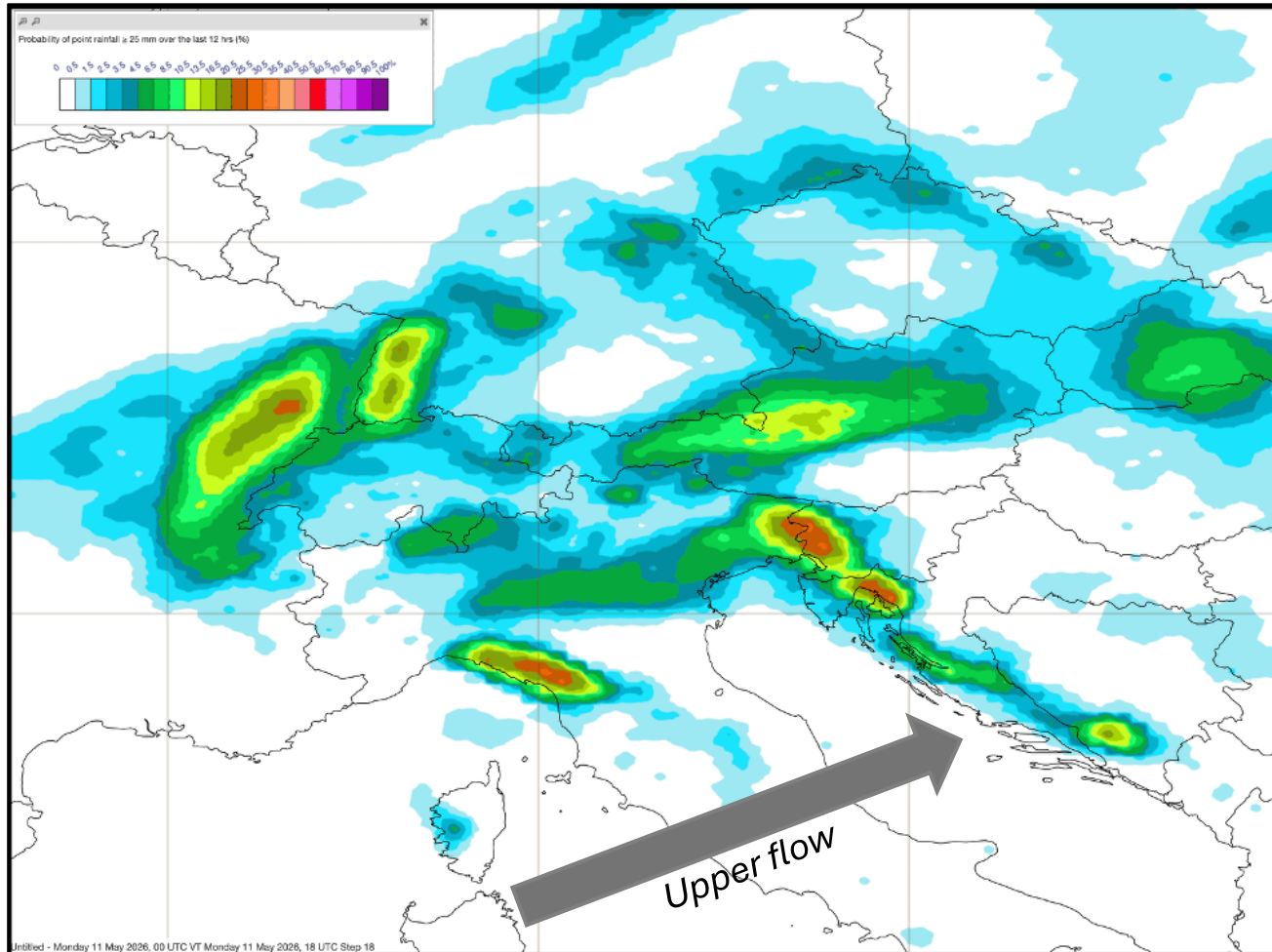
RAW MODEL vs ecPoint

Probability of >25mm/12h

50r1 ecPoint
also shifts signal
downstream

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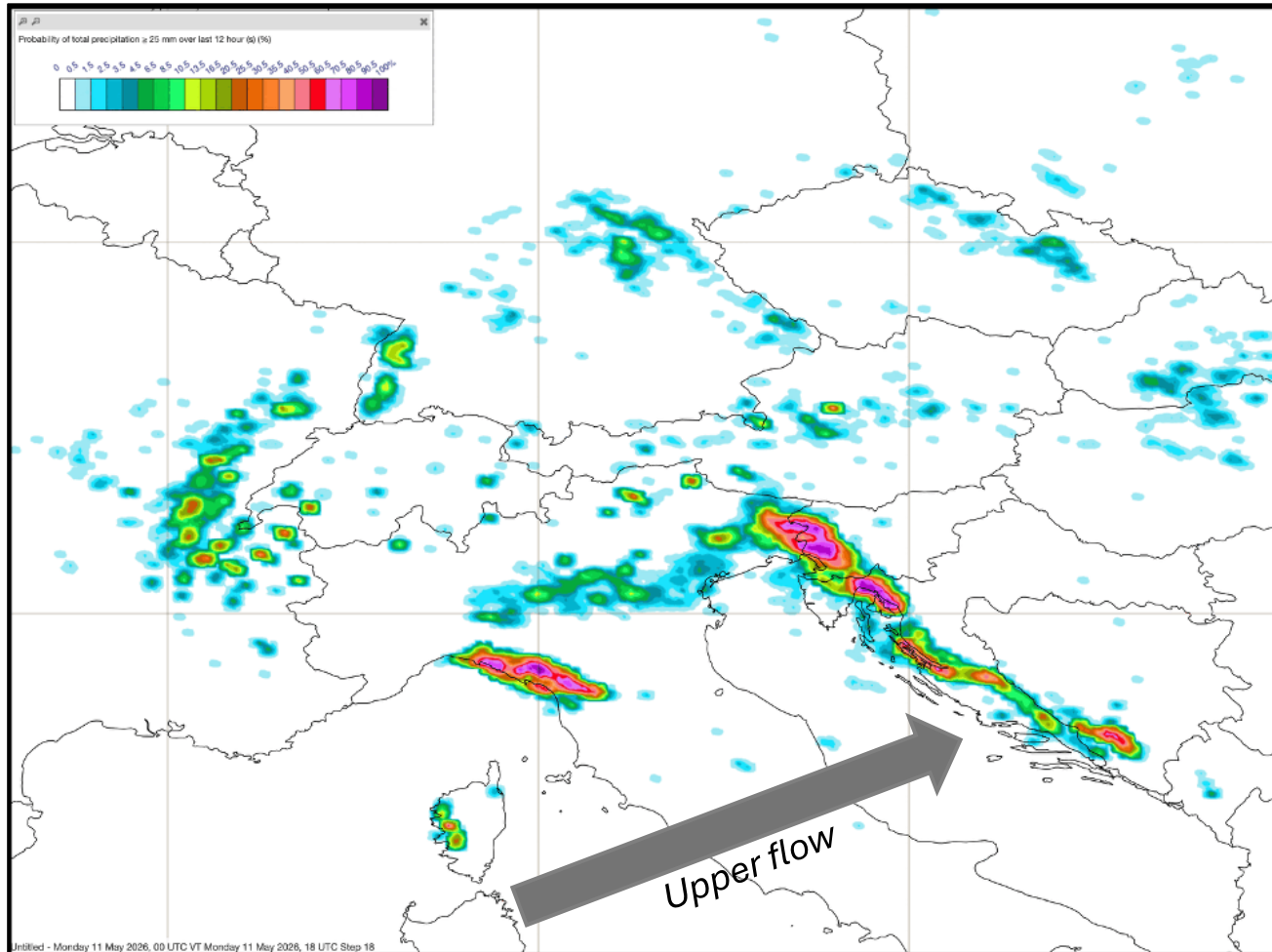
ecPoint

Probability of >25mm/12h

Downstream
shift bigger in
ecPoint cf raw

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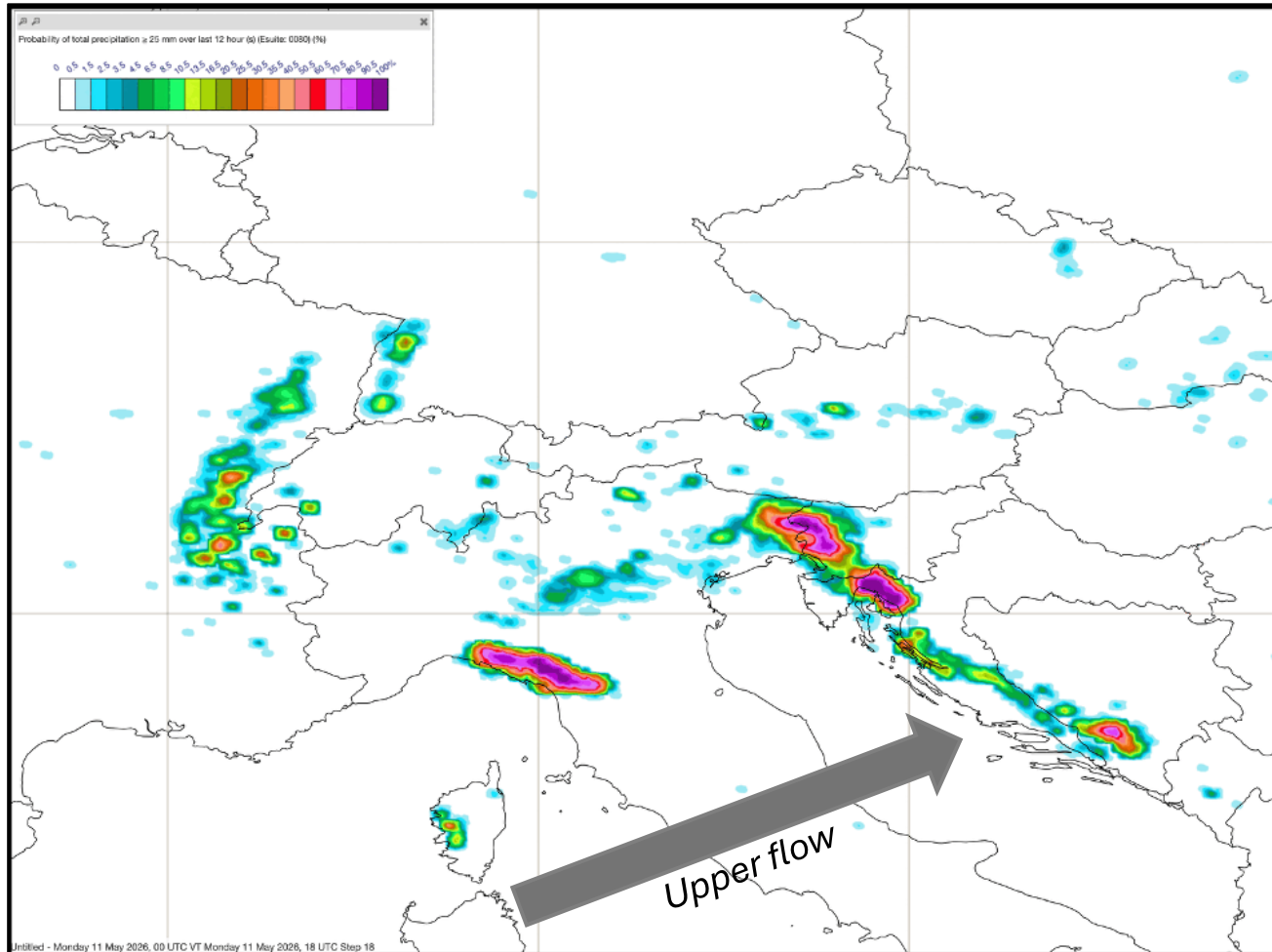
RAW MODEL vs OBS

Probability of >25mm/12h
(pink => ob>25mm)

49r1 raw probs
rather poor
match vs Obs

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50r1

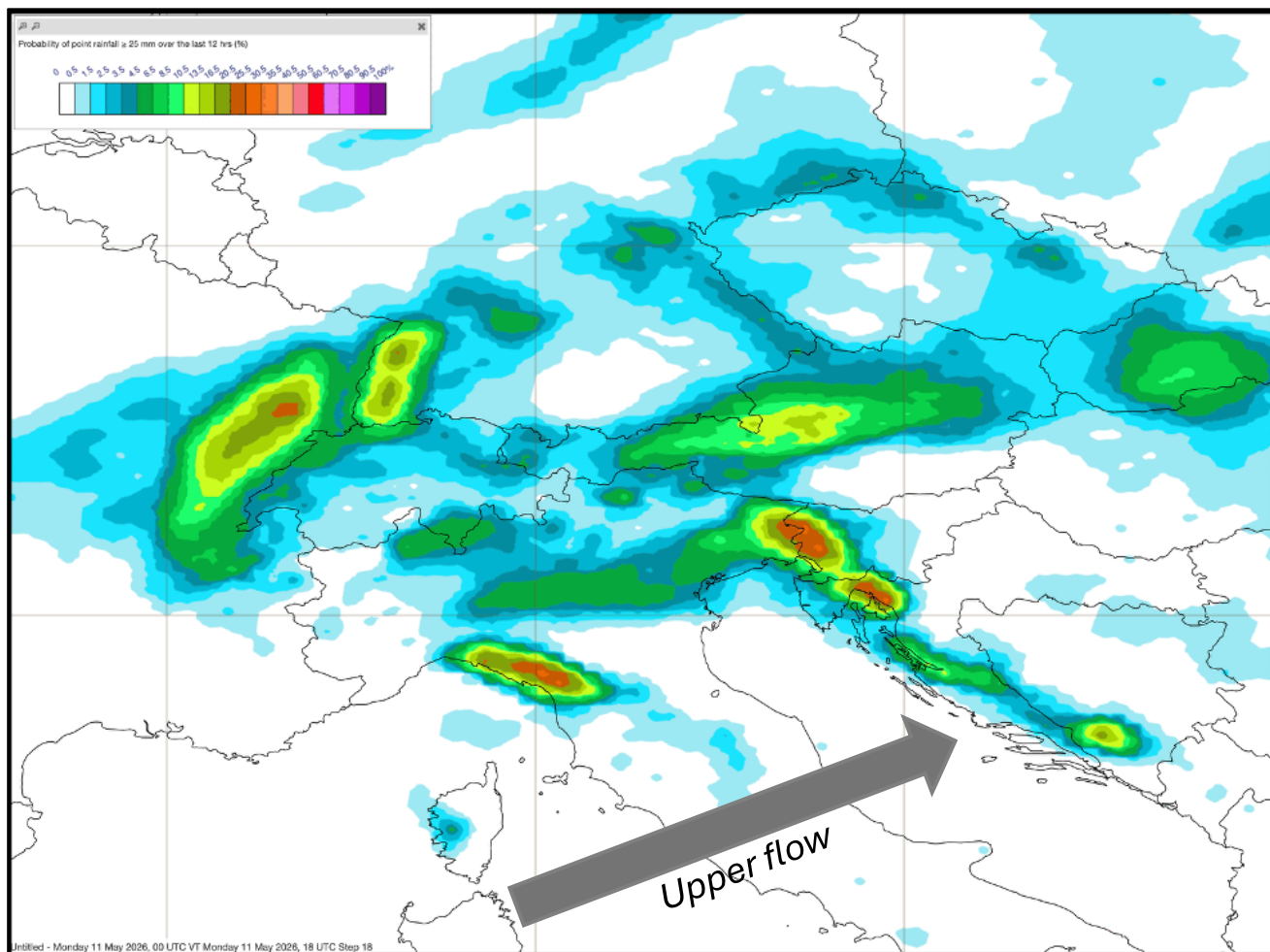
RAW MODEL vs OBS

Probability of >25mm/12h
(pink => ob>25mm)

50r1 raw probs
slightly better

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49r1

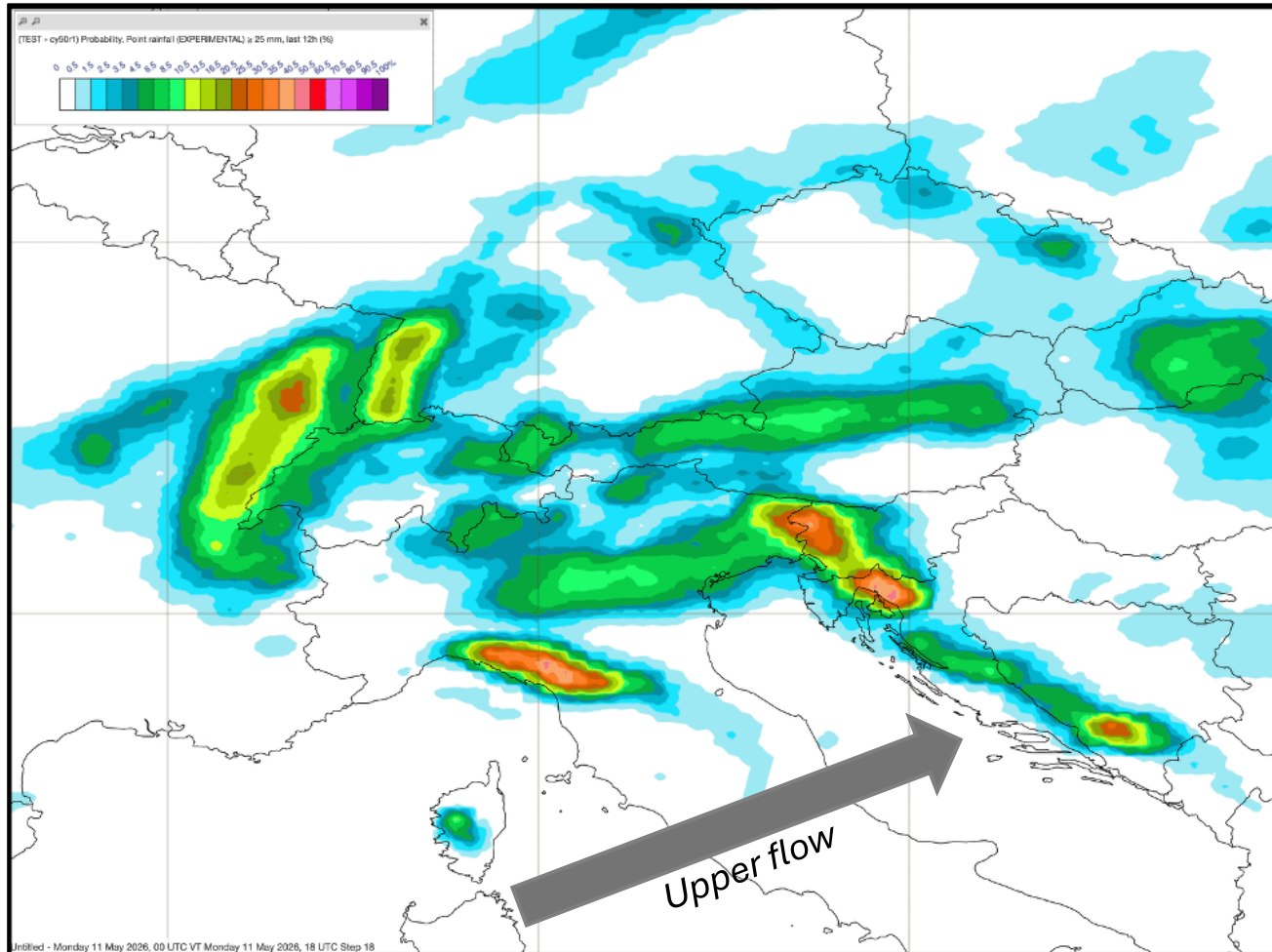
ecPoint vs OBS

Probability of >25mm/12h
(pink => ob>25mm)

49r1 ecPoint
probs quite good
(it seems)

Product creation

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EXAMPLE: 11 May 2026

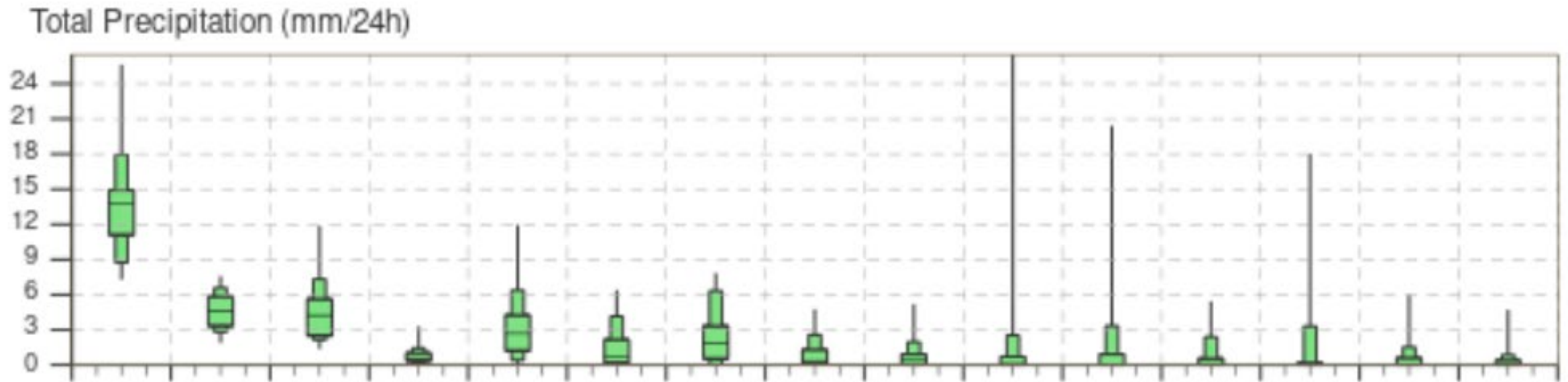
50r1

ecPoint vs OBS

Probability of >25mm/12h
(pink => ob>25mm)

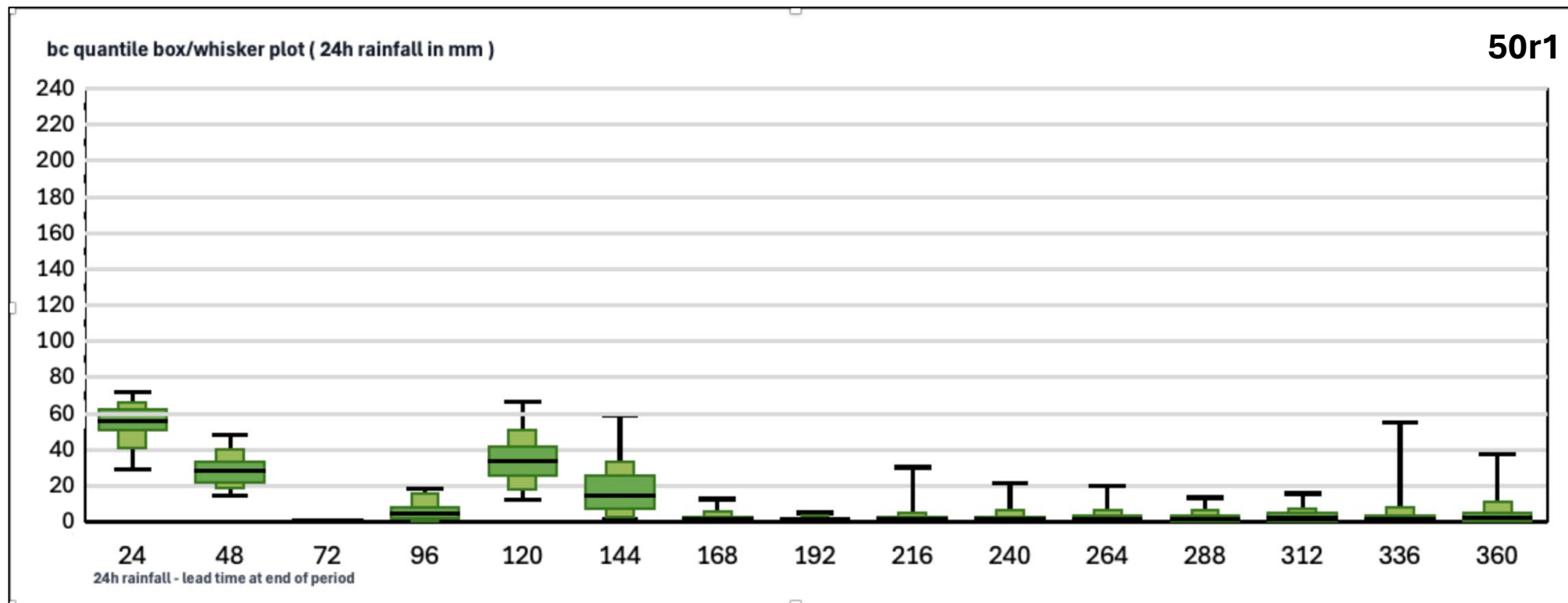
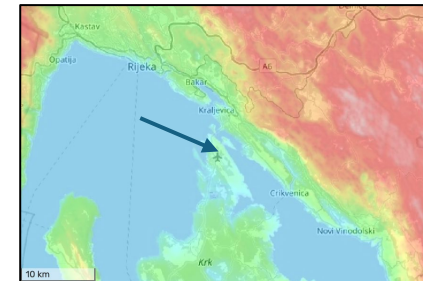
50r1 ecPoint
probs look even
better

A Classical 15-day Meteogram (rainfall component) – The following examples relate...



Possible New Products

- **15-day Meteogram** of 24h rainfall. Options to add:
 - 1. Bias-corrected Gridscale version (for direct comparison, hydrol and hydropower applications, ...)
 - 2. Point-Scale version (for local rainfall forecasting, flash flood prediction, ...)

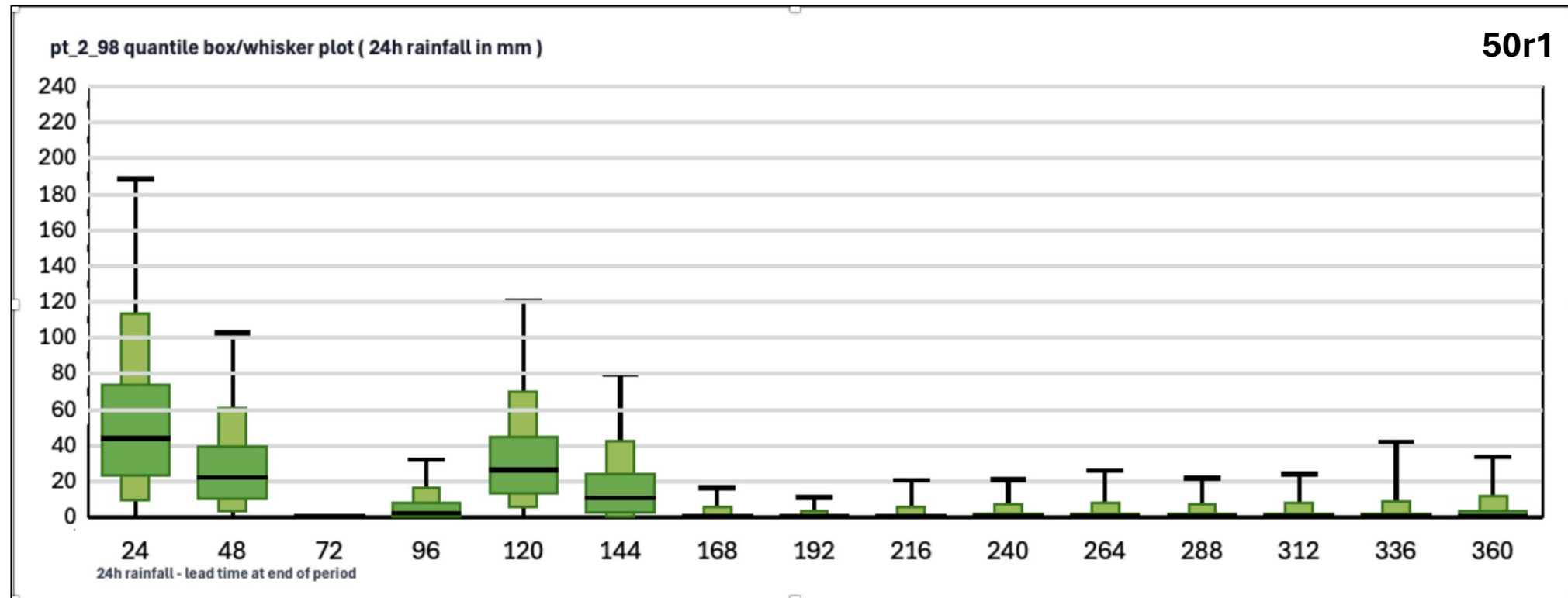


Example for Krk, Croatia, DT 00Z 11 May 2026

Bias-corrected Gridscale version

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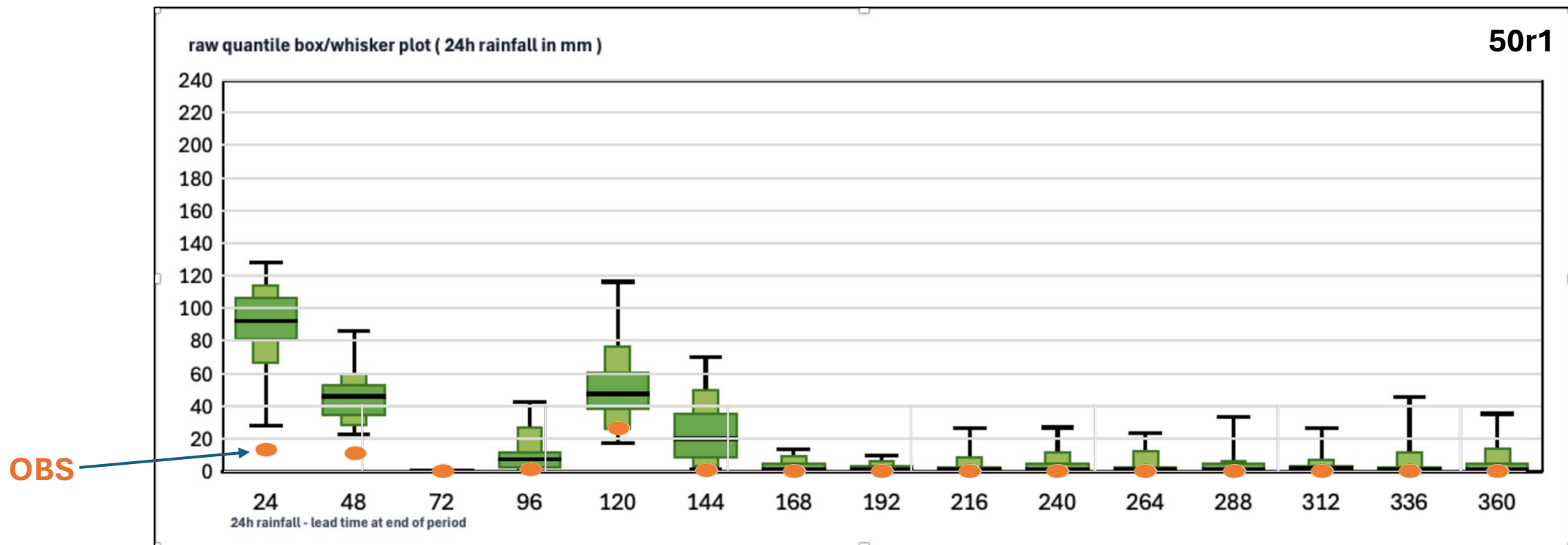
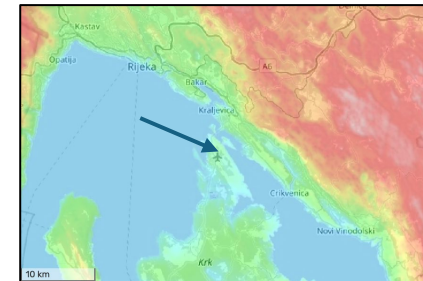


Example for Krk, Croatia, DT 00Z 11 May 2026

Point-Scale version

With verifying observations

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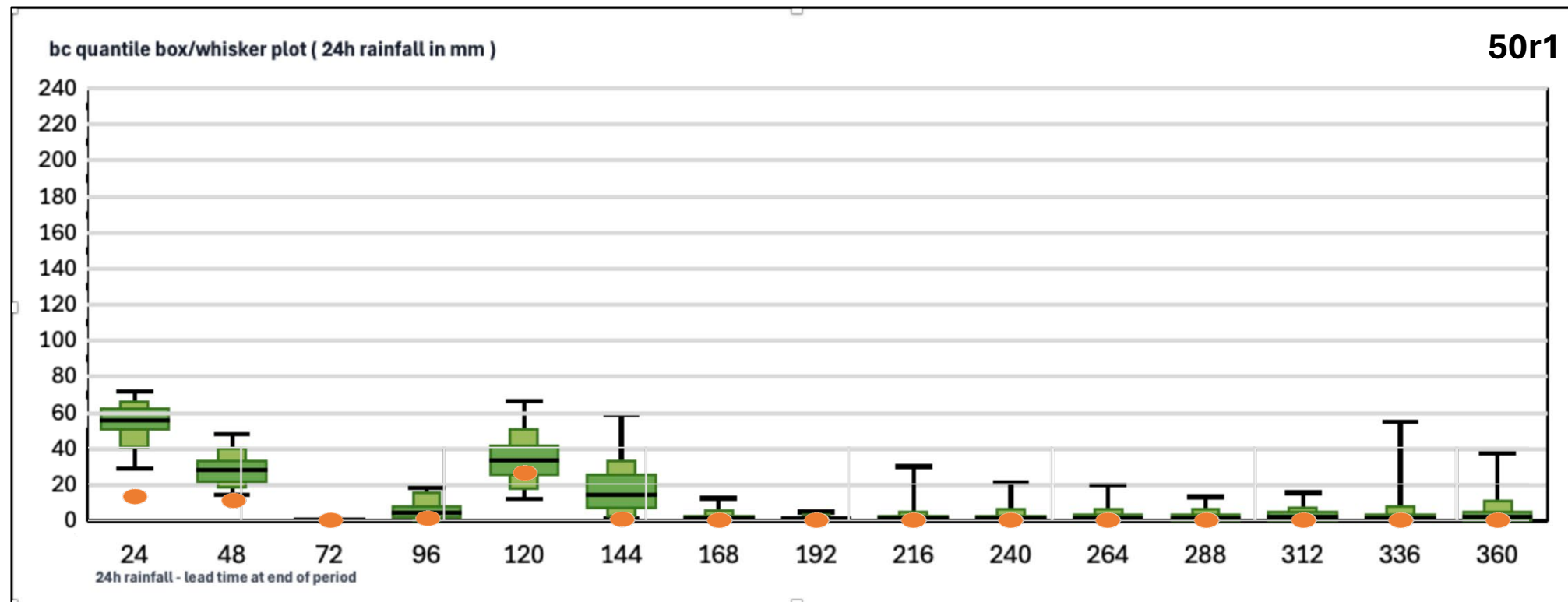
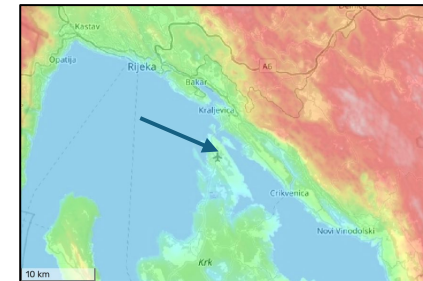


Example for Krk, Croatia, DT 00Z 11 May 2026

Raw Model output (as on current meteograms)

With verifying observations

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Example for Krk, Croatia, DT 00Z 11 May 2026

Bias-corrected Gridscale version

Looks better

- pt_2_98 quantile box/whisker plot (24h rainfall in mm)
- 50r1
-
- The plot displays the distribution of 24-hour rainfall at different lead times. The y-axis represents rainfall in mm, ranging from 0 to 240. The x-axis represents the lead time in hours, from 24 to 360. Each box plot shows the median (horizontal line inside the box), the interquartile range (the box itself), and the range of the data (whiskers). Orange circles indicate the mean rainfall for each lead time. The rainfall is highest at 24 hours (median around 45 mm) and decreases as the lead time increases, with most values falling below 20 mm for lead times greater than 144 hours.
- | 24h rainfall - lead time at end of period | Median (mm) | Q1 (mm) | Q3 (mm) | Min (mm) | Max (mm) | Mean (mm) |
|---|-------------|---------|---------|----------|----------|-----------|
| 24 | 45 | 25 | 75 | 10 | 190 | 15 |
| 48 | 22 | 10 | 40 | 5 | 105 | 12 |
| 72 | 0 | 0 | 0 | 0 | 0 | 0 |
| 96 | 5 | 5 | 15 | 0 | 35 | 2 |
| 120 | 28 | 15 | 45 | 10 | 120 | 25 |
| 144 | 15 | 5 | 25 | 0 | 80 | 5 |
| 168 | 5 | 0 | 10 | 0 | 20 | 2 |
| 192 | 2 | 0 | 5 | 0 | 15 | 1 |
| 216 | 5 | 0 | 10 | 0 | 25 | 2 |
| 240 | 5 | 0 | 10 | 0 | 25 | 2 |
| 264 | 5 | 0 | 10 | 0 | 25 | 2 |
| 288 | 5 | 0 | 10 | 0 | 25 | 2 |
| 312 | 5 | 0 | 10 | 0 | 25 | 2 |
| 336 | 5 | 0 | 10 | 0 | 45 | 2 |
| 360 | 5 | 0 | 15 | 0 | 35 | 2 |

Point-Scale version

Looks even better

Summary

For more information see the Blog Post
on the ECMWF Forecast User portal

- Whilst convection changes in 50r1 clearly improve rainfall distribution in certain situations, ecPoint post-processing brings further improvements as well, in almost all situations
- There is more to “work with” now, for the post-processing – dry can only be post-processed into dry – now the precipitation is more “spread out”, so less dry scenarios
- New graphical map products are already available (probs and percentiles), for 6h and 24h periods, the old 12h periods have been upgraded, and all are also now stored in MARS for user download in real time
- Direct dissemination likely to be activated at some point
- ECMWF could additionally provide **meteogram style products**, which could be even more useful for users

• ***Are you interested ?!***

- **ECMWF is also keen to build up Member and Co-operating state collaborations in product development – so any interest now in helping take ecPoint forwards ?!**