Copernicus Emergency Management Service

What is EFAS post-processing?

EFAS Annual Meeting 2022

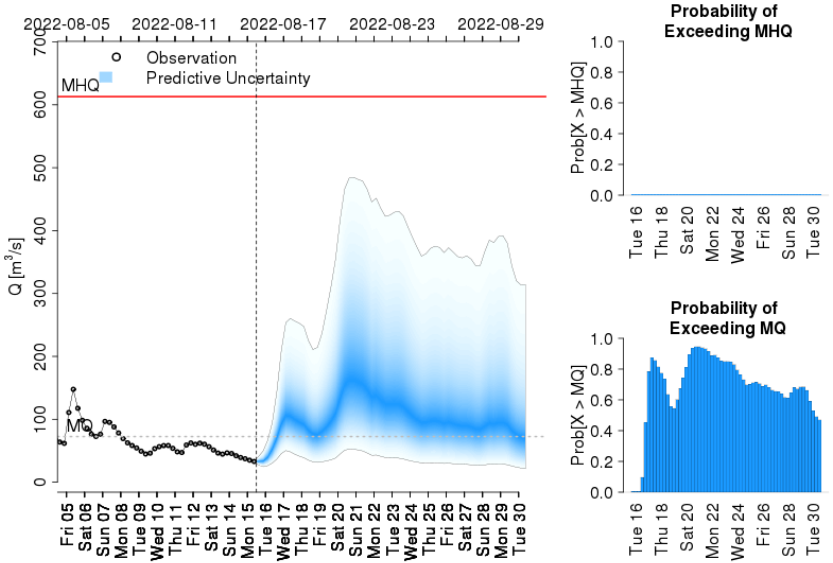
Presented by Gwyneth Matthews

27 09 2022

Copernicus Europe's eyes on Earth

European Commission

Aim: To reduce errors and uncertainty in the forecast so that it more accurately predicts the observed discharge.



- Post-processed forecast product
- Bias-corrected forecast
- Real-time hydrograph
- PP (post-processing)

Emergency Management

Agenda

- Presentation: ‘What is EFAS post-processing?’
- Demonstration: How to use the EFAS Sensor Observation service (SOS)
- Activity: Group mind-mapping
- Discussion: Future of EFAS post-processing

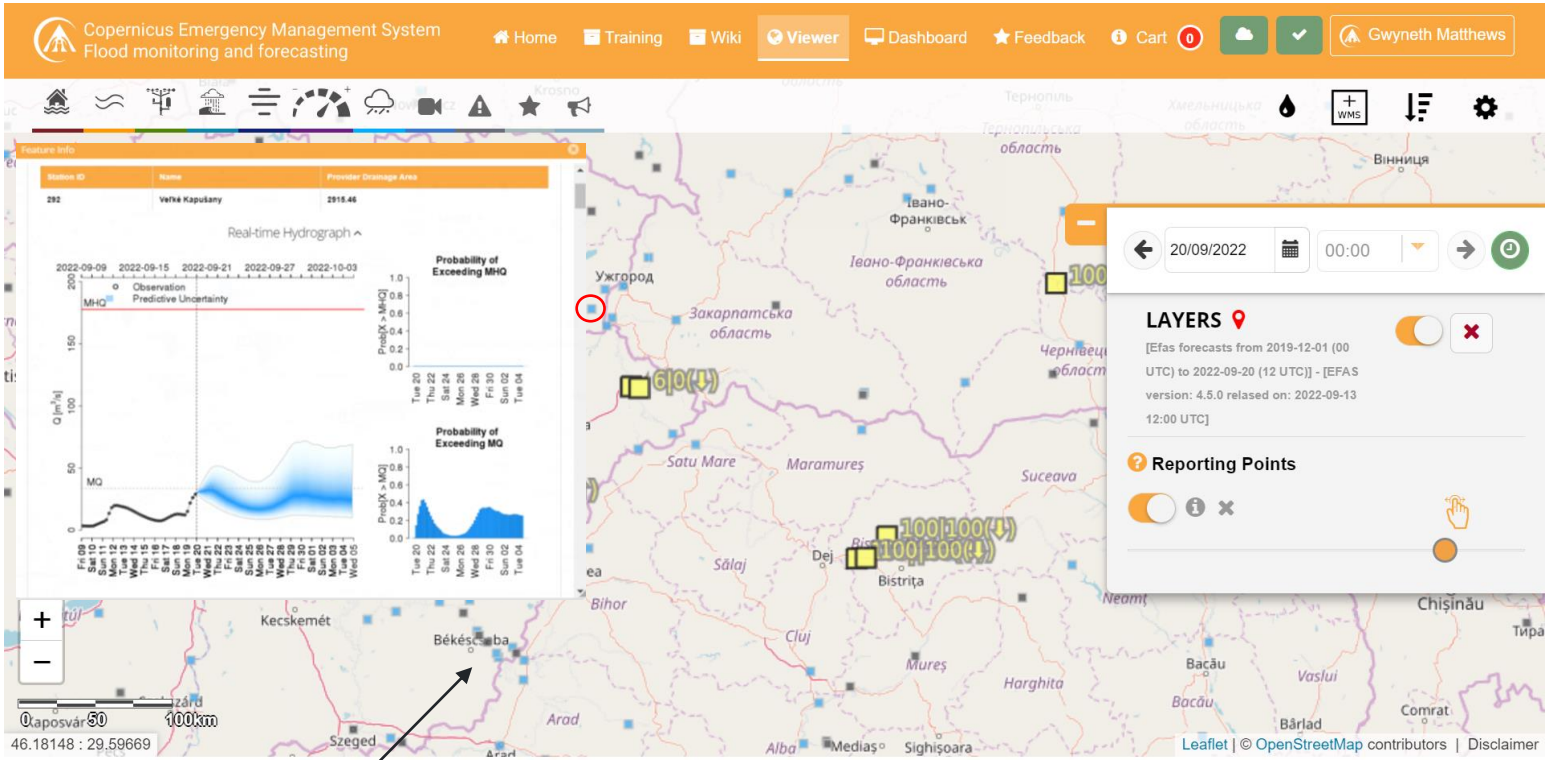
ECMWF Copernicus Europe’s eyes on Earth European Commission

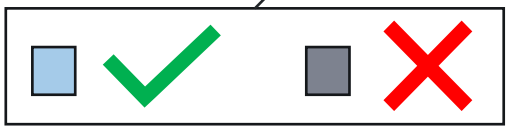
What is the EFAS post-processed forecast product?

European Commission | Copernicus Europe's eyes on Earth | ECMWF

Post-processed forecast product

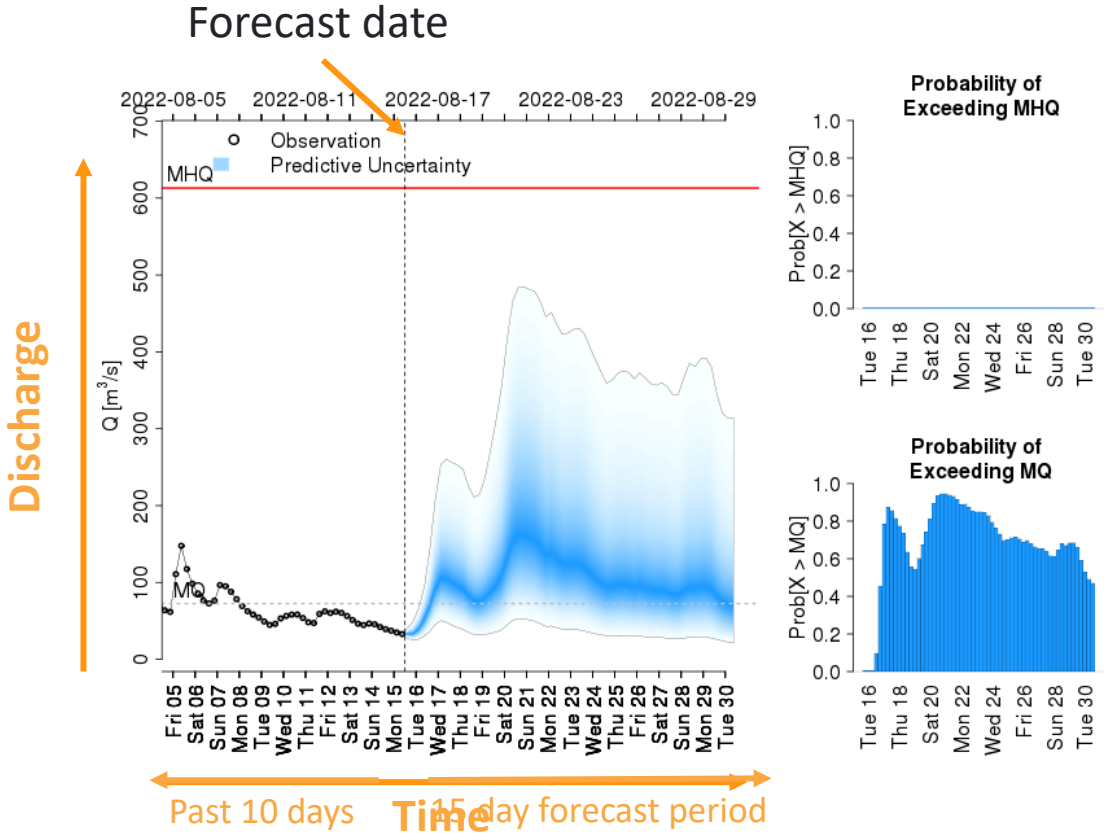
Emergency Management





Emergency Management

Post-processed forecast product



ECMWF Copernicus Europe's eyes on Earth European Commission

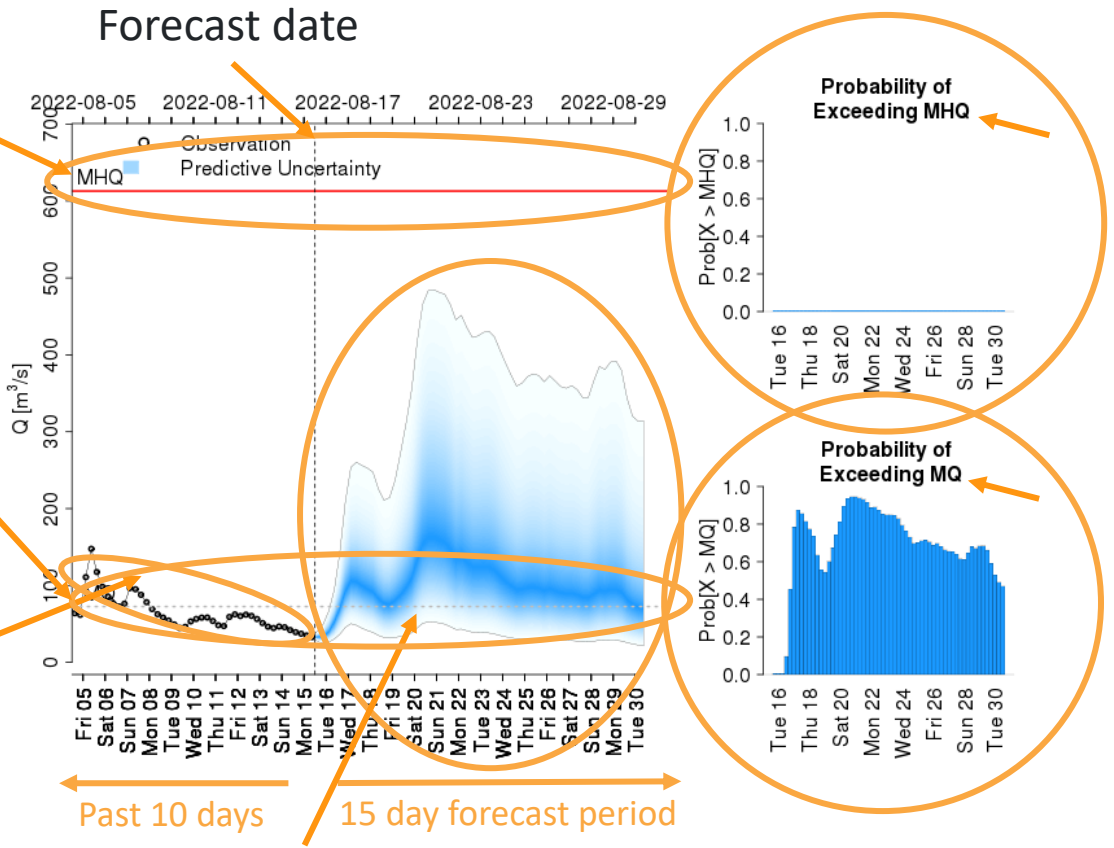
Post-processed forecast product

Emergency Management

MHQ threshold: mean annual maximum observed flow

MQ threshold: Average observed flow

Recent discharge observations



ECMWF Copernicus Europe's eyes on Earth European Commission

No equations!

How is the EFAS post-processed forecast made?

European Commission | Copernicus Europe's eyes on Earth | ECMWF

Method

Two parts to the process:

Offline calibration

Performed twice a year:

- Incorporating newer observations
- New stations can be added during this step.

Toolbox

Online forecast update

Performed twice a day (00 and 12):

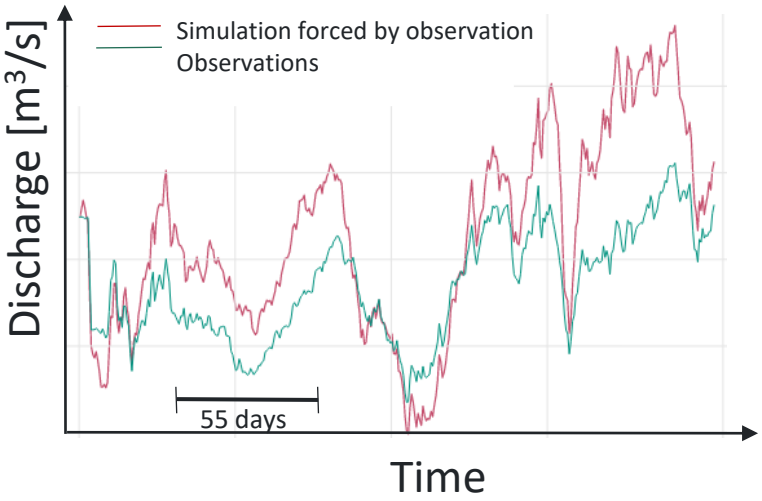
- Bias-corrects the forecast based on real-time observations

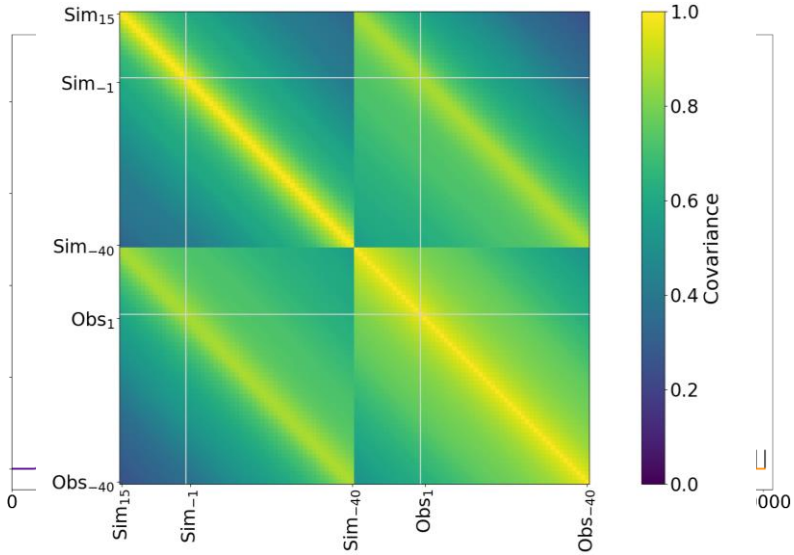
Emergency Management

Method – Offline calibration

Input data
- Past discharge observations
- EFAS simulation forced by meteorological observations

Toolbox





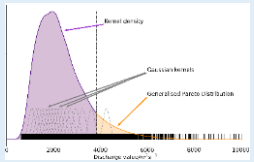
ECMWF Copernicus Europe's eyes on Earth European Commission

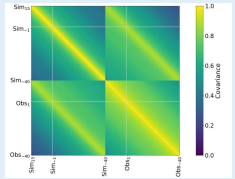
Method – Online forecast update

Emergency Management

Input data: From the past 40 days
- Past discharge observations
- Simulation forced by observations
- EFAS ensemble forecasts

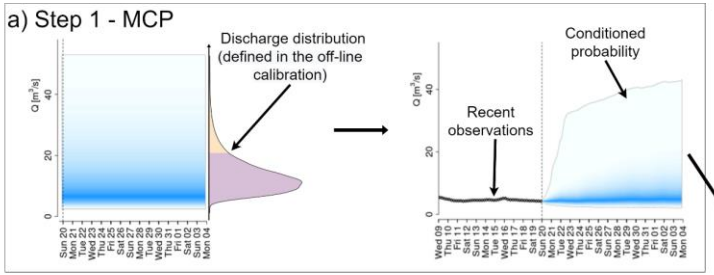
Toolbox

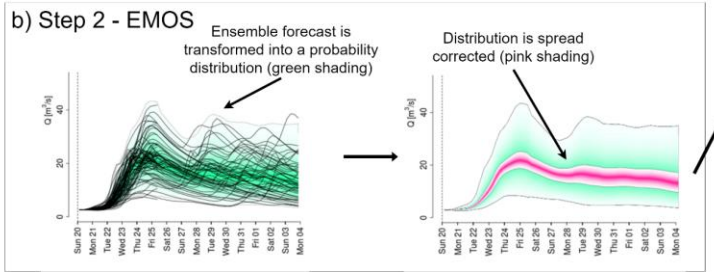




- Initial conditions
- Hydrological model

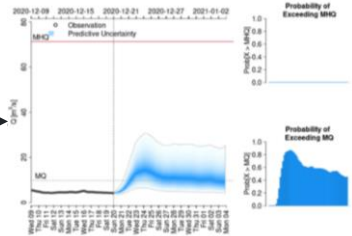
- Meteorological forcings





Step 3 - Kalman Filter

Step 4 – Real-time Hydrograph

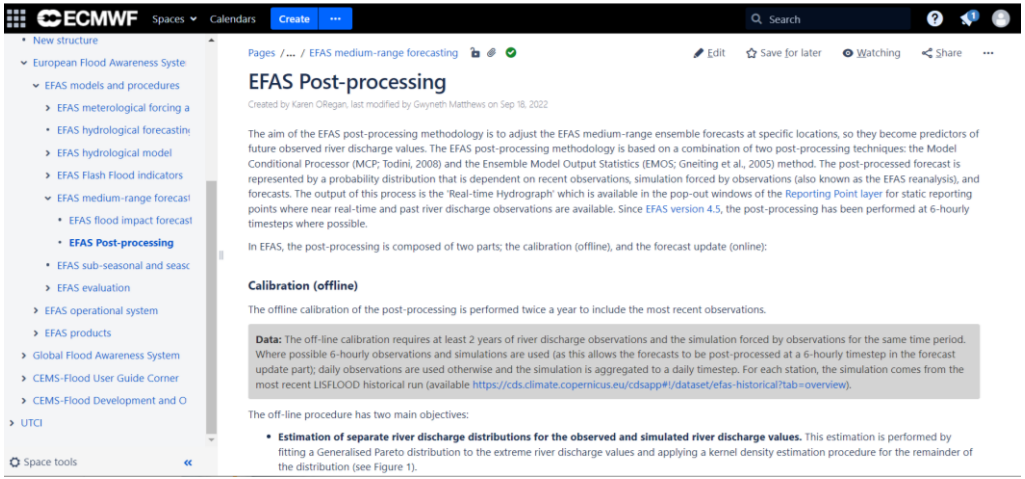


ECMWF Copernicus Europe's eyes on Earth European Commission

Documentation

Emergency Management

- This information is all available on the EFAS Wiki!



https://confluence.ecmwf.int/x/AwLMDw

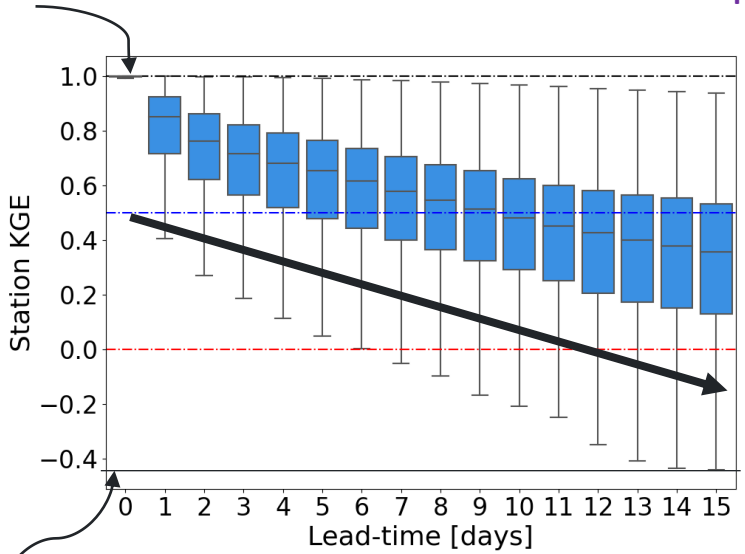
How good are the EFAS post-processed forecasts?

European Commission | Copernicus Europe's eyes on Earth | ECMWF

Evaluation – Forecast median

- KGE is a combination of time, bias, and variability errors

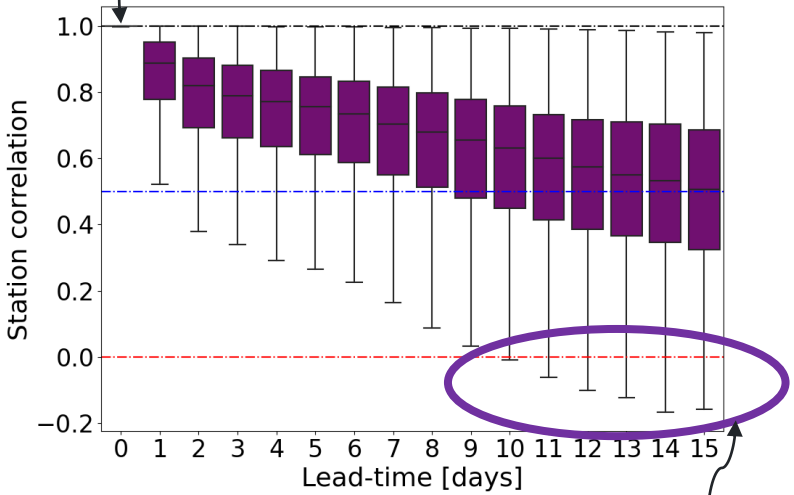
Initial conditions



Skill of the mean observations

Initial conditions

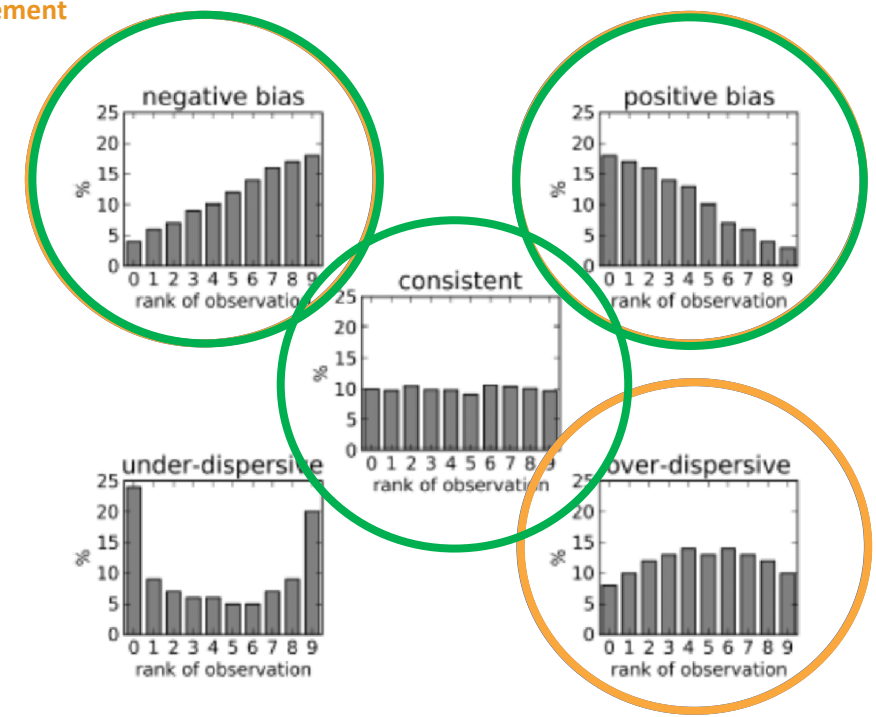
> 50% of stations have a correlation of +0.5 at a 15-day lead-time.

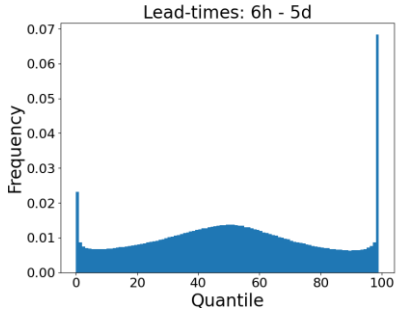


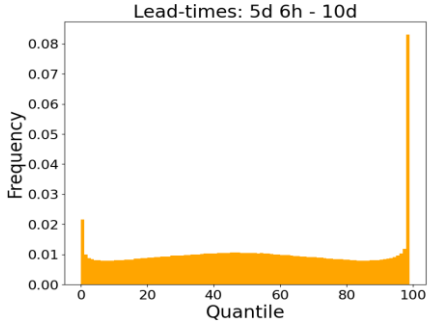
Some negative correlations

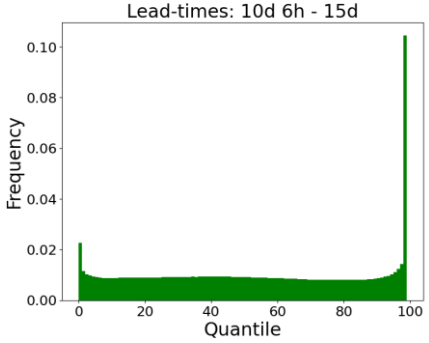
Evaluation – Forecast distribution

Emergency Management









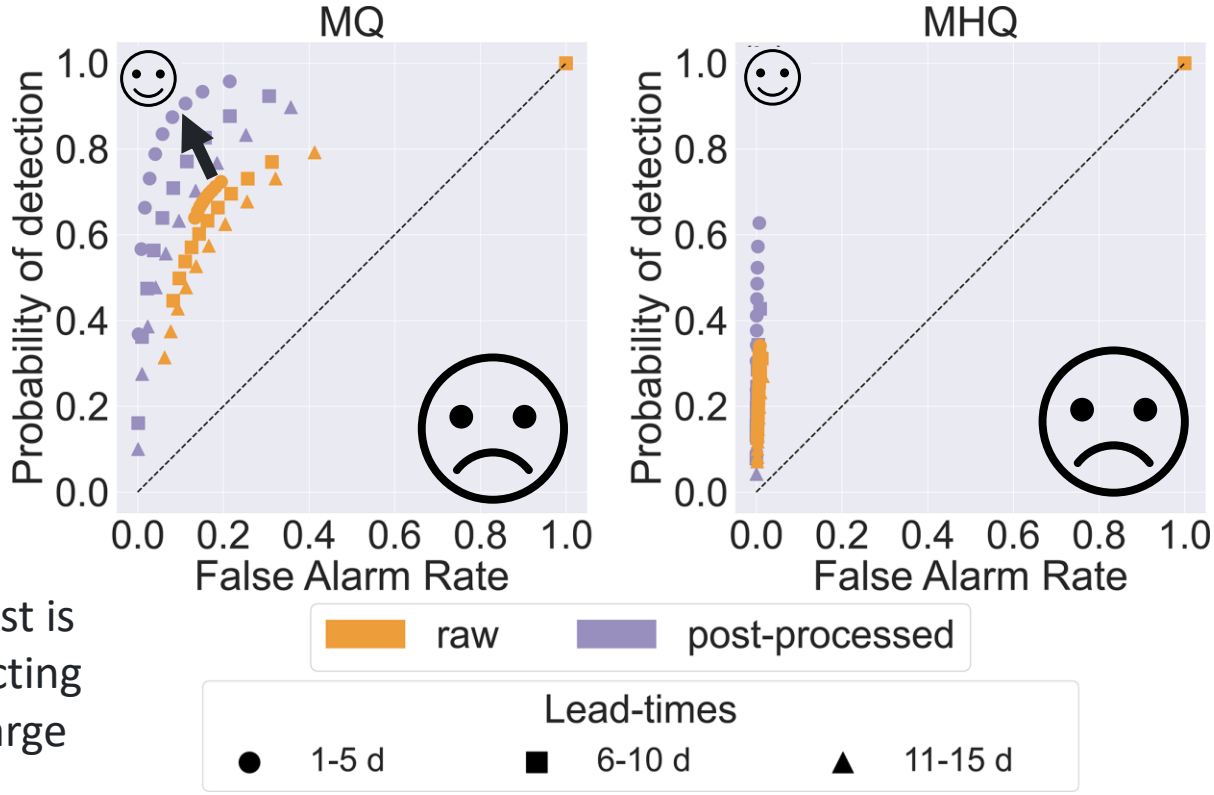
ECMWF Copernicus Europe's eyes on Earth European Commission

Benefits of post-processing

Emergency Management

Hits compared to misses

False alarms compared to true negative



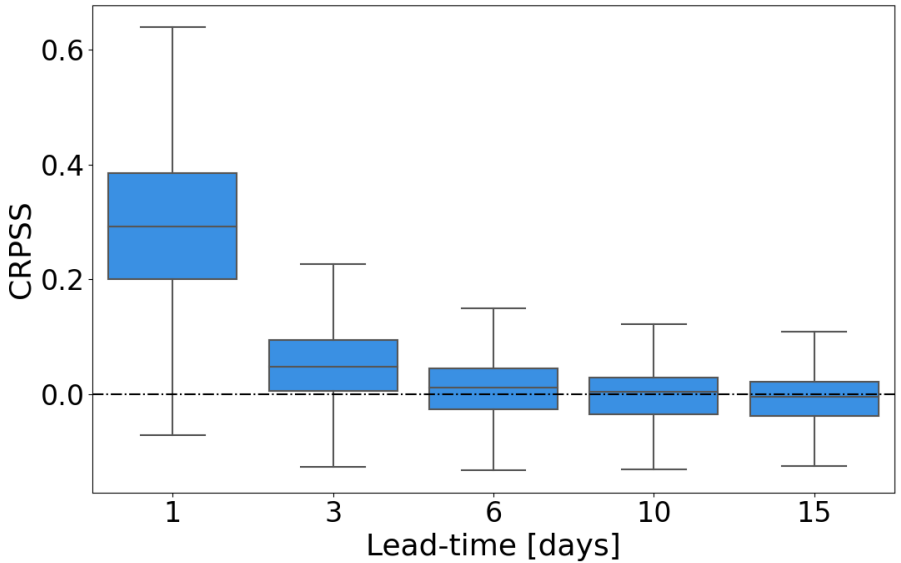
Post-processed forecast is more reliable at predicting the **OBSERVED** discharge value!

6-hourly post-processing

Emergency Management

6-hourly is better

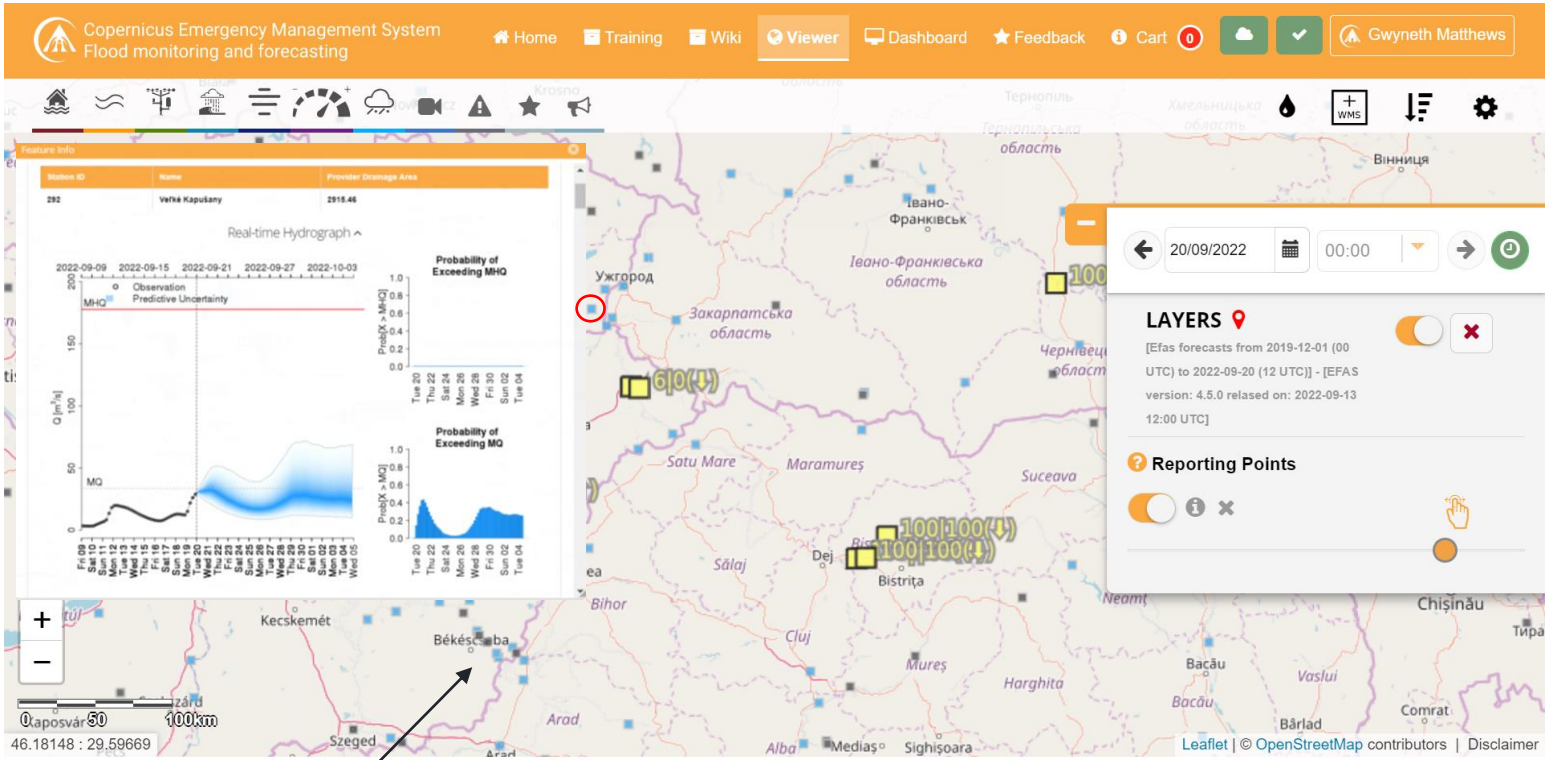
Daily is better

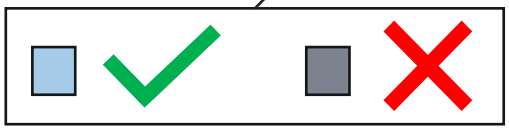


- Short lead-times are improved by using 6-hourly observations.
- Longer lead-times are not impacted.

Access points – EFAS-IS

Emergency Management

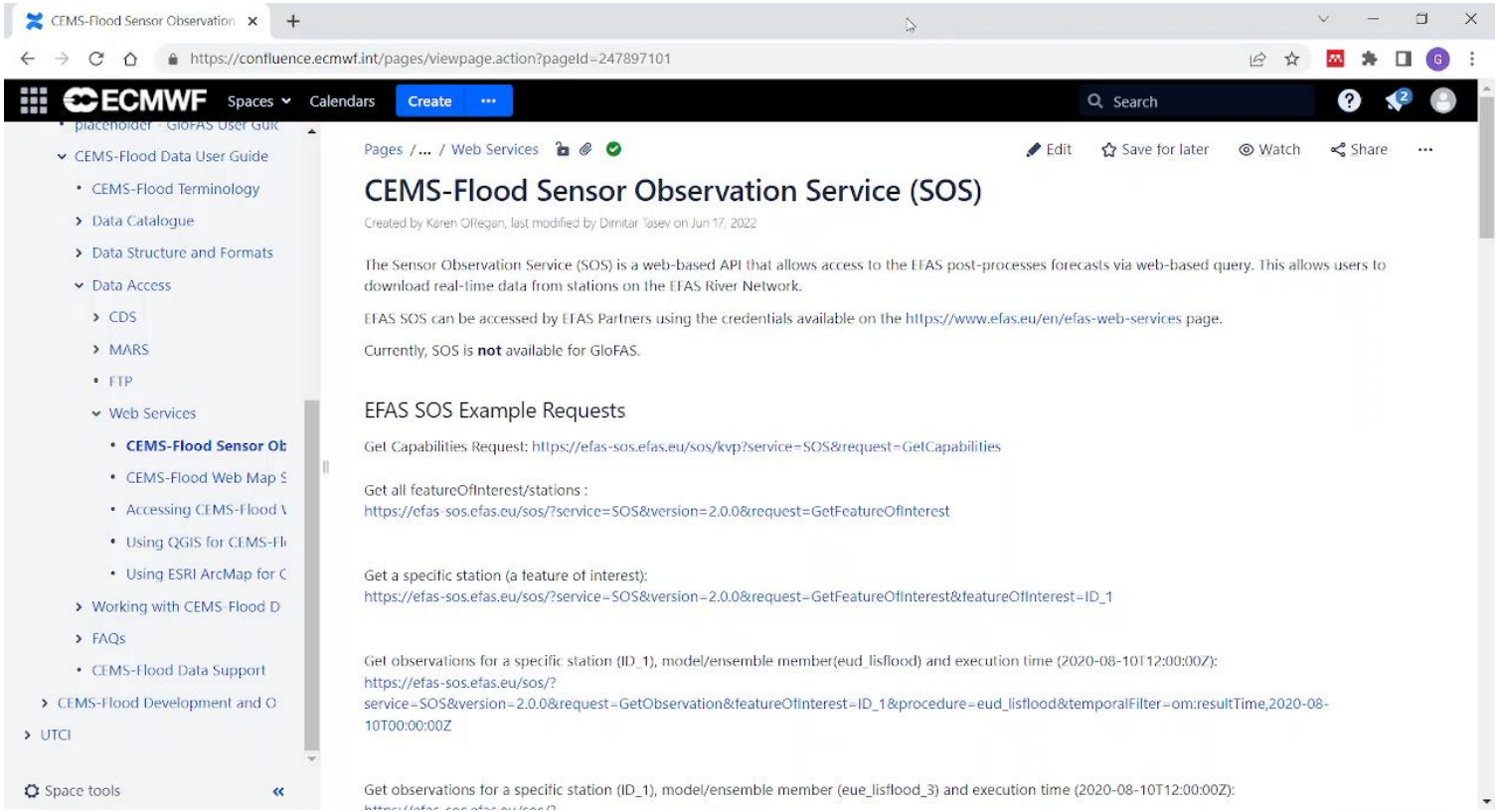




ECMWF Copernicus Europe's eyes on Earth European Commission

Access points- EFAS SOS

Emergency Management



Activity

European Commission

Copernicus
Europe's eyes on Earth

ECMWF

Activty

- **What do you like? What don't you like?**
- **How do you want the EFAS post-processing to change in the future?**

Discuss in groups and provide your feedback and suggestions on the mind-maps.

Discussion

European Commission | Copernicus Europe's eyes on Earth | ECMWF

What would be the **one** thing that you want changed?

Do you like the name ‘Real-time Hydrograph’?

Please complete the post-workshop questionnaire!

https://tinyurl.com/yx3hyf65

European Commission | Copernicus Europe's eyes on Earth | ECMWF

Thank you!

Please send question to
Gwyneth g.matthews@ecmwf.int

European Commission | Copernicus Europe's eyes on Earth | ECMWF