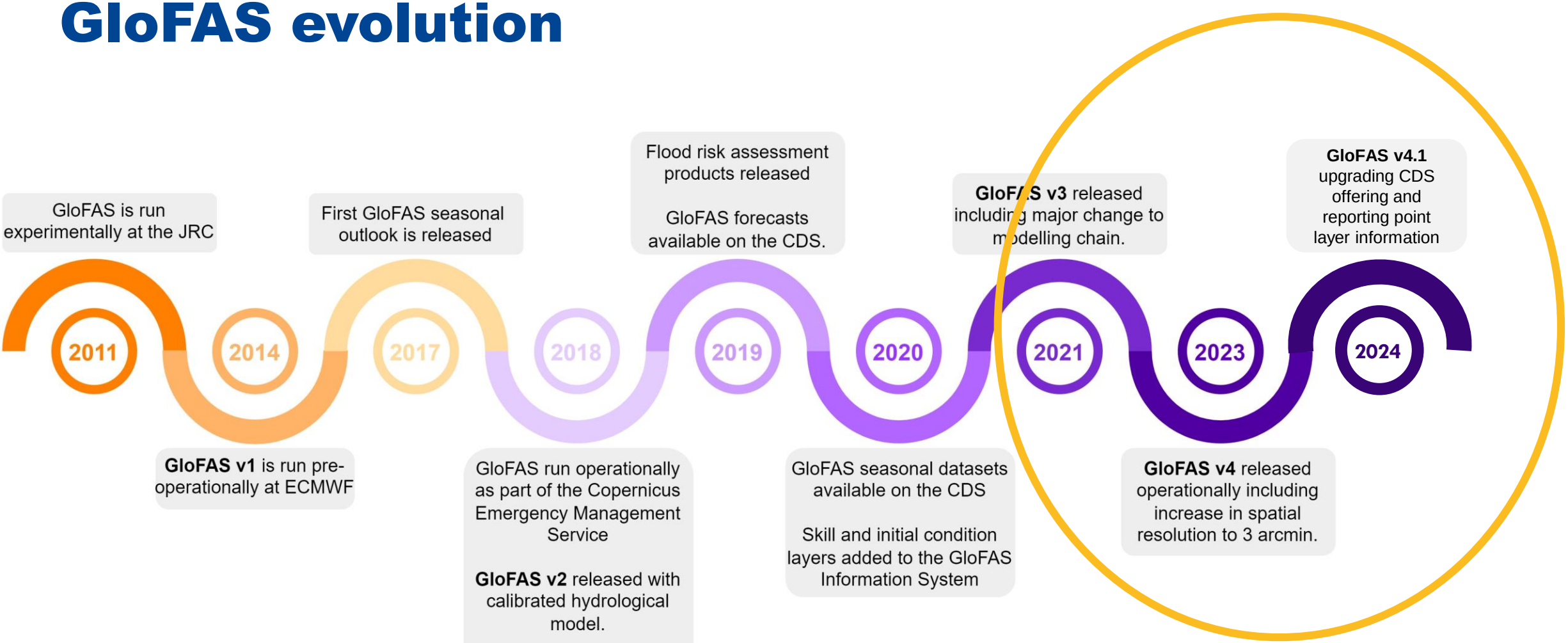
What is new in the Global Flood Awareness System GloFAS

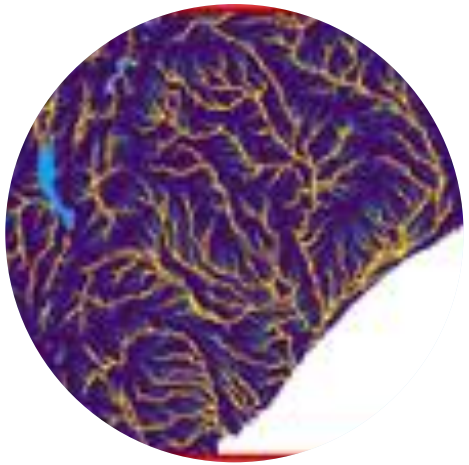
3rd Global Flood Forecasting and Monitoring Meeting

Christel Prudhomme and the CEMS-Flood teams at ECMWF and JRC

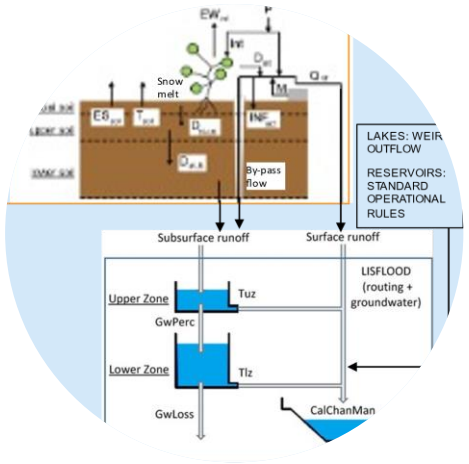
GloFAS evolution



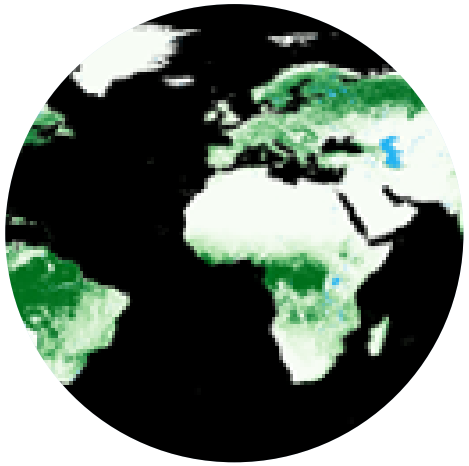
GloFAS v4.0 – Upgraded hydrological modelling chain



~5km resolution model grid and river network



Improved LISFLOOD-OS efficiency



Updated maps of physical properties

Regionalisation of model parameters for ungauged catchments

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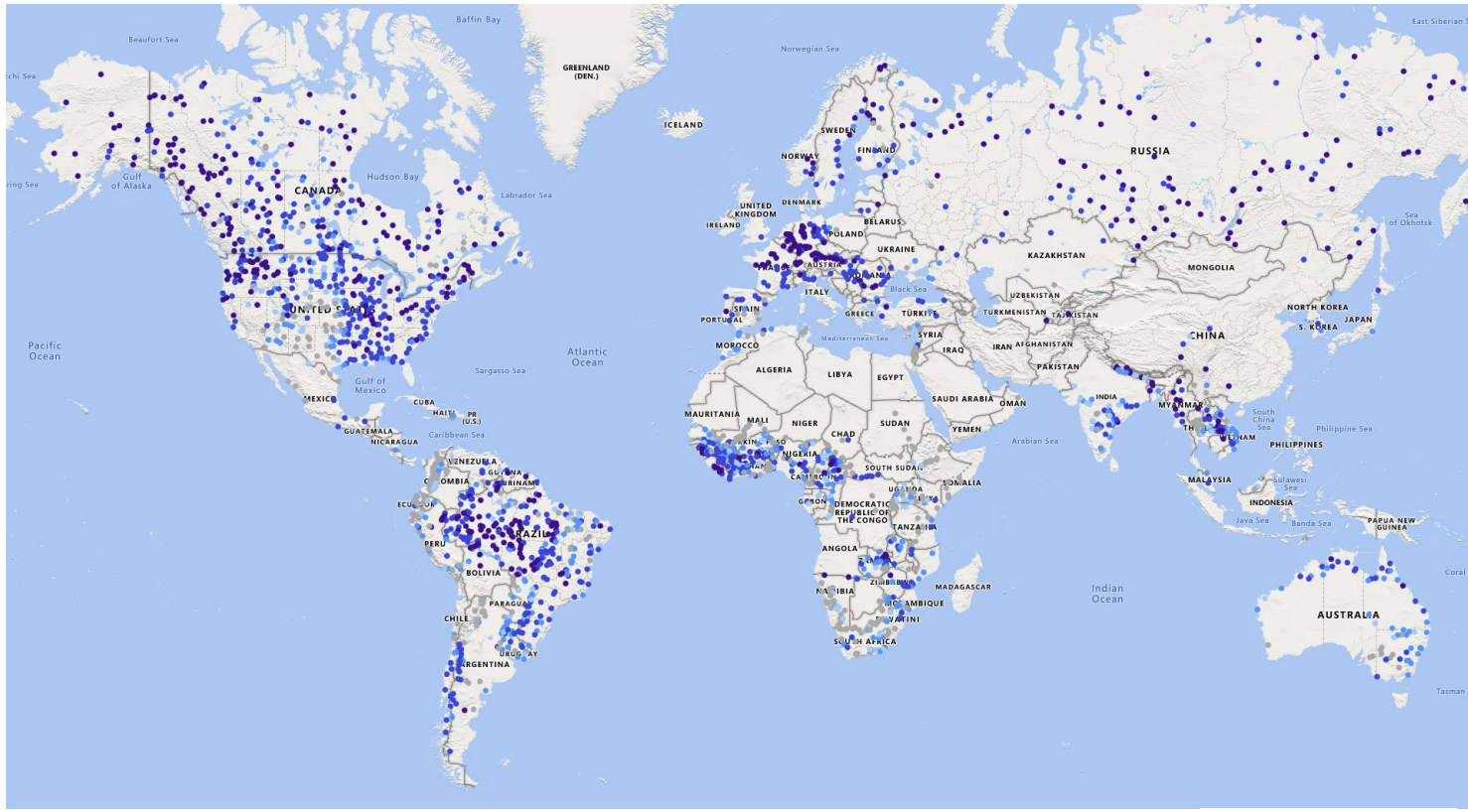
GloFAS v4.0 – Upgraded hydrological modelling chain

- Calibrated over nearly 2000 points
- ERA5 forcing
- Simulation available through CDS (1979-date)
- Lowest performance (grey) mainly in regulated rivers (KGE')
- Generally relatively high correlation



$$\mathrm{KGE}' = 1 - \sqrt{(r-1)^2 + (\beta-1)^2 + (\gamma-1)^2}$$

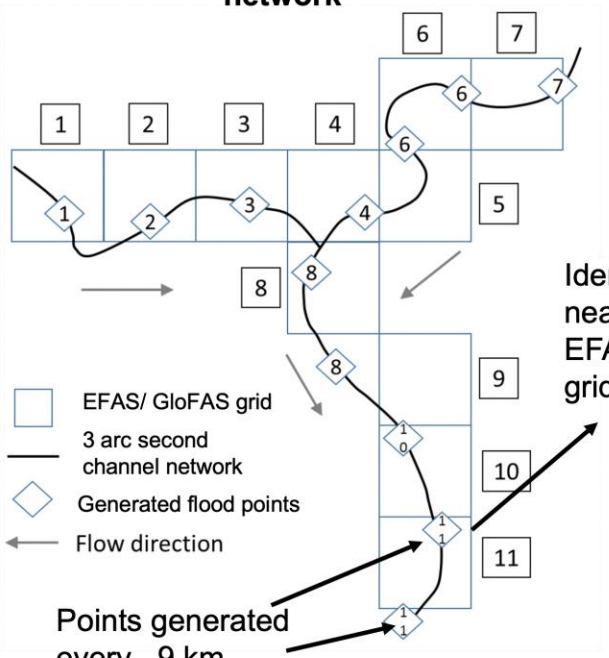
Correlation Bias ratio Variability ratio

KGE

- -∞ – 0.2
- 0.2 – 0.4
- 0.4 – 0.6
- 0.6 – 0.8
- 0.8 – 1.0

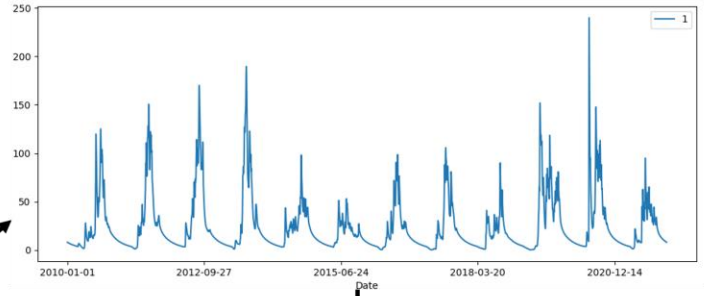
GloFAS v4.0 – High resolution flood inundation maps

1. Generate points along 3 arc second channel network

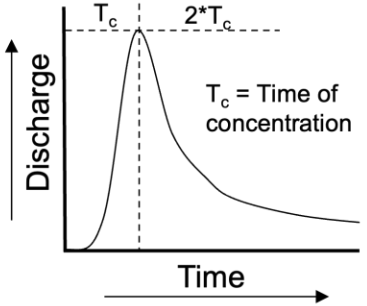


Identify nearest EFAS/GloFAS grid cell

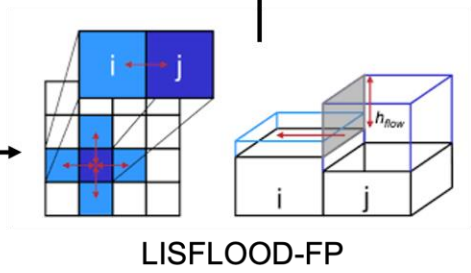
2. Extract EFAS/GloFAS discharge re-analysis at each generated point



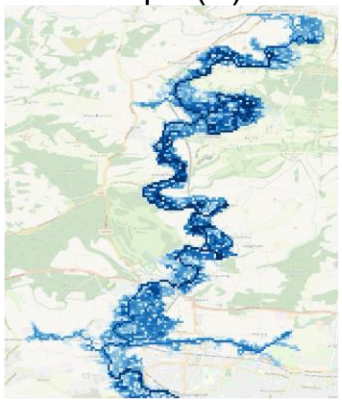
3. Generate Flood Event Hydrograph for return period scenarios



4. Run hydraulic model with hydrographs



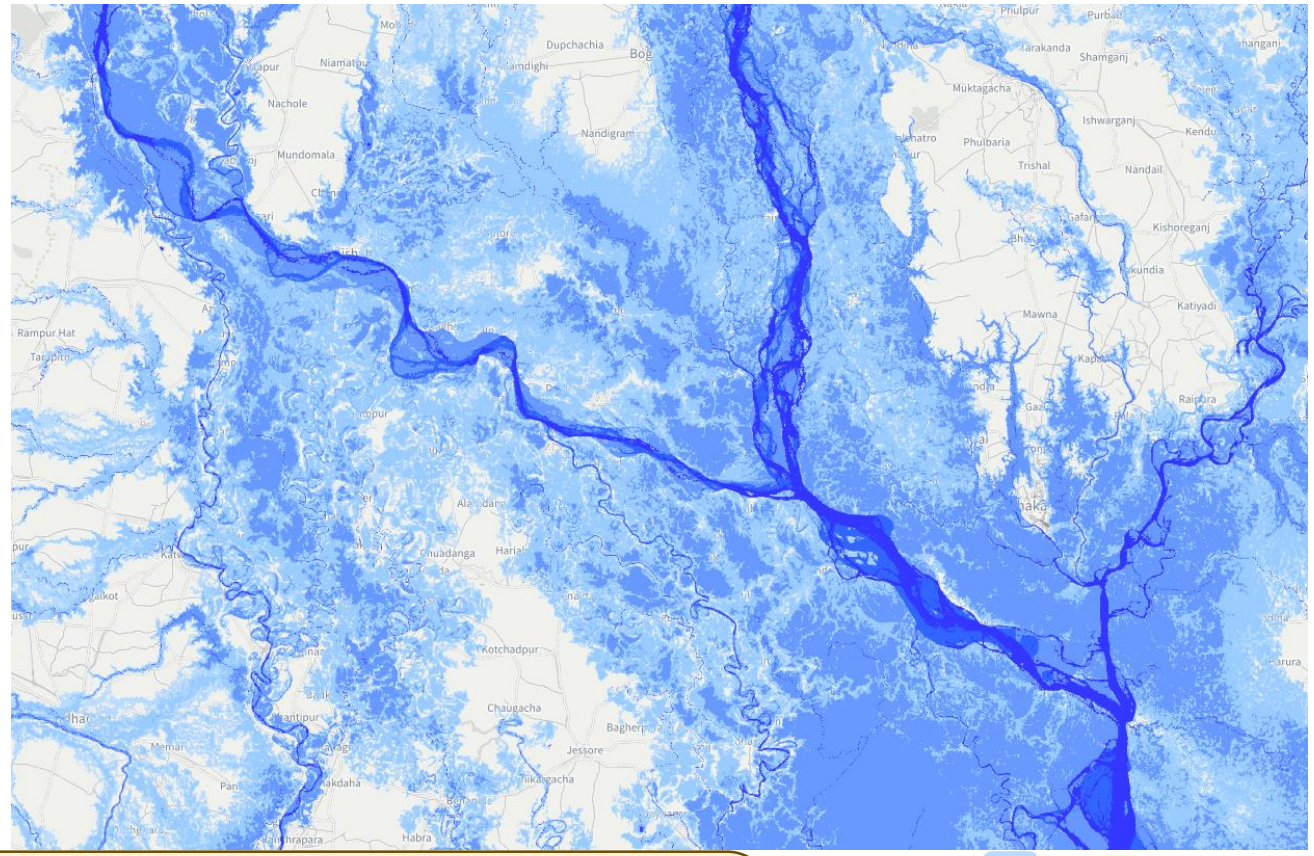
Maximum simulated depth (m)



GloFAS v4.0 – High resolution flood inundation maps

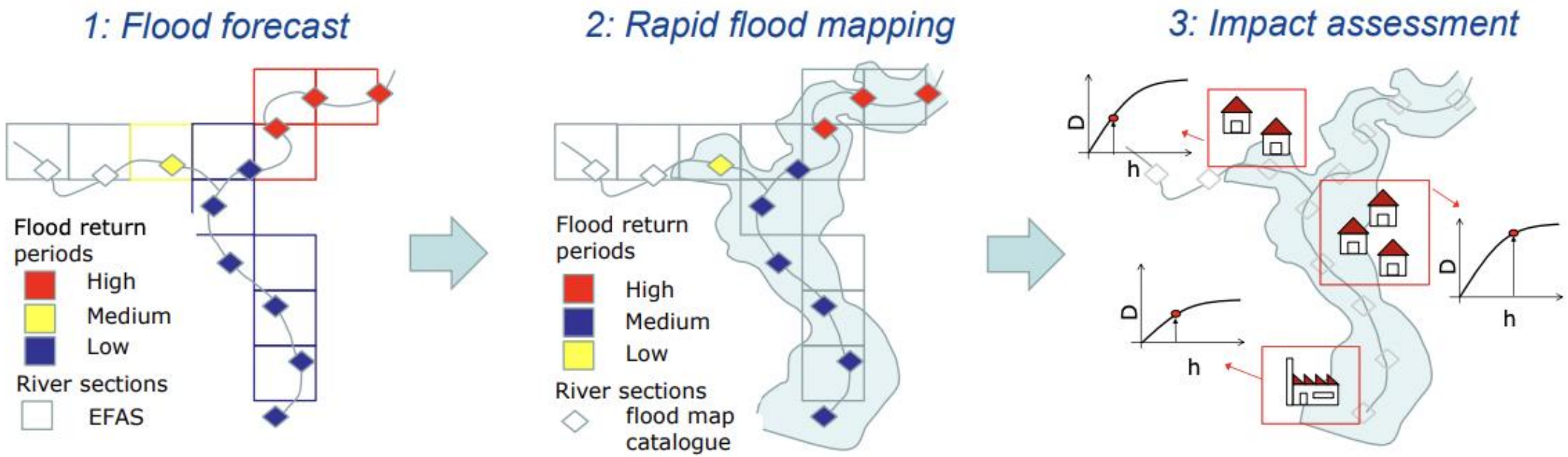
- 90-m resolution
- Return periods: 10, 20, 50, 75, 100, 200, 500 years
- Only for catchments >500km2
- Based on flood threshold magnitude of GloFAS v4 reanalysis
- 2D hydraulic flood inundation model

- Soon available from JRC catalogue



Ignite talk by Calum Baugh tomorrow

GloFAS v4.0 - Enhanced Rapid Risk Assessment



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GloFAS v4.0 - Enhanced Rapid Risk Assessment

- Updated/ enhanced exposure information
  - Population data - Global Human Settlement Layer (GHSL): https://ghsl.jrc.ec.europa.eu/
  - Critical Infrastructure: Health, education and airport facility information: openstreetmap.org

- Flood event description

GloFAS impact tables. Tables showing exposure information and the maximum forecast flood characteristics over the next 30 days and expected associated impacts. Results are aggregated over NUTS administration units.

Exposure Information	Protected	Unprotected
Population affected [No. of people]	70100	70100
Population within floodplain affected [%]	69	69
Cities affected (% area affected)	N/A	N/A
Health facilities affected (No. of facilities)	3	3
Education facilities affected (No. of facilities)	3	3
Airport affected (No. of facilities)	N/A	N/A
Artificial surfaces affected [ha]	N/A	N/A
Agricultural surfaces affected [ha]	258	258
Forest and semi-natural surfaces affected [ha]	3061	3063

Flood Event Information	Protected	Unprotected
Estimated mean return period [yr]	200	200
Estimated protection levels [yr]	6	6
Estimated peak time [d]	1	1
Estimated flooding duration (day)	13	13
Estimated flooded area (km2)	4024	4026
Mean probability of exceeding 2-years threshold	100	100
Mean probability of exceeding 5-years threshold	100	100
Mean probability of exceeding 20-years threshold	100	100

Exposure information. Potential impact of floods on population and land use (e.g. agriculture, urban).

Protected. Flood defenses accounted for in inundation extent estimates.

Unprotected. Inundation extent estimates assuming no flood defense.

Flood characteristics. Based on the maximum forecast median over the next 30 days.

Impact estimates. Defined by overlaying the inundation area with exposure data, aggregated over NUTS admin units.

GloFAS v4.1 – Increased CDS offering

Soil Wetness Index (root zone)

Ratio (0-1) of volume of water stored in the top two soil layers between saturation and residual levels, given as an instantaneous value at the end of each model time step

Snow Water Equivalent

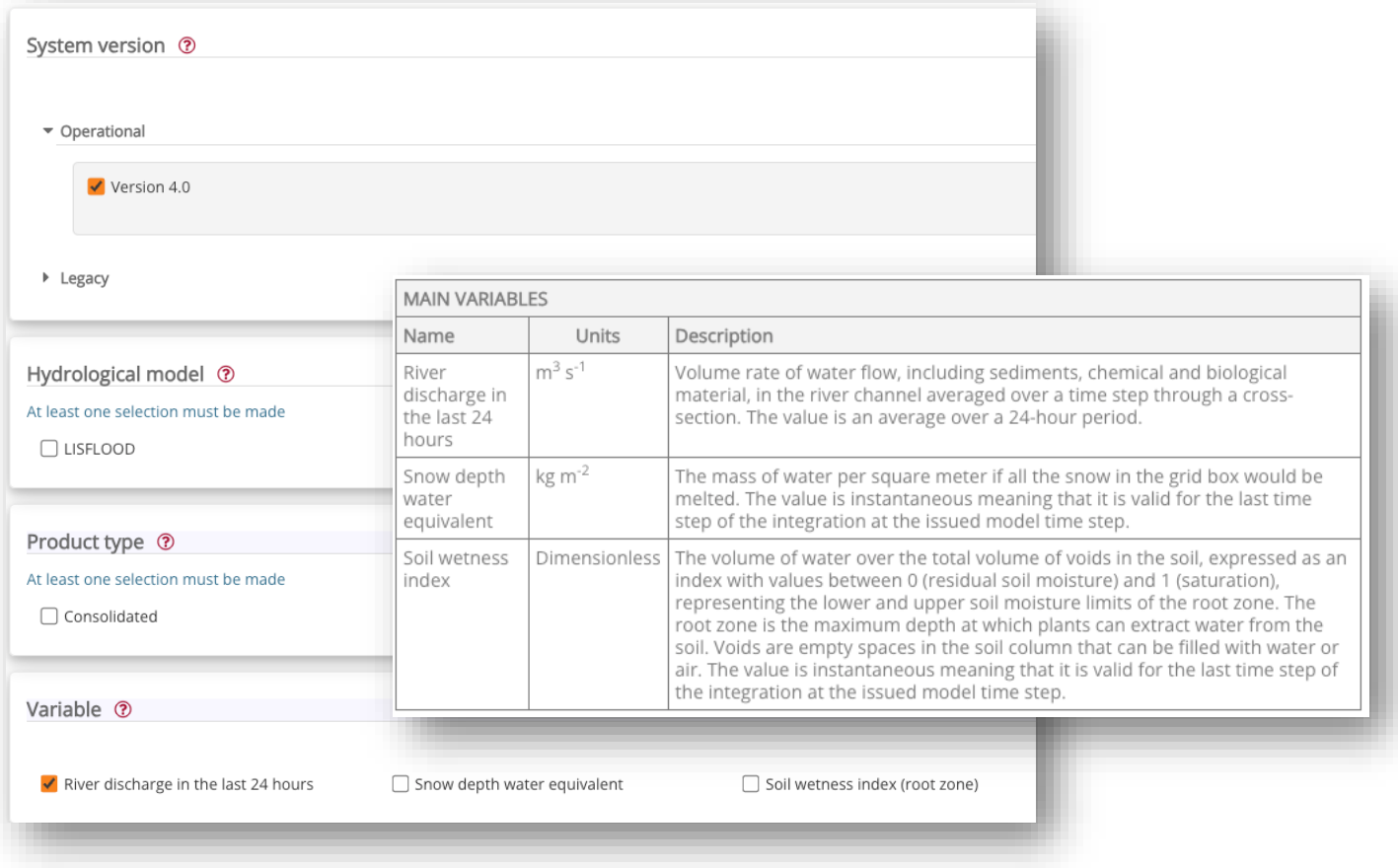
Amount of water stored (kg/m^2) as ice and snow given as an instantaneous value at the end of each model time step

Runoff water equivalent (surface and sub-surface)

Sum of surface and sub-surface runoff (kg/m^2), representing all the water that would drain away from the grid box

GloFAS v4.1- Increased CDS offering

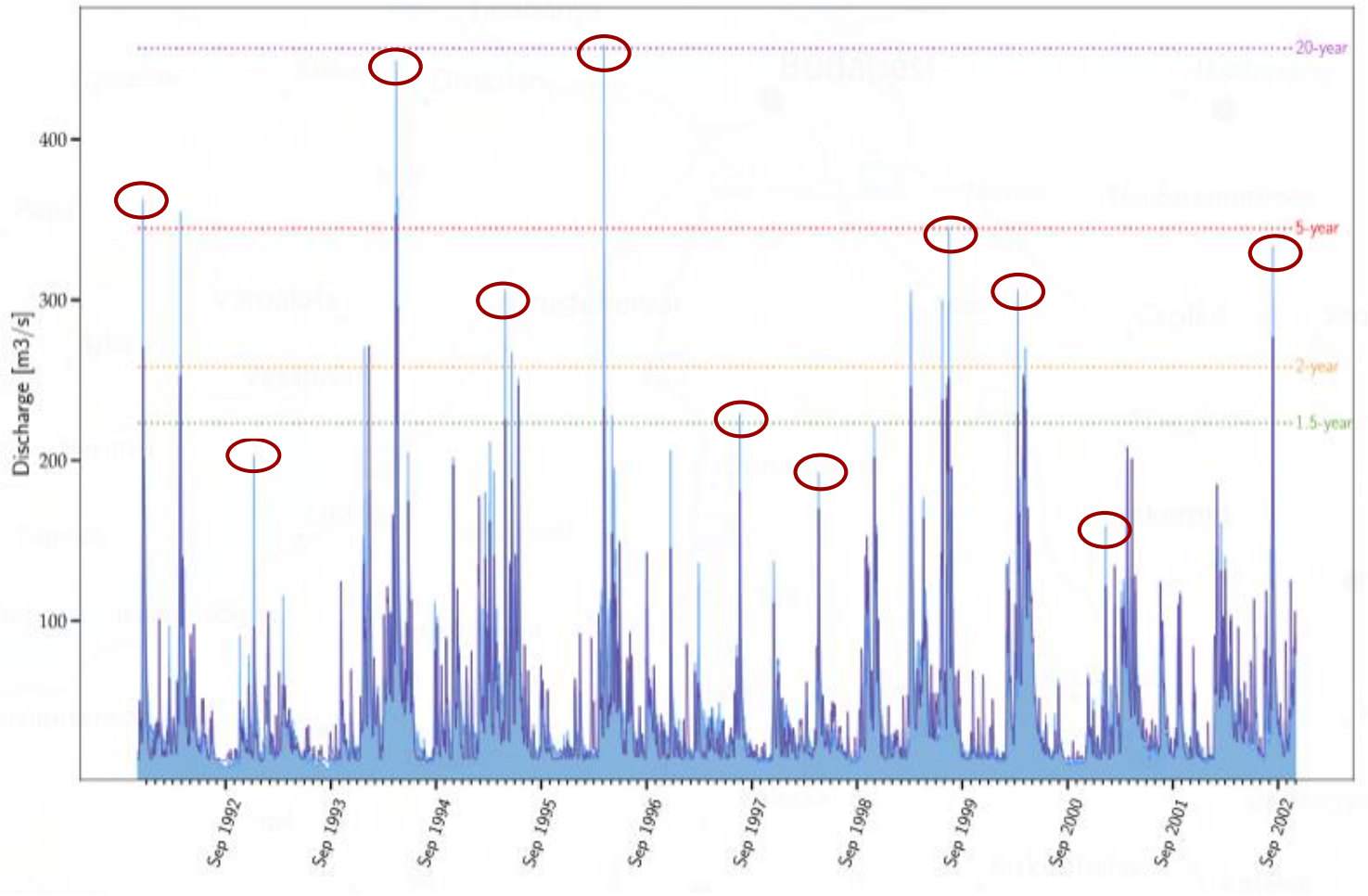
- Available as daily time series through Climate Data Store
- Consistent with initial condition layers shown on map viewer
- Available for reanalysis (historical simulation) and real-time forecasts
- During 2024, will also be made available for reforecasts



For more info

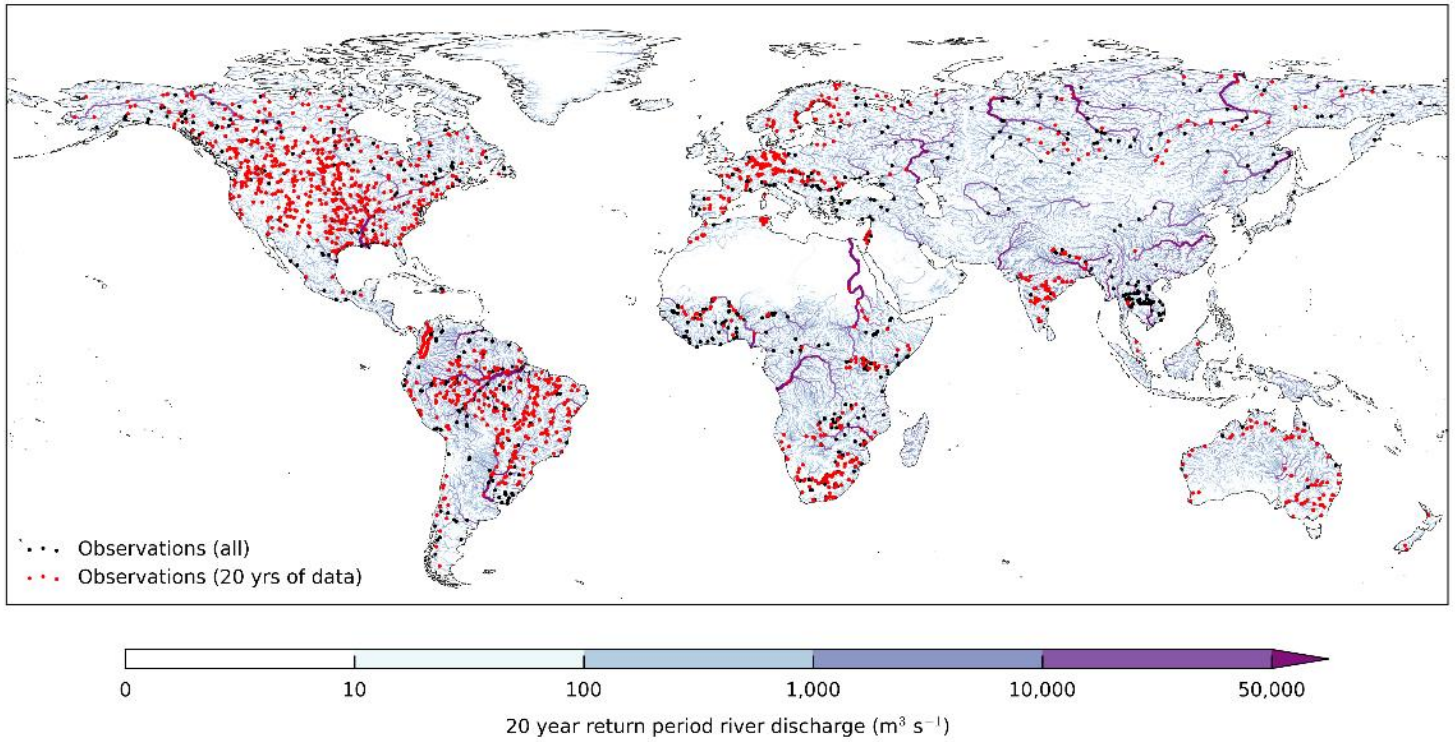
Want to know more? Visit us in GatherTown!

GloFAS v4.1- Flood thresholds



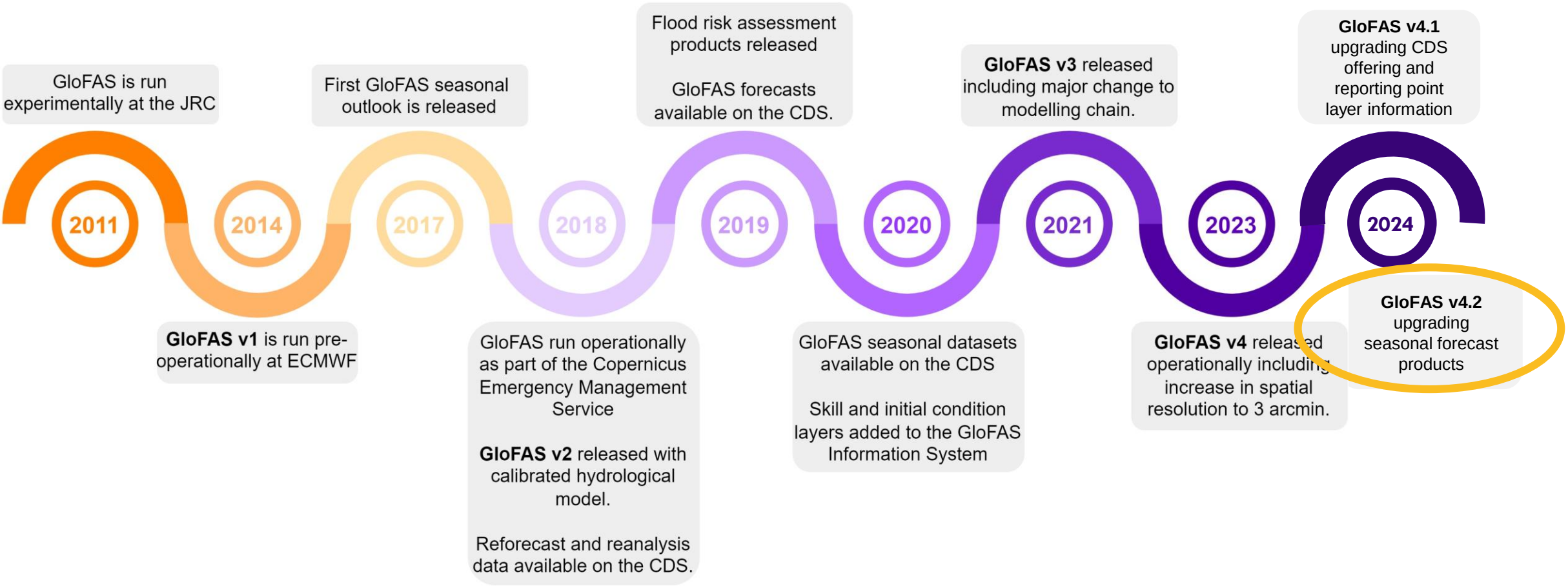
GloFAS v4.1- Flood Thresholds

- Calculated for every GloFAS grid cell
- Based on GloFAS reanalysis simulation (1979-2022)
- Re-calculated at every major release (change in hydrological modelling)
- Used to define the reporting points shown in the map viewer
- Additional return periods

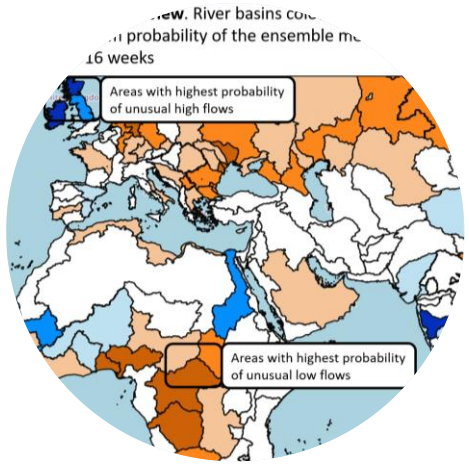


Ignite talk by Ervin Zsoter today!

GloFAS evolution – what to expect in the future

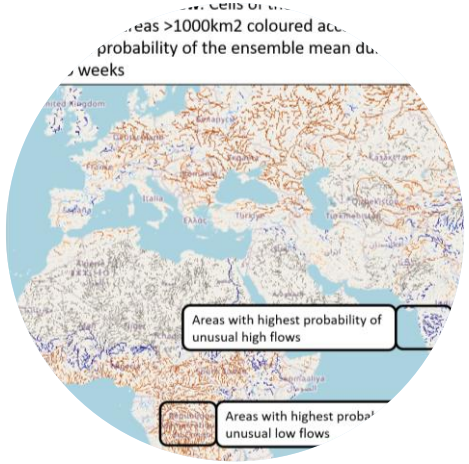


GloFAS v4.2 – Upgrade seasonal forecast products



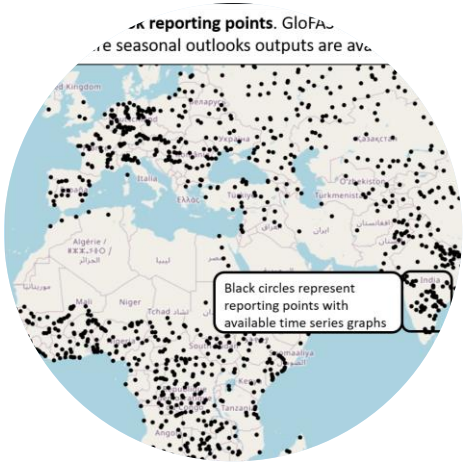
River basins overview

Map of maximum area-averaged probability of high/low flow weekly anomaly



River network overview

Map of river network with maximum basin-averaged probability of wet/dry weekly anomaly



Reporting points

Map of river station with avaiiable seasonal outlook hydrographs

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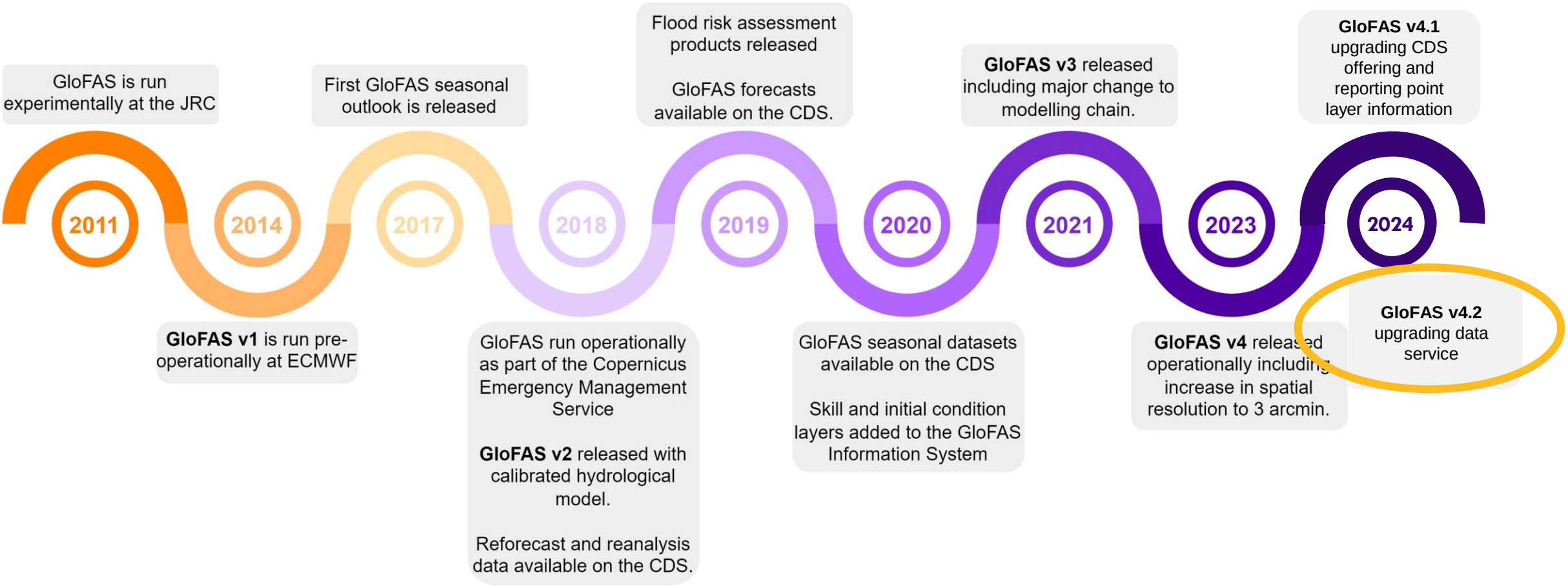
GloFAS v4.2- Upgrade seasonal forecast products

- Size of river basins
- Temporal aggregation (currently weekly)
- Definition of anomalies (currently 20/80th percentiles)
- How to convey forecast horizon information (instead of maximum anomaly)
- How to convey skill information

Have your say through the GloFAS Survey and talk to us in GatherTown!

GloFAS evolution – what to expect in the future



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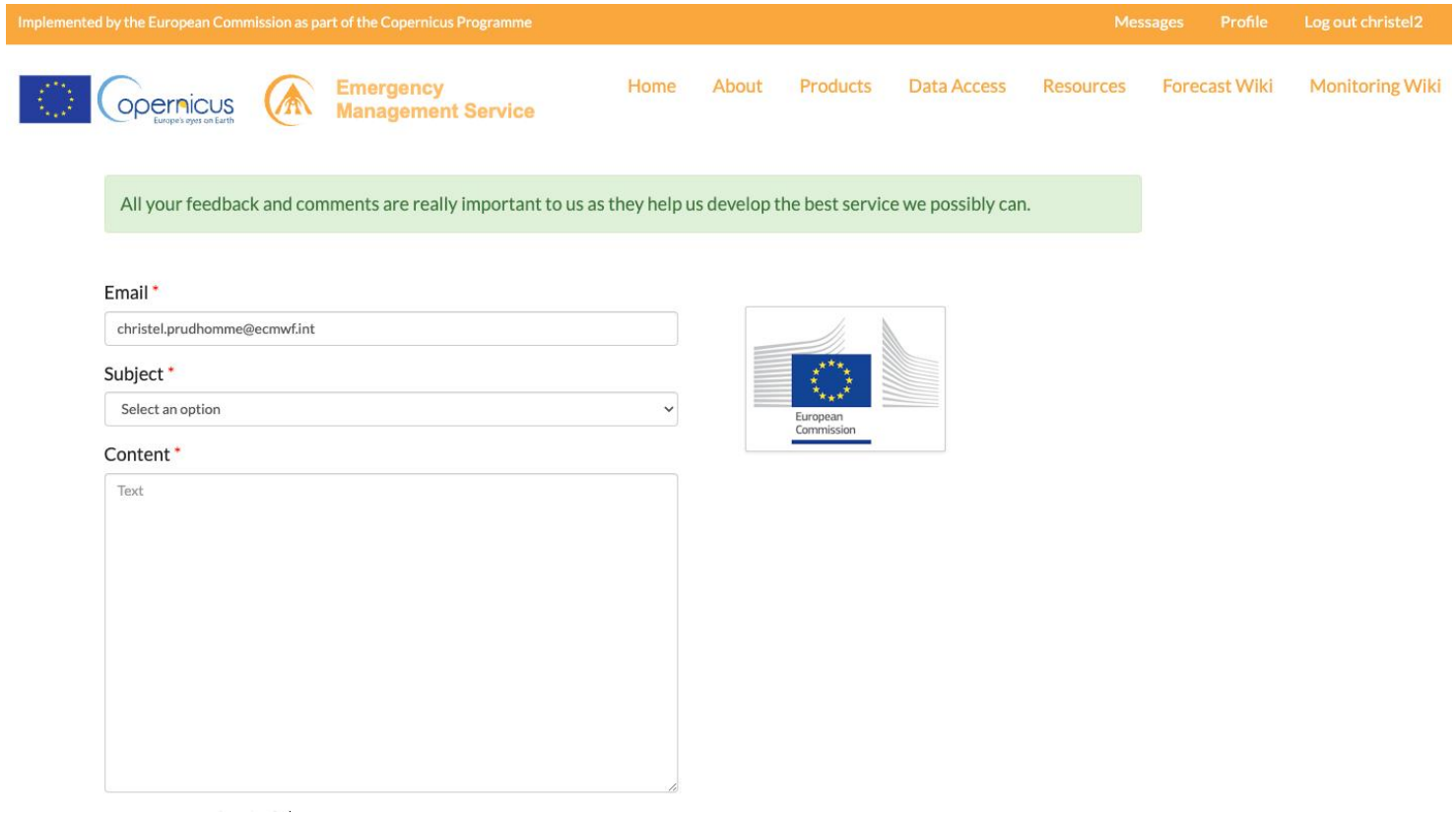
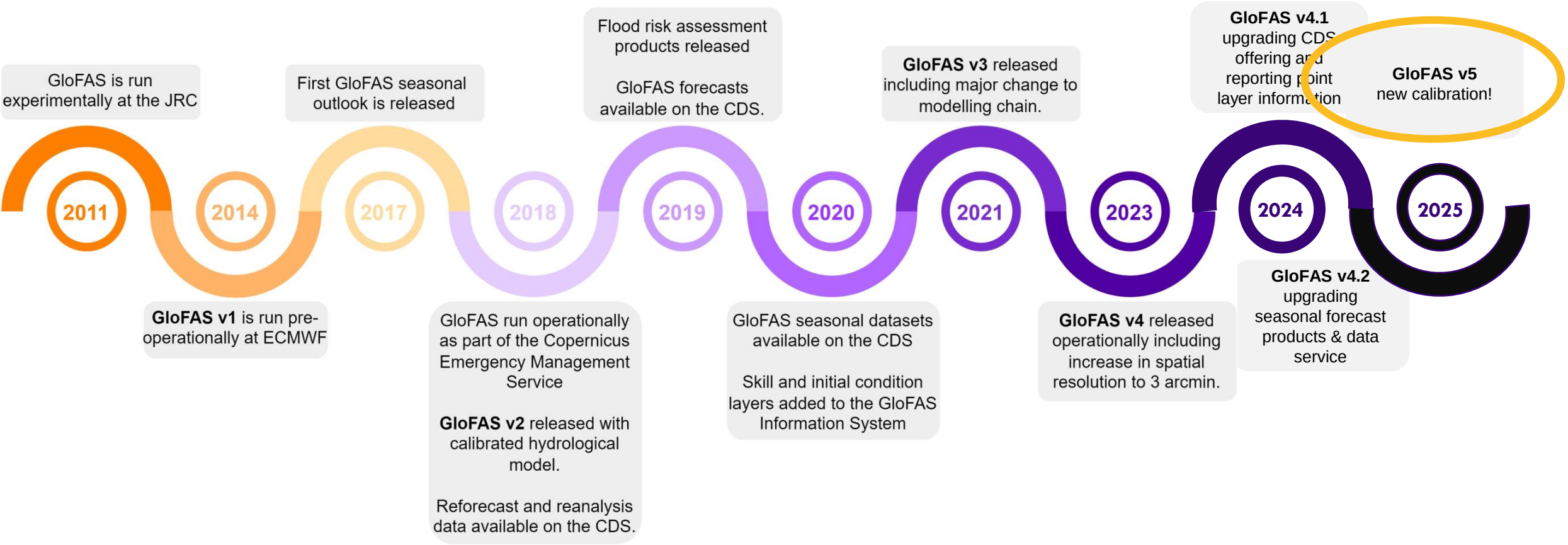
GloFAS v4.2- Upgrade data service

- Password-protected access
- Increased user support
- Notification service



Contact us if you wish to continue receiving our data service!

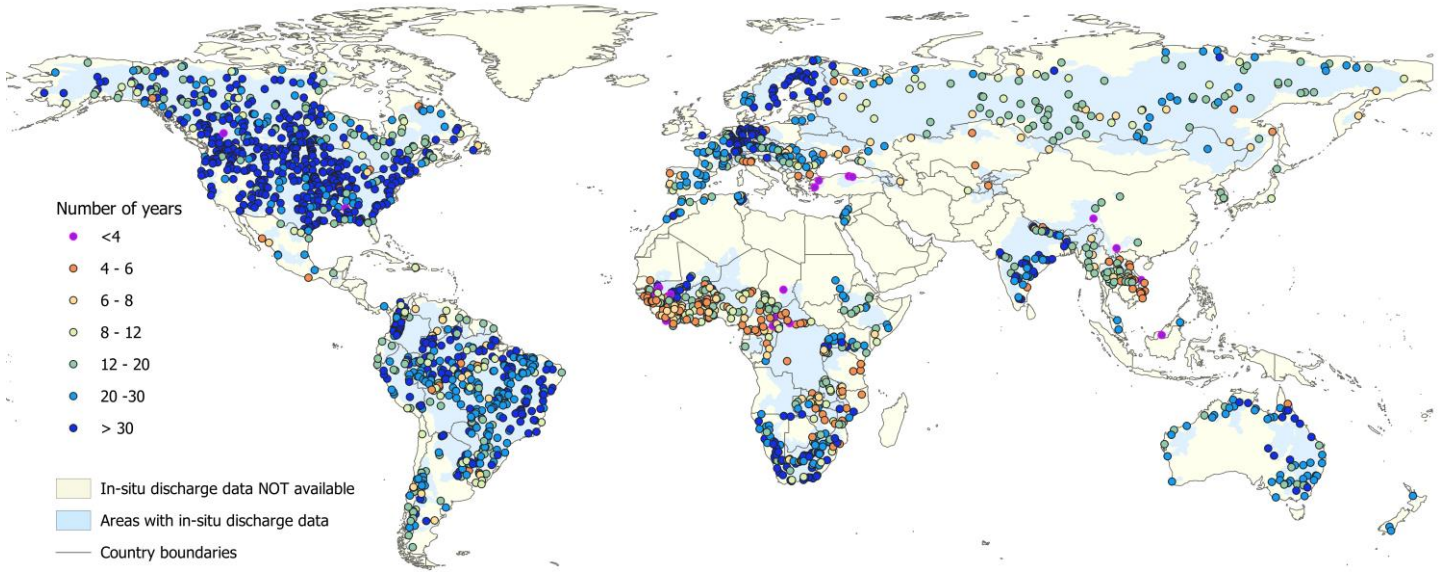
GloFAS evolution – what to expect in the future



GloFAS v5.0 – New calibation

- Improved physical property maps
- Improved LISFLOOD-OS

- Opportunity for more calibrated basins
- Opportunity for longer calibration time series
- Data collection campaign starting now!



Length of the observation time series in years used in GloFAS v4. The points in purple were included to increase the spatial coverage of the calibration

Want your region to be calibrated?
Visit us in GatherTown!

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Thank you