PROGRAMME OF THE EUROPEAN UNION

Implemented by European Commission

GloFAS Flood Thresholds

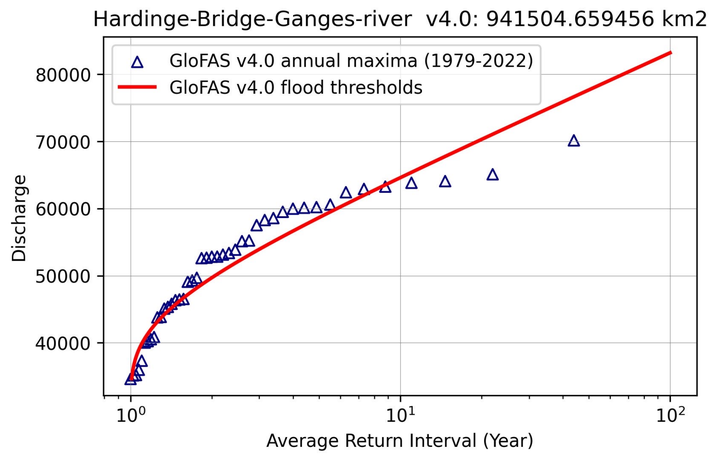
Ervin Zsoter and the CEMS-Flood team

GloFAS v4.0 threshold generation

- Extract the annual maxima time series (1979-2022)
- Fit a Gumbel distribution using the first two L-moments (λ_1, λ_2)

$$X = mu - sigma * \ln\left(\ln\frac{T}{T-1}\right) \quad simga = \lambda_2 * \frac{1}{\ln 2}$$

$$mu = \lambda_1 - 0.5772 * sigma \qquad \text{(T = return period)}$$



GloFAS Auxiliary Data

https://confluence.ecmwf.int/display/CEMS/Auxiliary+Data

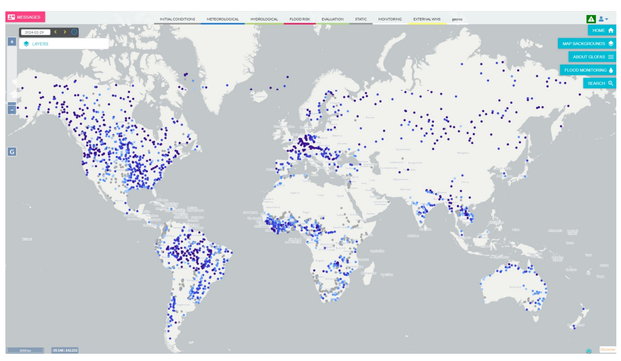
The auxiliary data for GloFAS are provided as NetCDF files in WGS 84 (EPSG:4326), and are **available to download below**.

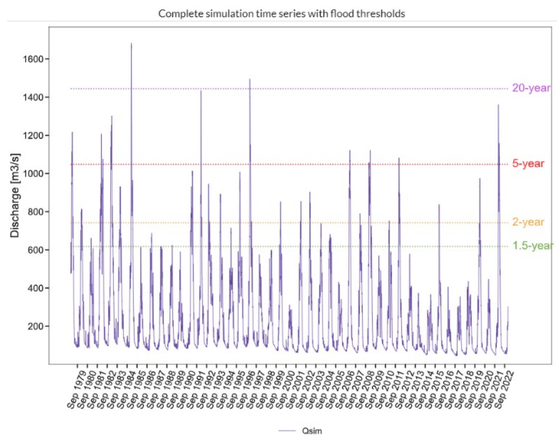
Four datasets are available to download:

- Upstream area
- Elevation
- The Local Drain Direction (LDD)
- Flood thresholds

GloFAS v4.0 reanalysis with flood thresholds

- The full reanalysis time series (1979-2022) is displayed in the Hydrological Model Performance layer on https://www.globalfloods.eu/
- For all the fixed reporting points, including also the flood thresholds (1.5-, 2-, 5- and 20-year)
- Helps with how well the thresholds represent the extreme event behaviour (in reanalysis alone and forecast vs reanalysis)





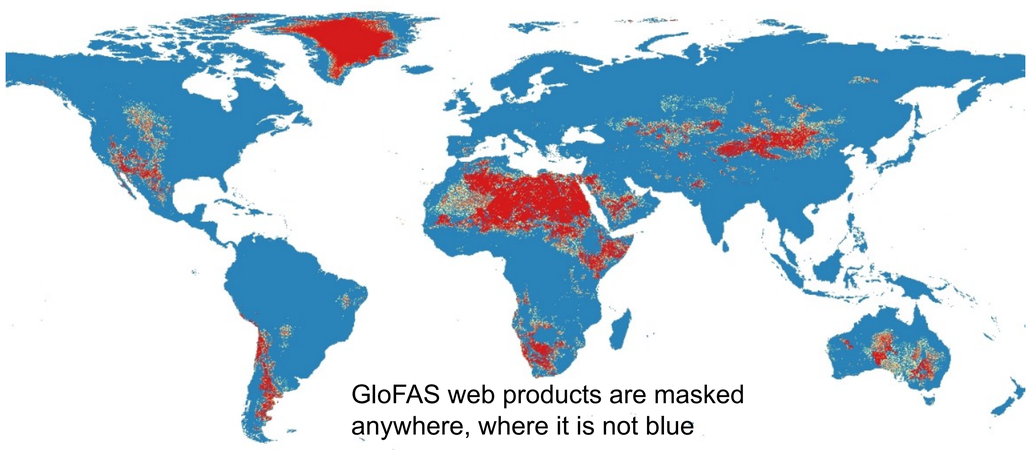
Flood Thresholds NetCDF metadata — Collapse source

```
Dimensions:   (lat: 3000, lon: 7200)
Coordinates:
  * lat       (lat) float64 89.97 89.92 89.88 89.82 ... -59.88 -59.92 -59.97
  * lon       (lon) float64 -180.0 -179.9 -179.9 -179.8 ... 179.9 179.9 180.0
Data variables:
    rl_1.5    (lat, lon) float64 ...
    rl_2.0    (lat, lon) float64 ...
    rl_5.0    (lat, lon) float64 ...
    rl_10.0   (lat, lon) float64 ...
    rl_20.0   (lat, lon) float64 ...
    rl_50.0   (lat, lon) float64 ...
    rl_100.0  (lat, lon) float64 ...
    rl_200.0  (lat, lon) float64 ...
    rl_500.0  (lat, lon) float64 ...
    sigma     (lat, lon) float64 ...
    mu        (lat, lon) float64 ...
```

GloFAS v4.0 river discharge masking

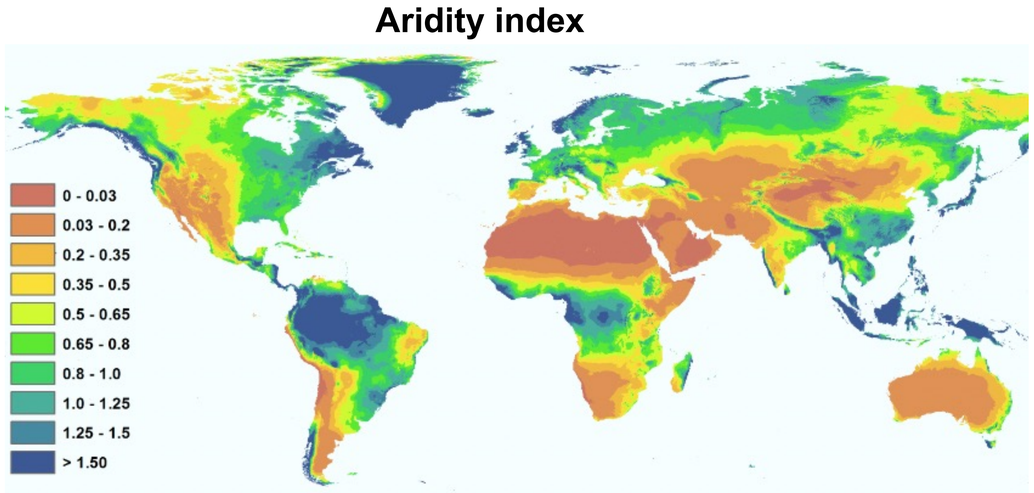
- Small (below 250 km^2) and extremely dry (below 0.1 m^3/s 2-year flood threshold values) catchments are masked in GloFAS web products
- No coloured river pixels (in flood summary layers and 5-, 20-year probability maps) and no dynamic reporting point in those areas
- Important to be aware of this when the no-flood-signal is interpreted
- Dry areas are in good agreement with the aridity index (mean precipitation / mean evapotranspiration)
- The minimum threshold value for masking was adjusted in GloFAS v4.1 from 1.0 to 0.1 m^3/s (2-year threshold)

GloFAS v4.1 2-year flood threshold

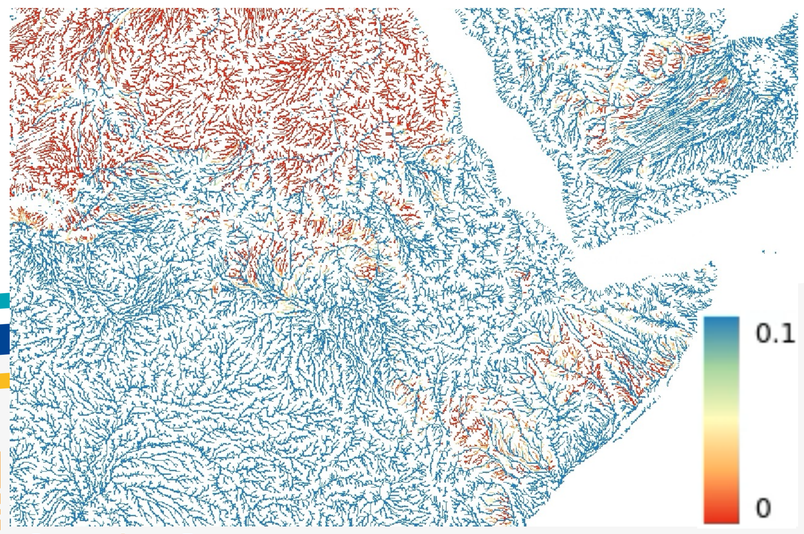


GloFAS web products are masked anywhere, where it is not blue

Aridity index

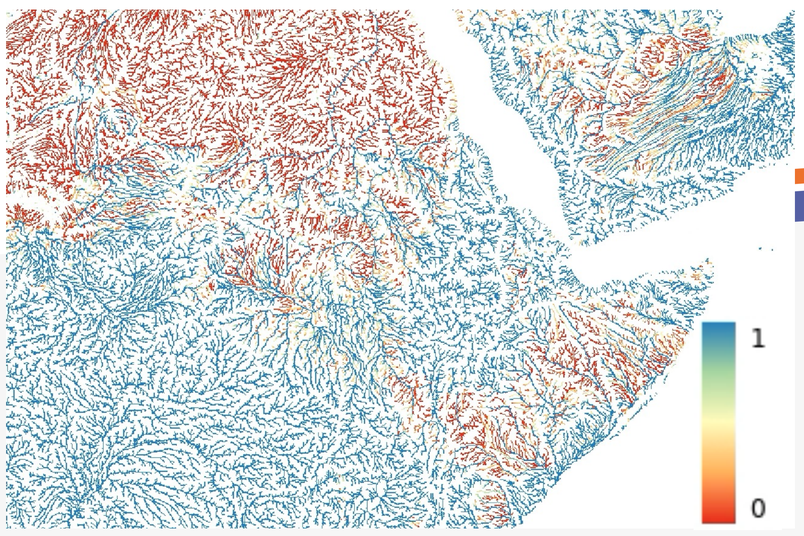


v4.1 (from 26 July 2023)



GloFAS web products are masked anywhere, where it is not blue

v4.0 (until 25 July 2023)



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