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Hydrological Data Collection Centre

COPERNICUS EMERGENCY MANAGEMENT SERVICE

18th EFAS ANNUAL MEETING

Presented by Tomás Jacobson

28 09 2023

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Who we are?

Where we are?

Who we are and where we are?

GHENOVA is an international company that provides multidisciplinary engineering and consulting services across a wide range of sectors, including energy, infrastructure, industry, marine, offshore, aeronautics, and systems.

GHENOVA DIGITAL is the subsidiary of GHENOVA specializing in systems and digital solutions.

Our main headquarters is located in Seville - Spain

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Our hydrological team:

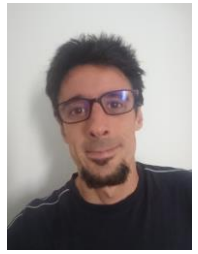
Antonio Jimenez Molina

Mercedes Garcia Padilla

Miguel Angel Borrego

Marina Gonzalez Martin

Maria Marquez Arroyo



Alejandro Serratosa

Our IT team:

Jesus Trujillo Tovar

Matías Huéscar Muñoz

Mariano Corzo Toscano

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Juan Antonio Castañeda

Management:

Rafael Garcia Sanchez

Tomás Jacobson

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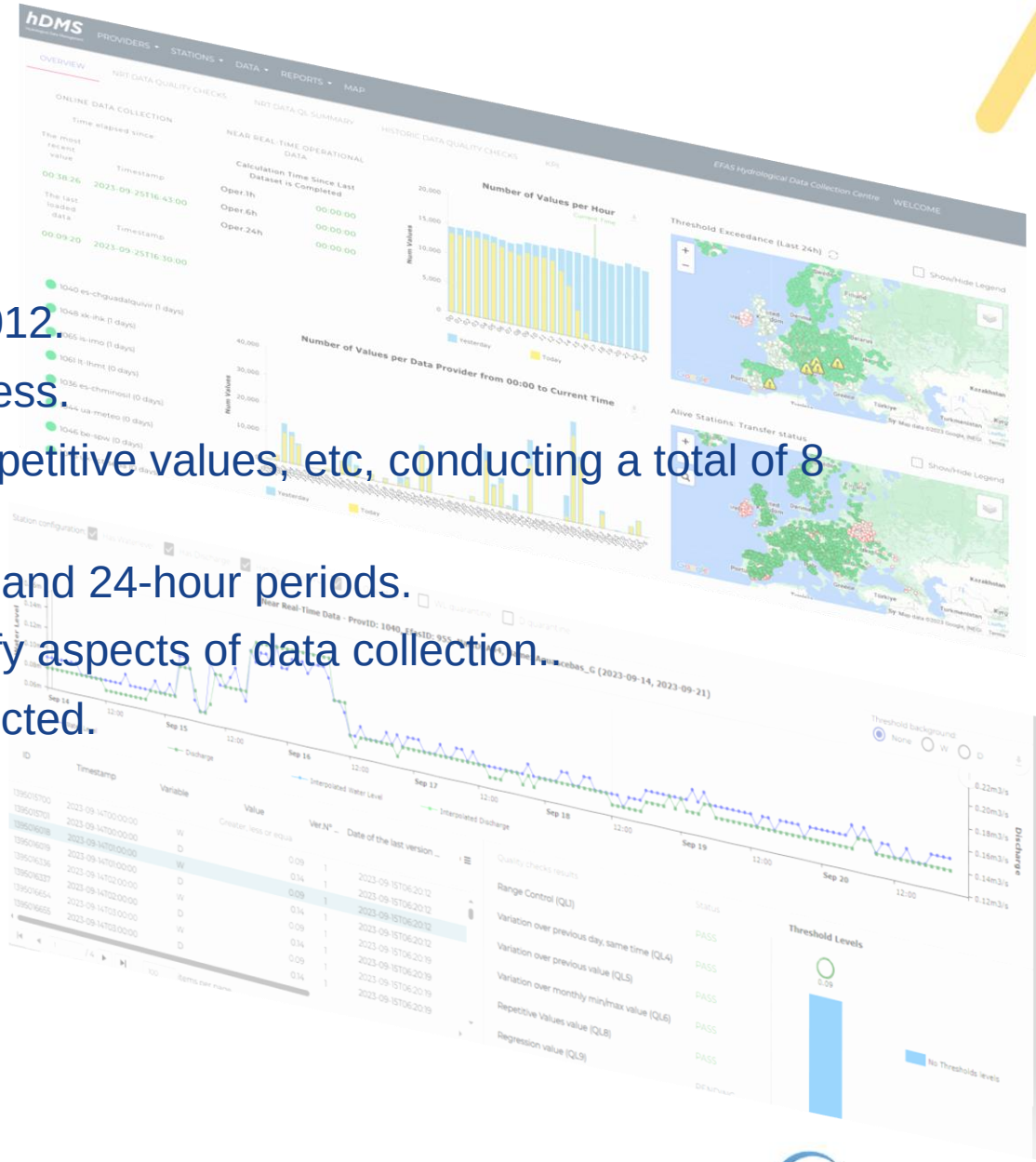
What do we do?
What do we have?

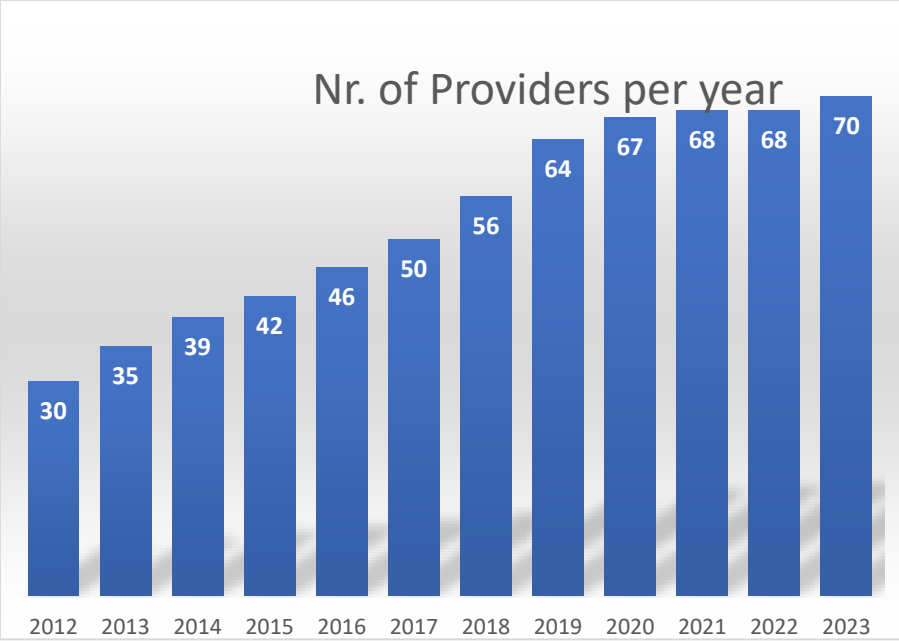
What we do

- Collect hydrological from EFAS partner´s since 2012.
- Contact new partners during the onboarding process.
- Check incoming data looking for gaps, outliers, repetitive values, etc, conducting a total of 8 different quality controls for each dataset.
- Normalize data by averaging over 1-hour, 6-hour, and 24-hour periods.
- Visit partners to assist with data transfer and clarify aspects of data collection..
- Reach out to data providers when issues are detected.
- Carry out historical data collection campaigns.
- Contribute to the EFAS monthly bulletin.
- Generate the Annual Hydrological Report.



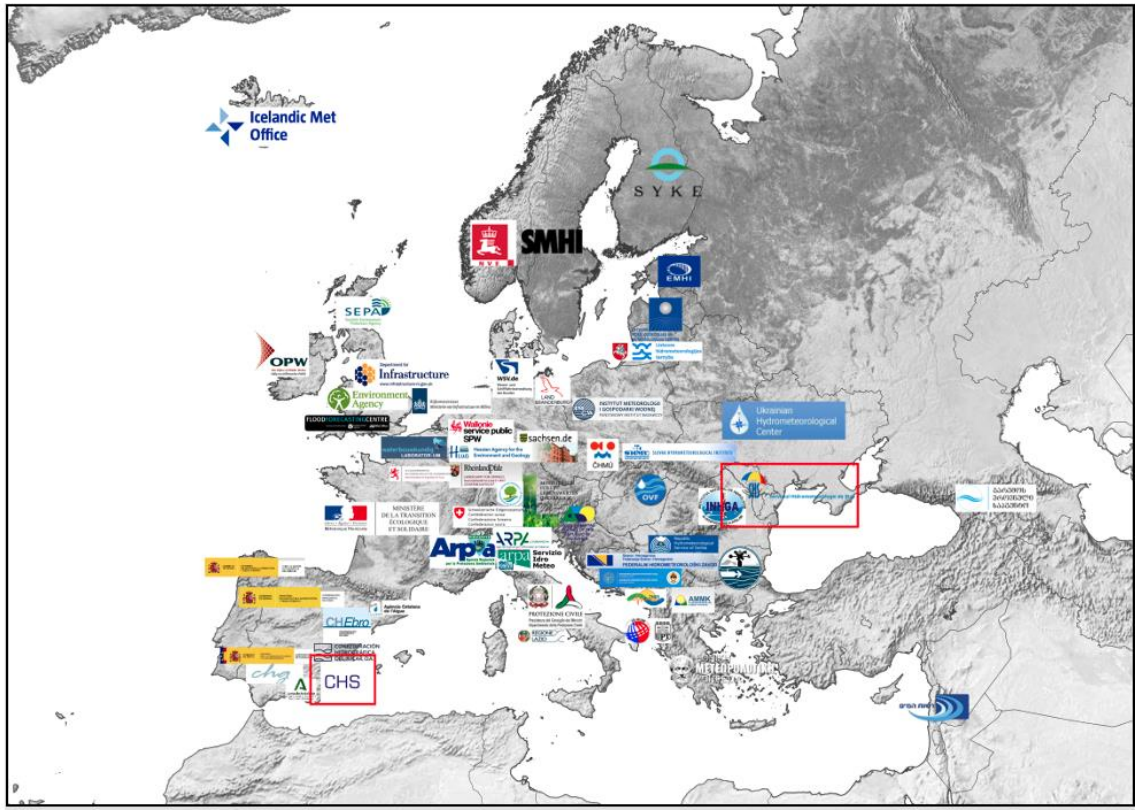
Data Providers over the years.

Increase from last year	Sept - 2022	Currently
Data Providers	68	70
Active Data Providers	48	52



41 countries and more than a 54% of all the European water basins.

In 2022, Increase of 3% respect to 2021 (Annual Report)



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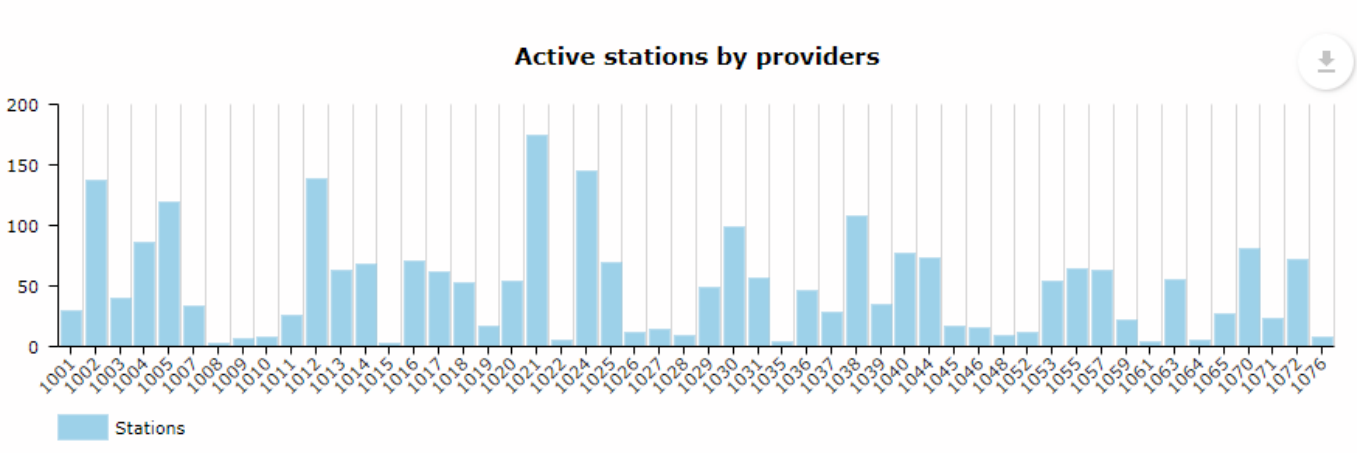
Nr of Stations in the HDCC database



Nr of Stations in the HDCC database

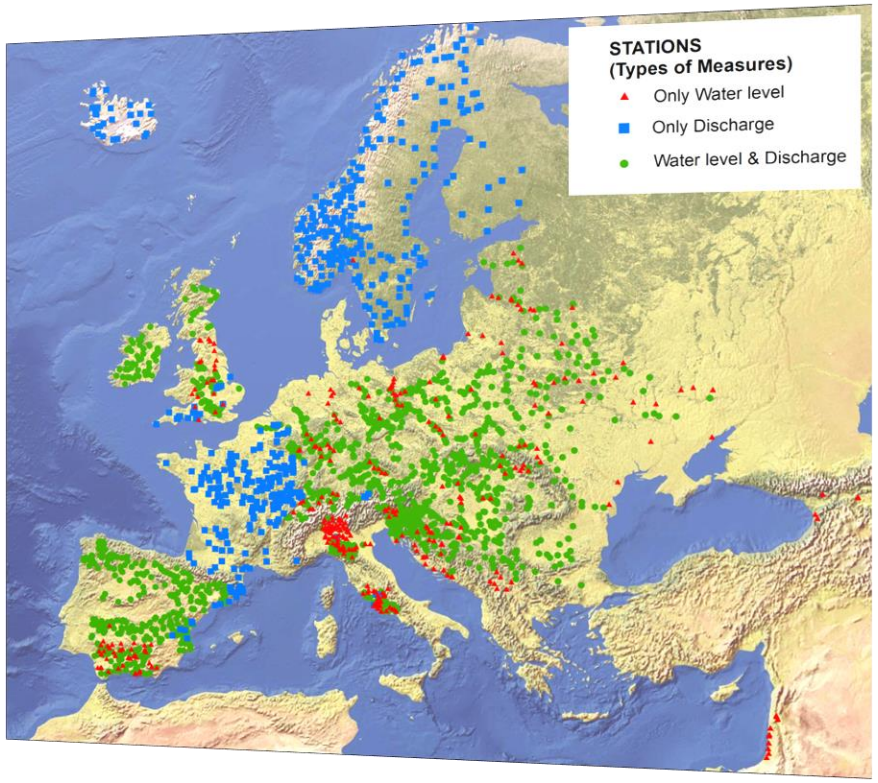
Total: 4.305

Active: 2.048

Active Discharge: 1.985

Active WL: 1.887

Active WL & D: 1.460



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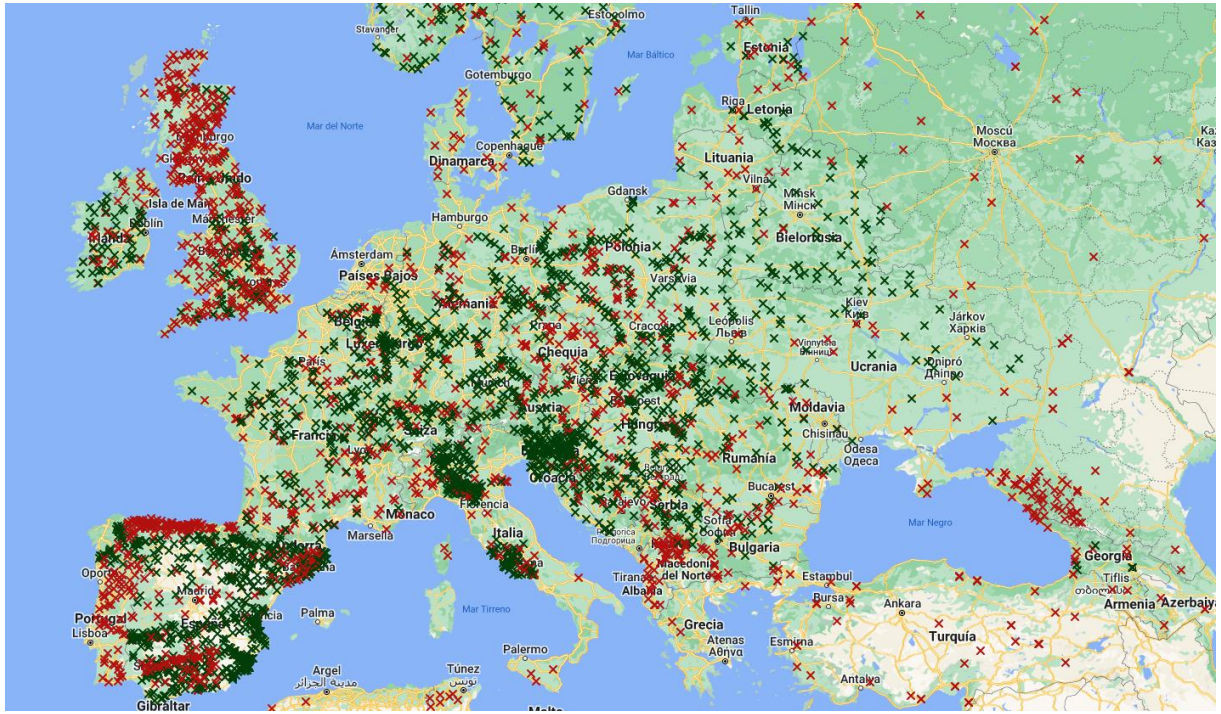
Stations included in the last year

Code	Data provider	New Stations 22-23
1005	Slovenian Environment Agency - SI	1
1028	Estonian Environmental Agency - EE	8
1035	State Hydrometeorological Service of Moldova - MD	5
1037	Catalan Water Agency - ES	46
1045	Scottish Environment Protection Agency - UK-SCT	125
1056	Confederación Hidrográfica del Cantábrico - ES	120

Total new stations 2022-2023:	305
Total new stations with water level:	302
Total new stations with discharge:	303



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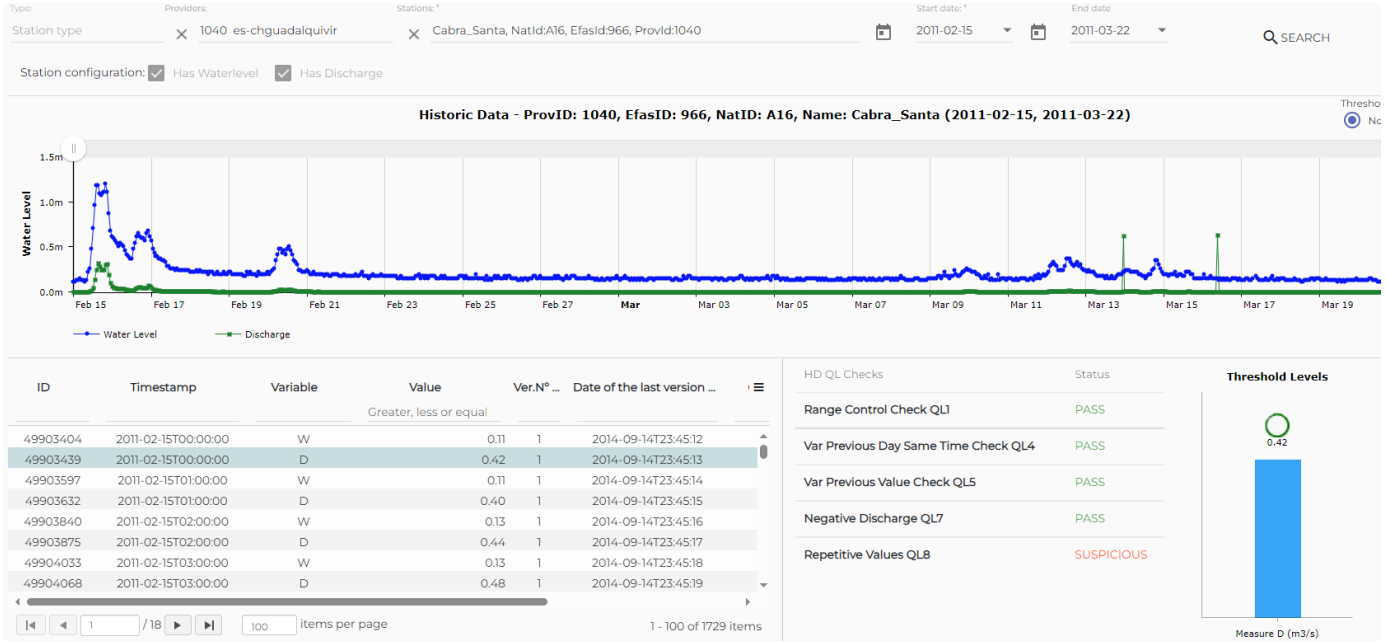
Collection data Campaign. Improvements!!! How to contribute??

Historical and Reservoir Data Collection Campaign.

- Currently, a campaign with data providers for collecting reservoir data has started.
- Partners will be contacted soon in the coming months to request historical data from recent years.



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Improvements

New processing of operational values.

Changes in operational value calculations:

Now, averaged observations (aka operational observations) are calculated using qualified NRT observations.

Only the near real-time observations not flagged as FAIL will be used for the calculation.

Result flags by quality check:

Check	PASS	FAIL	SUSPICIOUS	UNCHCKD.
Range Control	✓	✓	✓	✓
Rating Curve	✓		✓	✓
Variation vs Previous Day	✓		✓	✓
Variation vs Previous Value	✓		✓	✓
Manual Check	✓	✓		
Negative Discharges	✓	✓		
Repetitive Values	✓		✓	✓

The API for serving operational observations includes a summary of the different flags. For each operational observation, it is shown the percentage of each check result found in the aggregation interval.

Also, Operational Observations are flagged with a Quality Summary Flag (QSF).

- Responses to operational services 1h, 6h and 24h:

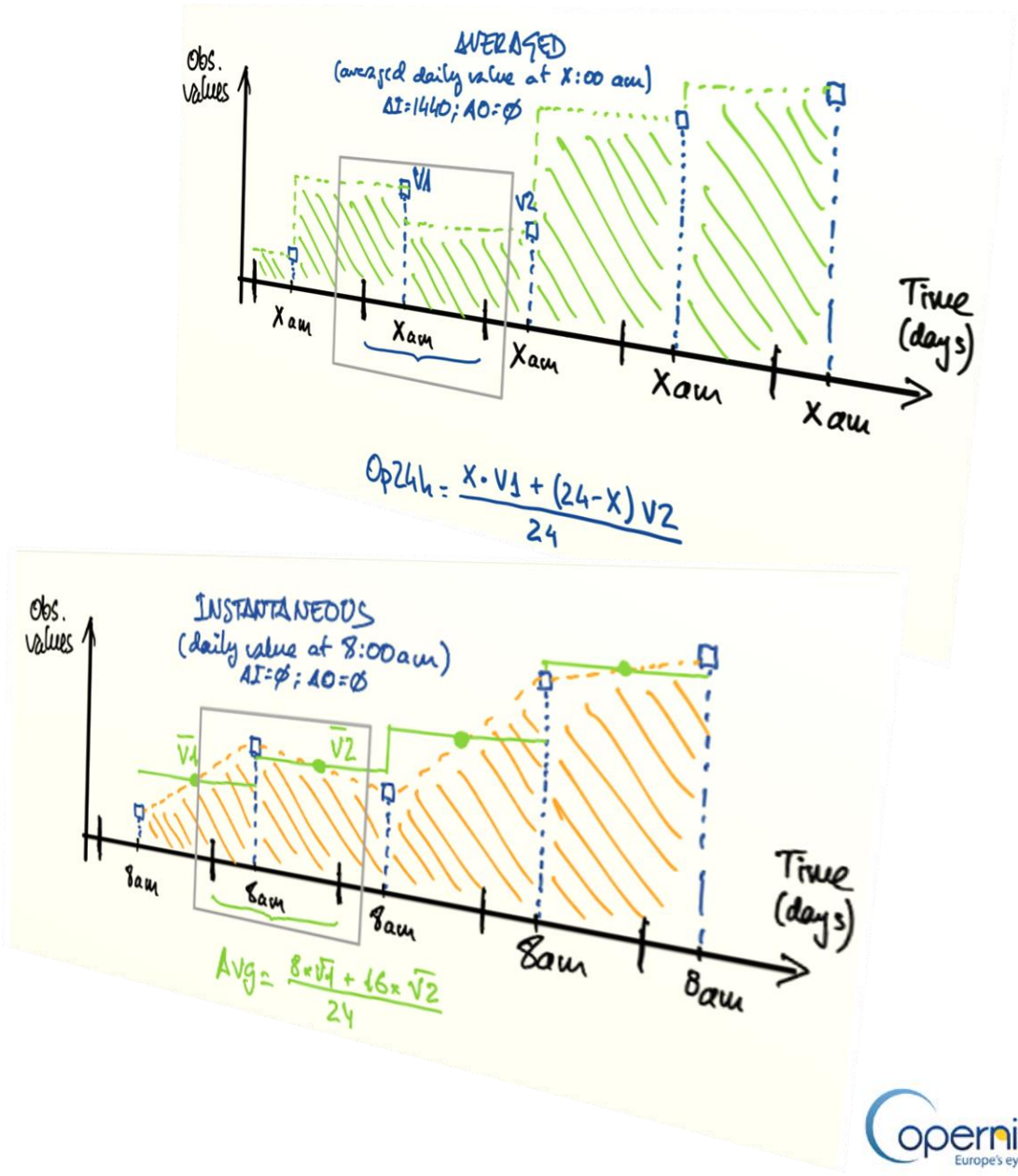

```
[{
    "Station ID": 1,
    "Variable": "W",
    "Timestamp": "2010-01-21 00:00:00",
    "AvgValue": 3.150,
    "MaxValue": 3.150,
    "MinValue": 3.150,
    "% PASS": 1.04,
    "% SUSP": 0.00,
    "% UNCHKD": 0.00,
    "% FAIL": 0.00,
    "% NODATA": 98.96,
    "QSF": 1,
    "Updated on": "2023-07-05 05:40:31"
}]
```

Improvements

New calculation of weighted operational observations.

For 24-hour operational values, it is considered the time offset from the UTC0 at which the data was produced.

It allows to provide a more accurate representation of the daily average expressed in UTC 0. This is particularly useful for stations with significant time zone differences.



How to contribute?

EFAS collects the following in situ hydrological data:

- **Near real-time observations**: **please, note that NRT observations are considered as raw observations!**
- **Historical observations**: **those observations processed and corrected by the partner usually during the following year. They are not raw observations (outliers removed, gaps filled, etc.)**
- **Stations metadata**: coordinates, river name (local and in English), catchment name (local and in English) and drained surface area, time zone, threshold levels, rating curves.
- **Observations metadata**: aggregated values (start, middle and end of the interval), instantaneous values.
- **Variables**
  - Discharge and/or water level for river stations and inflow, outflow, reservoir level and/or volume for reservoir stations
  - highest registered historical values of discharge and/or water
  - lowest registered historical values of discharge and/or water level

How to contribute?

More information available in: https://www.efas.eu/en/share-your-data-efas

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Copernicus Emergency Management Service
Hydrological Data Collection Centre

Frequently Asked Questions

Hydrological in situ measurements of water level, discharge, and reservoir data are essential to improve the **Copernicus Emergency Management Service (CEMS) European Flood Awareness System (EFAS)**. This leaflet provides answers to frequently asked questions about the collection of hydrological in situ measurements for EFAS.

1. Hydrological in-situ data for EFAS: What are the minimum data requirements?

What variables do we collect?

We collect river discharge, water level, and reservoir data. Specifically, for reservoirs, we collect reservoir level, volume (absolute and percentage), inflow discharge, and outflow discharge.

Is there a minimum catchment drainage area?

Yes, the minimum size of the drainage area is 50 km^2.

What is the temporal resolution needed for EFAS?

EFAS needs ideally data with a 6-hourly or higher (e.g. hourly, 15 minutes, etc.) temporal resolution. If 6-hourly temporal resolution is not available also daily measurements are acceptable.

Does EFAS need near real-time or historic data?

EFAS ideally needs both, near real-time and historic data. We collect historic data from 1970 onwards.

What metadata does EFAS need?

For each gauge station and each reservoir, the coordinates, measurement units and time zone are strictly required. If available, drainage area and flood threshold values of discharge (and water level) are very important pieces of information. Furthermore, we need station (reservoir) name, river name (inflow and outflow for reservoirs), and basin name. Availability of other important metadata such as presence of lakes or reservoirs nearby the gauge station or any other relevant piece of information (e.g. height above mean sea level) are highly appreciated.

2. What are the data license conditions if I share my data with EFAS?

If your hydrological in-situ data is already available as open-source data, then there is no need to sign a data license.

If your institution is part of EUMETNET then the hydrological data provided to EFAS is governed by this data license which was signed by EUMETNET and Copernicus.

If your institution is not part of EUMETNET you will have to sign a Copernicus data license that is very similar to the one for EUMETNET partners.

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3. How is my data used in EFAS?

Reporting points layer:
Gauging stations that provide discharge data are added as fixed reporting point to the *Reporting Points* layer in the EFAS map viewer. Once your station is added to this layer you can click on it and visualize a wide variety of information such as the flood forecasts for this station, forecast persistence tables, meteorological info, etc. Detailed information about *Reporting Points* layer is available from EFAS Reporting Points - Copernicus Emergency Management Service - CEMS - ECMWF Confluence Wiki. Newly provided hydrological stations are typically included twice per year into the *Reporting Points* layer.

Calibration and validation of the hydrological model in EFAS:
Historical time series of measured discharge data and reservoir data (in the future) are used to calibrate (or tune) the parameters of the hydrological model Open Source LISFLOOD in EFAS and to validate EFAS simulations. Typically, the hydrological model in EFAS is calibrated every two years. It should therefore be noted that when hydrological in-situ data is provided it may take a while until this data is also used for the hydrological model calibration in EFAS. Furthermore, not all hydrological stations which are collected for EFAS are used for model calibration as there is a selection process of these calibration stations depending on various criteria. The calibration methodology and the calibration stations used for the current operational version of EFAS are explained in this page.

EFAS post-processed hydrographs:
Where near-real-time and historical river discharge measurements are available, EFAS provides post-processed hydrographs. Those hydrographs are bias-corrected using the near real-time discharge measurements at the station with the aim to diminish the systematic errors of the hydrological model. When available, local flood threshold values of discharge are shown in the hydrographs. A detailed description of EFAS post-processing methodology is available from EFAS Post-processing - Copernicus Emergency Management Service - CEMS - ECMWF Confluence Wiki . Newly provided hydrological stations are typically included twice per year into the EFAS post-processed hydrographs.

National Flood Monitoring Layer
The *National Flood Monitoring* layer in the EFAS map viewer aims to provide an overview of the ongoing national/regional flood threshold exceedances. Stations that provide in near-real time discharge and/or water level and for which information on flood thresholds (either discharge or water level) is available, will be included into the *National Flood Monitoring* layer .

Verification for flash flood forecast skill
Stations with small drainage area and a relatively high temporal resolution (at least 6-hourly) will be used to assess the skill of the EFAS flash flood forecasts in the future.

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4. What do I need to do to share my data with EFAS?

1) Contact the CEMS Hydrological Data Collection Centre by sending an email to info@efas.eu (object: hydrological data sharing)
2) Sign the data licence (if applicable)
3) Establish data transfer with the help of the CEMS Hydrological Data Collection Centre
4) The CEMS Hydrological Data Collection Centre inserts the stations metadata and data in the EFAS database

5. Whom do I contact if I have questions about sharing my data?

Please contact the CEMS Hydrological Data Collection Centre directly or send an email to info@efas.eu .

The European Flood Awareness System (EFAS) is a Copernicus Emergency Management Service (CEMS) product.
The European Commission Joint Research Center (JRC) is the entrusted entity of CEMS EFAS and therefore it is responsible for CEMS EFAS in terms of management, technical implementation, and evolution.
The CEMS Hydrological Data Collection Centre (CEMS HDCC) is responsible for the collection, quality control, harmonisation and internal distribution of hydrological observations. GHENOVA Digital is the designated contractor to implement the operational functionalities of the CEMS HDCC.

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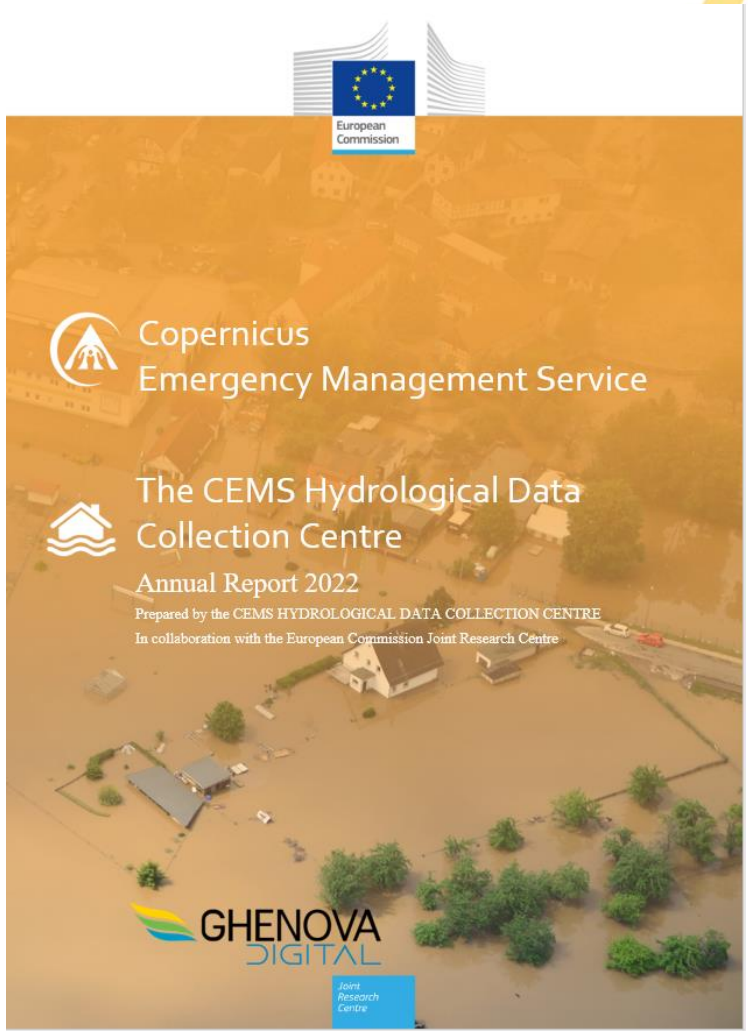
Annual Report 2022 - Remarks

- In 2022, 19% of the studied stations presented values below 100 mm/year, more than the previous year when this ratio was 12%.
- Almost 60% of the stations in Europe had a higher mean discharge in 2022.
- Compared to the historical period 1991–2019, the water volume in the rivers in 2022 was considerably smaller.
- 72% of the stations recorded minimum mean daily discharge values that were lower than in 2021



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