

Copernicus Climate Change Service (C3S) requirements for in-situ hydrological data



Climate Change

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PROGRAMME OF
THE EUROPEAN UNION





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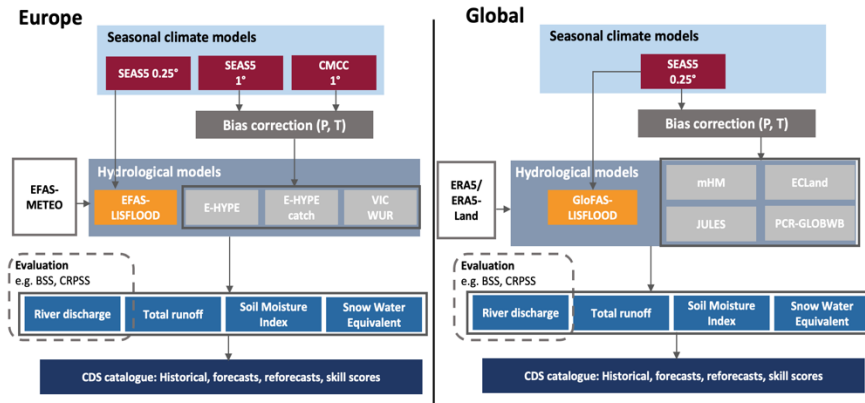
C3S Operational Water Service (seasonal & climate change projections)

Multi-model seasonal hydrological forecasts & climate change projections:

- 4 hydrological models across Europe (including CEMS EFAS-Seasonal)
- 5 hydrological models globally (including CEMS GloFAS-Seasonal)

Current / future requirements:

- **Historic observed river discharge** data for hydro. model calibration and evaluation
- **NRT observed river discharge** for post event / post-season evaluation (did models predict correct anomalies)
- Data for **AI-based hydrological models**
- State-of-the-art **reference data** (elevation, vegetation, soil, groundwater, land-use, reservoirs & dams etc.)





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C3S (Hydro)climate Intelligence

ESOTC 2023 | EUROPE

River flow

Hydroclimate monitoring activates :

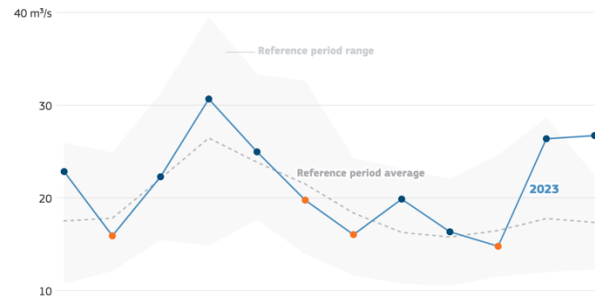
- [European State of the Climate \(ESOTC\):](#)
 - River flow
 - Extremes (Floods / droughts)
- [Monthly climate bulletin for hydrological variables](#)

Current / future requirements:

- Current monitoring products are fully hydrological model-based (CEMS EFAS river discharge reanalysis data), but requests to supplement with observed river discharge (NRT for past year + historic (1991-2020 reference))
- Evaluate performance of model-based products at observation sites / catchments (river discharge & soil moisture)

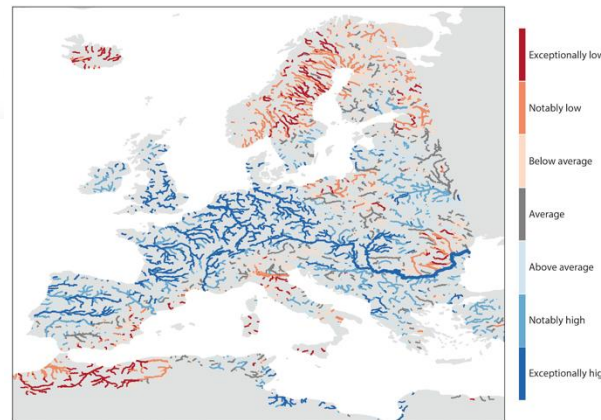
Monthly average river flow in Europe in 2023

Reference period 1991-2020



Anomalies in monthly average river flow across Europe in December 2023

Data: EFAS • Credit: CEMS/C3S/ECMWF





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Gaps and challenges across C3S hydrological activities

- **Can we leverage data already collected by CEMS Hydrological Data Collection Centre (HDCC) for monitoring long-term hydroclimatic changes within C3S?**
 - Does the current licence within Copernicus allow this?
- **No coordinated observed river discharge database at global-scale for use across Copernicus with clear policy on what data can / can't be used for:**
 - Especially for NRT, with regular quality checks, consistency with historic time-series & metadata (WMO WHOS is making progress here, but takes time)
 - Especially for data sparse regions not covered within GRDC, including temporal sparsity due to infrequent data updates
 - Metadata on gauge location and catchment size critical for mapping to gridded model river networks / model catchments
- **Other important observed in-situ variables:**
 - Soil moisture, snow, water levels, reservoirs and dams
 - Reference data improvements and dynamic in time (elevation, vegetation, soil, groundwater, land-use, reservoirs & dams etc.)