

SEED-FD

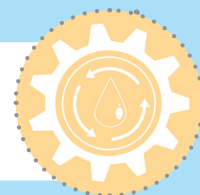
Initial situation

While CEMS (Copernicus Emergency Management Service) currently provides an operational global Early Warning System (EWS) for floods, there's room for improvement in the accuracy of its hydrological simulations, particularly in regions of the global south. Furthermore, despite the significant benefits they offer in addressing challenges related to the food-energy-water nexus, operational drought forecasts are not yet issued. SEED-FD (Strengthening Extreme Events Detection for Floods and Droughts) aims to harness the wealth of environmental information provided by Copernicus to enhance the quality of CEMS flood and drought forecasts and bolster its hydrological monitoring capabilities. This is achieved through three specific methods that synergize with one another:

Objectives

1. Enhance the CEMS hydrological model

for better representing the range of hydroclimatic processes worldwide.

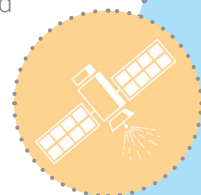


2. Enhancing CEMS hydrological simulations and forecasts globally through:

More realistic hydrological initial conditions by forcing CEMS HFMC with blended EO-based observations instead of (modelled) reanalysis meteorological data.

Data Assimilation of river discharge and water level to correct model hydrological states at the beginning of the forecast.

Near real-time post-processing of hydrological forecasts using Artificial Intelligence/Machine Learning techniques to integrate observational data to reduce modelling and forecasting errors.



3. Expanding the CEMS EWS forecast product portfolio

for floods and droughts by developing new extreme hydrometeorological event detection algorithms applicable worldwide: Flash Drought forecast product, Seasonal Drought forecast product, Drought tracking product, Flash Flood forecast product.



CONTACT

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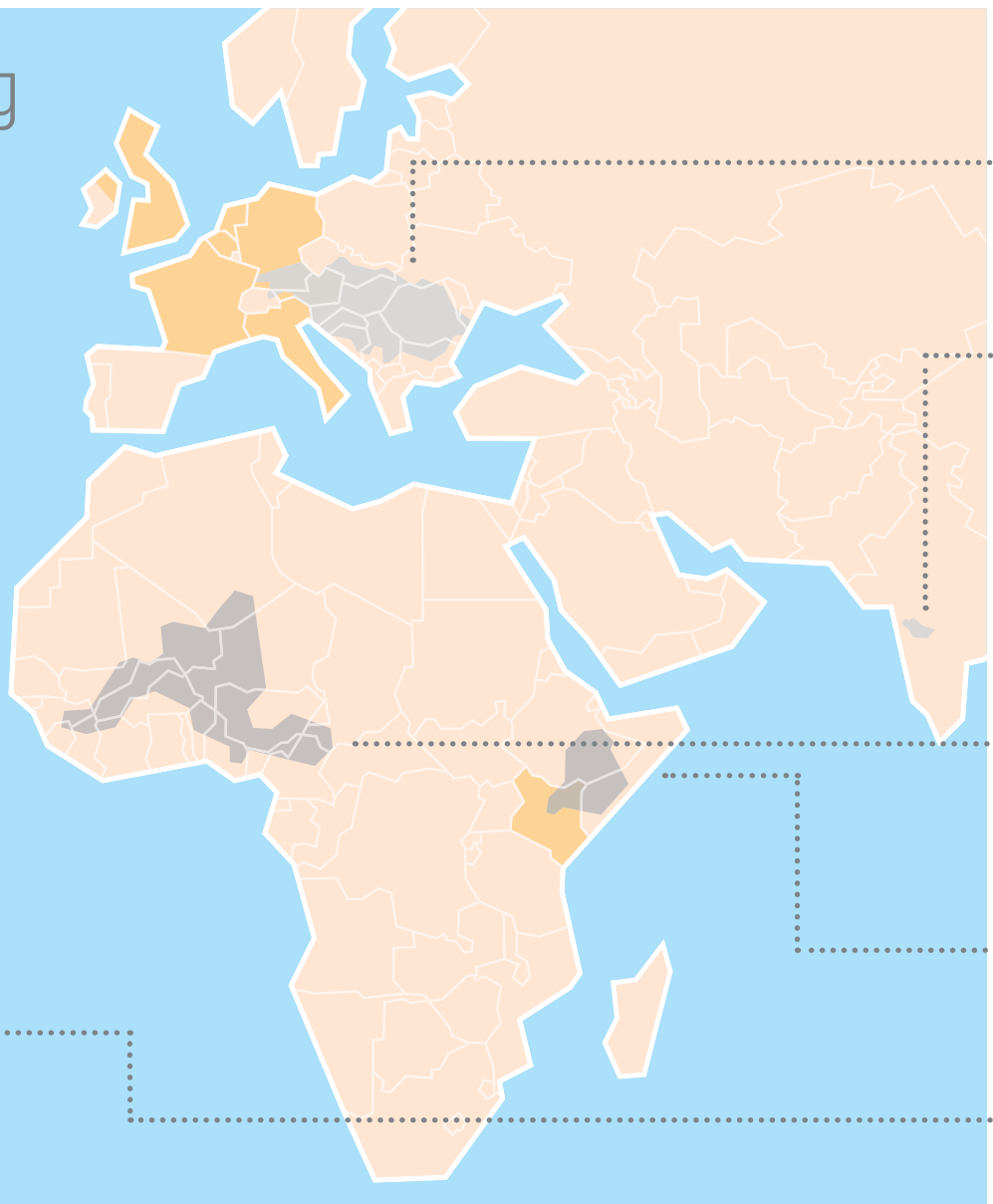


Consortium :
Magellium (France, prime), ECMWF (science leader), CNR-IRPI (Italy), ICPAC (Kenya, Intergovernmental Authority on Development (IGAD) Climate Prediction and Application Center, IIASA (Austria, International Institute for Applied Systems Analysis), VORTEX.IO (France), POLIMI (Italy, POLITECNICO DI MILANO), DesignData (Germany), JRC (EU)



Advancing the prediction of
extreme hydrological events

Strengthening Extreme Events Detection for Floods and Droughts



Methodology
 The project will be composed of two distinct phases - a scientific development phase and a scale-up validation phase - linked together by a prototyping stage. Conducted on selected Use Cases that are representative examples of worldwide hydro-climatic extremes, plus challenges associated with floods and droughts.

Partners ●
 2 development basins ●
 3 validation basins ●

DEVELOPMENT

DANUBE
 Major transboundary heavily regulated basin - temperate climate

BHIMA
 Heavily managed surface and groundwater system - tropical climate

FLOODS

- Flood caused by heavy rainfall, melting snow, or a combination of both
- Monsoon flooding, high inter- and intrannual variability

DROUGHTS

- Intensification of droughts with climate change
- Multi-years droughts due to limited interannual storage

VALIDATION

NIGER
 Data scarce semi-arid area with monsoon season and large wetlands

JUBA - SHEBELLE
 Data scarce semi-arid area, global hot spot for droughts

PARANÁ
 Tropical transnational basin, axis for waterway movement

WORLD
 Extreme hydrological events across the globe

FLOODS

- Multiple flash floods in urban areas each year
- Occasional floods due to heavy rains in the headwaters
- High population density, vulnerable to flash floods
- Flash flood events that devastate populated areas and infrastructure

DROUGHTS

- Consecutive failed rainy seasons and decades of increasing desertification of the Sahel
- Currently facing worst drought in history
- Multi-year droughts, lowest water levels in 80 years
- Long-term impact on population, food and energy security worldwide

ADVANCING THE PREDICTION OF EXTREME HYDROLOGICAL EVENTS

SEED-FD Outcomes



Local authorities, water security and humanitarian agencies will benefit from real-time and quantitative global forecasts of floods, droughts and new extreme events.



Better synergy between Copernicus services - integrating Copernicus satellite data into the CEMS EWS and adding new and innovative in-situ observations.



Scientists will have access to new or improved tools for hydrological modeling, data assimilation, data processing and forecasting of floods and droughts.



Use real case studies to raise awareness of flood and drought prevention with a wider audience.