Integrated chain for the hydrometeorological forecasting of low flows and droughts in France. The CIPRHES project

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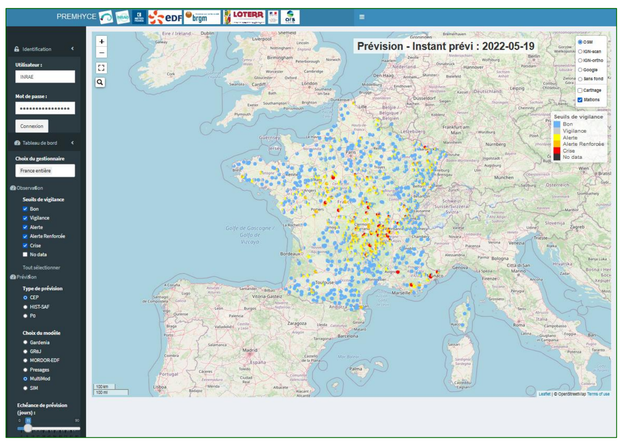
Integrated chain for the hydrometeorological forecasting of low flows and droughts in France – The CIPRHES project

- Growing interest in extending forecast lead times to facilitate water allocation and management during droughts and low-flow events
- Need to improve integrated hydrometeorological forecasting systems, to provide seamless forecasts of future meteorological and hydrological conditions over continuous space and time scales
- In France, proof-of-concept of the PREMHYCE multi-model platform for pre-operational low-flow forecasting
- Main objective of the CIPRHES project: building an efficient and integrated methodology and an online operational service for a France-wide hydrological drought and low-flow forecasting system

CIPRHES:
- Integrated chain of low-flows and droughts hydrometeorological forecasting
- 4 years (March 2021 – Feb. 2025)
- 5 partners, 263 person-months
- 27 deliverables
- Full cost: 1,800 k€; Funded by ANR: 750 k€

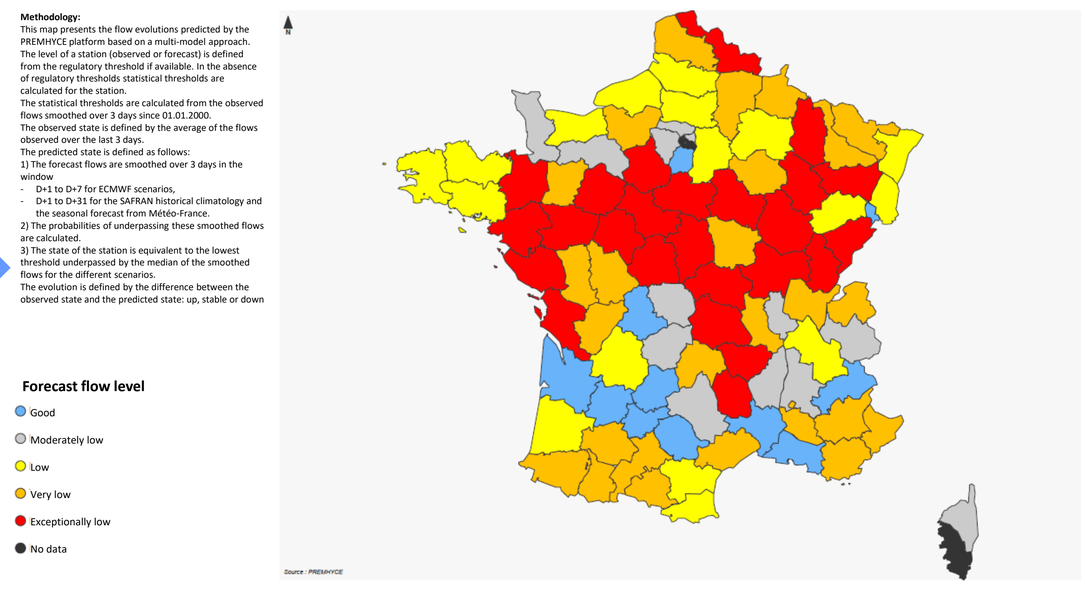
Durance River (France) downstream of the La Saulce Dam, Sept. 2019

PREMHYCE platform and outputs

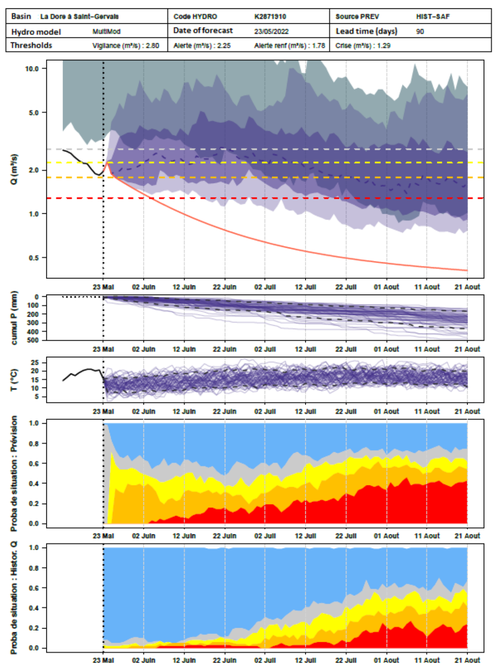


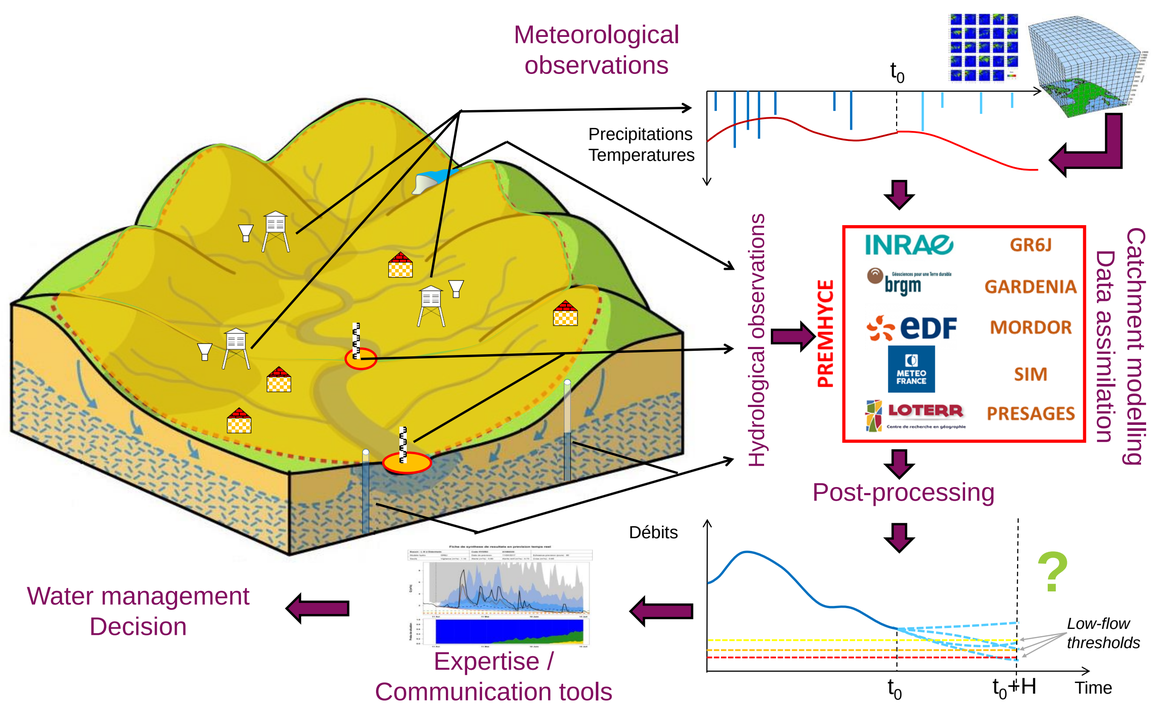
Methodology:
This map presents the flow evolutions predicted by the PREMHYCE platform based on a multi-model approach.
The level of a station (observed or forecast) is defined from the regulatory threshold if available. In the absence of regulatory thresholds statistical thresholds are calculated for the station.
The statistical thresholds are calculated from the observed flows smoothed over 3 days since 01.01.2000.
The observed state is defined by the average of the flows observed over the last 3 days.
The predicted state is defined as follows:
1) The forecast flows are smoothed over 3 days in the window
- D+1 to D+7 for ECMWF scenarios,
- D+1 to D+31 for the SAFRAN historical climatology and the seasonal forecast from Météo-France.

2) The probabilities of underpassing these smoothed flows are calculated.
3) The state of the station is equivalent to the lowest threshold underpassed by the median of the smoothed flows for the different scenarios.
The evolution is defined by the difference between the observed state and the predicted state: up, stable or down



Hydrological multi-model forecast (90 days ahead) obtained from seasonal forecasts issued by Météo-France on 1st May 2022





CIPRHES objective #1

To produce efficient seamless atmospheric forecasts combining information from climatology, weather predictions and seasonal forecasts

CIPRHES objective #2

To develop an integrated hydrometeorological modelling approach for short- to long-term seamless hydrological forecasts at gauged and ungauged locations

CIPRHES objective #3

To develop approaches to explicitly identify and quantify the various sources of uncertainty affecting low-flow forecasts

CIPRHES objective #4

To set up and apply advanced 'crash-testing' frameworks to better evaluate the performance, robustness and usefulness of low-flow forecasts

CIPRHES objective #5

To design a robust and user-tailored online hydrometeorological service for efficient and informative real-time low-flow forecasts

Communications linked to CIPRHES at IAHS 2022:
- El Khalfi et al., IAHS2022-623, Session 3 - Low flow characterization and forecasting in a non-stationary context
- Gbangou et al., IAHS2022-579, Session 8 - Seamless meteorological forecast production and evaluation towards hydrological decision-making in France: CIPRHES project
- Tilmant et al., IAHS2022-66, Session 10 - Low-flow forecasting in France using the PREMHYCE operational platform: recent advances and perspectives

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