



HAL
open science

How will water resources change in France? An ensemble projection using a semi-distributed model during the 21st century.

Laurent Strohmenger, Eric Sauquet, Guillaume Thirel, Charles Perrin

► To cite this version:

Laurent Strohmenger, Eric Sauquet, Guillaume Thirel, Charles Perrin. How will water resources change in France? An ensemble projection using a semi-distributed model during the 21st century.. Climat et Impacts (7e édition), Nov 2022, Gif-sur-Yvette, France. hal-03931368

HAL Id: hal-03931368

<https://hal.inrae.fr/hal-03931368>

Submitted on 9 Jan 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Laurent Strohmeinger¹
Eric Sauquet²
Guillaume Thirel¹
Charles Perrin¹

¹Université Paris Saclay, INRAE, UR HYCAR, Antony, France
²INRAE, UR RIVERLY, Villeurbanne, France



How will water resources change in France?

An ensemble projection using a semi-distributed model during the 21st century.

The Explore2 initiative

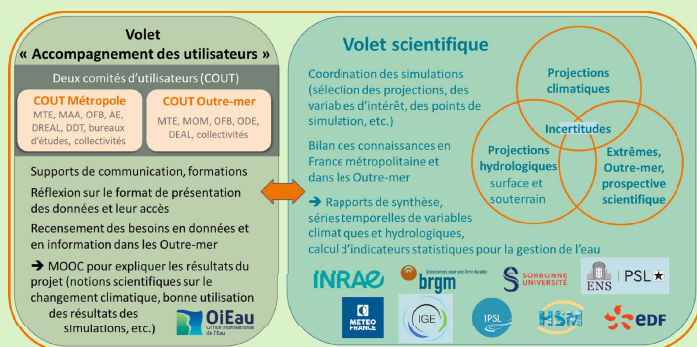
Assessment of climate change impacts on water resources

- Describe the future climate over France
- Evaluate changes in river flow regimes
- Characterize the extremes

A multi-scenario and multi-model approach

- 3 greenhouse gas concentration trajectories
- 19 pairs of global and regional climate models
- 2 bias correction methods
- 7 hydrological models

Contact: eric.sauquet@inrae.fr (scientific coordinator)



Methods

One hydrological model (GRSD)

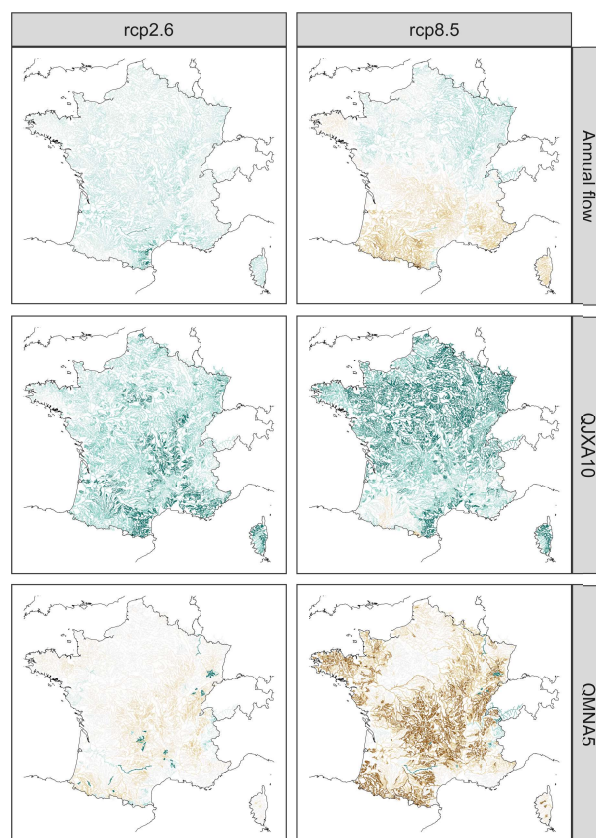
- GR5J semi-distributed
- Calibrated using SAFRAN and observed daily discharge over 611 stations (1976-2019)
- Simulation of daily discharges for 4044 stations

Three hydrological indicators shown here

- Mean annual flow
- Annual maximum daily flow with a 10-year return period (QJXA10)
- Annual minimum monthly flow with a 5-year return period (QMNA5)

Conclusions

- Contrasted response of river flow in France (wetter in north vs. drier in south)
 - Extreme flows are more likely to change than annual flow in 2070-2099
 - Streamflows are less impacted in the optimistic (rcp2.6) than in the pessimistic (rcp8.5) scenario
- Next: to include all hydrological models and to evaluate uncertainties in hydrological projections



Preliminary results

Relative change [%]
(2070-2099 vs 1976-2005)

