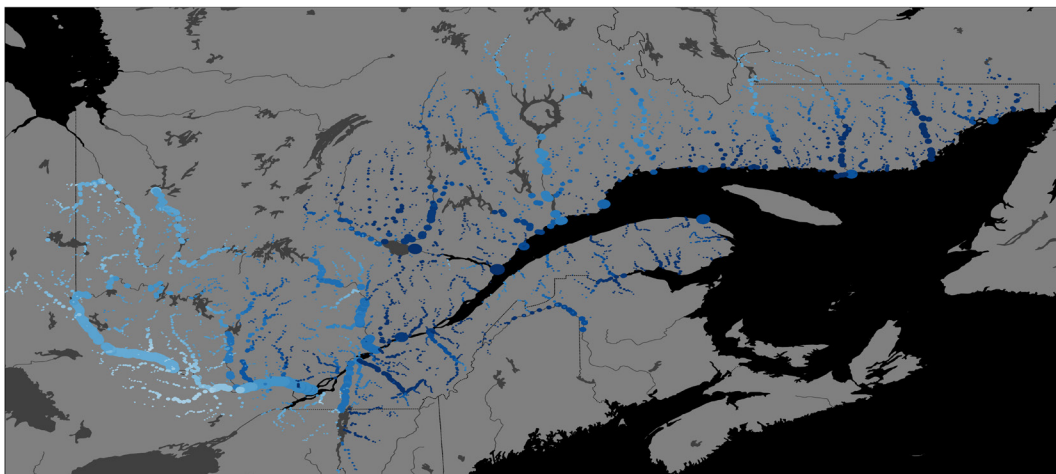


## PROJECT IN PROGRESS

# ASSESSING THE PERFORMANCE AND UNIQUENESS OF HYDROLOGICAL SIMULATIONS PRODUCED BY A HETEROGENEOUS CLIMATE ENSEMBLE AND RECOMMENDING A WEIGHTING SCHEME FOR THIS ENSEMBLE TO MEET THE NEEDS OF THE INFO-CRUE PROJECT



PROGRAM: SUPPORT FOR INFO-CRUE

PROJECT START DATE AND LENGTH  
APRIL 2020 • 18 months

### INFORMATION

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### FUNDED BY

Environnement  
et Lutte contre  
les changements  
climatiques



## CONTEXT

To predict the evolution of floods in the context of climate change, the Direction de l'expertise hydrique (DEH) produced an ensemble of 180 hydrological simulations covering the 1955-2100 period for about 28,000 river reaches in southern Québec using the HYDROTEL model. These hydroclimate projections differ in their driving data, which come from several climate models. While this state-of-the-art ensemble includes most available simulations and offers a wide variety of projections of future climate change, it is not calibrated according to model performance in simulating observed climate or optimal representation of the principal sources of uncertainty. This research project proposes to explore alternatives to the "one model, one vote" methodology often used in response to these issues. A weighting approach will be used in which a weight is applied to hydroclimate simulations based on analyses of model performance for historical climate and the independence of the simulations relative to the rest of the ensemble.

## OBJECTIVES

- Establish an analysis framework for constructing a weighting scheme for the hydroclimate simulation ensemble;
- Assess the performance and level of duplication of the information contained in the hydroclimate simulation ensemble;
- Recommend a weighting to be applied to the hydroclimate scenarios.

## METHODOLOGY

- Acquire hydrological indicators of interest for the different versions of HYDROTEL;
- Evaluate the performance of the hydrological simulations compared to baseline and the uniqueness of hydroclimate simulations under a future climate;
- Evaluate the added value of a complex weighting scheme compared to the simpler alternatives frequently used in practice;
- Apply the results to the climate model weighting project;
- Propose a specific weighting for each of the 180 simulations of the ensemble.

## EXPECTED RESULTS

A weighting scheme for hydrological projections will be constructed by combining the performance and similarity attributes of the simulations into a single weighting factor per model.

## BENEFITS FOR ADAPTATION

The process used to create the ensemble of hydroclimate simulations can be interpreted as an "ensemble of opportunities", in the sense that the simulation sampling depends to a large extent on the resources and interest of each contributing research centre. Although the ensemble of opportunities has the main advantage of bringing together most available simulations, thereby offering a wide variety of future climate change projections for use in impact studies, this type of ensemble is not calibrated according to model performance in simulating observed climate or optimal representation of the principal sources of uncertainty. This project will advance our understanding of how the simulations in this type of ensemble should be combined to maximize the information contained in such projections.