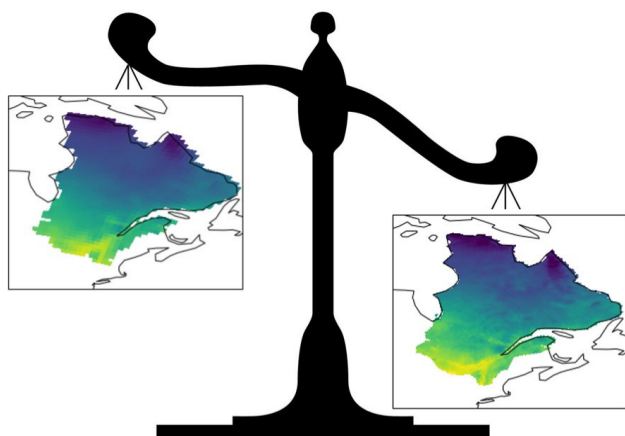


## PROJECT IN PROGRESS

# ASSESSING THE VALUE OF WEIGHTING A HETEROGENEOUS CLIMATE MODEL ENSEMBLE TO IMPROVE FUTURE HYDROCLIMATIC PROJECTIONS OVER SOUTHERN QUEBEC



PROGRAM: SUPPORT FOR INFO-CRUE

PROJECT START DATE AND LENGTH  
OCTOBER 2020 • 3 years

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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 hydrological simulations for about 28,000 river reaches in Québec. These simulations use climate projections from several different 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 was not built according to the models' performance in simulating observed climate, nor their credibility in making future climate projections. In this project, we will explore the usefulness of weighting this heterogeneous model ensemble (i.e. giving more importance to certain simulations according to specific criteria) to improve hydroclimate projections for Québec.

## OBJECTIVE

- Assess the performance of historic climate models and the level of duplication of climate information contained in the climate simulation ensemble;
- Combine the performance and independence metrics into a single weighting scheme;
- Quantify the sources of uncertainty in the climate projections produced by the climate simulation ensemble

## METHODOLOGY

- Compile and calculate a list of hydrologically relevant climate indices for the simulations and observations and calculate the associated biases;
- Evaluate the effect of natural variability on bias using the ClimEx ensemble;
- Apply a similarity metric to all climate model-index pairs;
- Evaluate the effect of natural variability on the similarity metric;
- Combine the information within a single weighting scheme;
- Evaluate the statistical relationships between present climate indices and projected climate change;
- Compare the weighted and non-weighted results, varying the number of indices considered to constrain the ensemble.

## EXPECTED RESULTS

The project will produce several variations of a weighting scheme for climate projections by combining the performance and similarity attributes of the simulations into a single weighting factor per model.

## BENEFITS FOR ADAPTATION

This project will advance our understanding of how heterogeneous ensemble simulations should be combined to maximize the information contained in climate projections. The resulting methodology could not only improve hydroclimate projections under Info-Crue, but may also be applicable to other climate change impact studies where the selection and weighting of climate models can influence the conclusions. Furthermore, the weighting methods explored will support decision makers by integrating critical information on the credibility of climate models in the development of adaptation strategies.