PROJECT IN PROGRESS

IMPROVING THE HISTORICAL RECONSTRUCTION OF DAILY FLOWS AND ANNUAL PEAKS IN GAUGED AND UNGAUGED AREAS

Photo : A. Poulin

CONTEXT

In the wake of the events of the spring of 2017, the Québec government engaged a variety of stakeholders in a reflection on the management of flood risk across the province in the context of climate change. This reflection led to several key findings, including the need for up-to-date, comprehensive flood zone maps for Québec to allow for adequate consideration of risk in land use planning and in the implementation of adaptation solutions. Such mapping requires estimating the frequency and associated uncertainty of high recurrence events. Since the flood zone maps will cover both gauged and ungauged areas, the computation chain must be adaptable to both types of environments. For ungauged areas, performing a historical reconstruction of daily flows and annual flow peaks represents a major challenge.

OBJECTIVES

- Develop methods to combine flows from several different historical hydrological simulations with data from hydrometric stations to produce the best information for ungauged areas.
- Identify the optimal way to produce annual peak flow series and/or distributions with consideration for uncertainty.
- Explore the use of large ensembles (including ClimEx) to reduce uncertainty for high recurrence events (for example 100 and 350 years) at gauging stations and in ungauged areas.

METHODOLOGY

- Apply weighting algorithms for historical hydrological simulations at gauged sites;
- Regionalize historical hydrological simulations weights at ungauged locations;
- Perform leave-one-out cross-validation;
- Evaluate uncertainty using the envelope method;
- Compare the results to the Direction de l'expertise hydrique (DEH)'s optimal interpolation method;
- Apply regionalization algorithms to ClimEx-driven Hydrotel simulated flows;
- Integrate the uncertainty of observed flows into the noising method for hydrographs.

EXPECTED RESULTS

When completed, the project will provide computer code to implement the method in DEH operations and will lead to better estimates of annual peak flows, spatially distributed over the area of interest. A scientific paper demonstrating the soundness of the proposed method will also be published. In addition, the project will result in the training of highly qualified personnel in the fields of regionalization, multi-model simulation and statistical analysis. Finally, a comparison between the operationally used method and the developed method will highlight the strengths and weaknesses of each.

VULNERABILITIES, IMPACTS AND ADAPTATION PROGRAM: SUPPORT FOR INFO-CRUE

PROJECT STARTING DATE AND LENGTH
SEPTEMBER 2020 • 18 months

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FUNDING

Environnement et Lutte contre les changements climatiques Québec

BENEFITS FOR ADAPTATION

The results of this project will provide decision-makers with a better understanding of the risks related to extreme flood events in both gauged and ungauged areas. Annual peak flow distributions for spring and summer-autumn flood periods will be used to drive the hydraulic models in the flood zone mapping process.