

Avec le soutien de :



# COLLOQUE GESTION DES EAUX SOUTERRAINES

Du 15 au 17 février 2023  
à l'ENSEGID - Bordeaux INP

Des regards diversifiés pour mieux cerner l'évolution potentielle du régime hydrologique des cours d'eau sous changement climatique

François Anctil, Université Laval, Québec



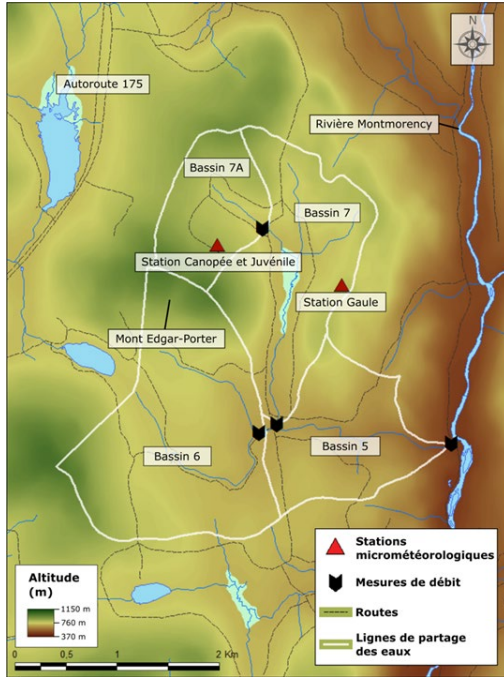
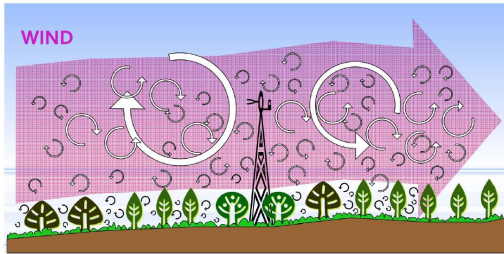


The background is a solid blue color. It features several white, curved, brushstroke-like shapes scattered across the surface. One shape is in the top-left corner, another is in the top-right, and several others are in the bottom-right area. These shapes vary in length and curvature, creating a modern, abstract design.

Regard 1

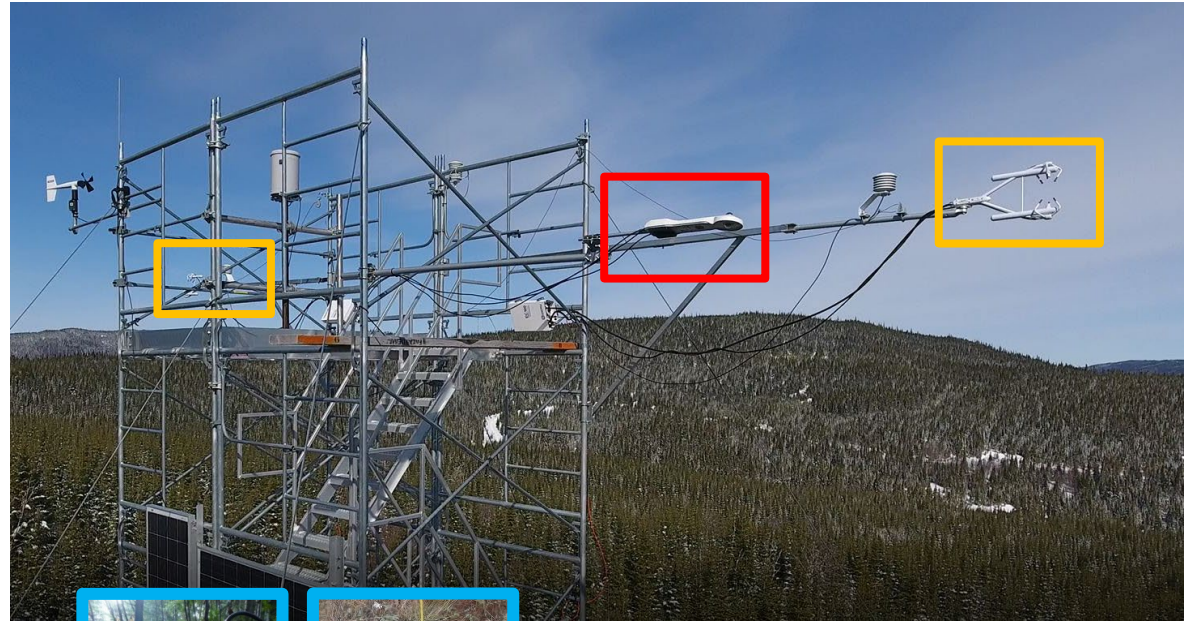
# Documentation du cycle de l'eau

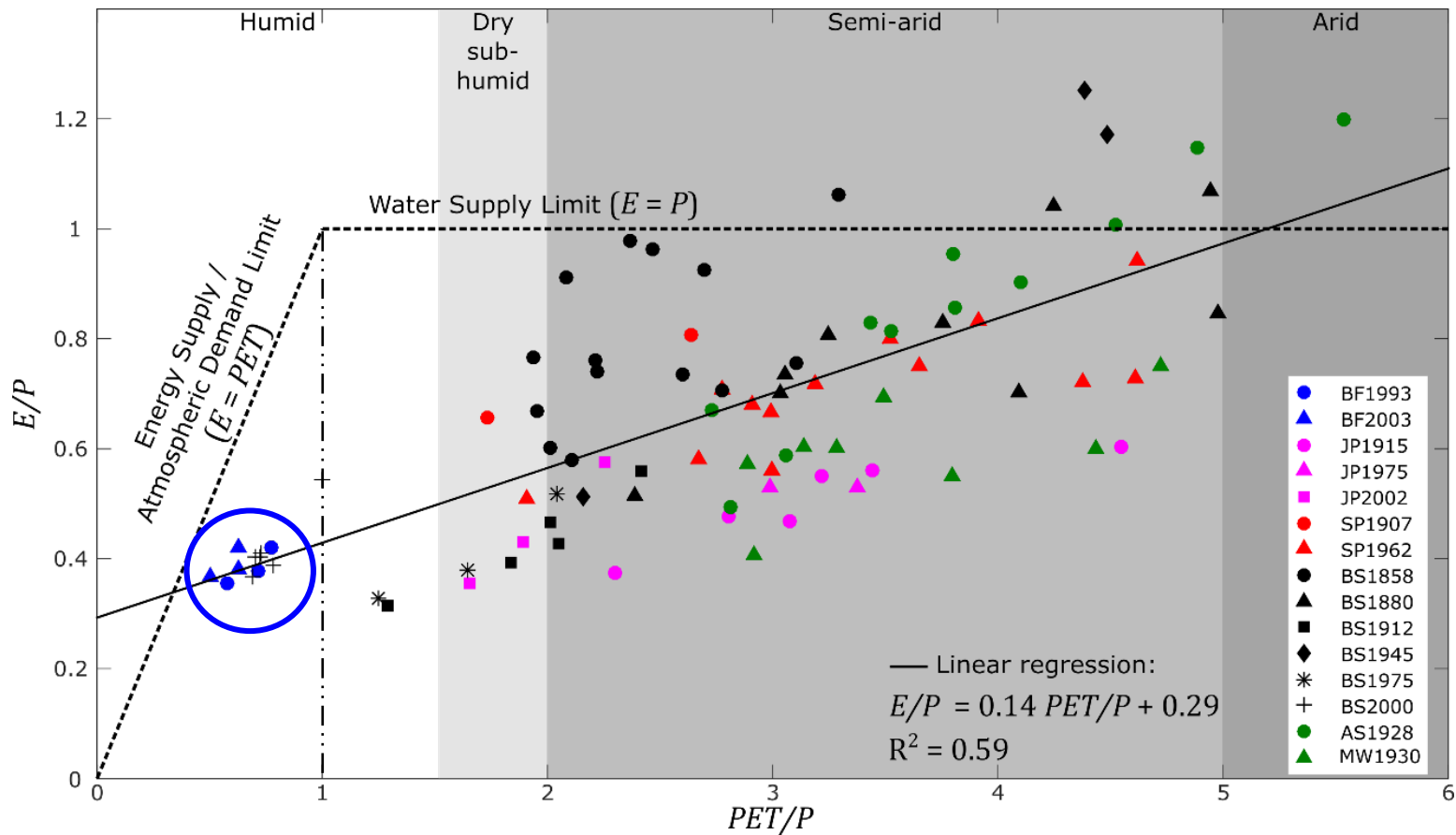


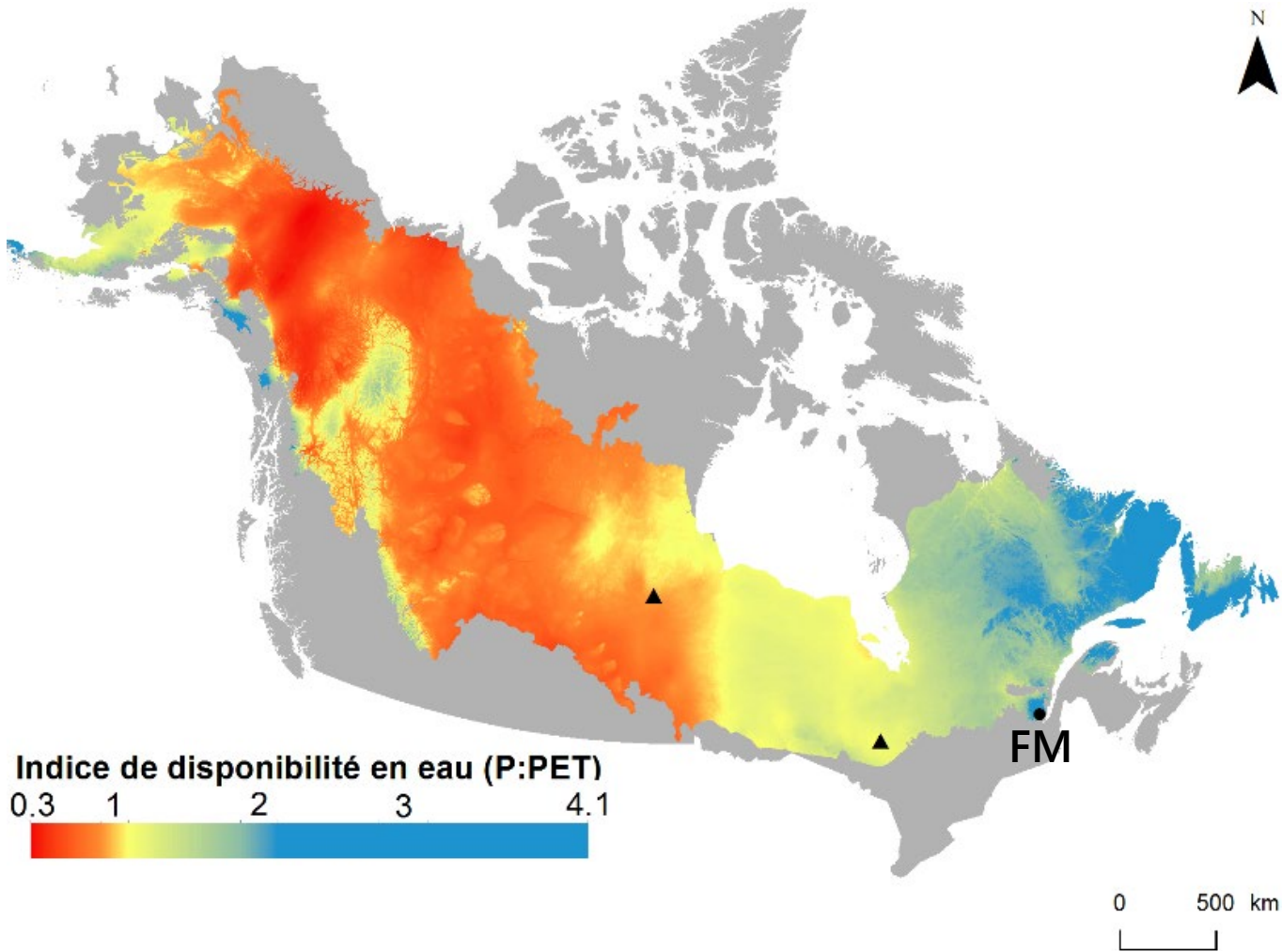


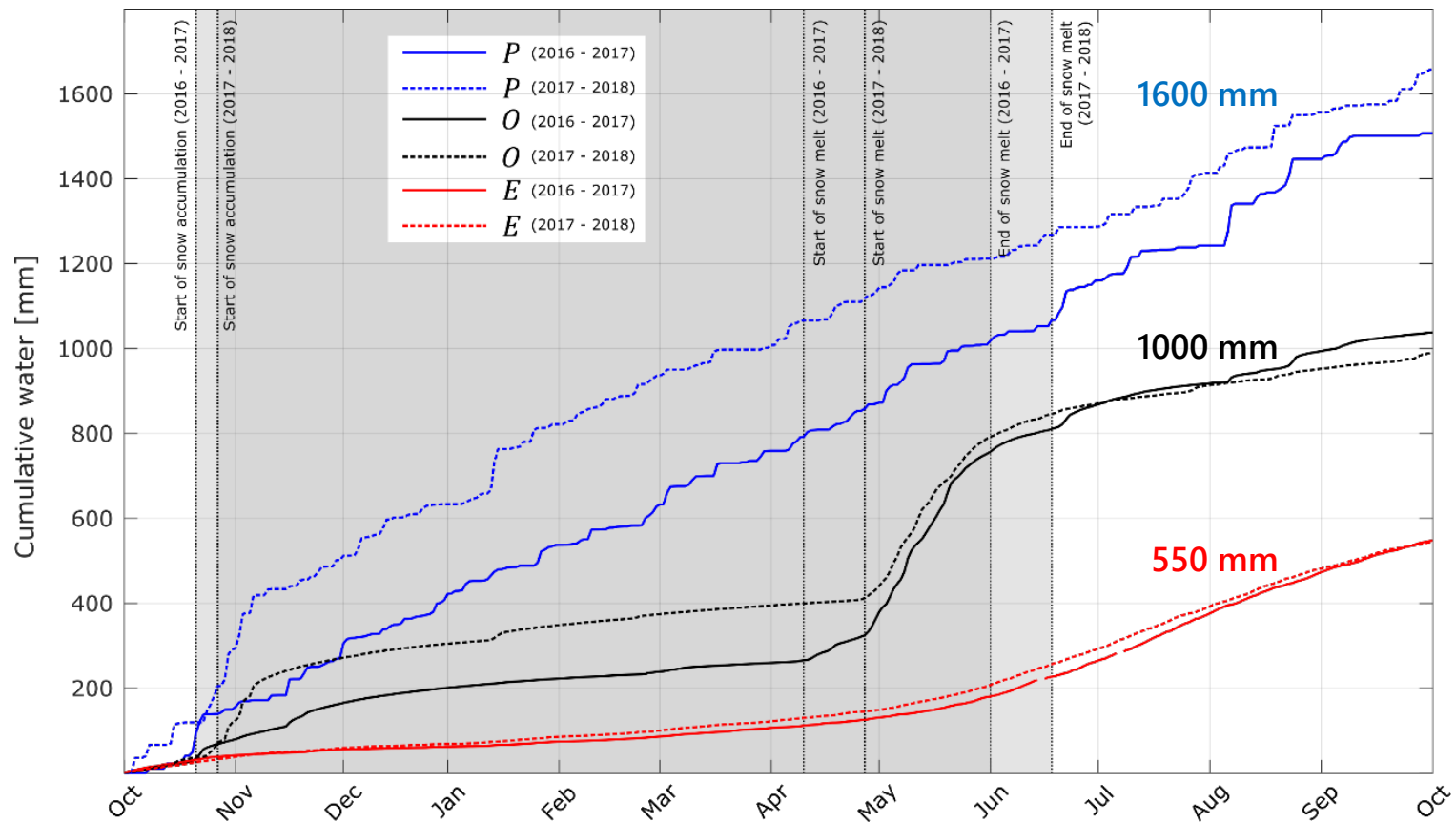
$$R_n = H + \lambda E + G + \Delta S$$

$$P = E + Q_{surf} + Q_{sout} + \Delta S$$

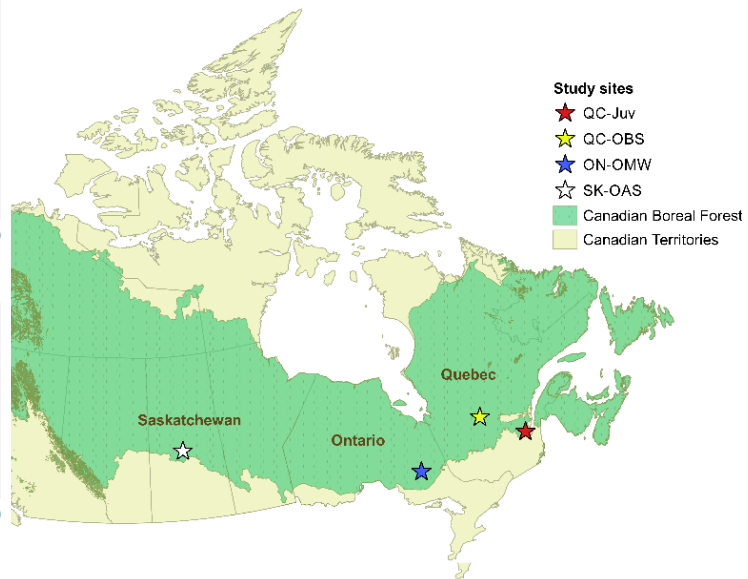
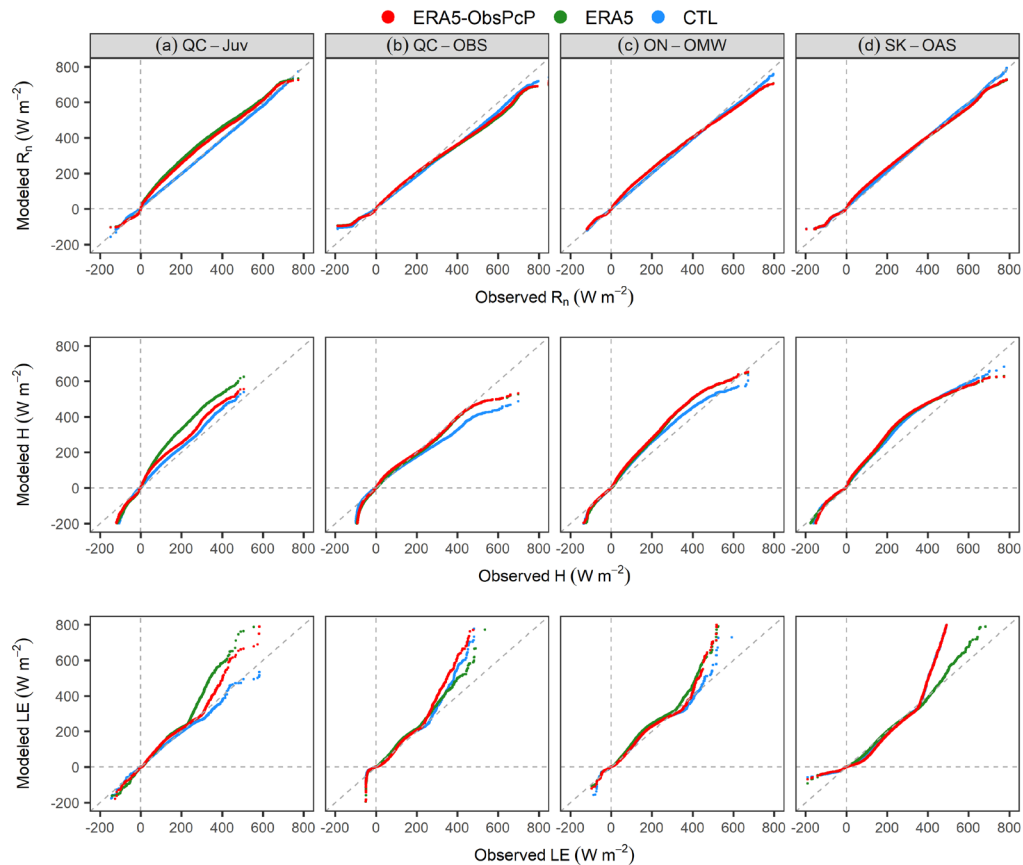


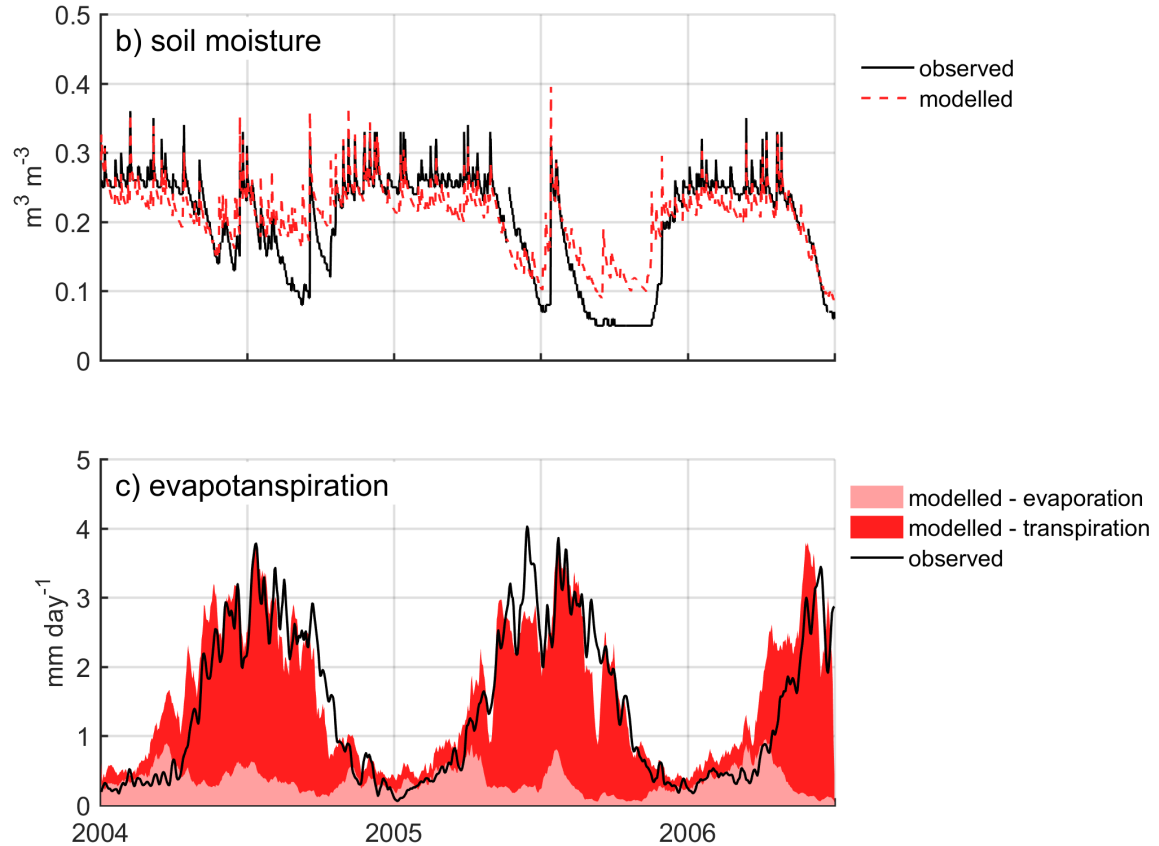












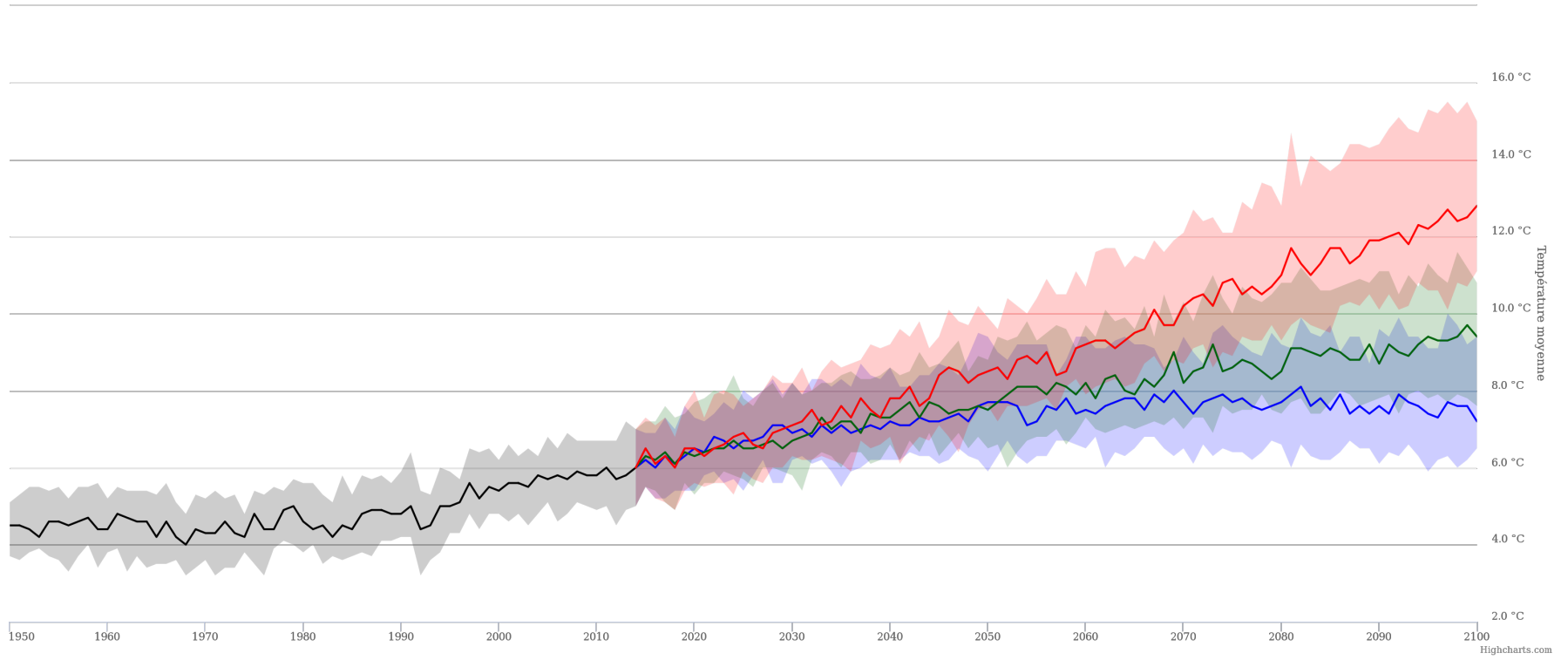
The background is a solid blue color. It features several white, abstract, geometric shapes that resemble stylized letters or symbols. These shapes are scattered across the frame, with some appearing as thin lines and others as larger, more complex forms. The overall aesthetic is modern and minimalist.

Regard 2

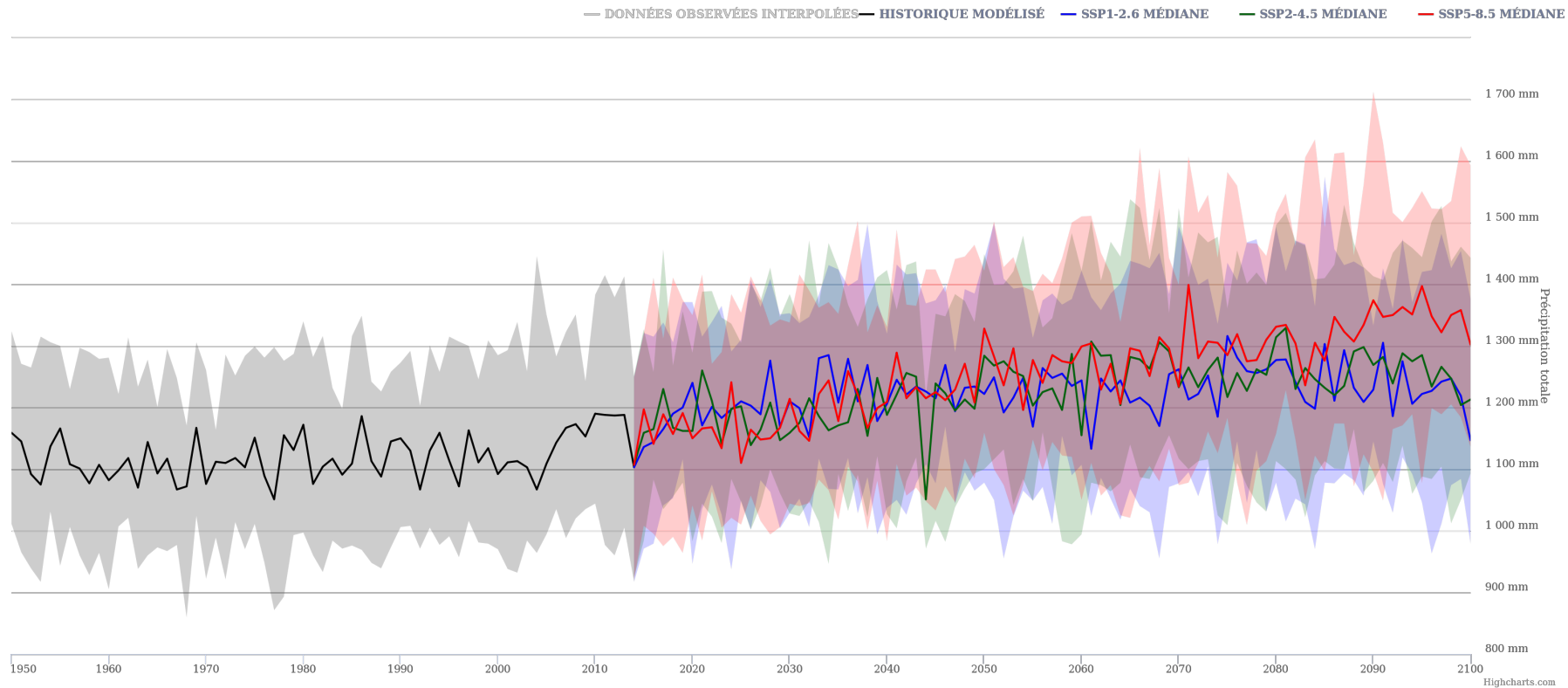
# Projection hydrologique par scénarios

# Température de l'air – ville de Québec – CMIP6

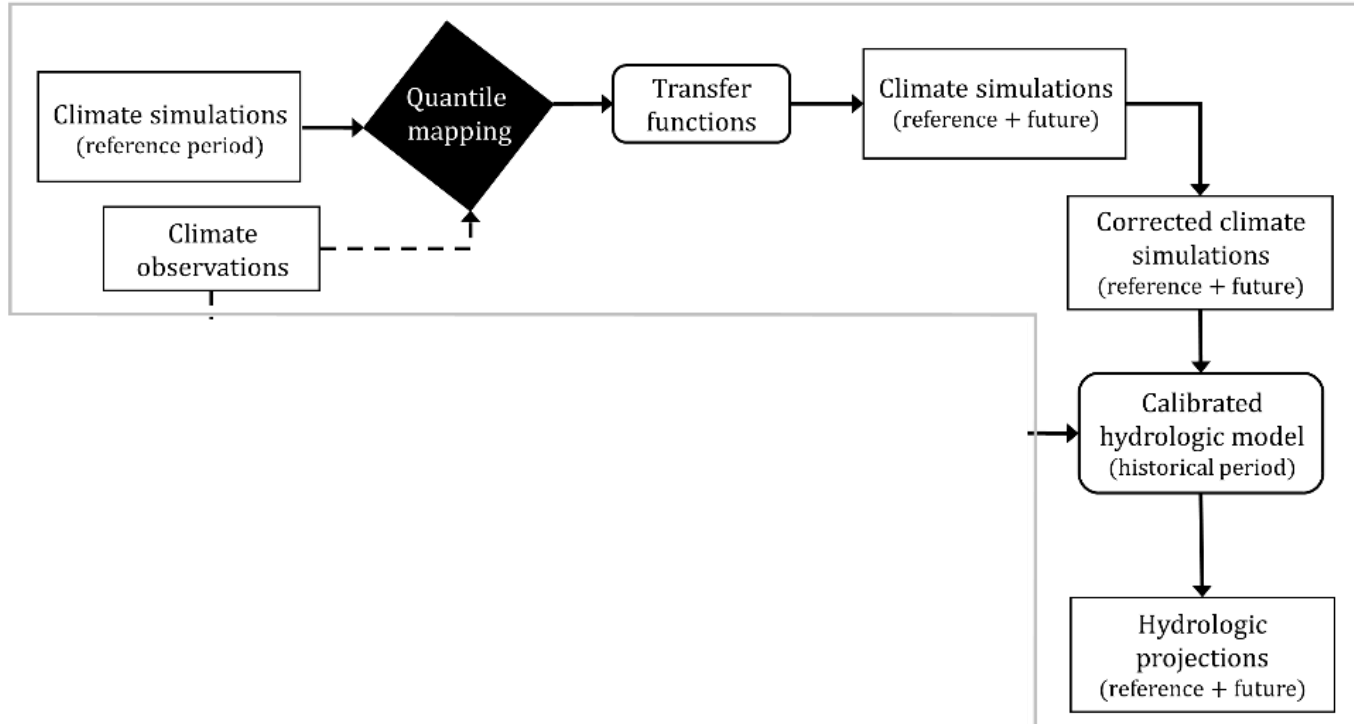
— DONNÉES OBSERVÉES INTERPOLÉES — HISTORIQUE MODÉLISÉ — SSP1-2.6 MÉDIANE — SSP2-4.5 MÉDIANE — SSP5-8.5 MÉDIANE



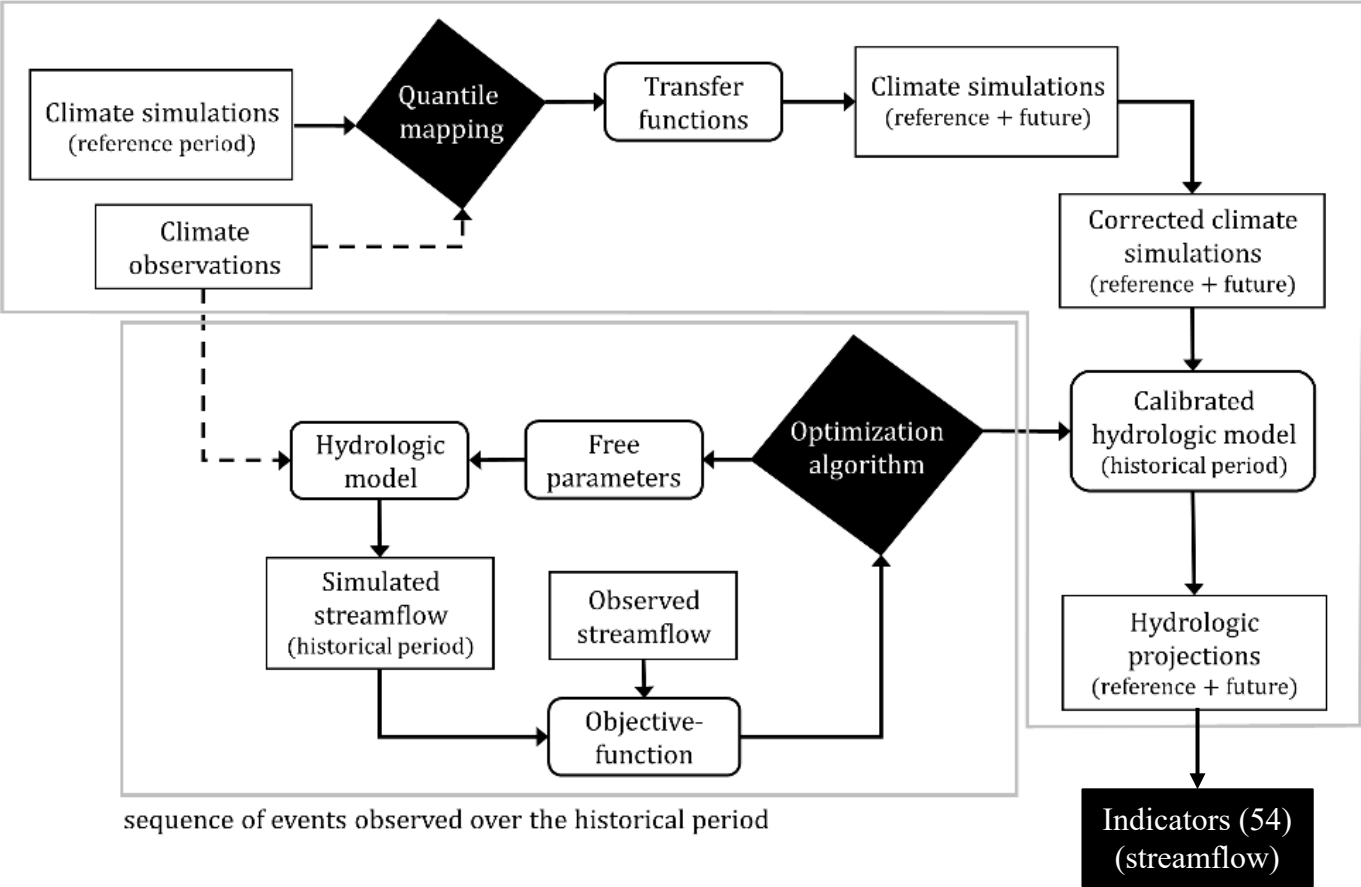
# Précipitation totale – ville de Québec – CMIP6



sequence of events embedded within the climate model

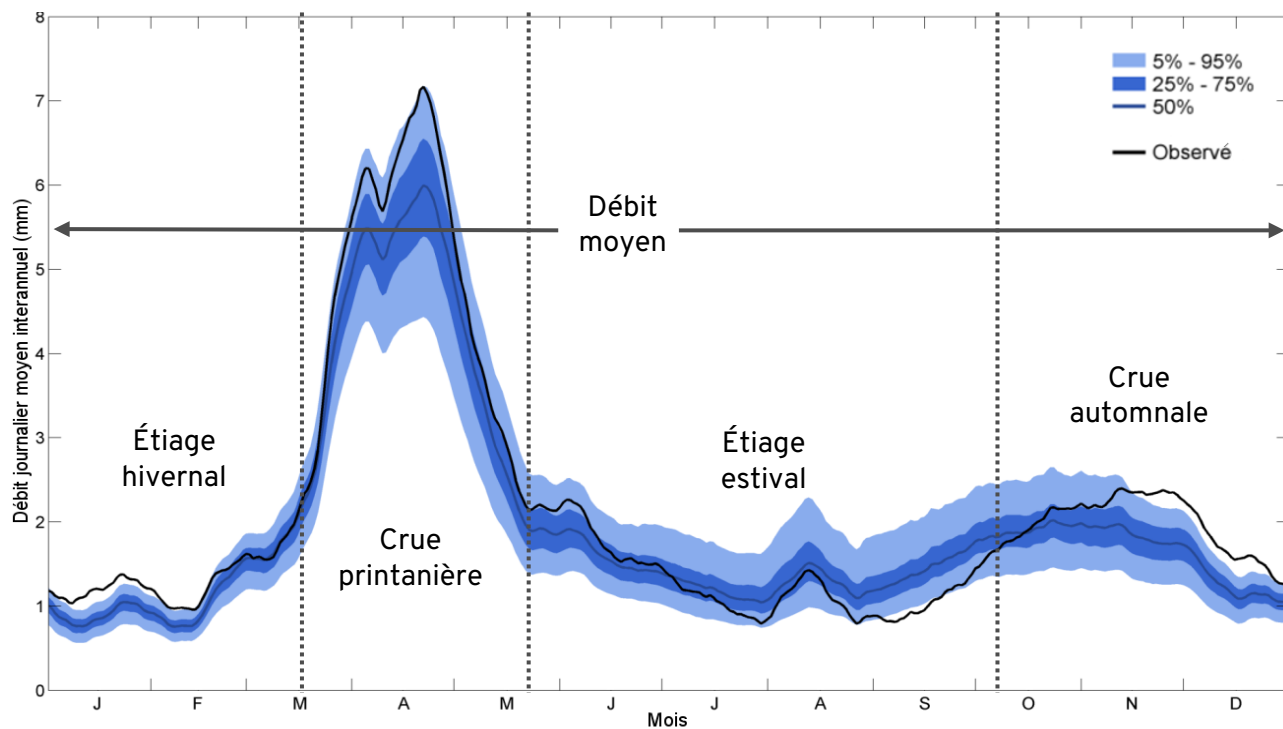


sequence of events embedded within the climate model



sequence of events observed over the historical period

**Indicators (54)  
(streamflow)**

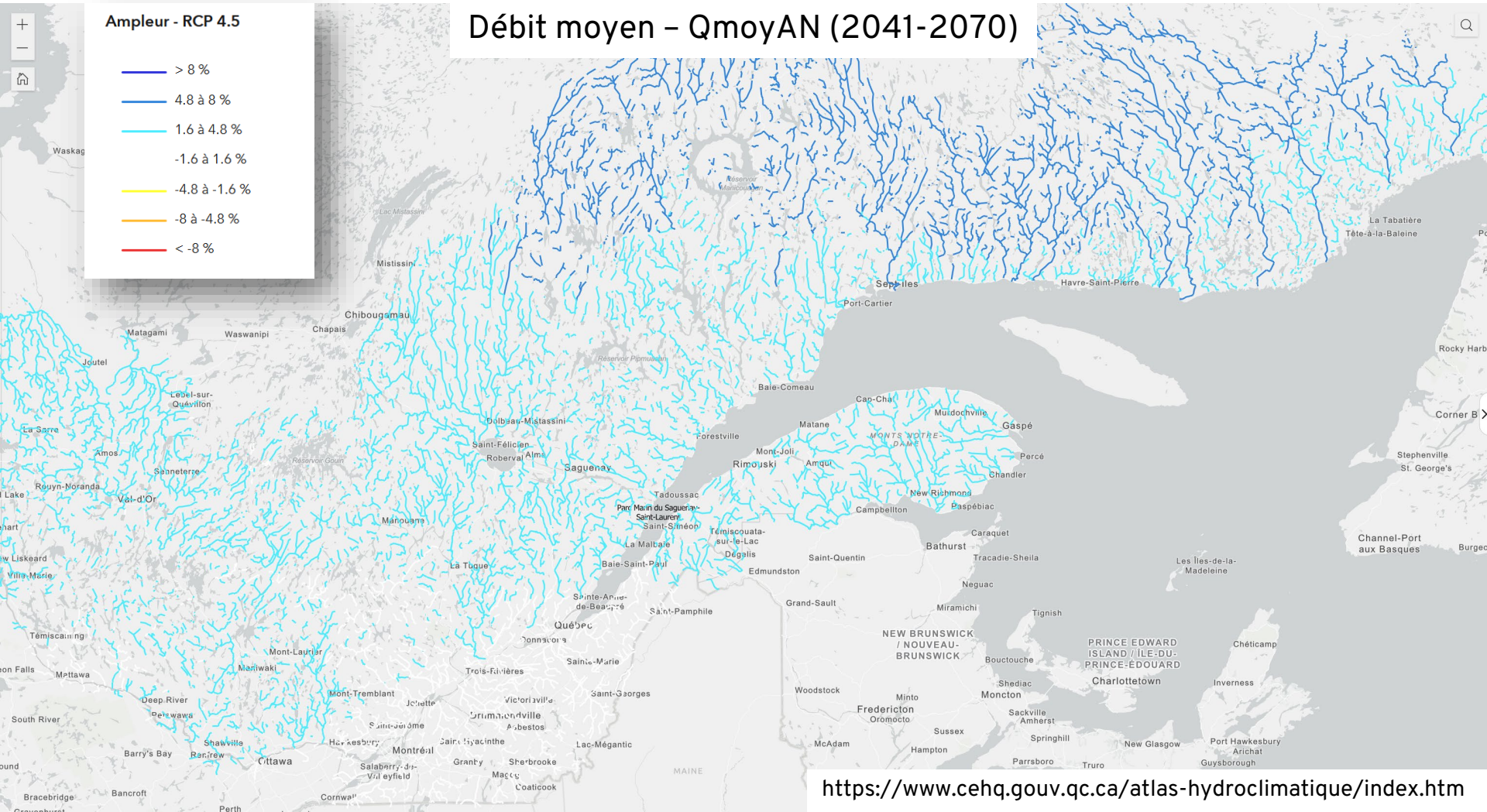




# Débit moyen - QmoyAN (2041-2070)

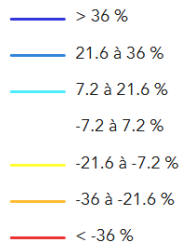
Ampleur - RCP 4.5

- > 8 %
- 4.8 à 8 %
- 1.6 à 4.8 %
- 1.6 à 1.6 %
- 4.8 à -1.6 %
- 8 à -4.8 %
- < -8 %



# Étiage estival - Q7min2EA (2041-2070)

## Ampleur - RCP 4.5



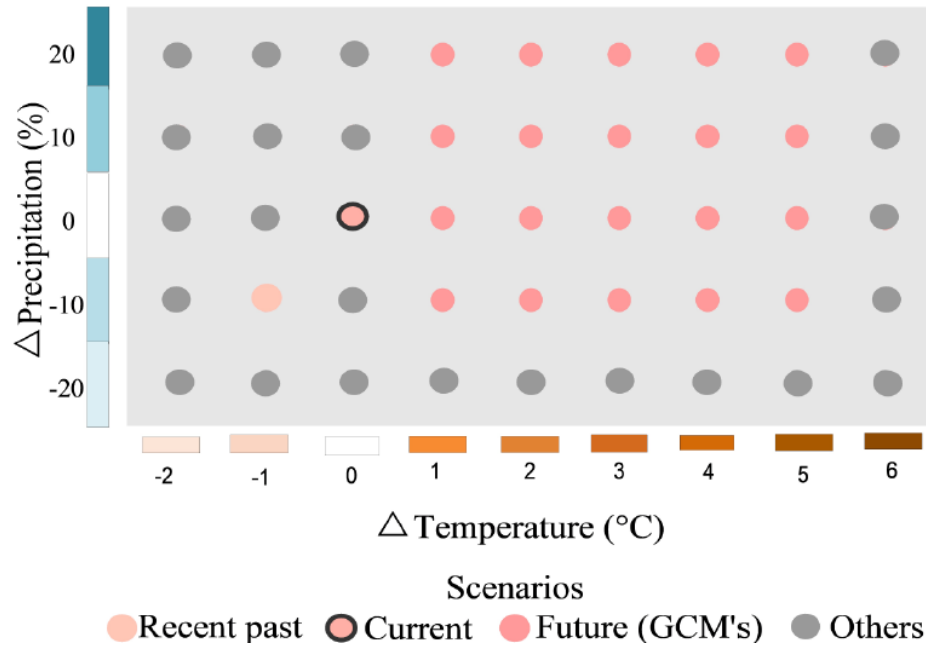
Aucune information  
sur les autres  
composantes du  
cycle de l'eau



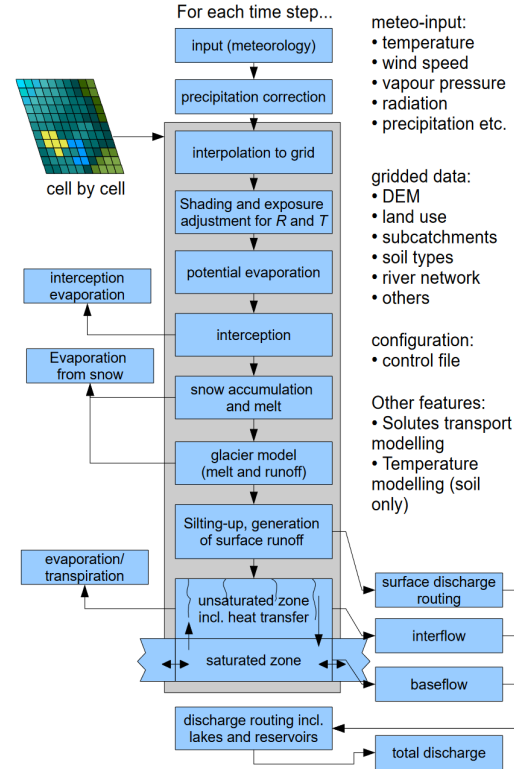
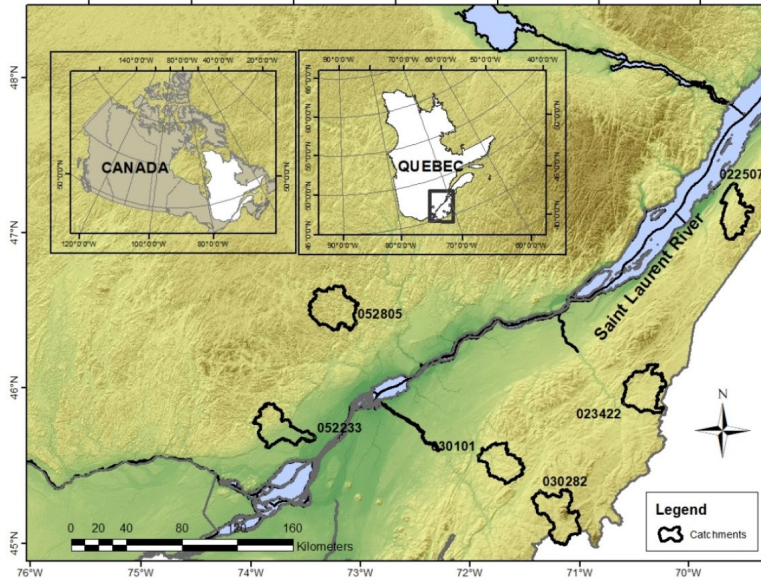
The background is a solid blue color. There are several white, rounded, rectangular shapes scattered across the page, some in the top-left and bottom-right corners, and others in the right-hand side, creating a modern, abstract design.

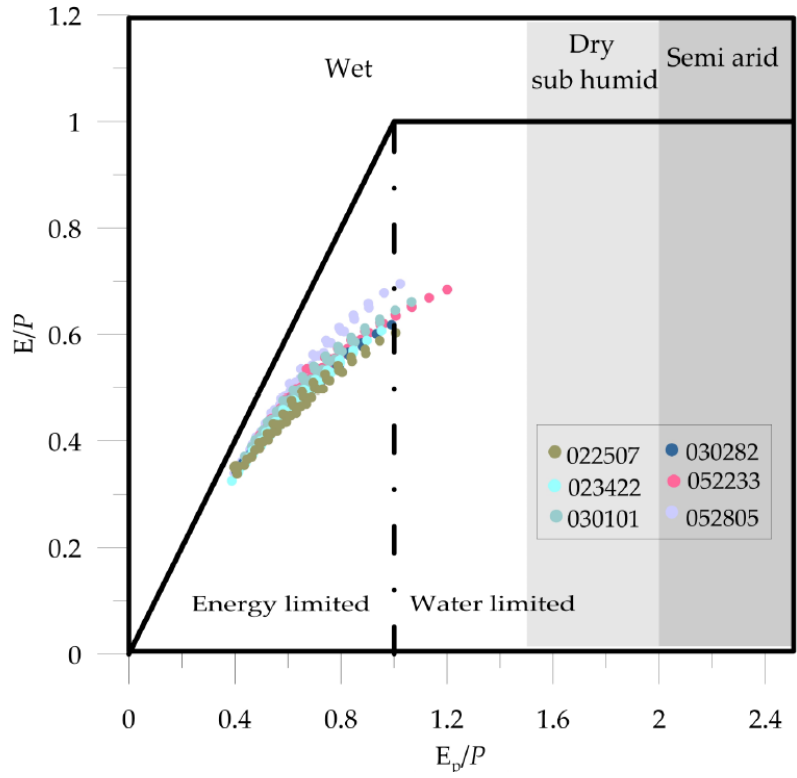
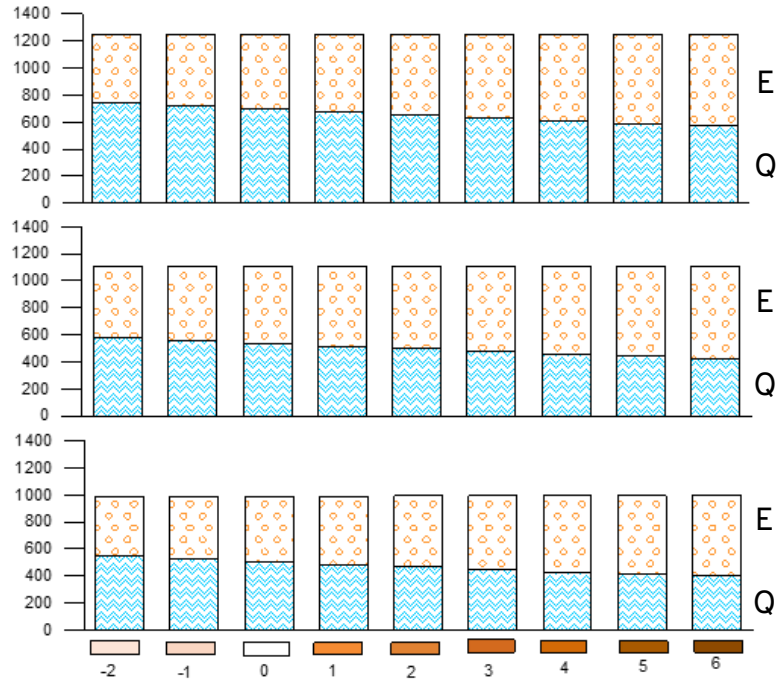
Regard 3

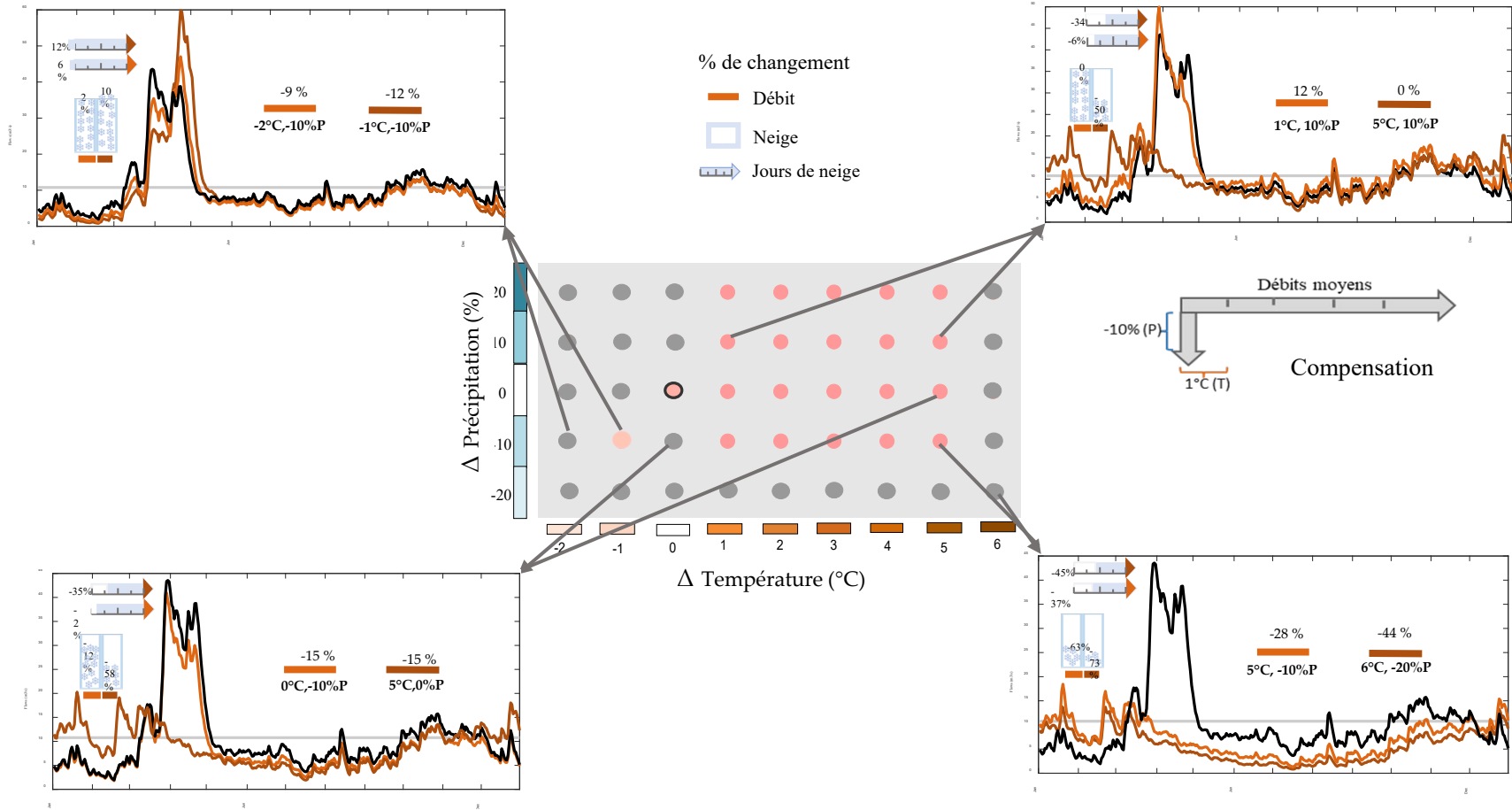
# Projection hydrologique neutre



# WaSIM-ETH







The background is a solid blue color. It features several white, abstract, geometric shapes that resemble stylized letters or symbols. These shapes are primarily located on the right side of the image, with some extending from the top and bottom edges. They have rounded corners and sharp, angular forms, creating a modern, minimalist aesthetic.

Que retenir de tout cela ?



1. Documenter les bilans en eau et en énergie pour comprendre le cycle de l'eau local et valider (améliorer) nos outils de modélisation
  - Surtout si on veut aller plus loin que le débit seul
2. Identifier des indicateurs de changement qui sont pertinents avec les objectifs de l'étude et les outils (méthodes) de projection
3. Diversifier les regards, par exemple combiner des approches avec scénarios et neutres



UNIVERSITÉ  
**LAVAL**

Centre de recherche sur l'eau