

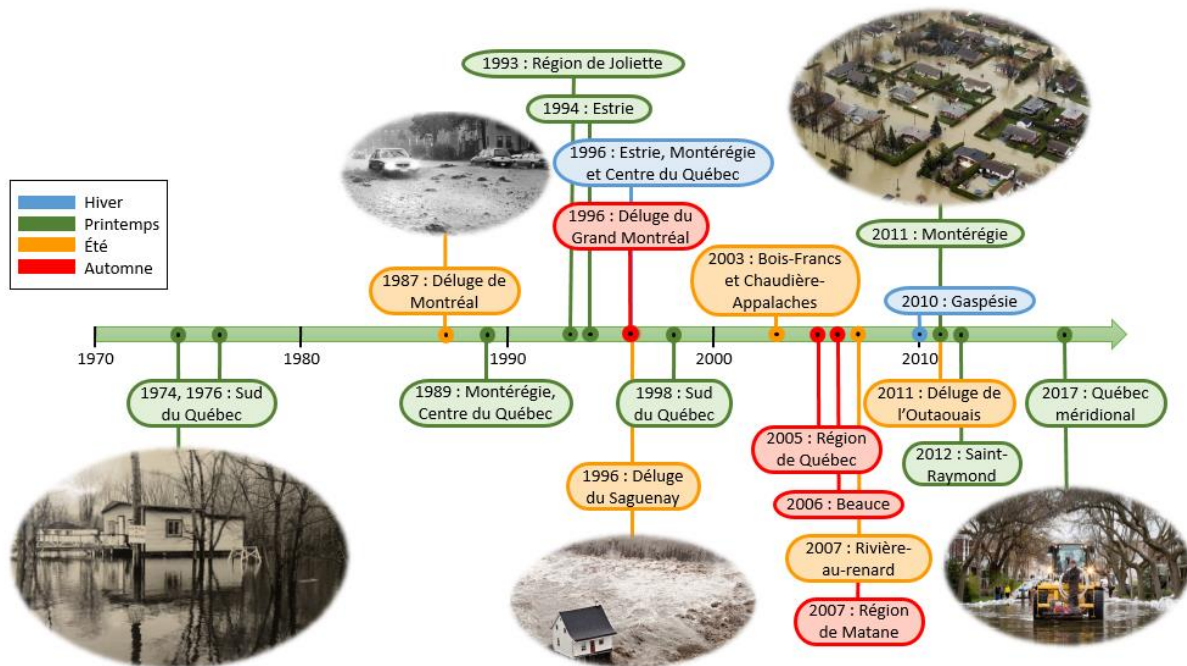
Flood forecasting at MELCC

Dominic Roussel, P. Eng., M. Sc.

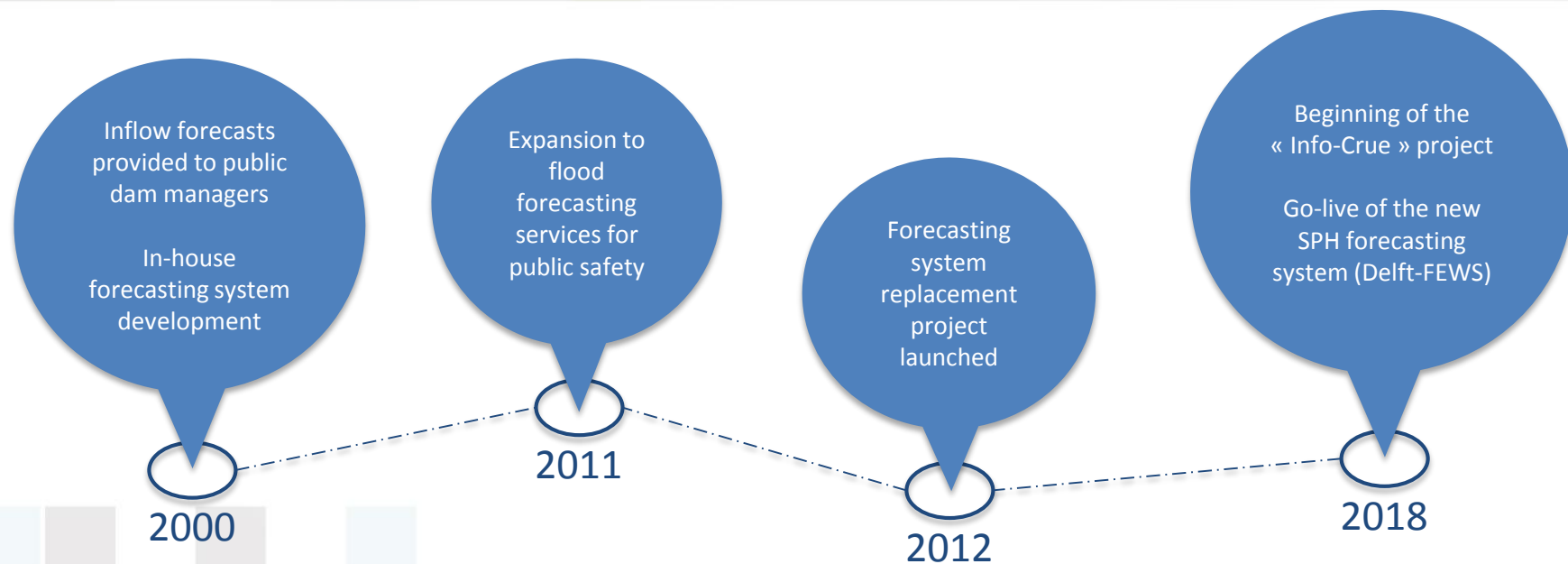
Outlines

- Brief history of flow forecasting in Quebec
- Current structure and services
- FEWS implementation project
- Quebec hydrology challenges
- Q/A

Brief history of flow forecasting in Quebec



Brief history of flow forecasting in Quebec



Current structure and services

*Environnement
et Lutte contre
les changements
climatiques*

Québec

Sécurité publique
Québec

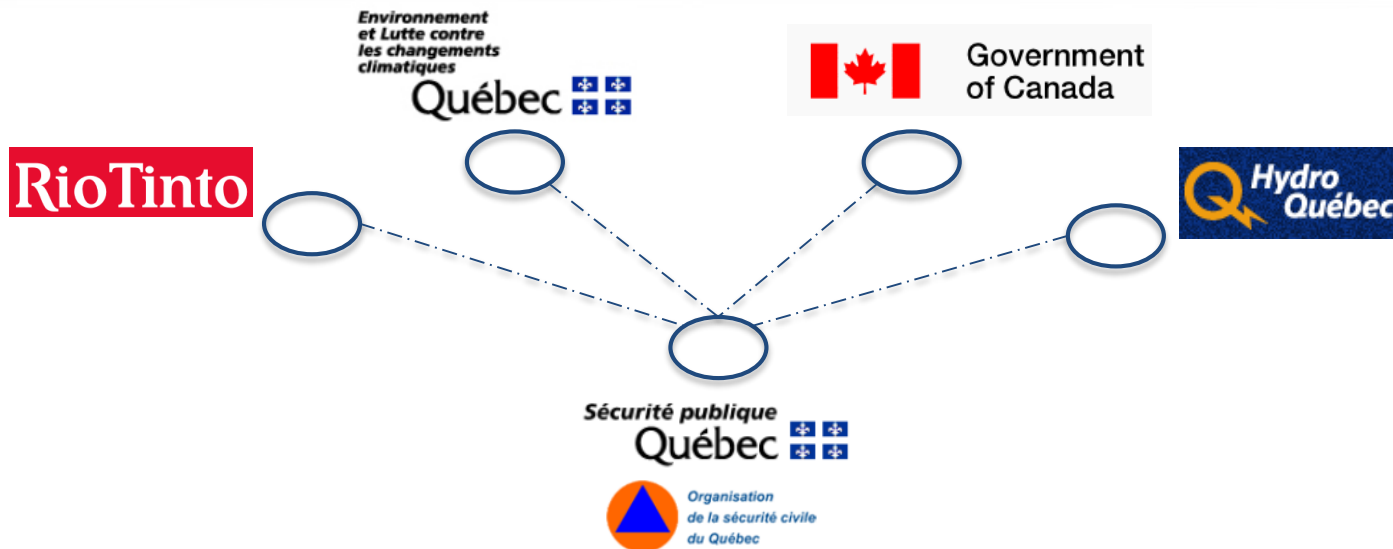


Integrated flood forecasting, warning and response
system

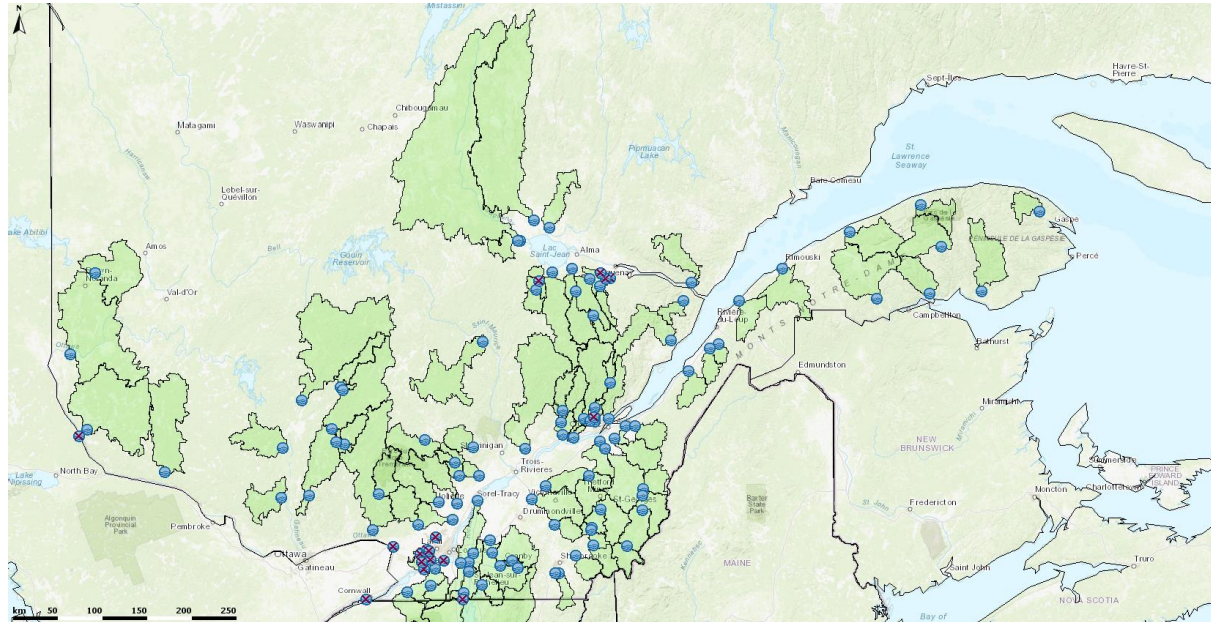
Guide to Hydrological Practices (WMO
No.168)

Québec

Current structure and services



Current structure and services



119 forecasting locations

Current structure and services

TEAM

Dominic Roussel, team leader (physical engineering / water sciences)

Simon Lachance-Cloutier (physical engineering / water sciences)

Martin-Pierre Lavigne (forest engineering / water sciences)

Philippe Paradis-Lacombe (water engineering / forest sciences)

Charles Malenfant (water engineering)

Anne Morais (physics / civil engineering / water engineering)

Karine Robert (civil engineering / ocean physics)

Futur forecaster (???)

Current structure and services

Operations

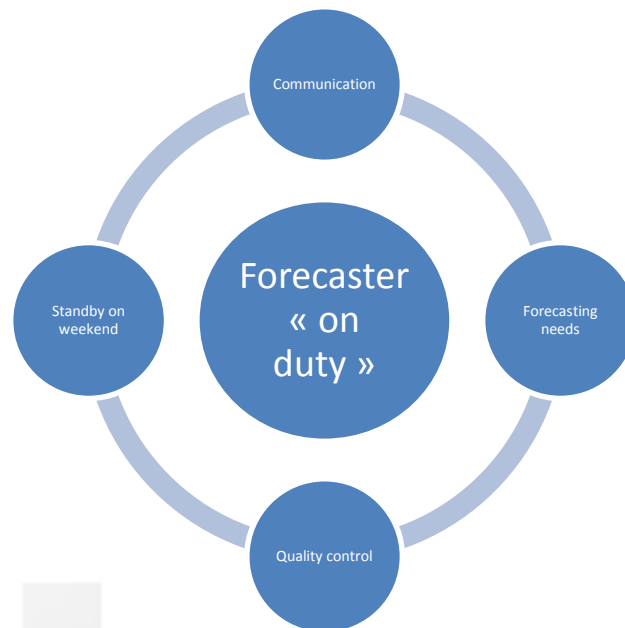
Operation on business hours on week days

Forecasters validate forecast every day for their assigned location

Daily official forecasts due at 10AM

Updates as required

Weekend operation determined on Friday (from standby to full service)



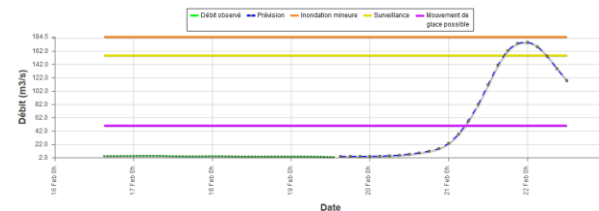
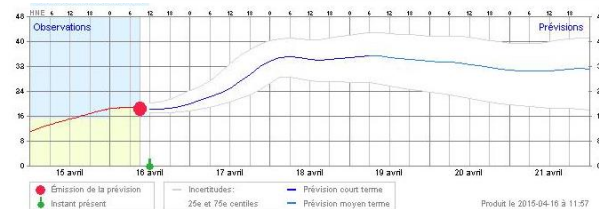
Current structure and services

Services

Forecasts available on public safety
« Vigilance » platform and on our website

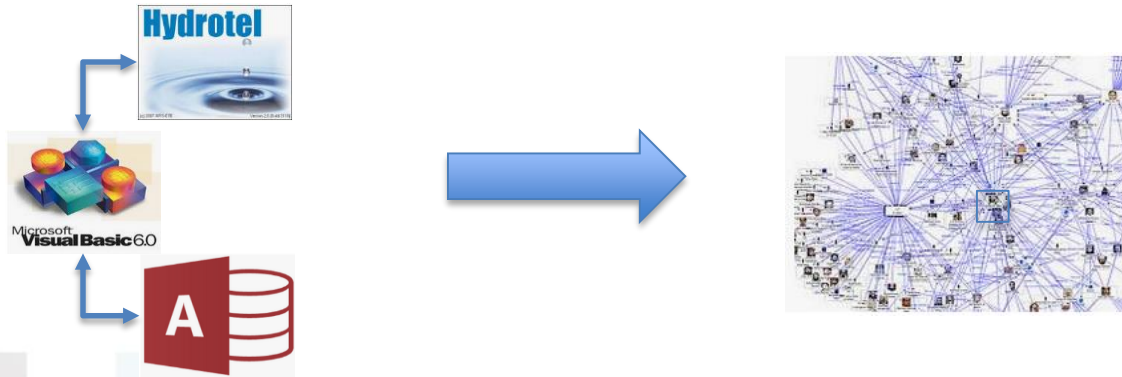
Regular telephone conference with flood
response managers during flood watches

Direct email adress for general public



FEWS implementation project

- Evolution of our in-house system over the years



FEWS implementation project

- Early 2000s to 2018 – In house legacy system
 - Limited performance and scaling up capabilities (hard to add forecasting locations)
 - Stand alone deployment only (maximum of 2 forecasters working simultaneously)
 - High maintenance (lot's of bugs and anomalies)
 - Required advanced computer skills to maintain.
- Replacement project kick started by :
 - New flood forecasting requirements (39 to 120 forecasting location)
 - Astronomical conjunction

FEWS implementation project

- Phase 1 of the project (2012 to 2017)
 - Opportunity case
 - Request for information
 - Preliminary analysis
 - Request for proposal
 - Contracting
- Main challenges
 - Paradigm shift (engineering and IT)
 - Separation of roles and responsibilities
 - Administrative issues for such a highly specialized field system

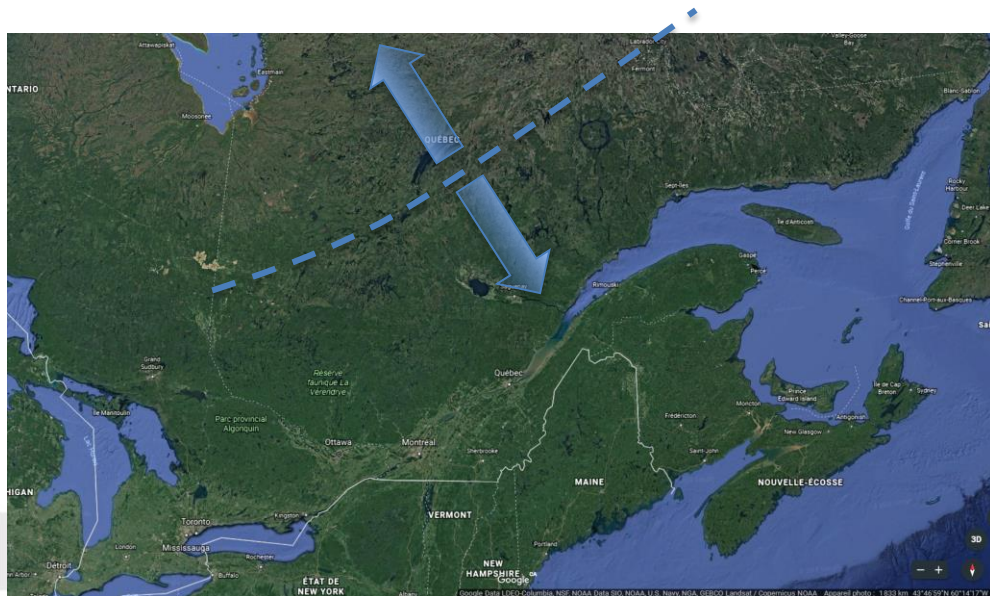
FEWS implementation project

- Phase 2 of the project (2017 to 2018)
 - Coding adapters for Hydrotel
 - Coding adapters free modules (reservoir, snow, uncertainty)
 - Pilot project (done by Deltares)
 - Expanding pilot project (done by us with Deltares support)
- Main challenges
 - Keeping an excited team (kids in a candy shop) within project requirements.
 - Going through the learning curve in such a short time.
 - Staying compliant with Deltares regulations throughout the project.

FEWS implementation project



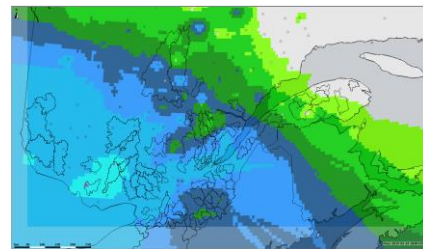
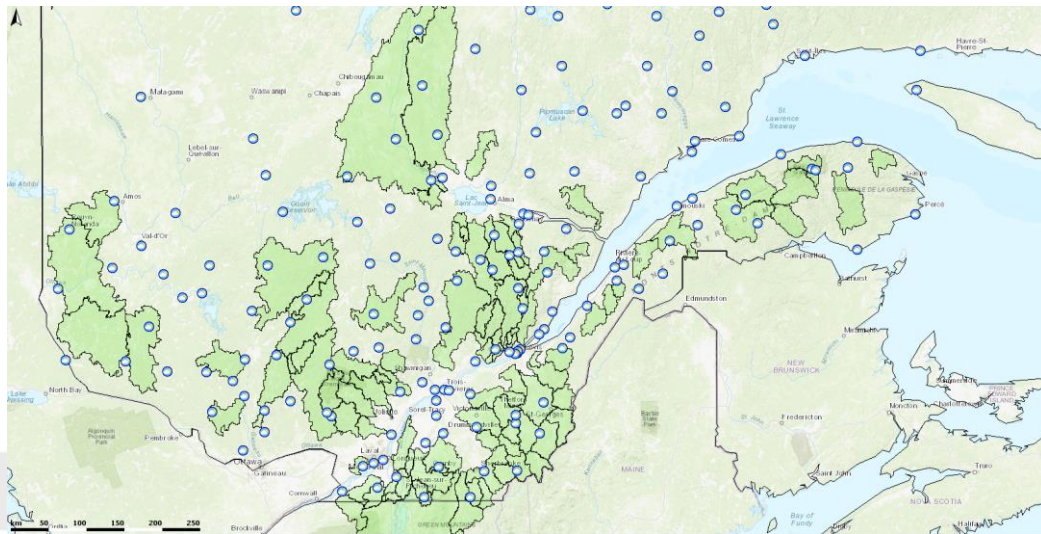
Quebec hydrology challenges



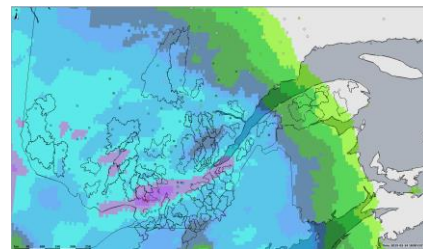
- Covered with water up to 12 %
- More than 500 000 lakes and water bodies
- 3 % of the world running water
- ~1000 mm (39 inches) of precipitations on a yearly basis
- 1/3 is solid precipitation
- 3 to 5 months of ice-covered river
- ~96% Hydro-powered (41 GW)

Quebec hydrology challenges

- Challenge 1 : Getting good precipitation forcings



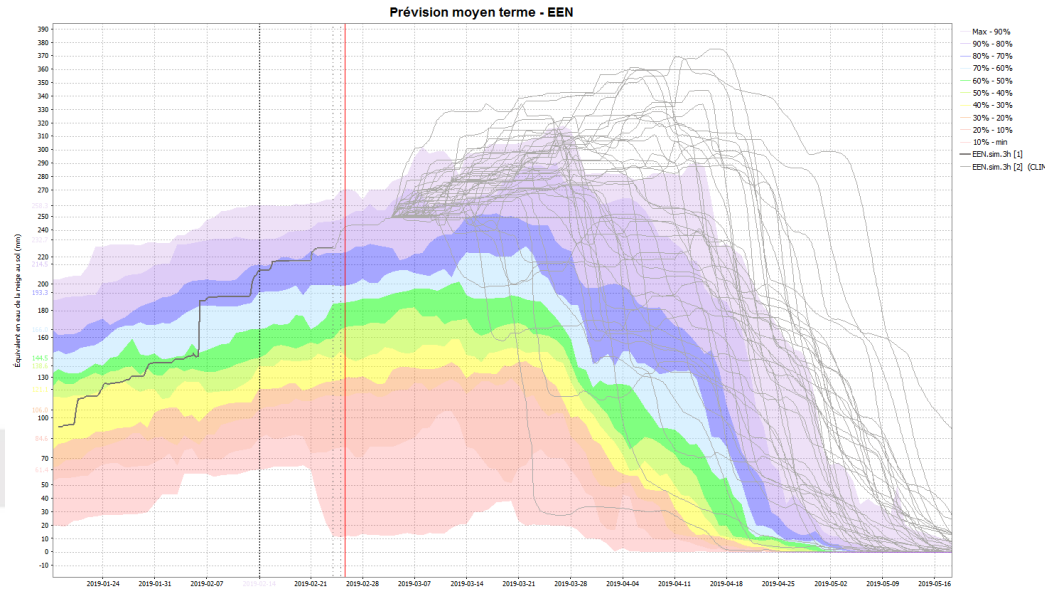
Spatial interpolation



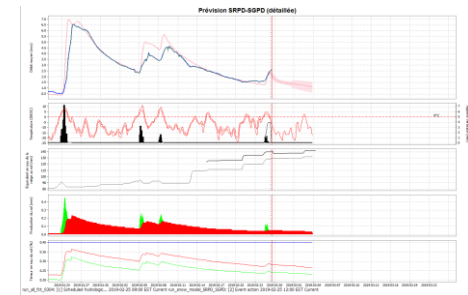
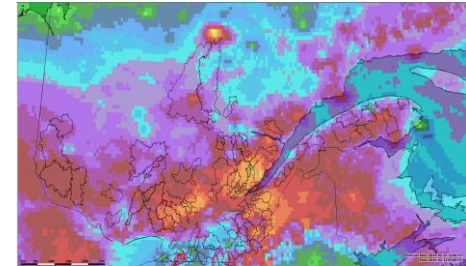
Canadian Precipitation Analysis (CaPA)

Quebec hydrology challenges

- Challenge 2 : Getting good snow water equivalent

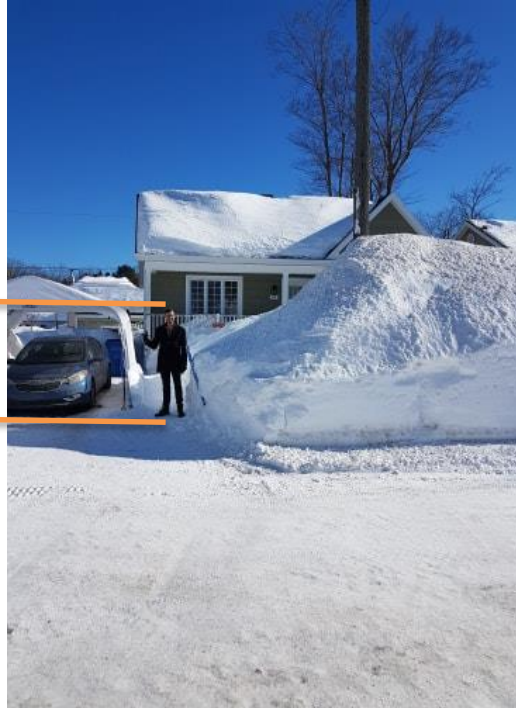


February 5th lowest basin average SWE → 130 mm (5 inches)



Quebec hydrology challenges

6'4"



Quebec hydrology challenges

- Challenge 3 : Getting good flow observations in winter conditions



February 25th – 79% backwater

Next steps

- Major expansion with the « Info-Crue » project
 - Project initiated following 2017 major flooding on the Ottawa river.
 - Substantial budget to improve flood mapping and to start producing flood extent forecasting maps.
 - Adding ~50 discharge gauges .
 - Nearly doubling the number of forecasting locations.
 - Forecasting at ungauged locations



Thank you for your time!