



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

Canada

INTRODUCING CLIMATE INFORMATION FOR DECISION-MAKING

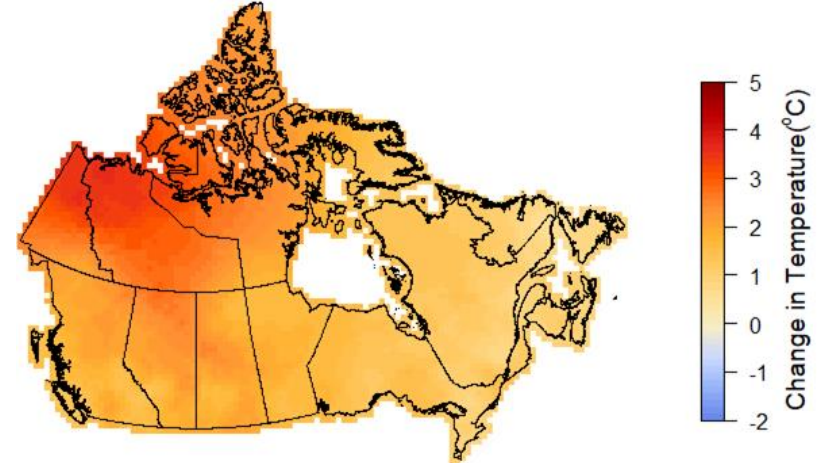
Elaine Barrow and Jeremy Fyke
Canadian Centre for Climate Services

AMONTario Climate Change and Asset Management Conference
February 22, 2021

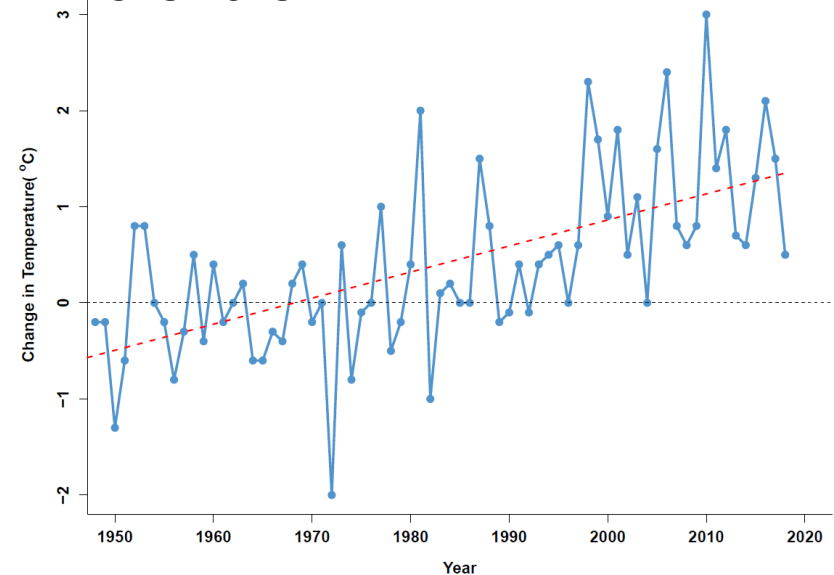


WHY USE CLIMATE INFORMATION?

- The climate is changing.
- We need to make decisions and design for a future climate.
- Future climate projections can help us prepare and adapt to changing conditions.



Temperature change in Canada
1948-2018



For more information visit climatedata.ca

Source: ECCC

CLIMATE CHANGE HAZARDS



Permafrost Degradation



Extreme Temperatures



Wildfire



Sea Level Rise



Storm Surges



Flooding



Erosion



Drought



Hailstorms



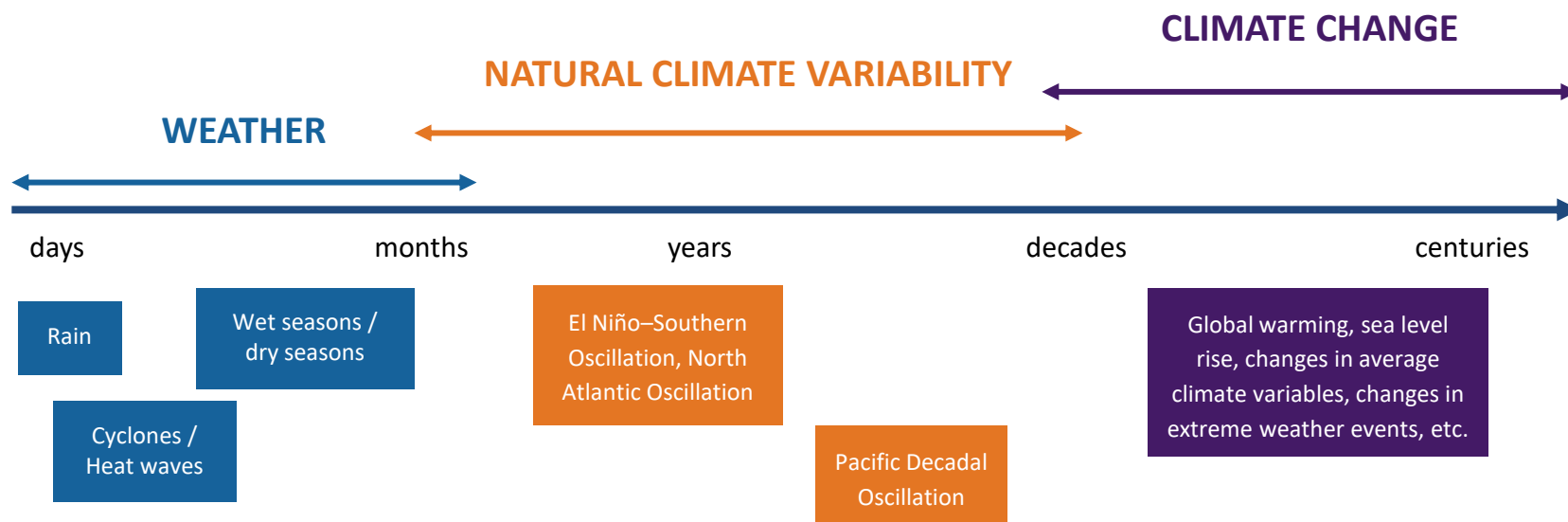
High Winds



Severe Weather

WEATHER, NATURAL VARIABILITY AND CLIMATE CHANGE

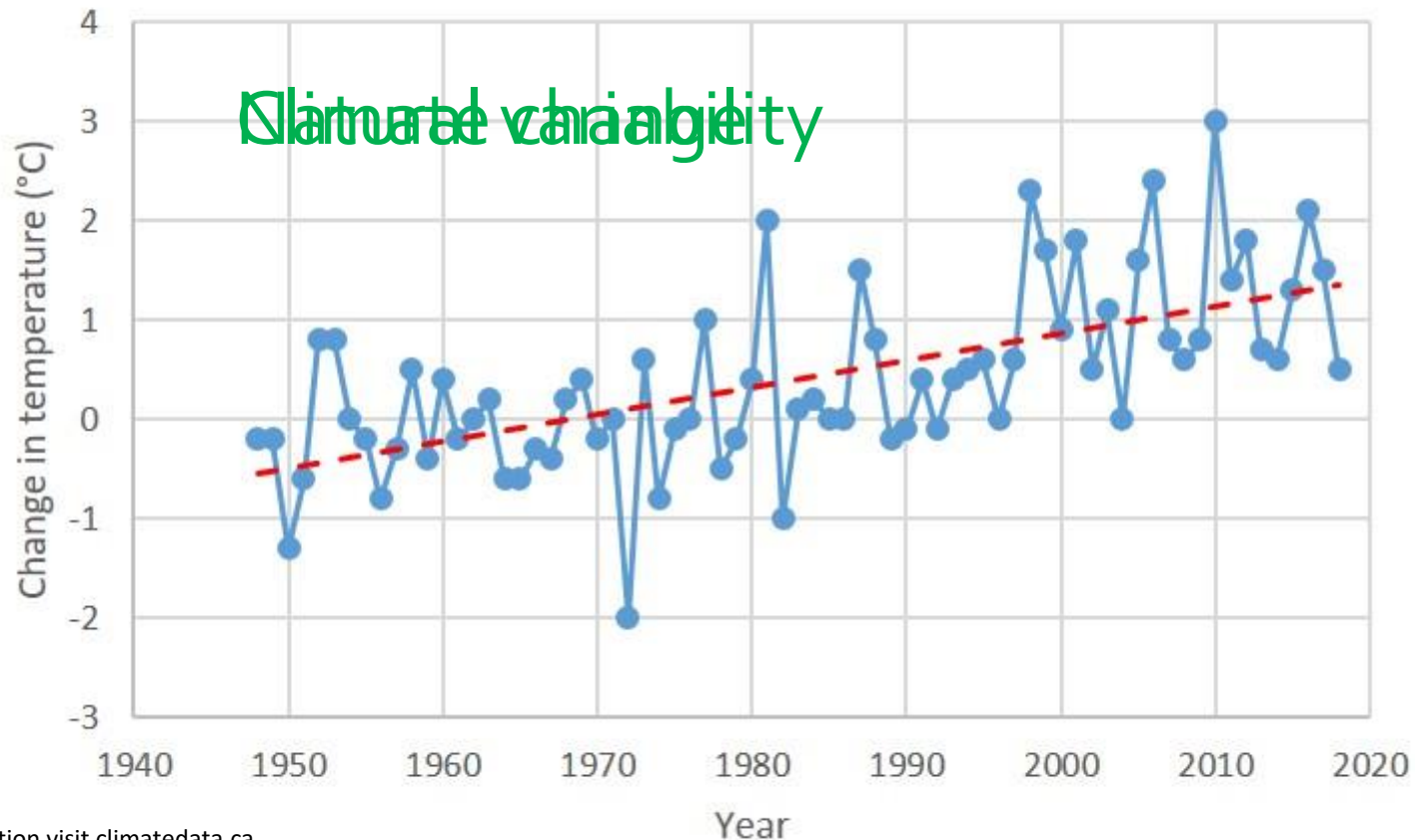
- Decisions often need to consider many different time scales



For more information visit climatedata.ca

Source: Modified from Ouranos and Pacific Climate Futures

NATURAL VARIABILITY VS CLIMATE CHANGE

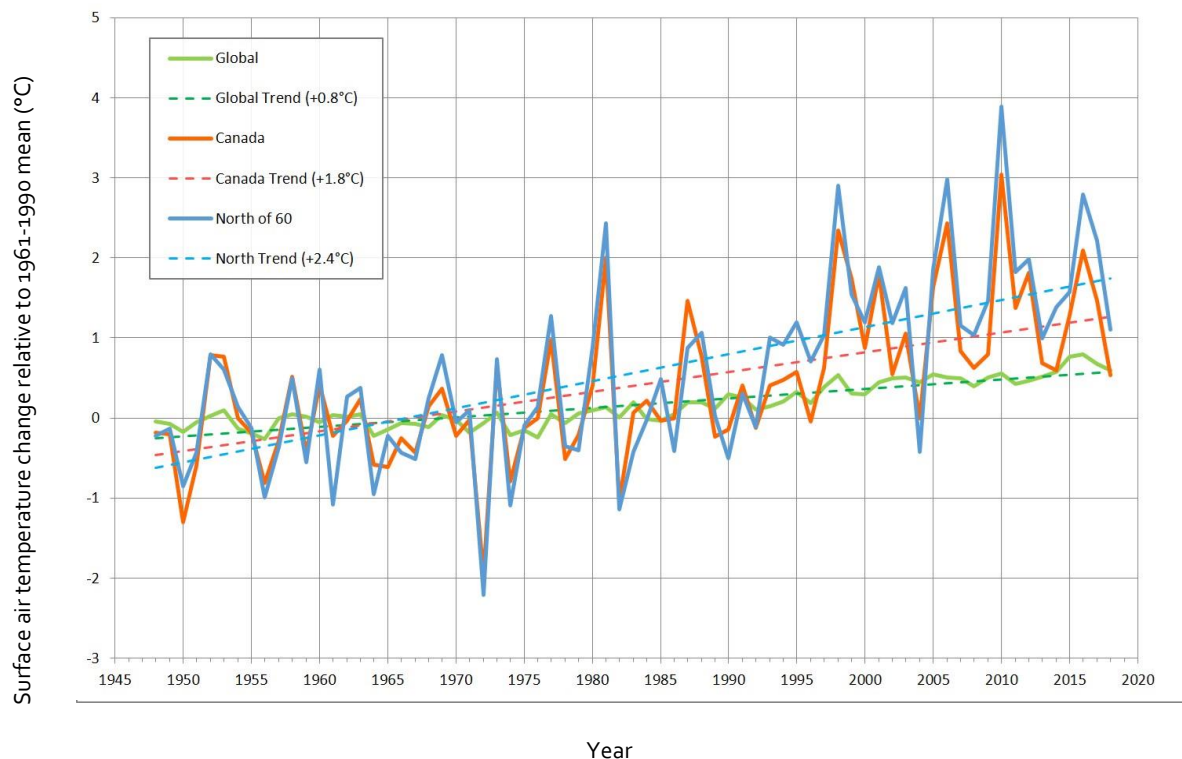


For more information visit climatedata.ca

Source: ECCC

THERE IS VARIABILITY BUT HISTORICAL DATA ILLUSTRATES CLEAR TRENDS

Annual Global, National, and Northern Canada mean temperature departures and long-term trend, 1948-2018



Northern Canada: +2.4°C

Canada: +1.7°C

Global: +0.8°C

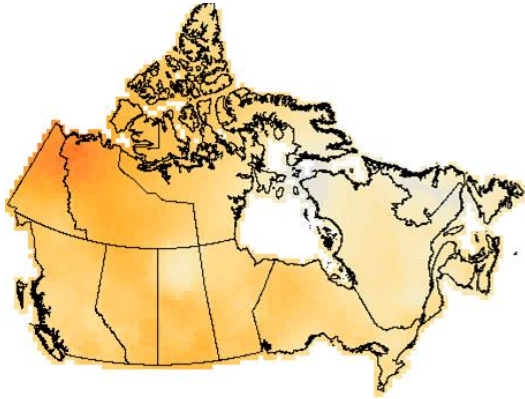


For more information visit climatedata.ca

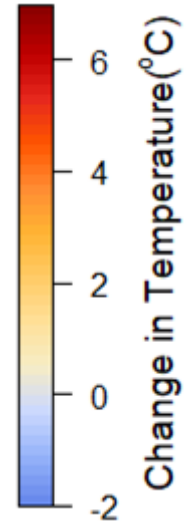
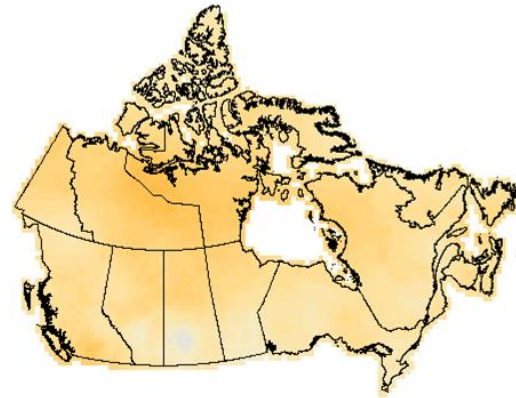
Source: ECCC

TEMPERATURE CHANGE VARIES WITH SEASON

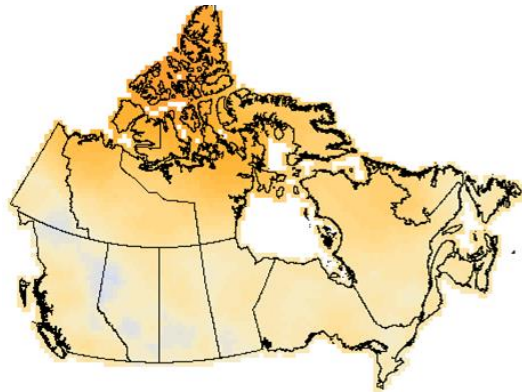
Spring (+1.3°C*)



Summer (+1.1°C*)

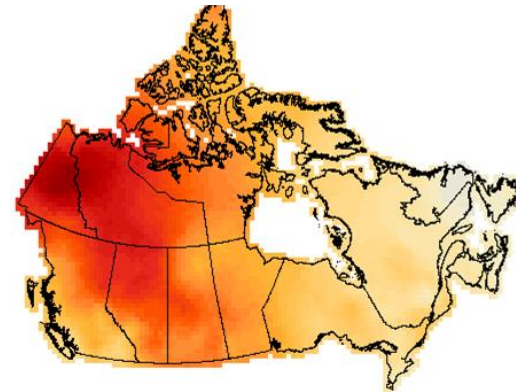


Autumn (+0.9°C*)



1948-2018

Winter (+2.1°C*)



***Values in brackets are for Ontario**

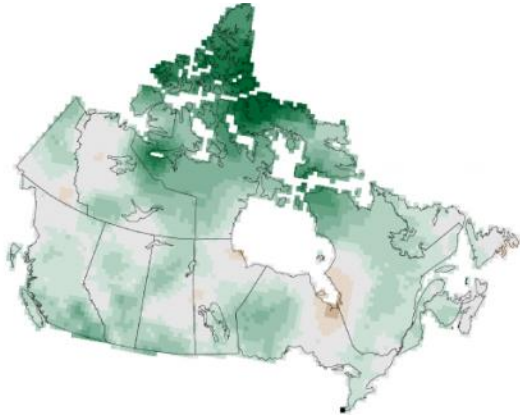


For more information visit [ClimateData.ca](https://climateData.ca)

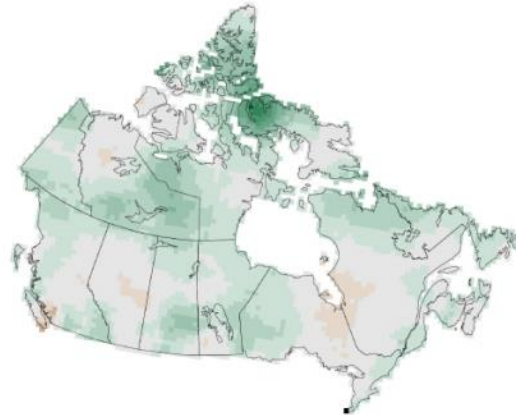
Source: ECCC

PRECIPITATION CHANGE VARIES WITH LOCATION

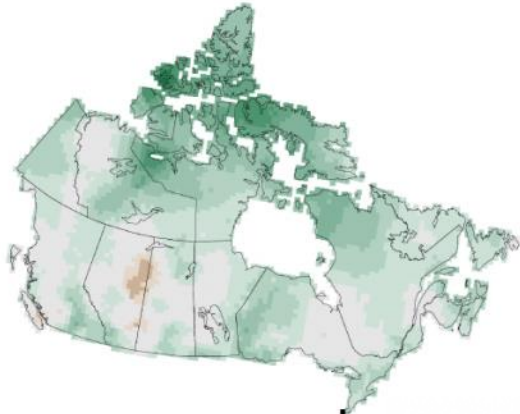
Spring (+12.5%)



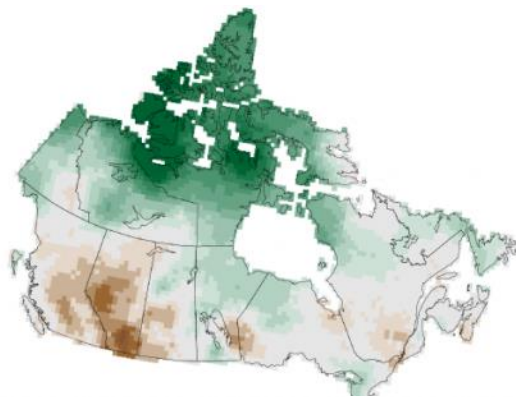
Summer (+8.6%)



Autumn (+17.8%)



Winter (+5.2%)



**Seasonal
precipitation change
(%)
1948-2012**

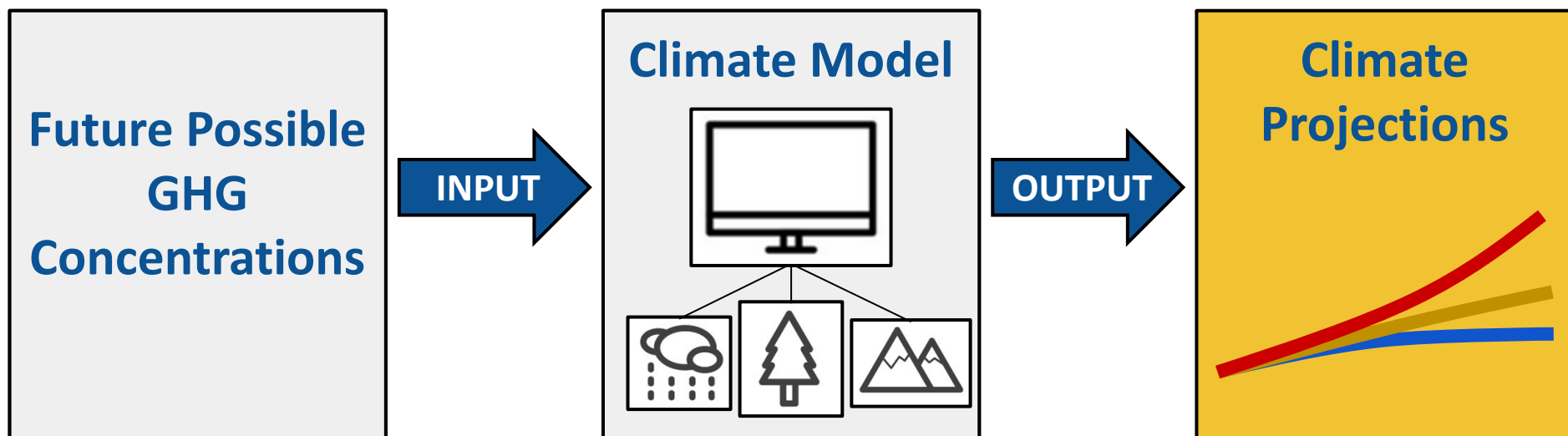
***Values in
brackets are
for Ontario**




For more information visit ClimateData.ca

Source: ECCC

WHERE DO CLIMATE PROJECTIONS COME FROM?



 For more information visit climatedata.ca

EMISSIONS SCENARIOS

- An important input into climate models
- Because we don't know what will happen in the future, trajectories called emission scenarios used
- These describe plausible future releases of greenhouse gases and other emissions into the atmosphere

**High
Emissions
(RCP 8.5)**



**Moderate
Emissions
(RCP 4.5)**



**Low
Emissions
(RCP 2.6)**



For more information visit climatedata.ca

RCP = Representative Concentration Pathway

PROJECTED TEMPERATURE CHANGE

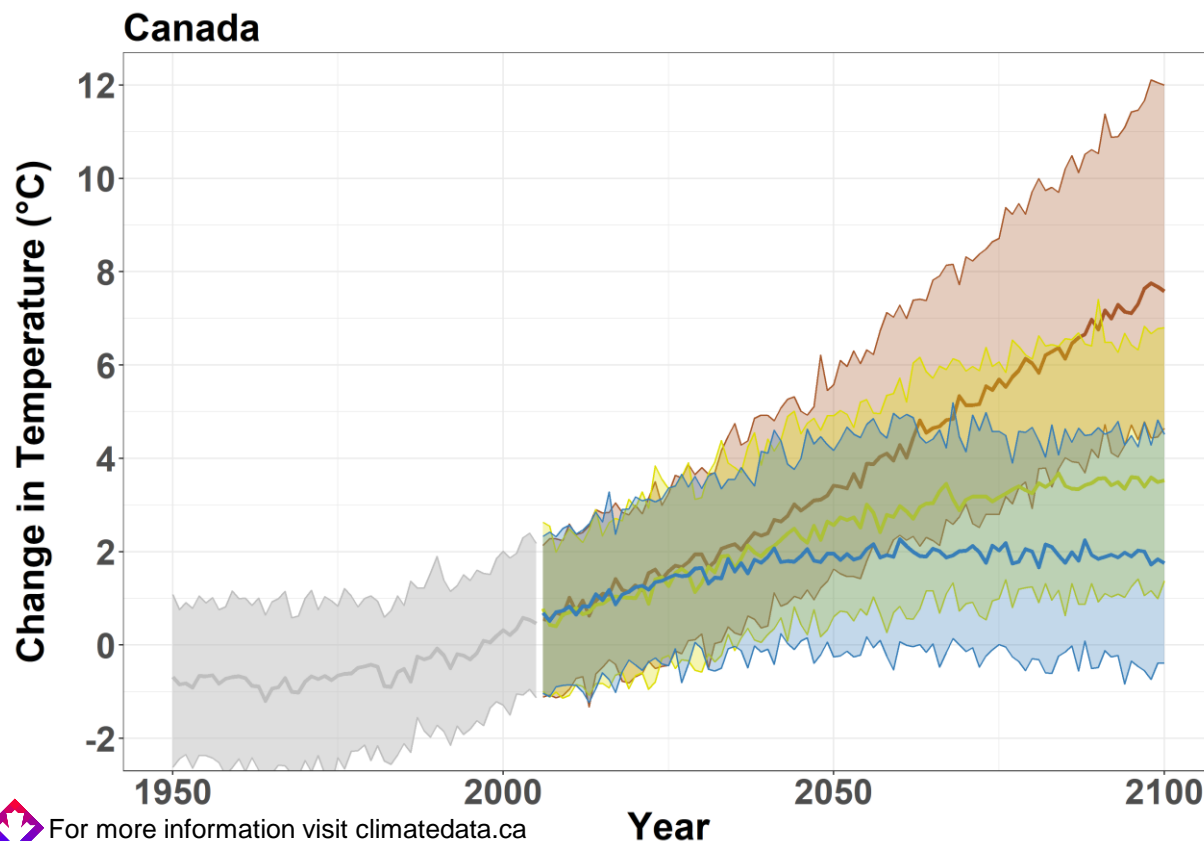
By the end of the century:

**High Emissions
Scenario (RCP 8.5):**
Global: +4.7°C
Canada: +6.1°C

**Moderate Emissions
Scenario (RCP 4.5)**
Global: +2.1°C
Canada: +2.9°C

**Low Emissions
Scenario (RCP 2.6)**
Global: +1.1°C
Canada: +1.8°C

(Change relative to
1986-2005 baseline)



Source: ECCC

FUTURE TEMPERATURE - ONTARIO

By the end of century (2081-2100)

Average annual change (°C)	RCP2.6	RCP4.5	RCP8.5
Ontario	+1.7	+3.2	+6.3
Canada	+1.8	+3.2	+6.3

(Average annual change compared to 1986-2005, median value)

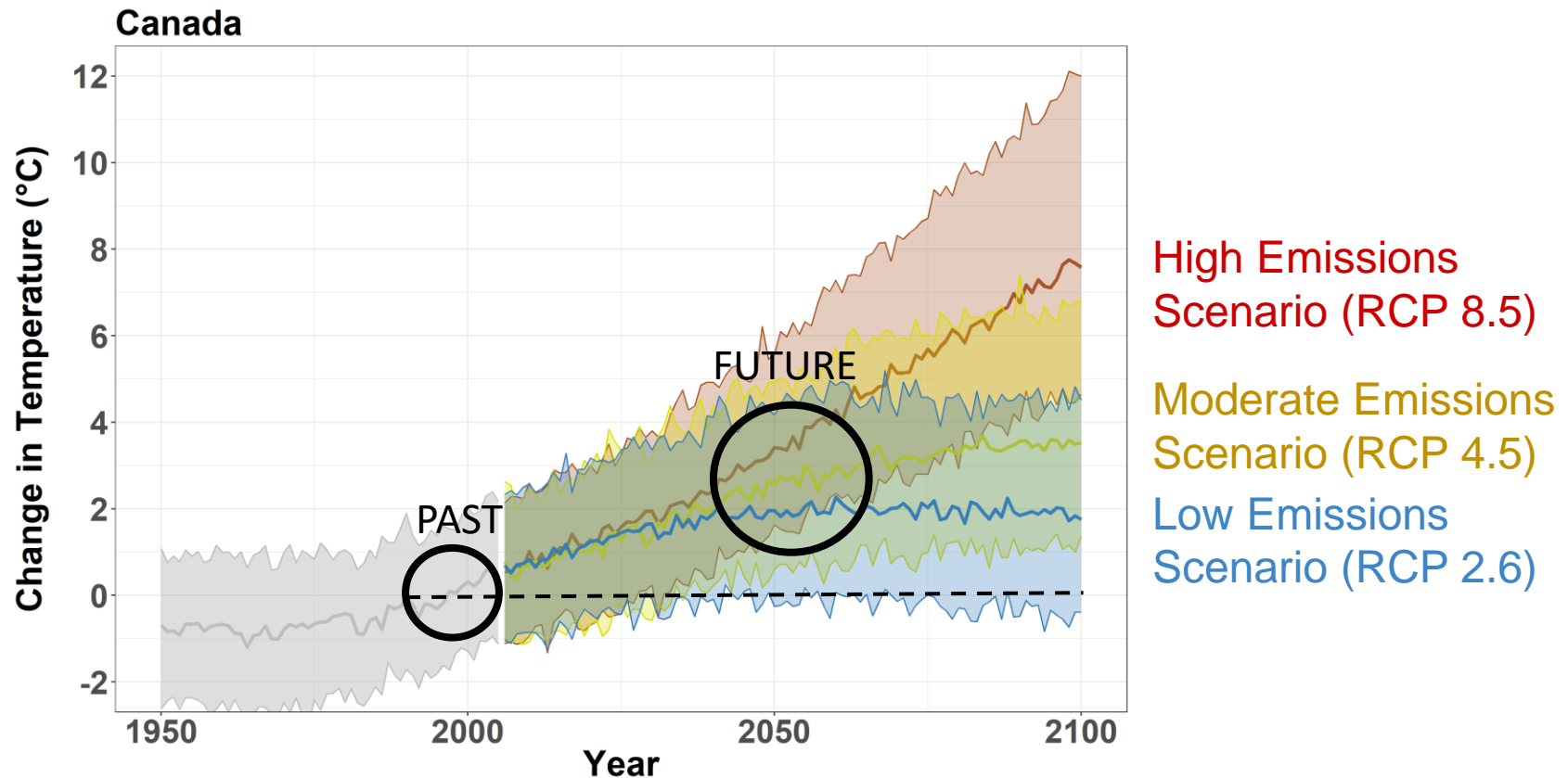
Average winter change (°C)	RCP2.6	RCP4.5	RCP8.5
Ontario	+2.4	+4.4	+8.2
Canada	+2.4	+4.2	+8.2

(Average winter change compared to 1986-2005, median value)

Average summer change (°C)	RCP2.6	RCP4.5	RCP8.5
Ontario	+1.3	+2.9	+6.0
Canada	+1.4	+2.6	+5.4

(Average summer change compared to 1986-2005, median value)

DECISION-MAKING USING CLIMATE INFORMATION



For more information visit climatedata.ca

Source: ECCC

TYPES OF CLIMATE INFORMATION NEEDS

Category of Climate Information	Example of Purpose	Type of Climate Information Commonly Provided
BASIC	To raise awareness: <ul style="list-style-type: none"> Initial awareness Risk scanning High level governance 	Historical trends and future mean changes over large spatial and temporal scales and for simple climate variables
INTERMEDIATE	To evaluate vulnerability/impact study: <ul style="list-style-type: none"> Vulnerability assessment Impact study Increase resilience Early development of adaptation plan 	Future changes or future absolute values of more complex climate variables over finer spatial scales
DETAILED	To evaluate adaptation options: <ul style="list-style-type: none"> Evaluate adaptation measures Research and development Local governance 	Future changes in means, absolute values and extremes (including low-confidence climate indices and events) over finer spatial scales

Modified from Charron (2016) – A Guidebook on Climate Scenarios:
Using Climate Information to Guide Adaptation Research and Decisions.



For more information visit climatedata.ca

EXAMPLE OF BASIC CLIMATE INFORMATION NEED

Synthesis Table:

Climate Change Projections for Toronto (High Emissions Scenario)

Source: Climate Atlas of Canada, Prairie Climate Centre
(www.climateatlas.ca)

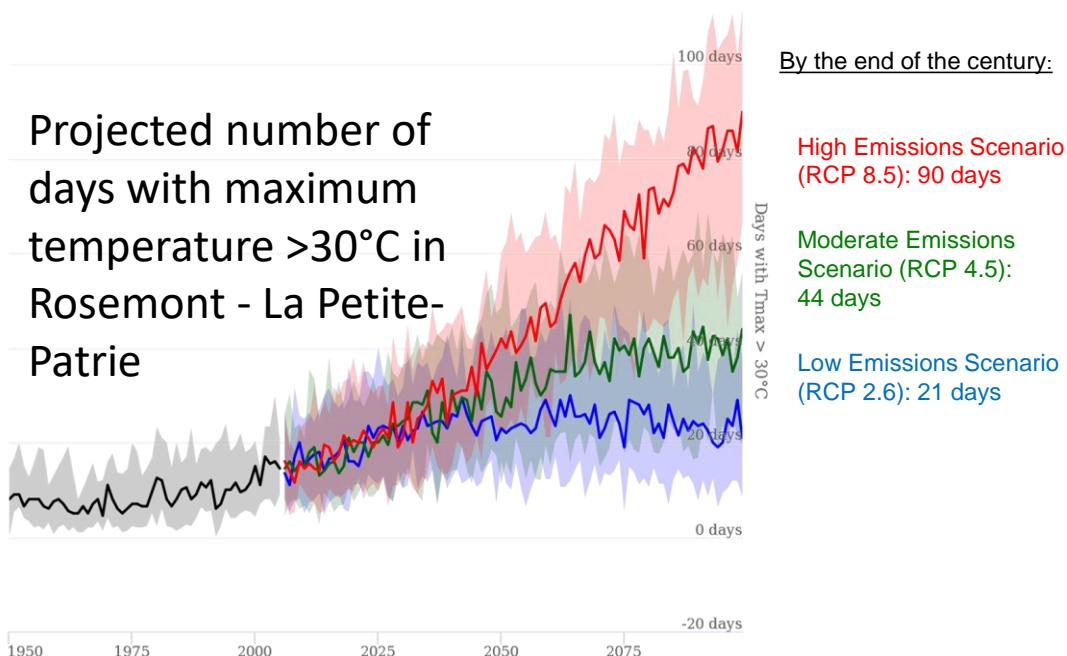


High-Carbon Climate Change Projections*

Change	1976-2005	2051-2080		
	Mean	Low	Mean	High
Typical hottest summer day	33.6 °C	35.3 °C	38.4 °C	42.0 °C
Typical coldest winter day	-21.4 °C	-18.1 °C	-13.4 °C	-8.5 °C
Number of +30 °C days per year	12	31	55	80
Number of +20 °C nights per year	8	28	47	69
Number of below-zero days per year	122	45	72	96
Annual precipitation	793 mm	699 mm	870 mm	1058 mm
Frost-free season (days)	188	203	232	263

CLIMATE INFORMATION NEEDS ARE CONTEXT DEPENDENT

- **Basic** climate information needs example: Rosemont - La Petite-Patrie borough of Montreal




 For more information visit climatedata.ca

Photo source: flickr

Figure source: climatedata.ca

CLIMATE INFORMATION NEEDS ARE CONTEXT DEPENDENT

- **Intermediate** climate information needs example: Lyme disease in Ontario

2030s, high emissions scenario (RCP8.5)

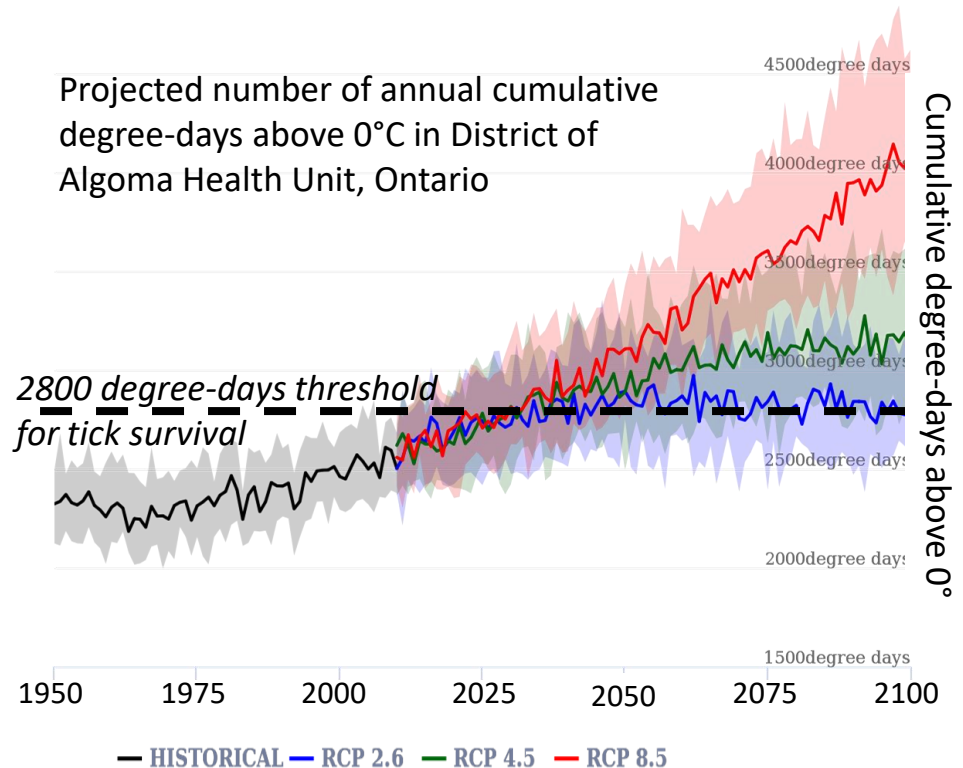
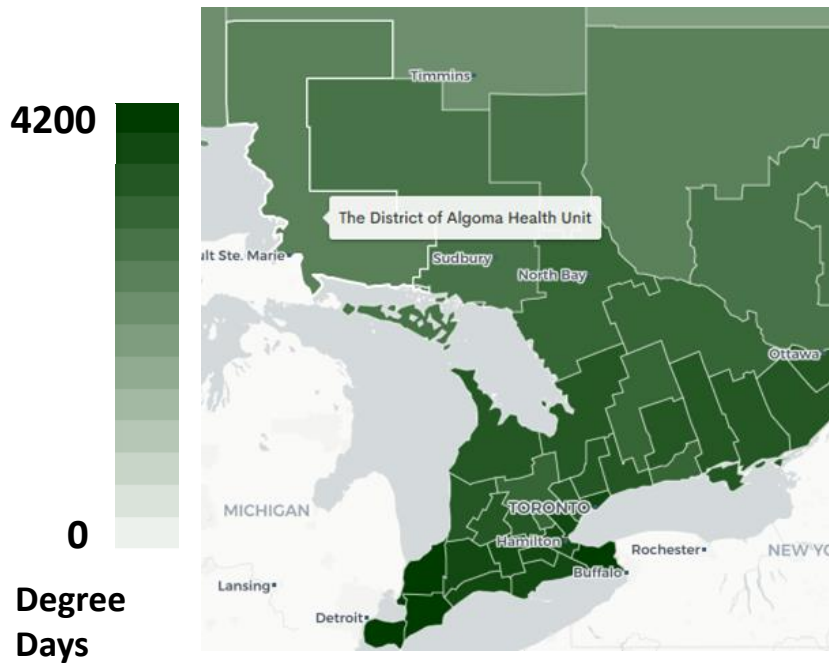


Figure sources: climatedata.ca

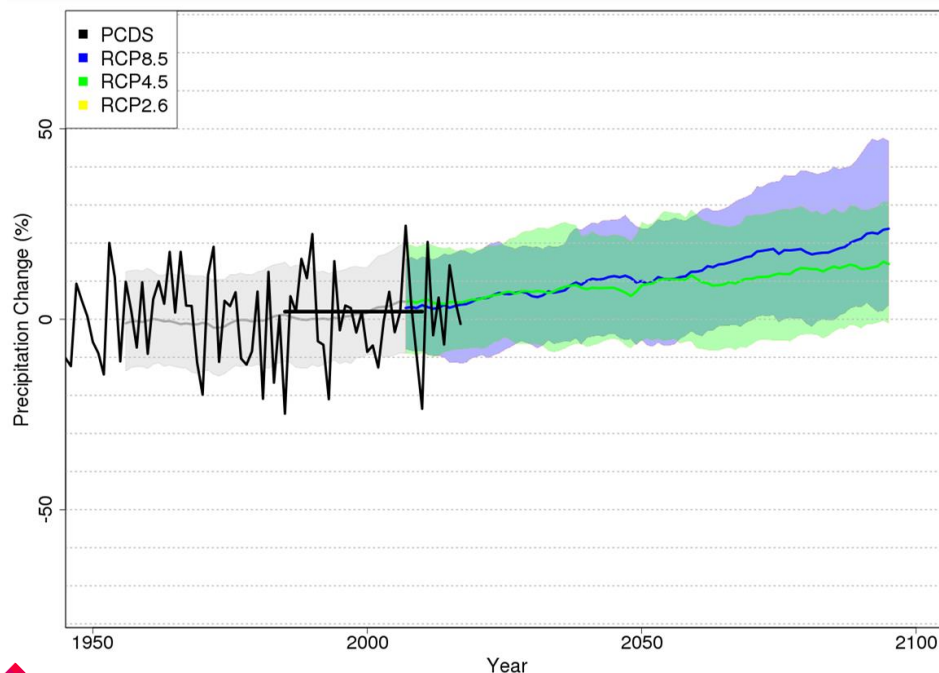


For more information visit climatedata.ca

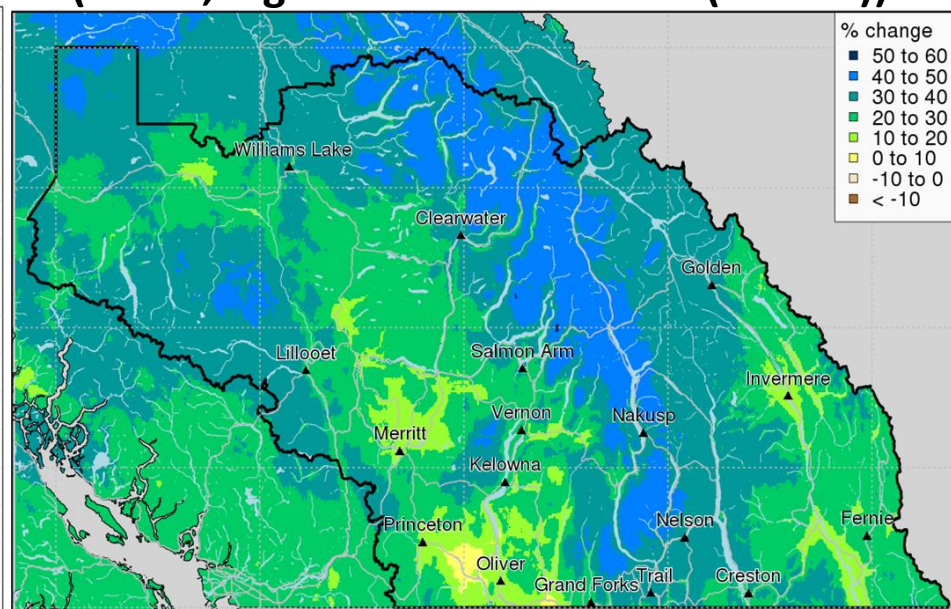
CLIMATE INFORMATION NEEDS ARE CONTEXT DEPENDENT

- **Detailed** climate information needs example: Extreme precipitation in BC

Annual average precipitation



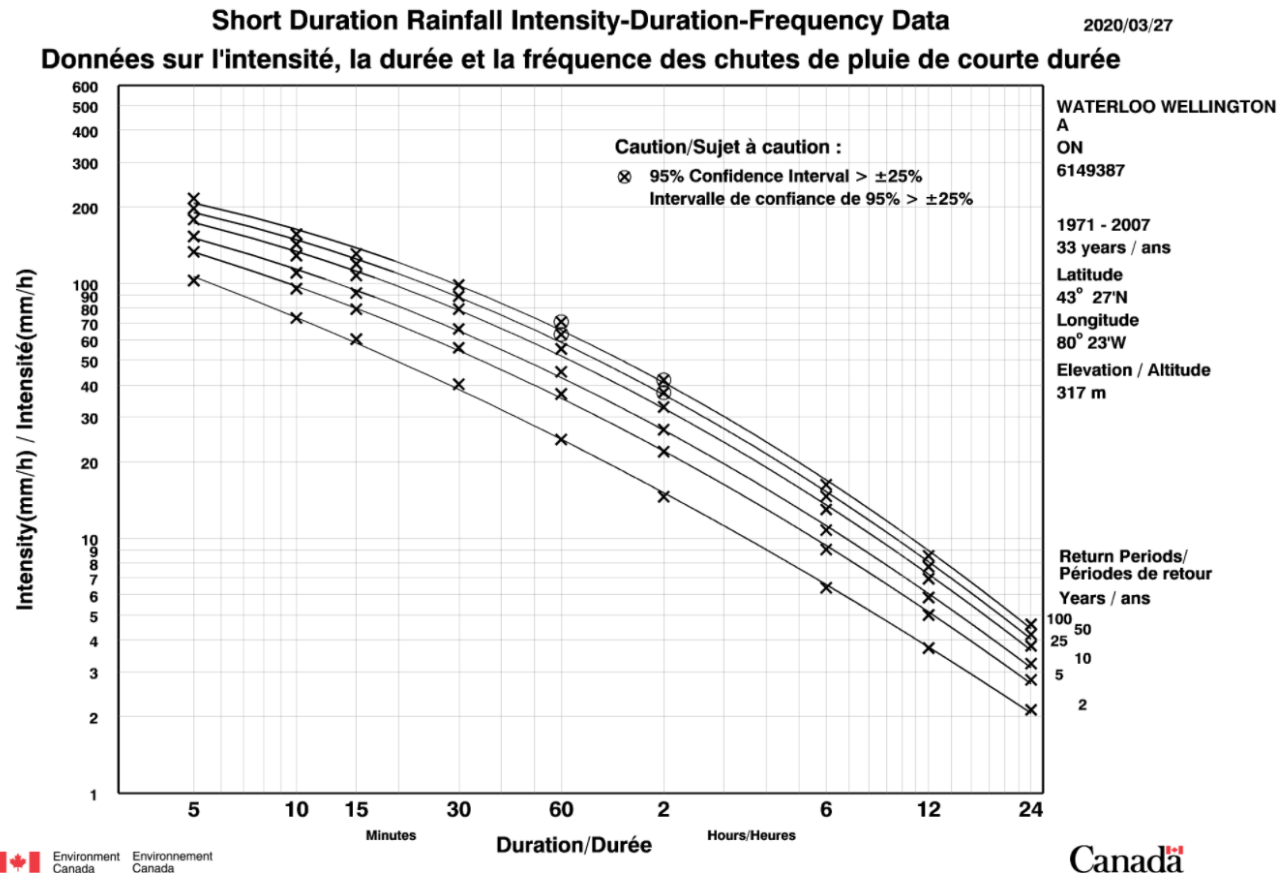
% change in volume of precipitation in high precipitation events
(2050s, high emissions scenario (RCP8.5))



For more information visit climatedata.ca

Source: PCIC

EXAMPLE OF DETAILED CLIMATE INFORMATION NEED



Intensity Duration Frequency (IDF) Curve, Waterloo ON

Source: www.ClimateData.ca

EXAMPLES OF RELEVANT CLIMATE INDICES BY SECTOR

Infrastructure

- Precipitation amounts
- Frost and ice days
- Heating and cooling degree days

Health

- Maximum temperatures
- Heavy precipitation
- Number of hot days above certain temperature thresholds

Water management

- Seasonal precipitation
- Maximum precipitation
- IDF curves

Energy

- Seasonal and monthly temperatures
- Heating and cooling degree days

Agriculture/Forestry

- Temperatures
- Precipitation
- Growing degree days
- Frost and ice days



For more information visit [ClimateData.ca](https://climatedata.ca)

WHERE TO FIND CLIMATE INFORMATION - SUMMARY

NATIONAL CLIMATE SERVICES PROVIDER

Canadian Centre for Climate Services
www.canada.ca/climate-services



Government
of Canada

Gouvernement
du Canada

NATIONAL TOOLS

Climate Atlas of Canada
www.climateatlas.ca



Climate Atlas
of Canada

Canadian Climate Data
www.ClimateData.ca



REGIONAL CLIMATE SERVICES PROVIDERS

Ouranos
www.ouranos.ca
(region: mostly Quebec)



Pacific Climate Impacts
Consortium
www.pacificclimate.org
(region: mostly Pacific NW)



ClimateWest
climategwest.ca
(region: the Prairies)



ClimateWest
Building Prairie Resilience



For more information visit climatedata.ca

CLIMATE SERVICES SUPPORT DESK

The Climate Services Support Desk provides support to meet individual needs:

- Helps users find the right datasets and information
- Provides guidance for understanding and using data
- Draws on a network of experts to respond to inquiries



The Climate Services Support Desk can be reached by:



Phone: 1-833-517-0376



Email: info.cccs-ccsc@canada.ca



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