



Prairie Provinces Water Board
Committees on Flow Forecasting & Hydrology Workshop
27 November 2019



The Climate Atlas of Canada

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THE UNIVERSITY OF
WINNIPEG



Prairie
Climate Centre



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Climate Atlas of Canada
climateatlas.ca



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Manitoba



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WINNIPEG

THE
Great-West Life
ASSURANCE  COMPANY



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

 **IISD**
International Institute for
Sustainable Development



Public Health
Agency of Canada

Agence de la santé
publique du Canada

SSHRC  CRSH
Social Sciences and Humanities Research Council of Canada
Conseil de recherches en sciences humaines du Canada

I V E Y f o u n d a t i o n



Health Santé
Canada Canada



CLIMATEDATA.CA

Canada's new climate data portal



Environment and
Climate Change Canada
Environnement et
Changement climatique Canada



**Prairie
Climate Centre**
From Risk to Resilience



HabitatSeven





Welcome to the **Climate Atlas**

The Climate Atlas of Canada combines climate science, mapping and storytelling to bring the global issue of climate change closer to home for Canadians. It is designed to inspire local, regional, and national action that will let us move from risk to resilience.

Start Exploring 

Climate Atlas **Version 2**

The Climate Atlas of Canada was launched in April 2018, and quickly became a go-to resource for Canadians seeking information about climate change and its national, regional, and local impacts. On July 10, 2019, we released a major update to the atlas, which improves and expands the tools we offer. [Read all about the changes here.](#)

***Atlas* data and presentation**

- **Data from 24 Climate Models (2 carbon scenarios) obtained from Pacific Climate Impacts Consortium**
- **We have daily TMax, TMin, and Precip data for the period 1950-2095, for a 10 km X 10 km grid for all of Canada**
- **We wrote our own computer code to process, analyze, summarize and display the data**
- **We designed the maps, and wrote the code to display the interactive maps and graphs on the website**

The *Atlas* also includes:

- Easy-to-understand explanations of the data, methods, results, and implications
- Special topics related to cities, agriculture, forests, health, and science...and what you can do
- Summaries for major cities
- Short-documentaries in which people from all across Canada talk about impacts of climate change and what they are doing...telling positive stories

MENU

MAP

Average value (Days)



Very Hot Days (+30°C)

High Carbon → More climate change • 2021-2050

HELP

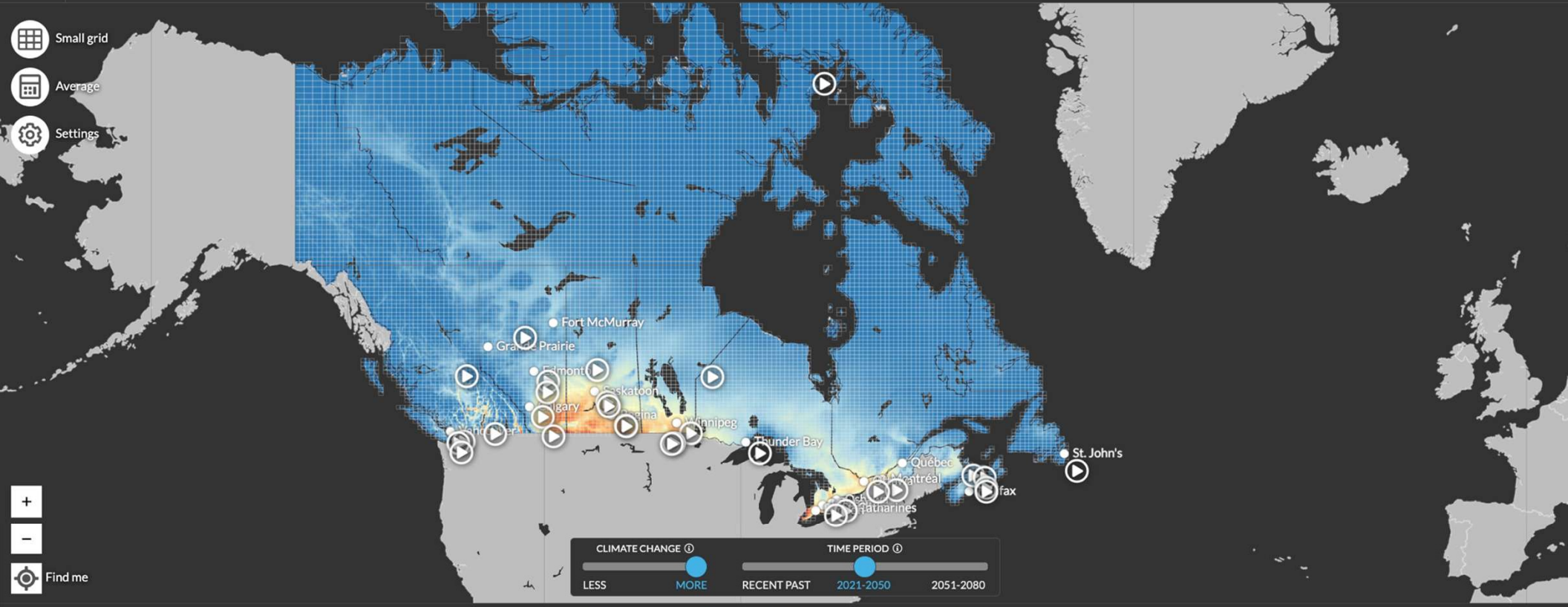
TOUR

SHARE

Fr

- Small grid
- Average
- Settings

- +
-
- Find me



CLIMATE CHANGE ⓘ TIME PERIOD ⓘ

LESS MORE RECENT PAST 2021-2050 2051-2080

- Hot Weather
- Cold Weather
- Temperature
- Precipitation
- Agriculture

MENU

MAP

Change (Days)



Very Hot Days (+30°C)

High Carbon → More climate change • 2021-2050

HELP

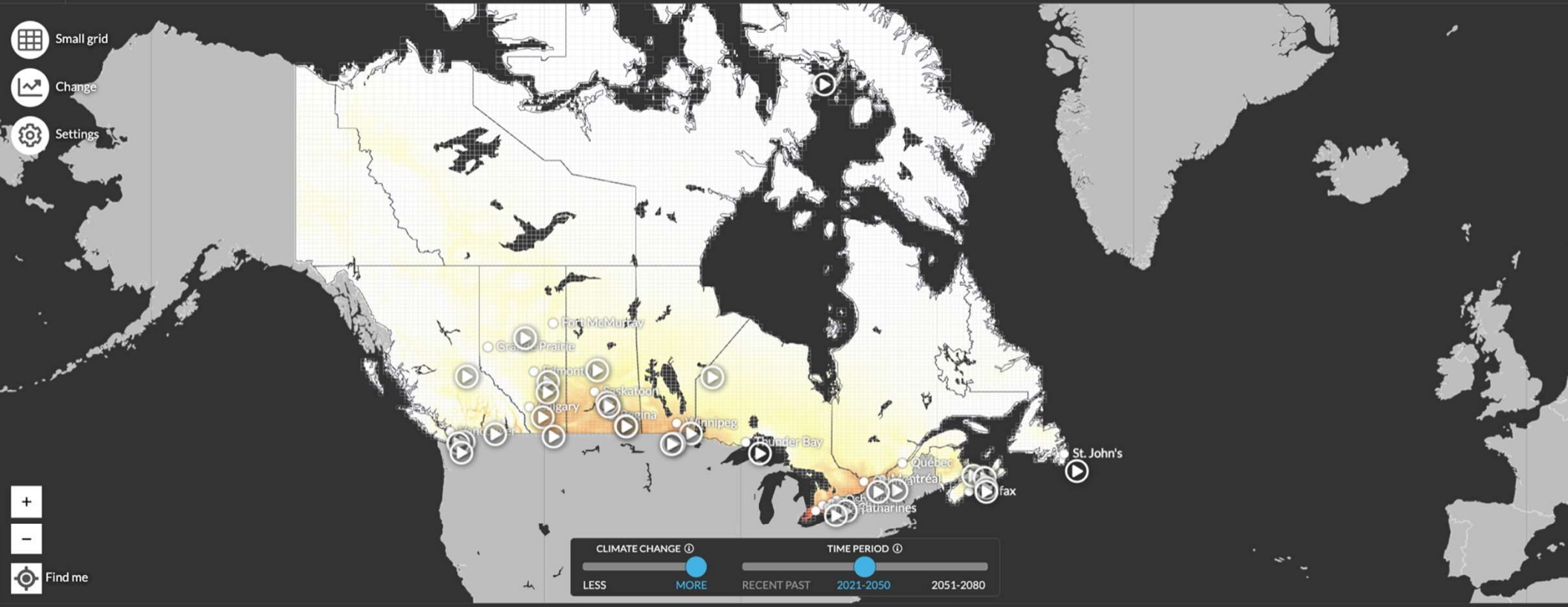
TOUR

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- Find me



CLIMATE CHANGE ⓘ TIME PERIOD ⓘ

LESS MORE RECENT PAST 2021-2050 2051-2080

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Change (Days)



Very Hot Days (+30°C)

High Carbon → More climate change • 2051-2080

HELP

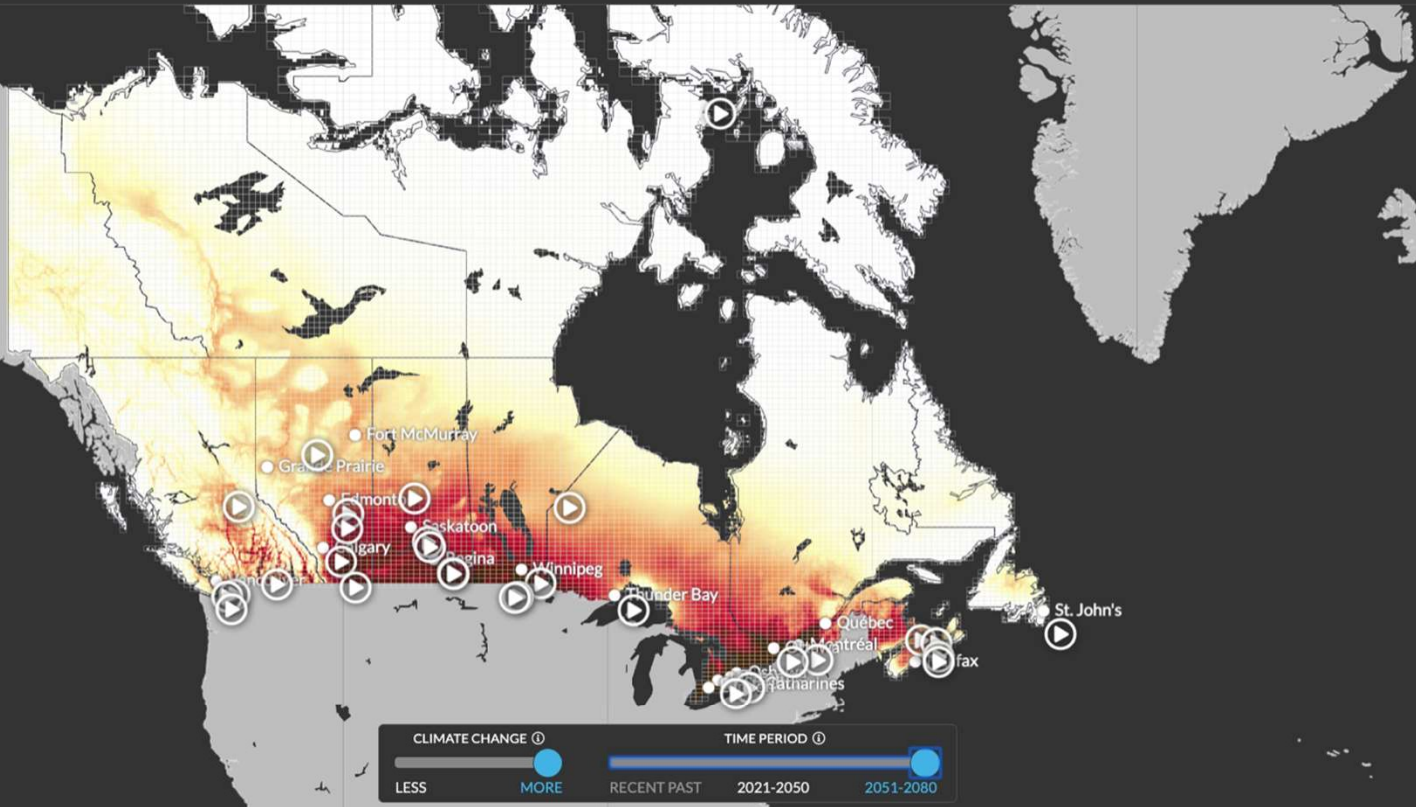
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CLIMATE CHANGE ⓘ TIME PERIOD ⓘ

LESS MORE RECENT PAST 2021-2050 2051-2080

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Change (Days)



Very Hot Days (+30°C)

High Carbon → More climate change • 2051-2080

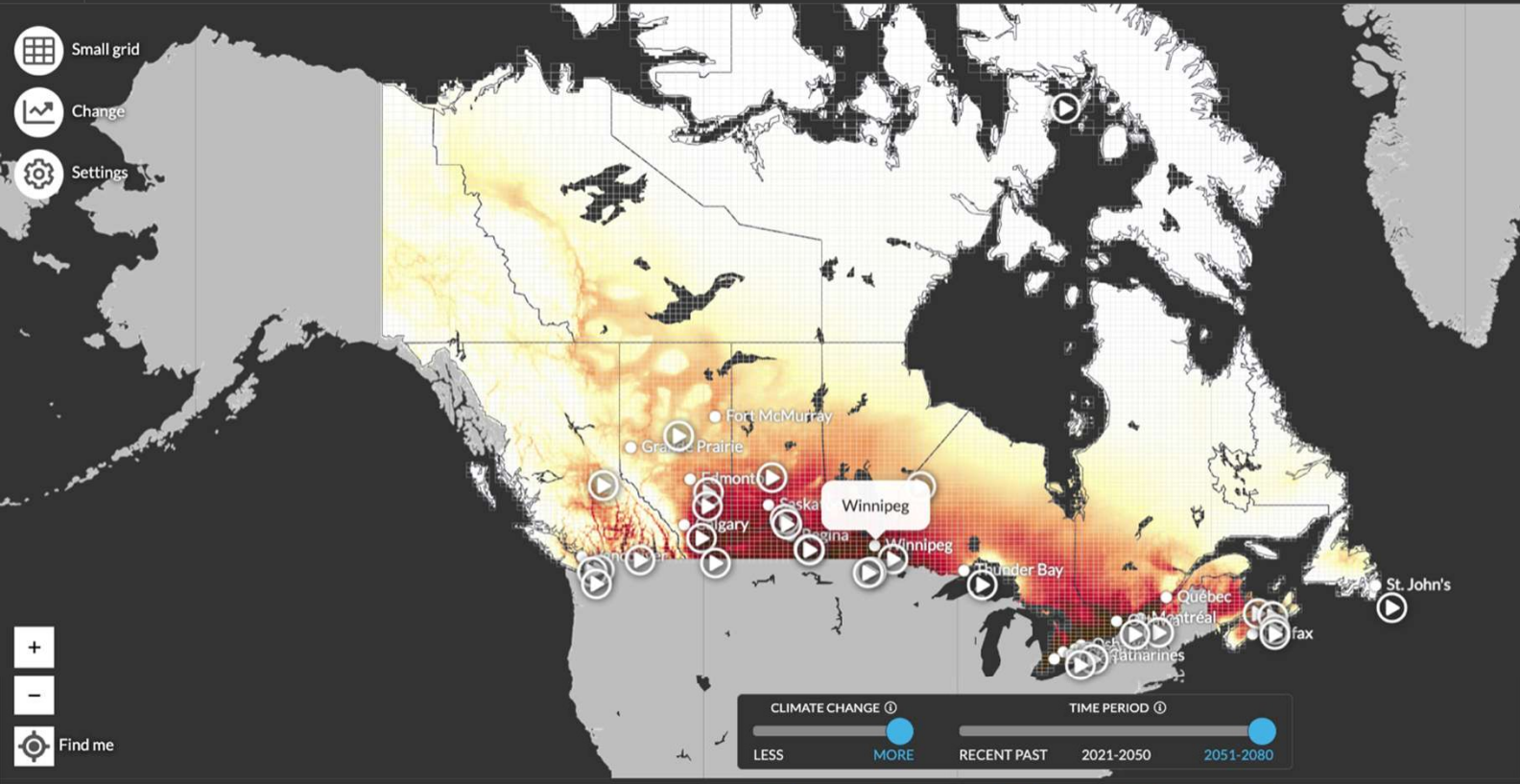
HELP

TOUR

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- Settings

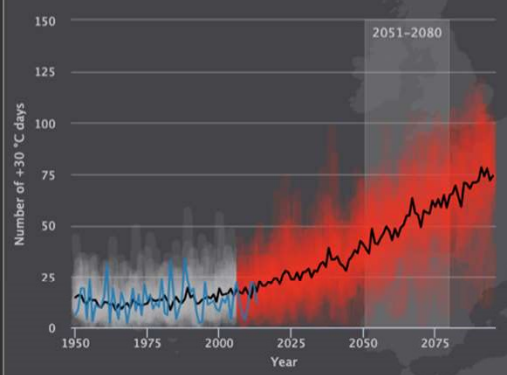


Municipality
WINNIPEG

Projected change in mean
Number of +30 °C days
High Carbon → More climate change

1976-2005 2051-2080
14.3 → **52.1**

Up ▲
+37.8



CLIMATE CHANGE ⓘ TIME PERIOD ⓘ

LESS MORE RECENT PAST 2021-2050 2051-2080

- +
-
- Find me

- Hot Weather
- Cold Weather
- Temperature
- Precipitation
- Agriculture

MENU

MAP

Change (Days)



Very Hot Days (+30°C)

High Carbon → More climate change • 2051-2080

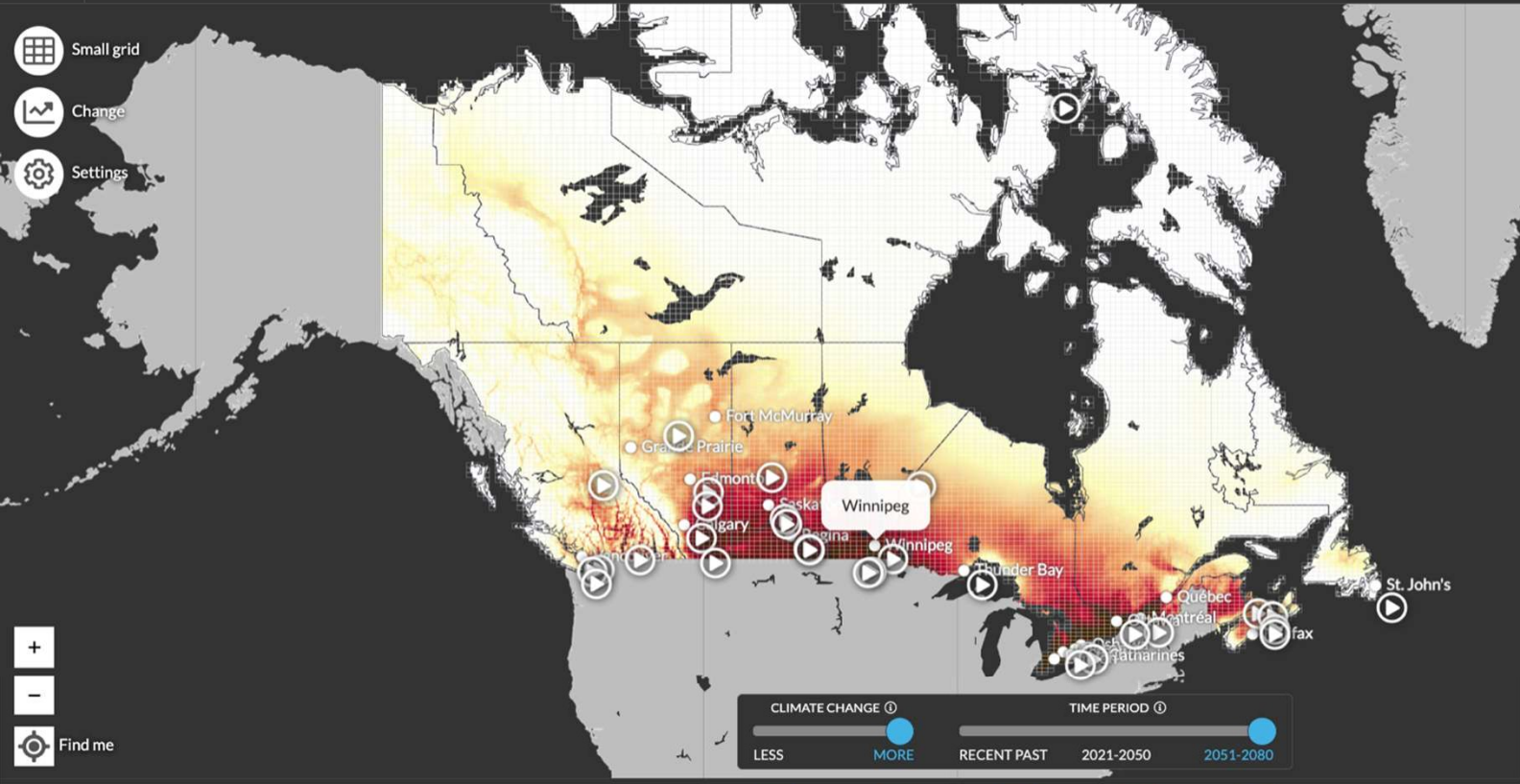
HELP

TOUR

SHARE

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- Change
- Settings



More Details

	Low	Mean	High
1976-2005	3.9	14.3	27.6
2051-2080	25.1	52.1	77.4

This table summarizes the range of values across the 24 climate models for each 30-year period. "Low" and "High" are the mean 10th and 90th percentile values (this means that 10% of the values are higher than "High" and 10% are lower than "Low").

[Explore detailed climate data](#)

Downloads

- Climate report: Winnipeg - PDF
- Climate model data - CSV
- Historical data - CSV
- Graph image - PNG
- Map of Canada image - PNG

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Data & Methods

- Data and methods
- Important notes and limitations
- Climate Change Projections

- +
-
- Find me

CLIMATE CHANGE ⓘ TIME PERIOD ⓘ

LESS MORE RECENT PAST 2021-2050 2051-2080

- Hot Weather
- Cold Weather
- Temperature
- Precipitation
- Agriculture

Contents

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Graph

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Data and Methods

Data and methods >

Important notes and limitations >

Climate Change Projections >

Uncertainty >

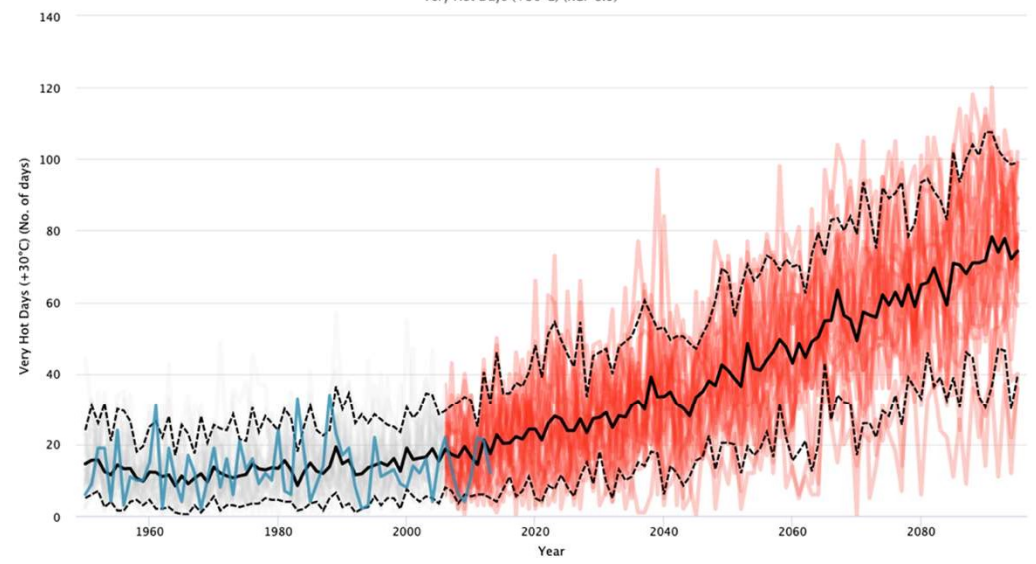
Find & Display Local Data

MAP > Winnipeg

⊕ Location WINNIPEG
 ⊕ Variable VERY HOT DAYS (+30°C)
 ⊕ Type of display TIME SERIES
 ?

OPTIONS > Scenario High carbon (RCP8.5) ↓

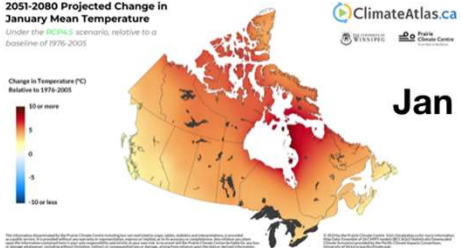
Municipality: Winnipeg
Very Hot Days (+30°C) (RCP 8.5)



Change in Monthly Mean Temp 2051-2080

RCP4.5

Baseline:
1976-2005



Jan



Feb



Mar



Apr



May



Jun



Jul



Aug



Sep



Oct



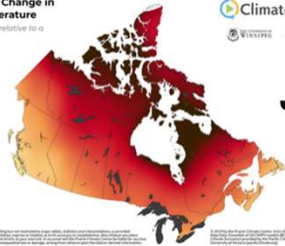
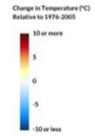
Nov



Dec

2051-2080 Projected Change in January Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

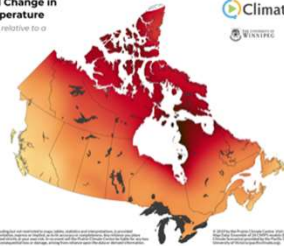
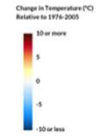


Jan

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2051-2080 Projected Change in February Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

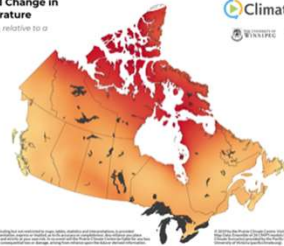
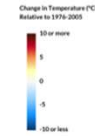


Feb

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2051-2080 Projected Change in March Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

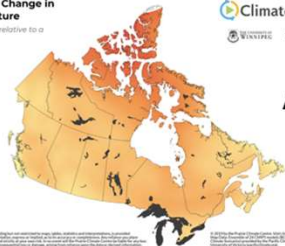
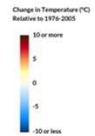


Mar

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2051-2080 Projected Change in April Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

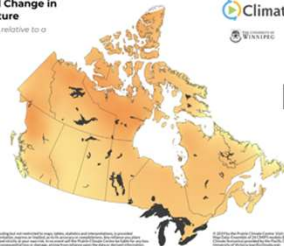
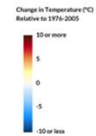


Apr

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2051-2080 Projected Change in May Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

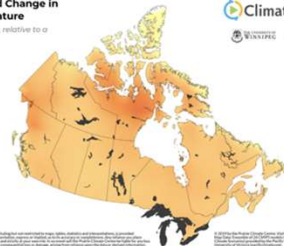
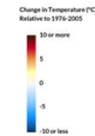


May

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2051-2080 Projected Change in June Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

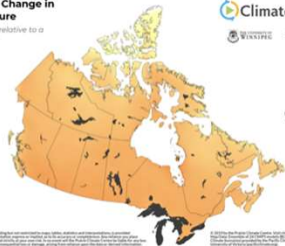
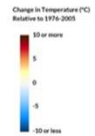


Jun

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2051-2080 Projected Change in July Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

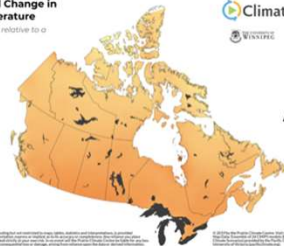
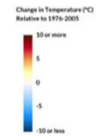


Jul

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2051-2080 Projected Change in August Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

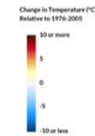


Aug

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2051-2080 Projected Change in September Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

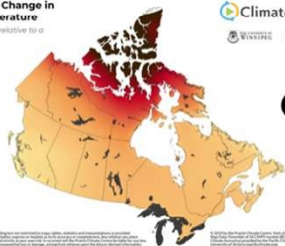
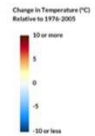


Sep

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2051-2080 Projected Change in October Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

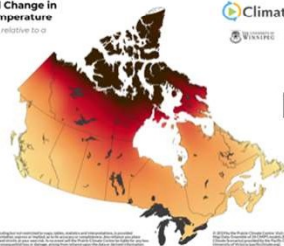
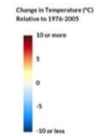


Oct

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2051-2080 Projected Change in November Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005

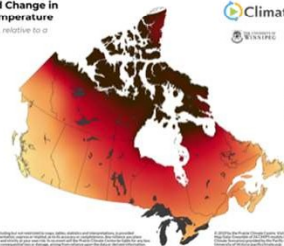
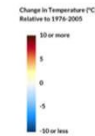


Nov

ClimateAtlas.ca
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2051-2080 Projected Change in December Mean Temperature

Under the RCP8.5 scenario, relative to a baseline of 1976-2005



Dec

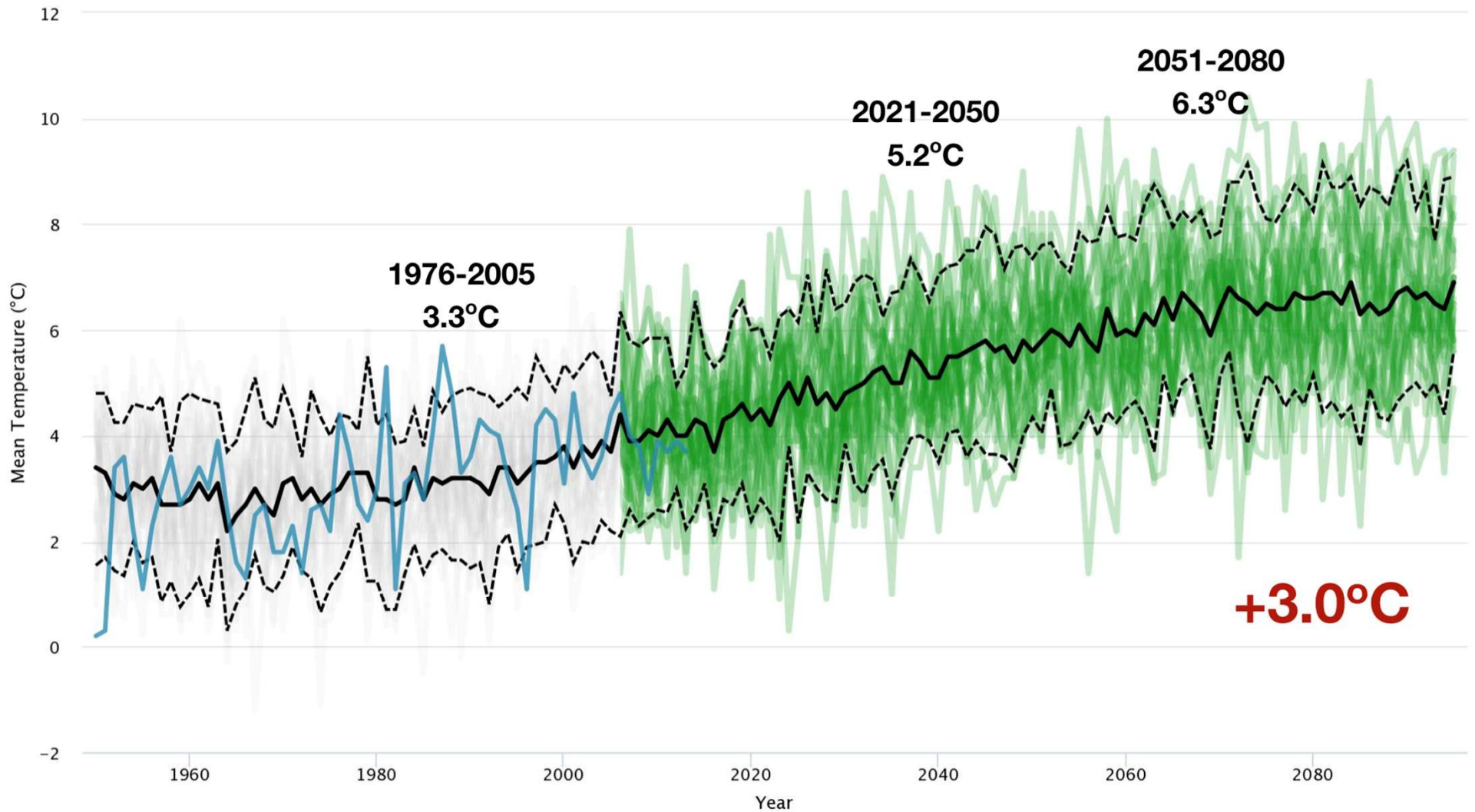
ClimateAtlas.ca
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Change in Monthly Mean Temp 2051-2080

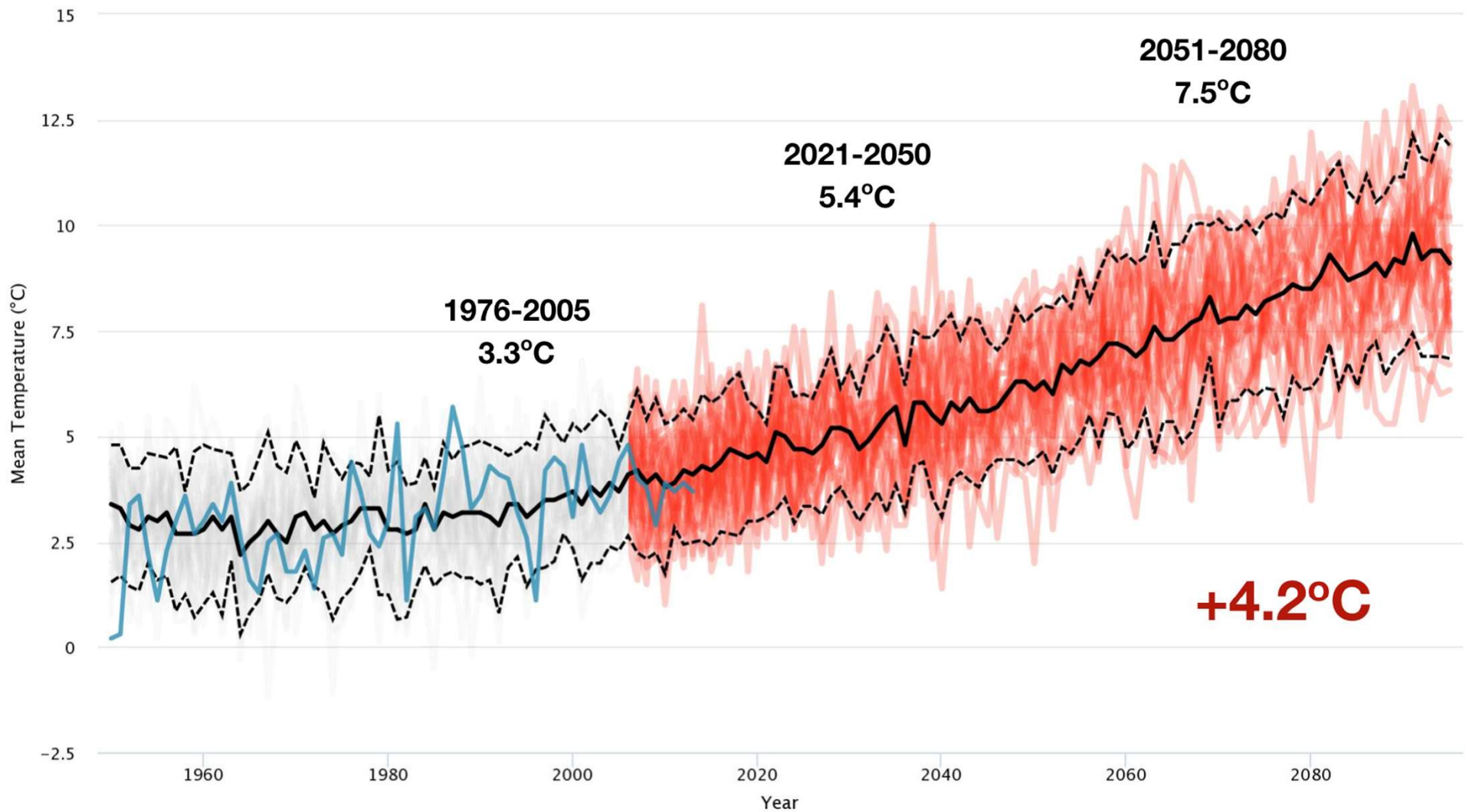
RCP8.5

Baseline: 1976-2005

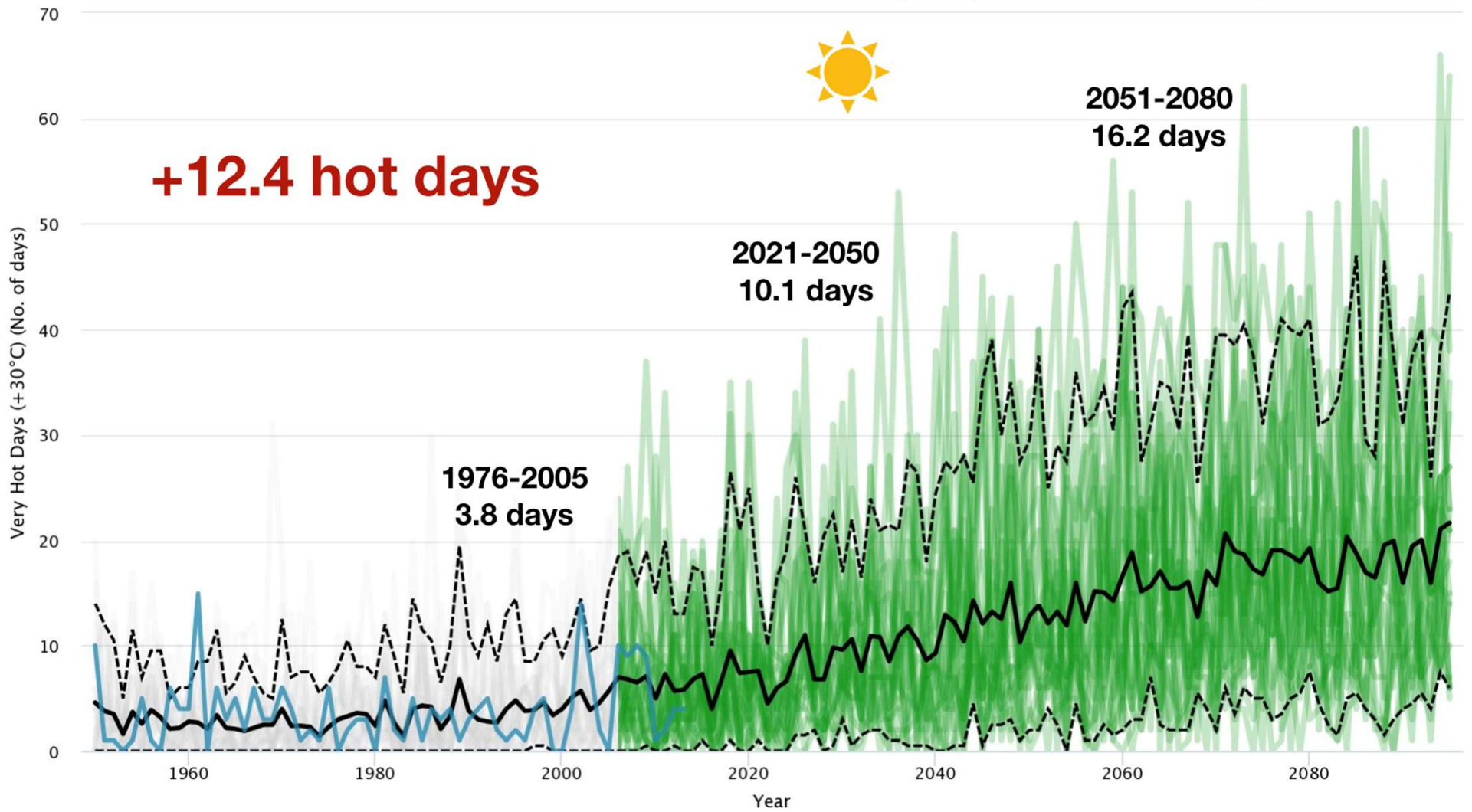
Edmonton: Annual Mean Temperature (Low Carbon)



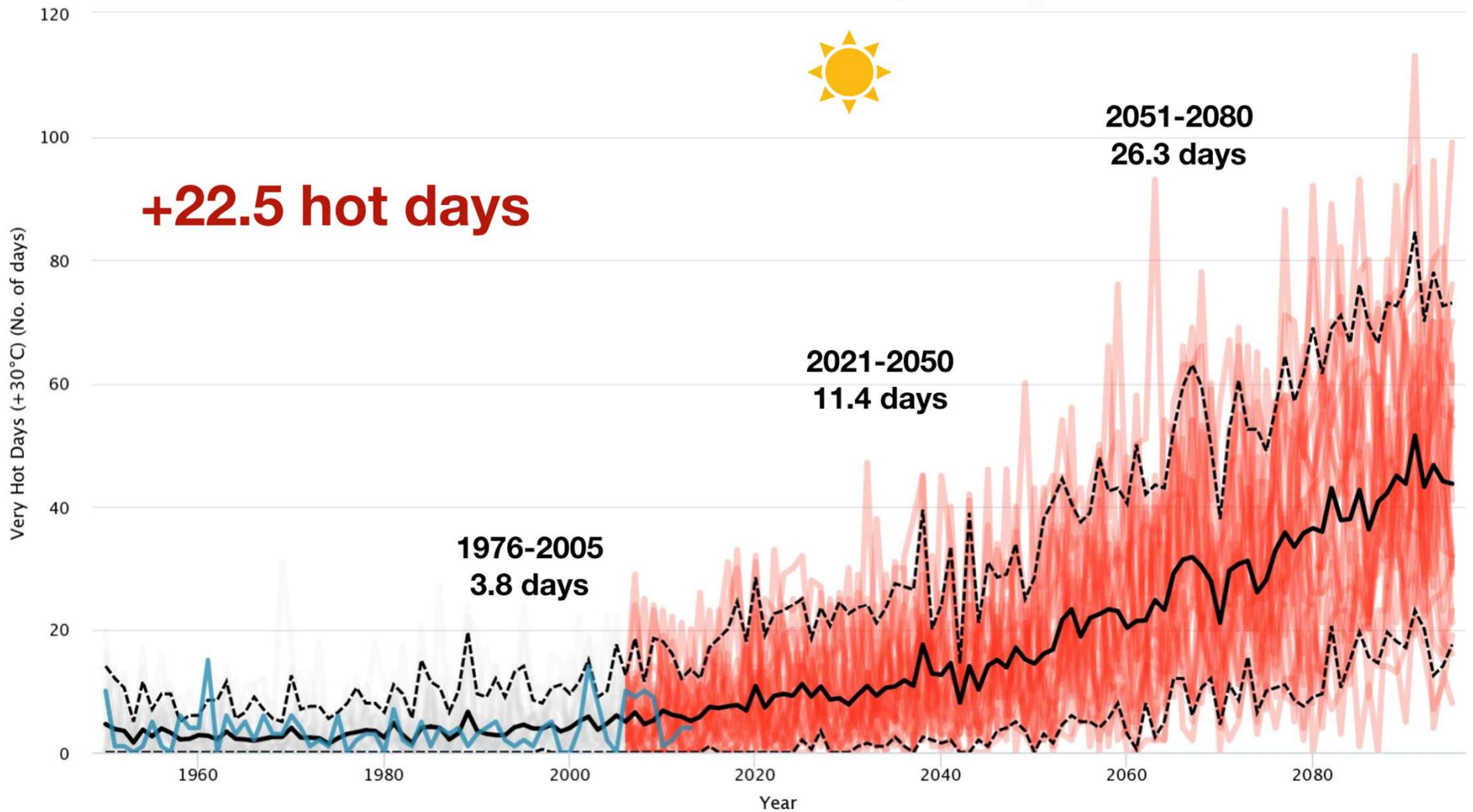
Edmonton: Annual Mean Temperature (High Carbon)



Edmonton: Annual # of Hot Days (Low Carbon)



Edmonton: Annual # of Hot Days (High Carbon)

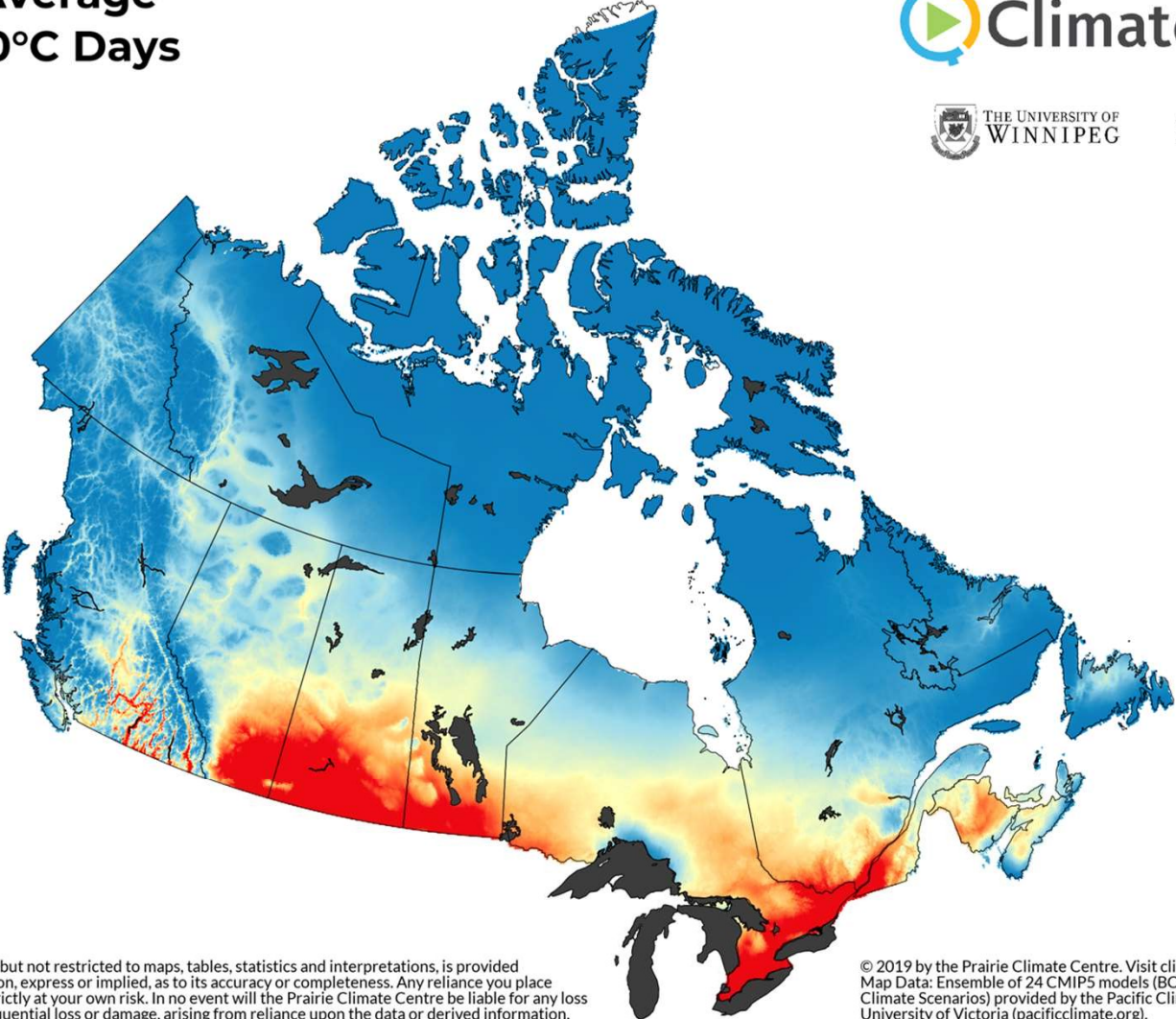
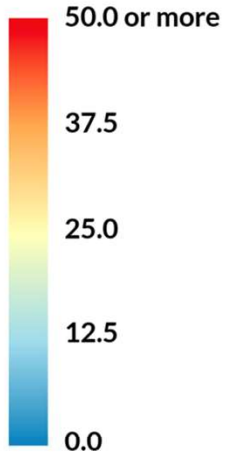


2051-2080 Projected Average Annual Number of +30°C Days

Under the RCP8.5 scenario



Number of Days



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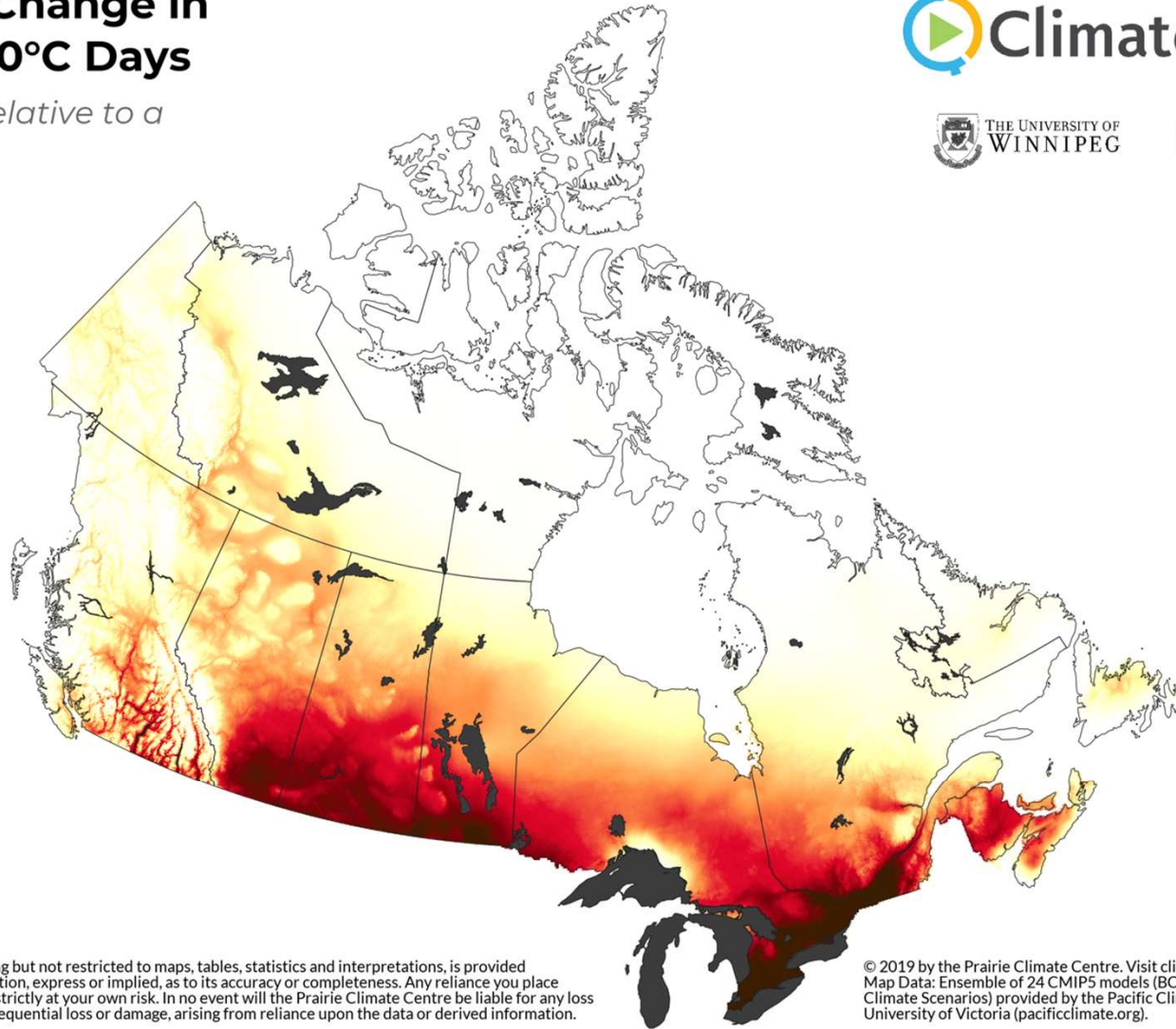
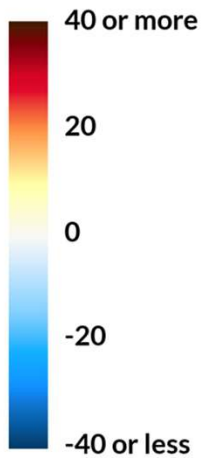
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2051-2080 Projected Change in Annual Number of +30°C Days

Under the *RCP8.5* scenario, relative to a baseline of 1976-2005



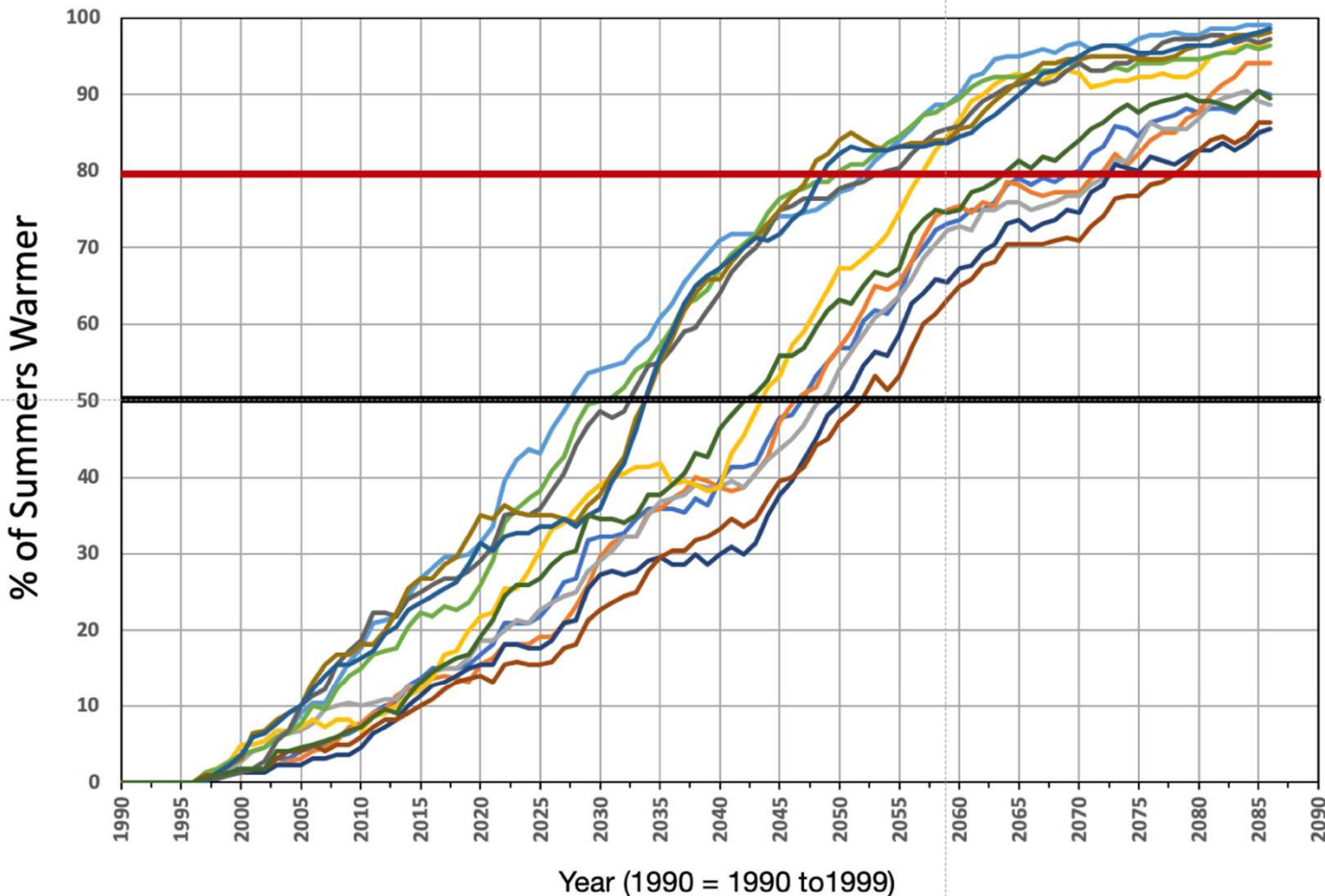
Change in Days
Relative to 1976-2005



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10-Yr Moving Average of **High Carbon** % of Model Summers Warmer than Warmest Year in 1950-2005



22 models

Across Southern Canada:

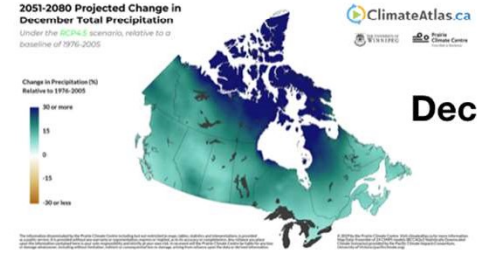
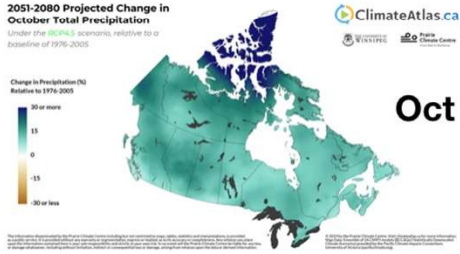
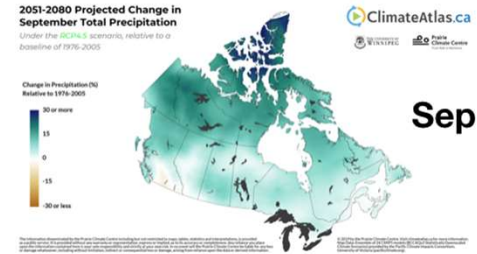
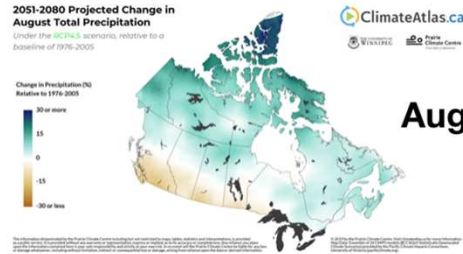
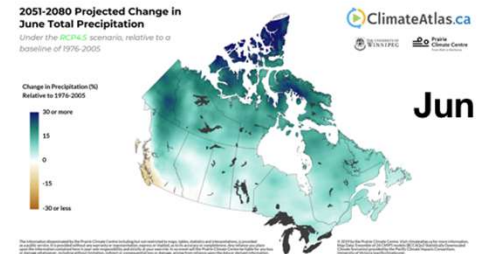
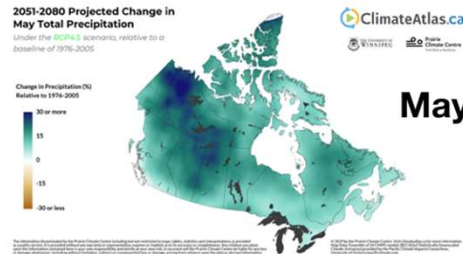
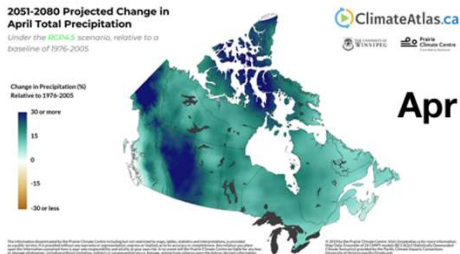
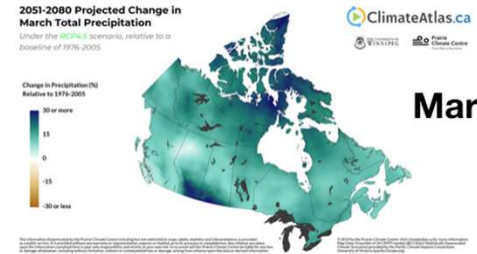
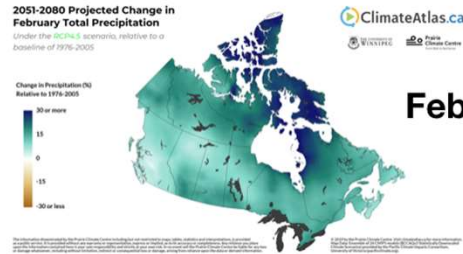
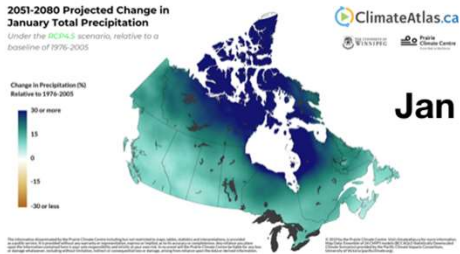
By end of century, **over 80% of summers will be warmer than the warmest summer in 1950-2005, under the high carbon scenario.**

- Brandon
- Calgary
- Edmonton
- Halifax
- Montreal
- Ottawa
- Regina
- Saskatoon
- Toronto
- Vancouver
- Victoria
- Winnipeg

% Change in Monthly Precipitation 2051-2080

RCP4.5

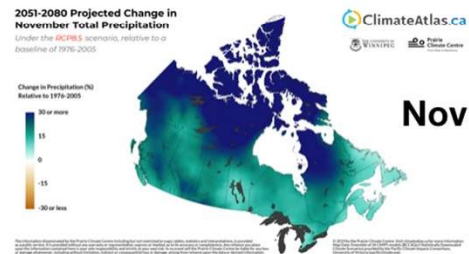
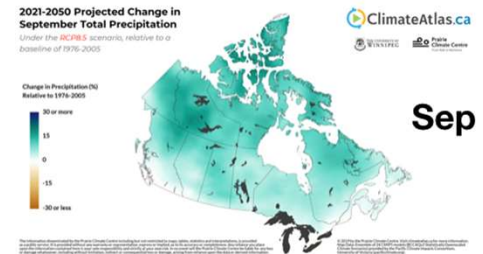
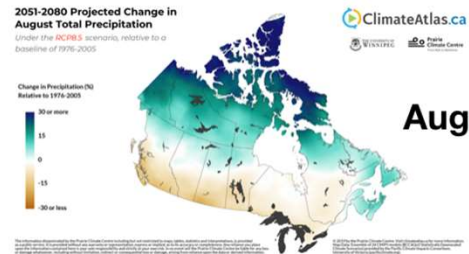
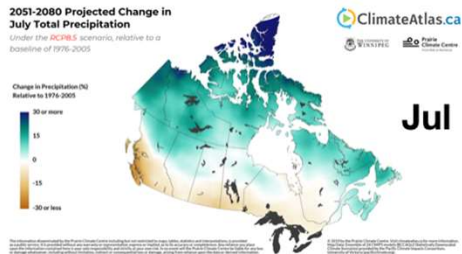
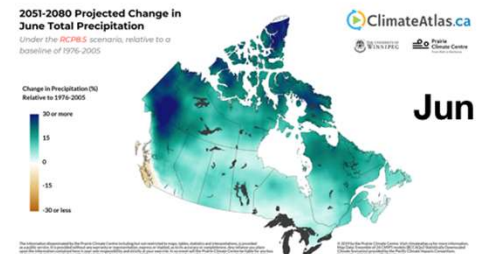
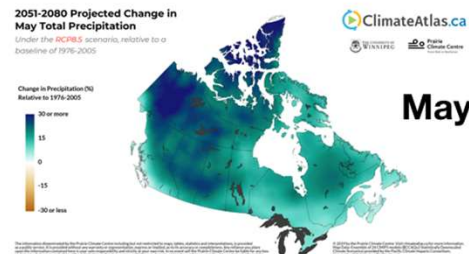
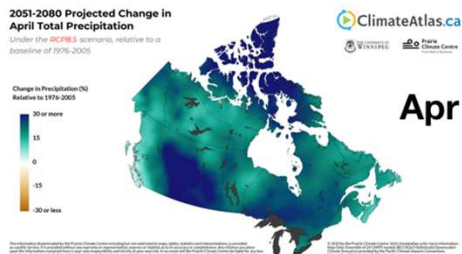
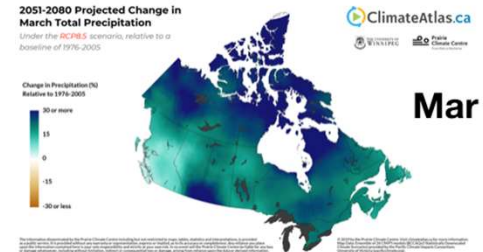
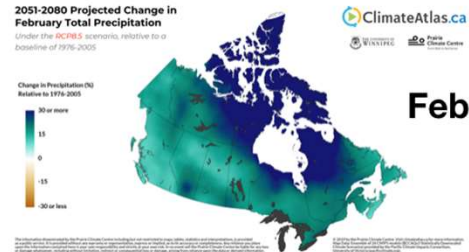
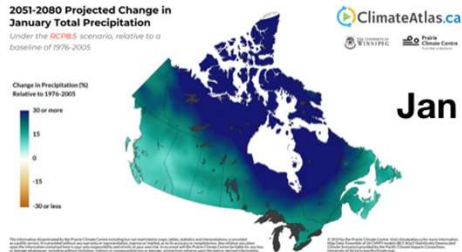
Baseline: 1976-2005

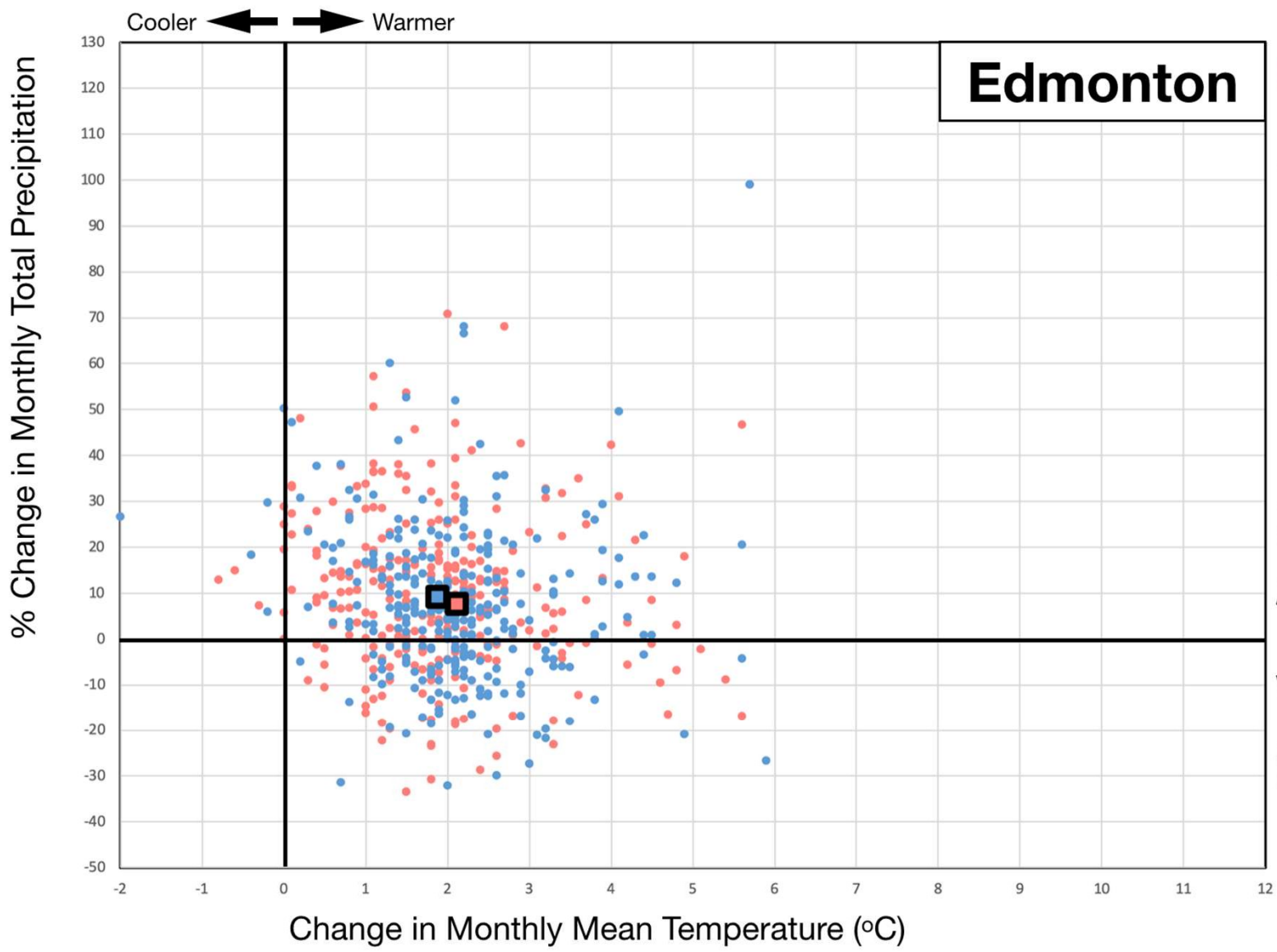


% Change in Monthly Precipitation 2051-2080

RCP8.5

Baseline: 1976-2005

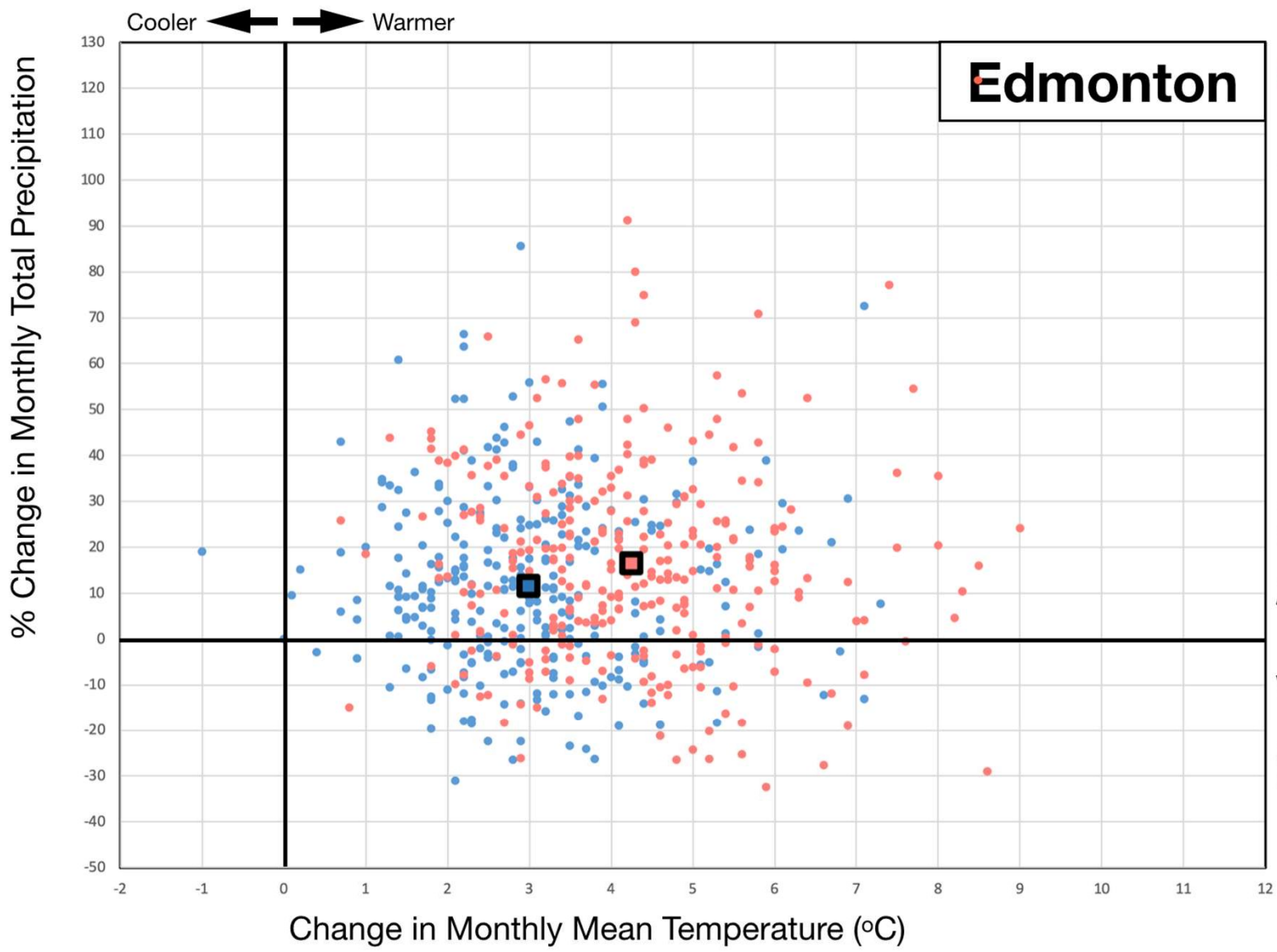




2021-2050 average:
Change in Mean
Temperature vs
Percent Change in
Total Precipitation

RCP4.5
RCP8.5

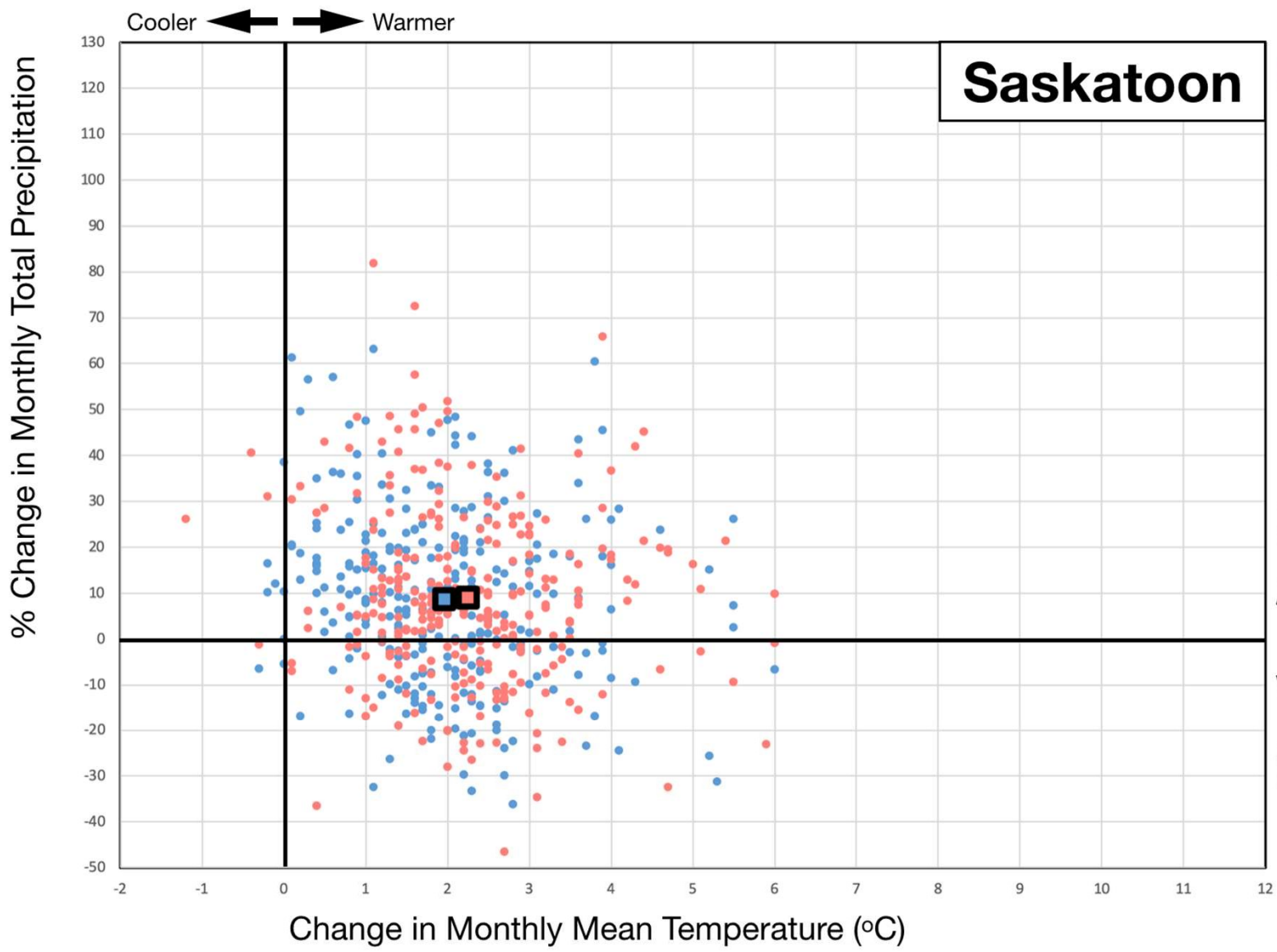
All Months
24 Models
Relative to
1976-2005 baseline



2051-2080 average:
Change in Mean
Temperature vs
Percent Change in
Total Precipitation

RCP4.5
RCP8.5

All Months
24 Models
Relative to
1976-2005 baseline

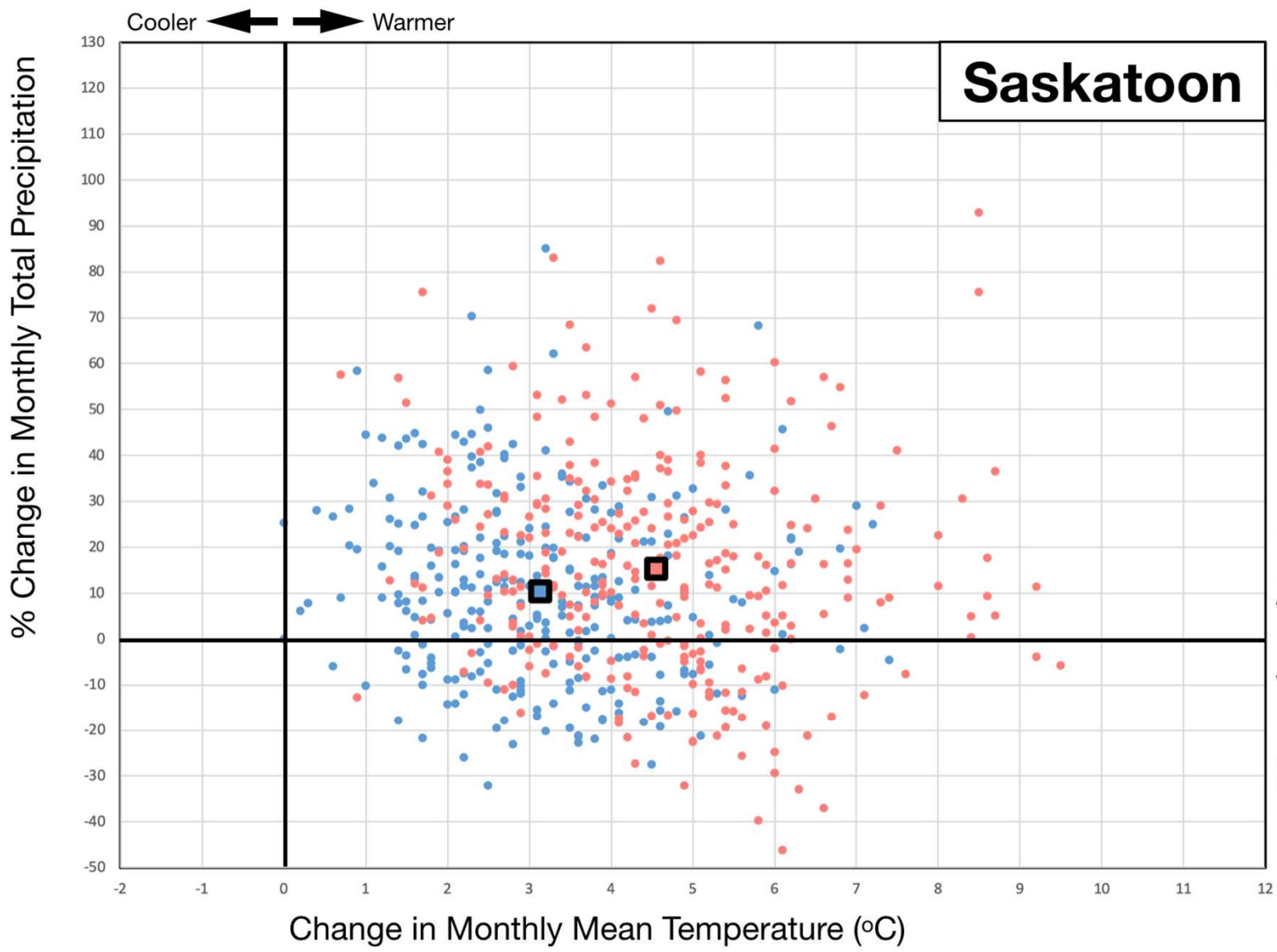


2021-2050 average:
 Change in Mean
 Temperature vs
 Percent Change in
 Total Precipitation

RCP4.5
RCP8.5

All Months
 24 Models
 Relative to
 1976-2005 baseline

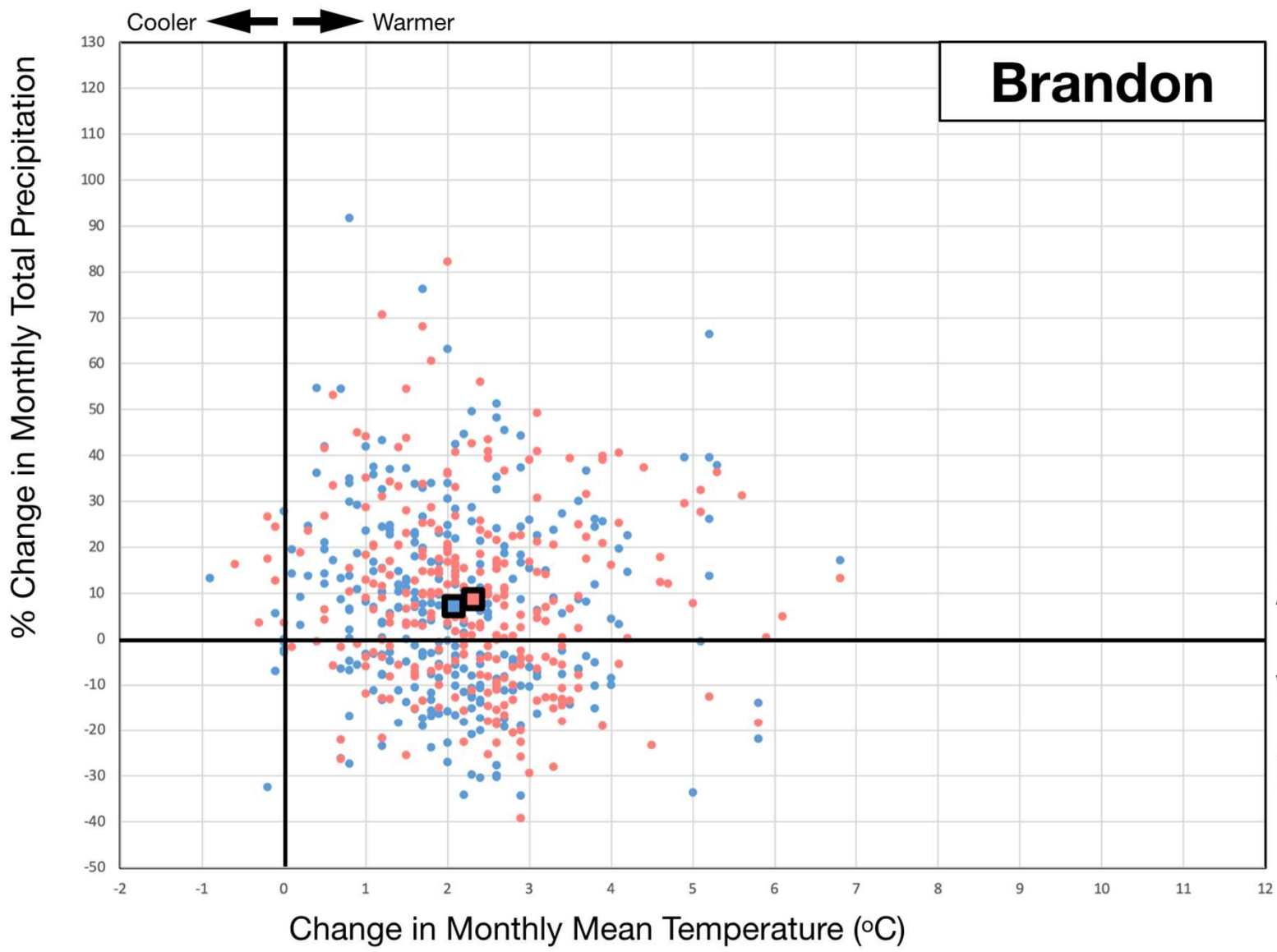
Wetter ↑
 Drier ↓



2051-2080 average:
Change in Mean
Temperature vs
Percent Change in
Total Precipitation

RCP4.5
RCP8.5

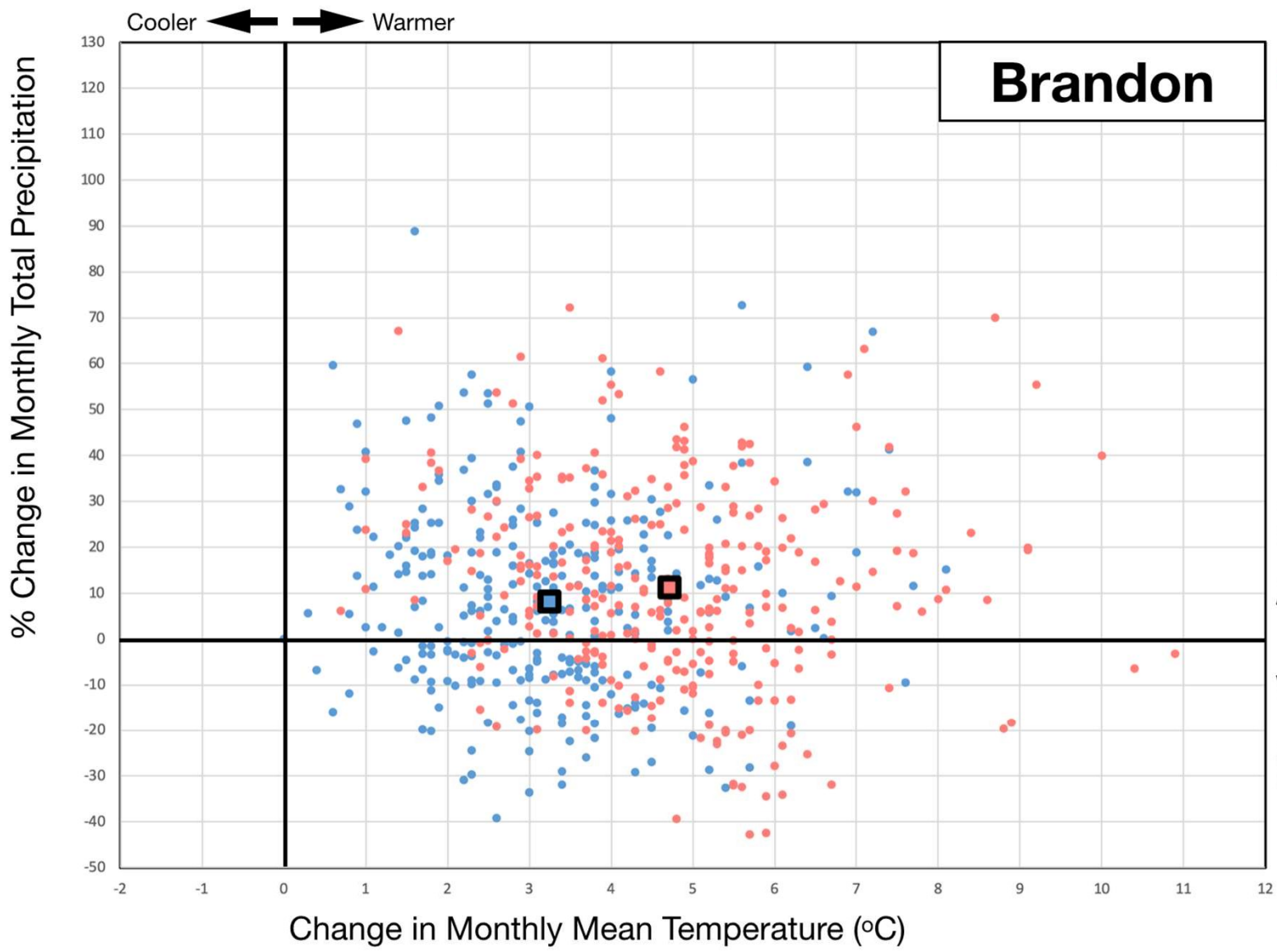
All Months
24 Models
Relative to
1976-2005 baseline



2021-2050 average:
Change in Mean
Temperature vs
Percent Change in
Total Precipitation

RCP4.5
RCP8.5

All Months
24 Models
Relative to
1976-2005 baseline



2051-2080 average:
 Change in Mean
 Temperature vs
 Percent Change in
 Total Precipitation

RCP4.5
RCP8.5

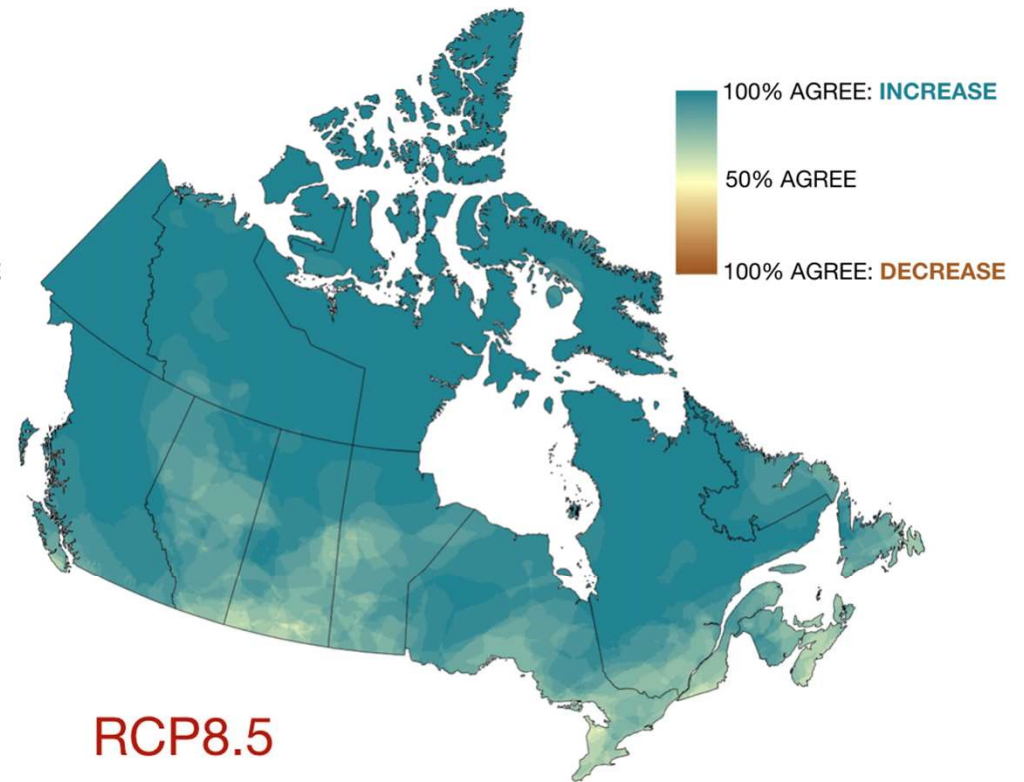
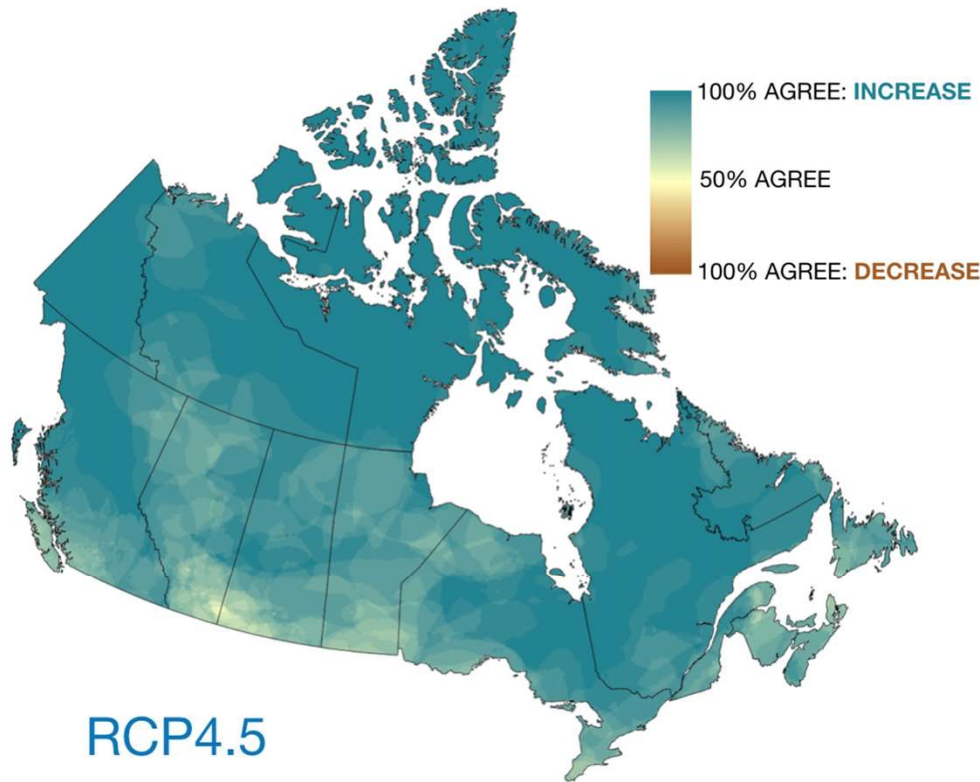
All Months
 24 Models
 Relative to
 1976-2005 baseline

Wetter ↑
 Drier ↓

LEVEL OF AGREEMENT AMONG 24 MODELS ON DIRECTION OF CHANGE IN TOTAL PRECIPITATION

FALL

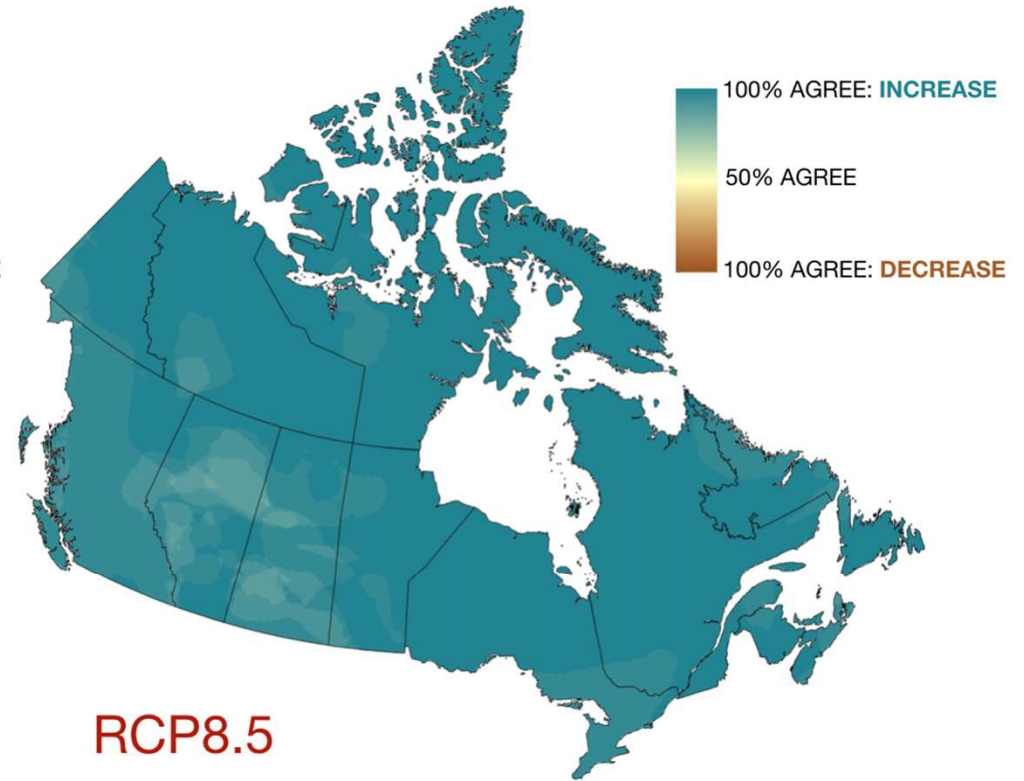
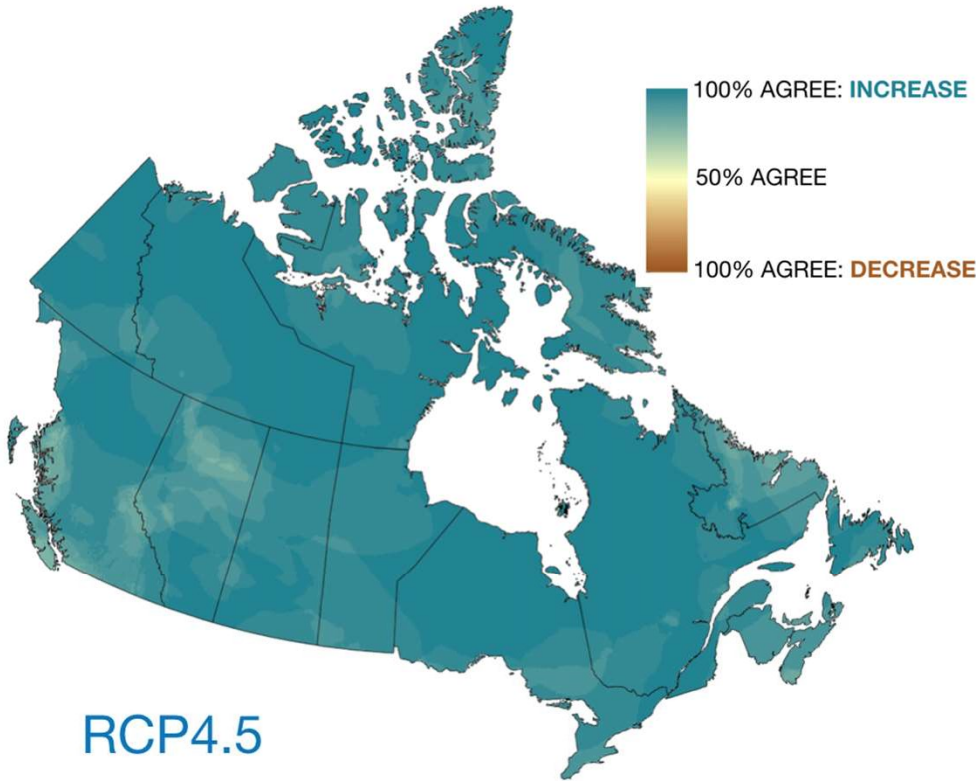
1976-2005 vs 2051-2080 means



LEVEL OF AGREEMENT AMONG 24 MODELS ON DIRECTION OF CHANGE IN TOTAL PRECIPITATION

WINTER

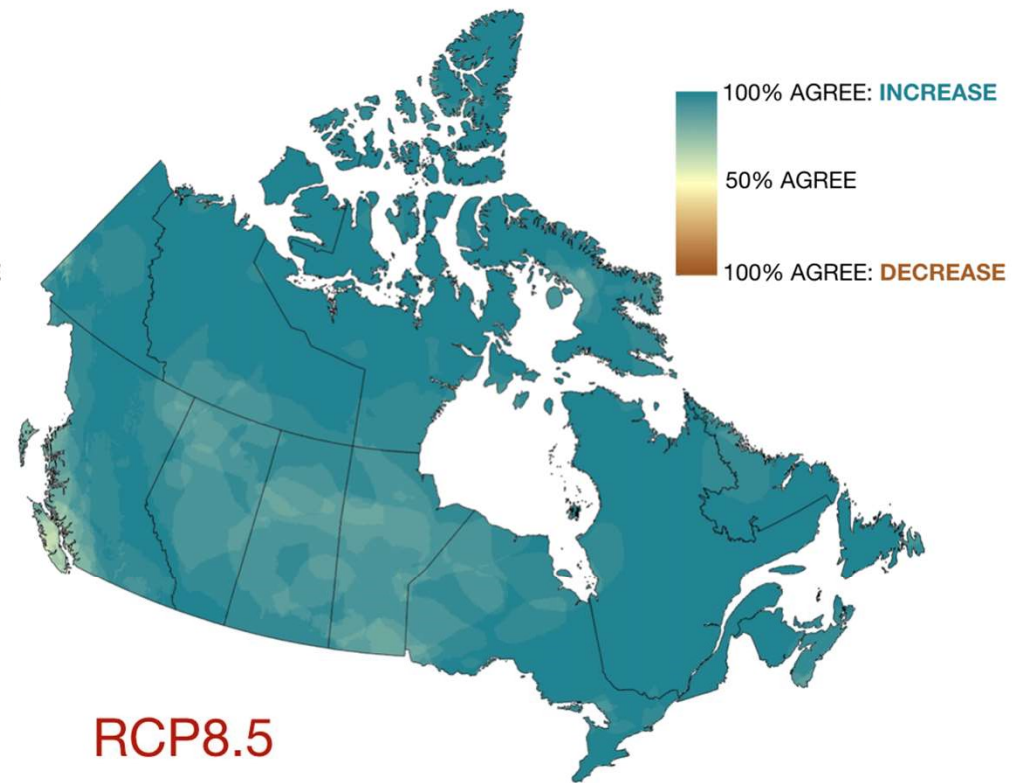
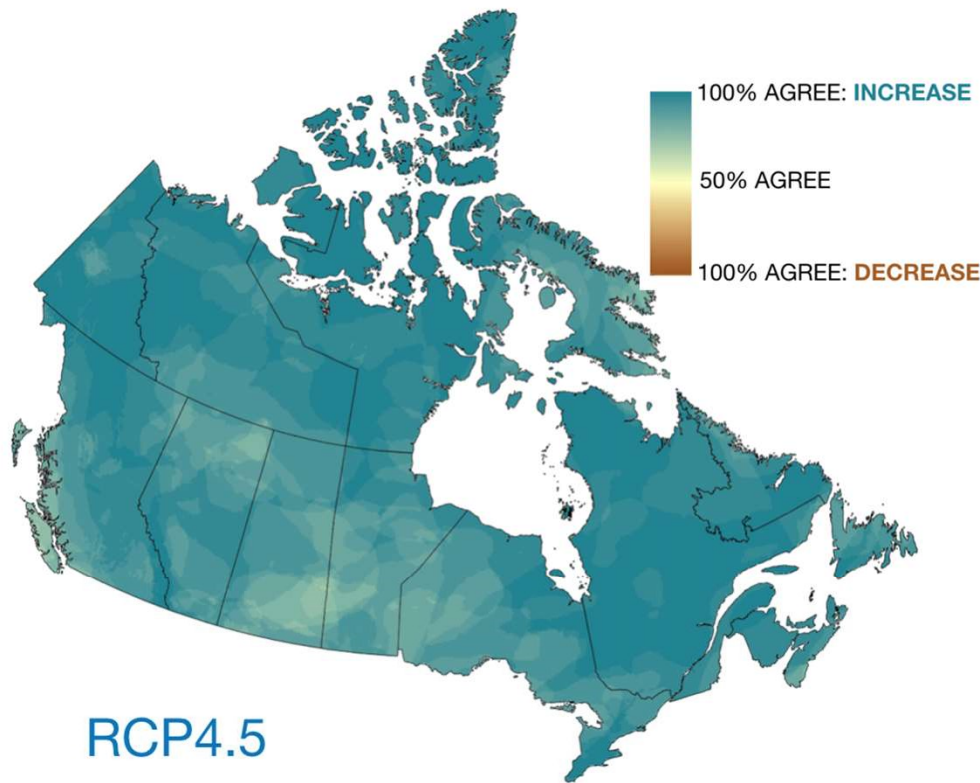
1976-2005 vs 2051-2080 means



LEVEL OF AGREEMENT AMONG 24 MODELS ON DIRECTION OF CHANGE IN TOTAL PRECIPITATION

SPRING

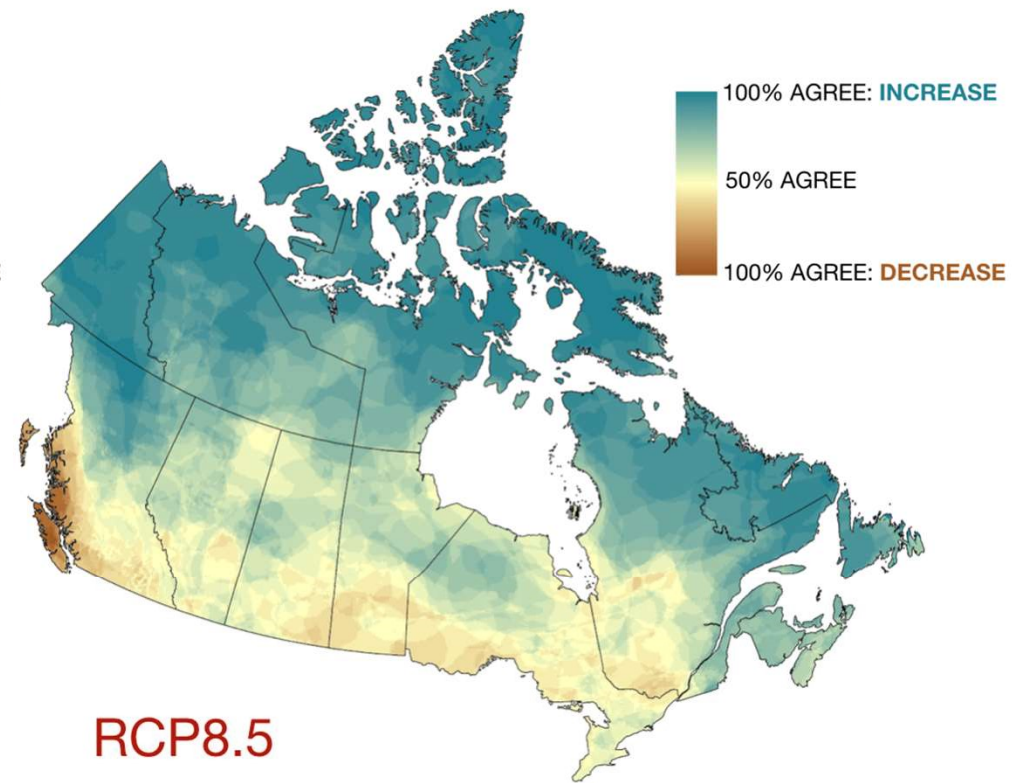
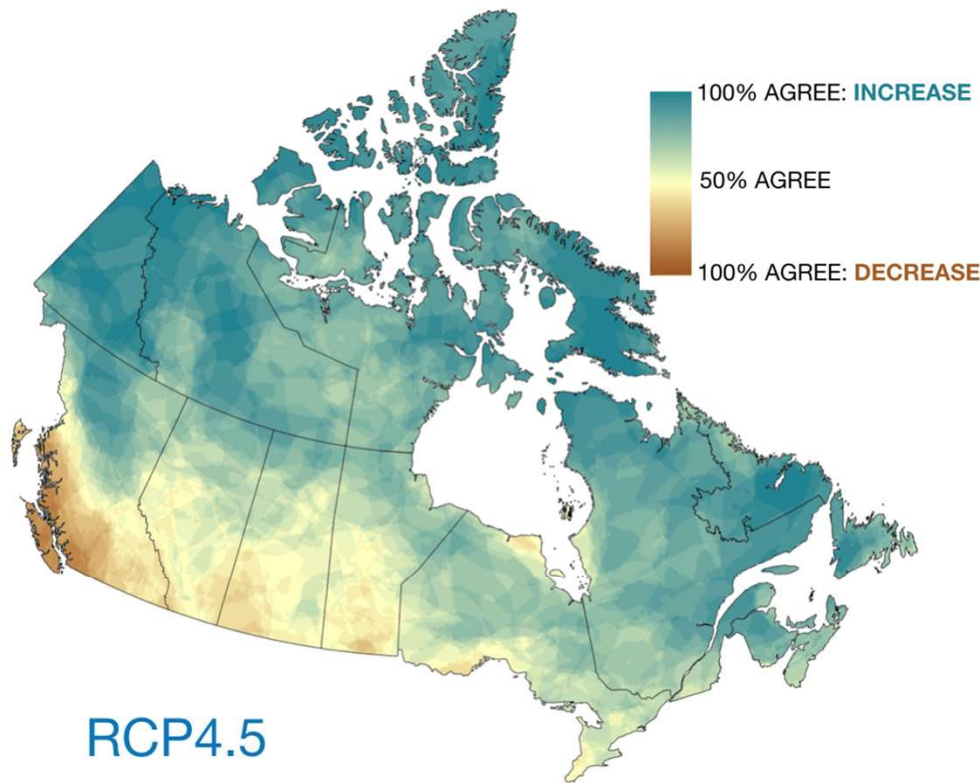
1976-2005 vs 2051-2080 means

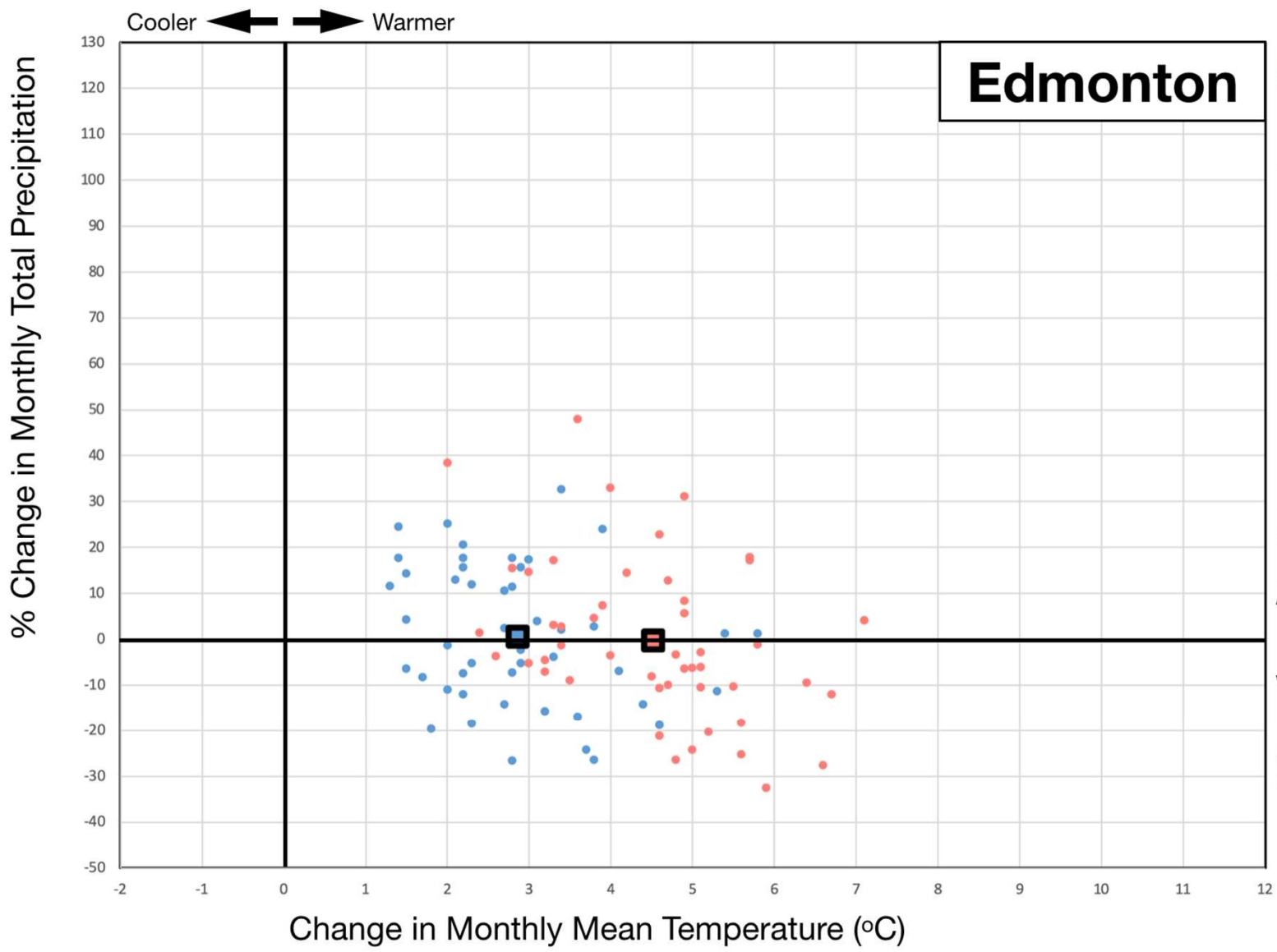


LEVEL OF AGREEMENT AMONG 24 MODELS ON DIRECTION OF CHANGE IN TOTAL PRECIPITATION

SUMMER

1976-2005 vs 2051-2080 means

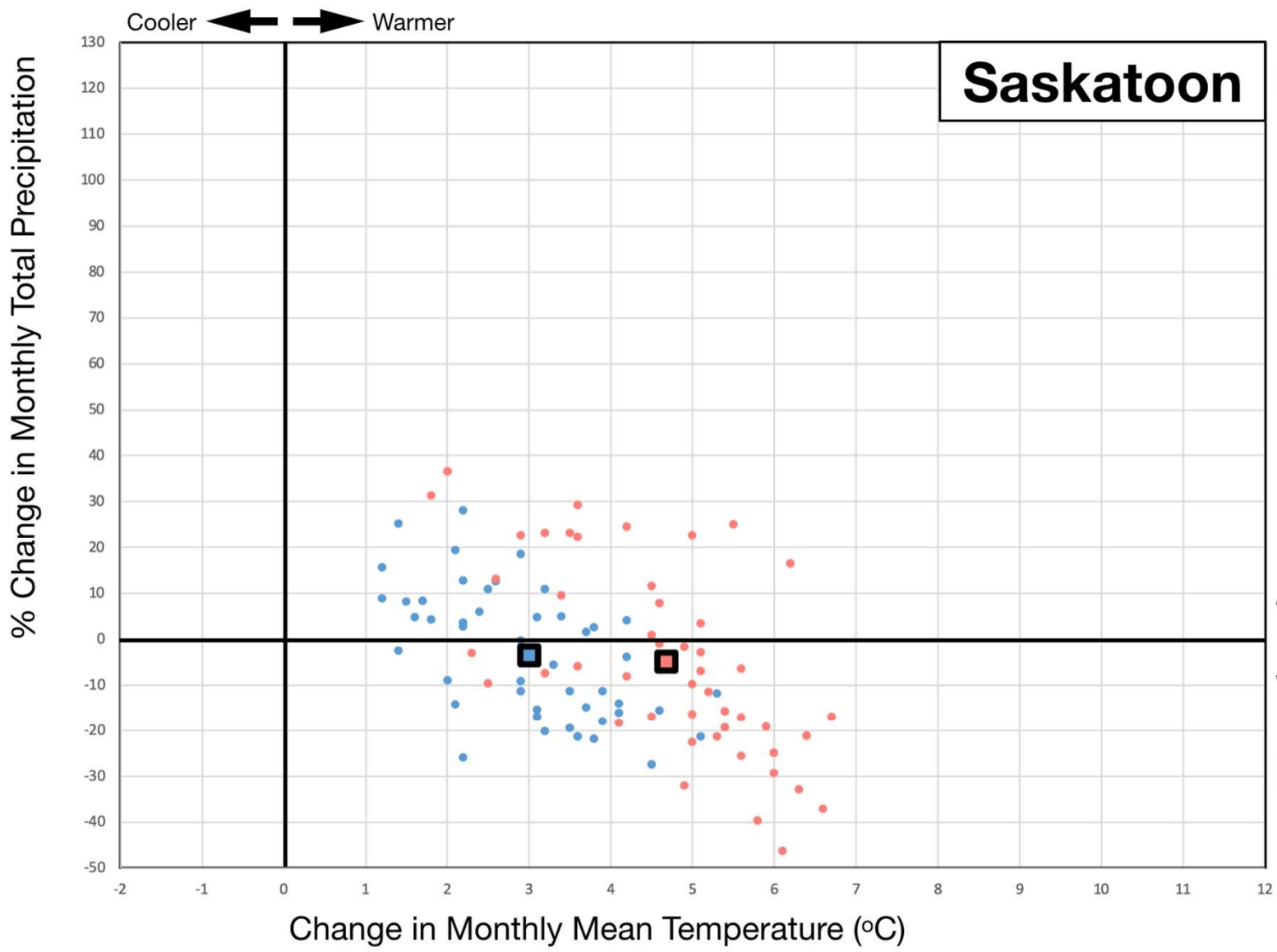




2051-2080 average:
Change in Mean
Temperature vs
Percent Change in
Total Precipitation

RCP4.5
RCP8.5

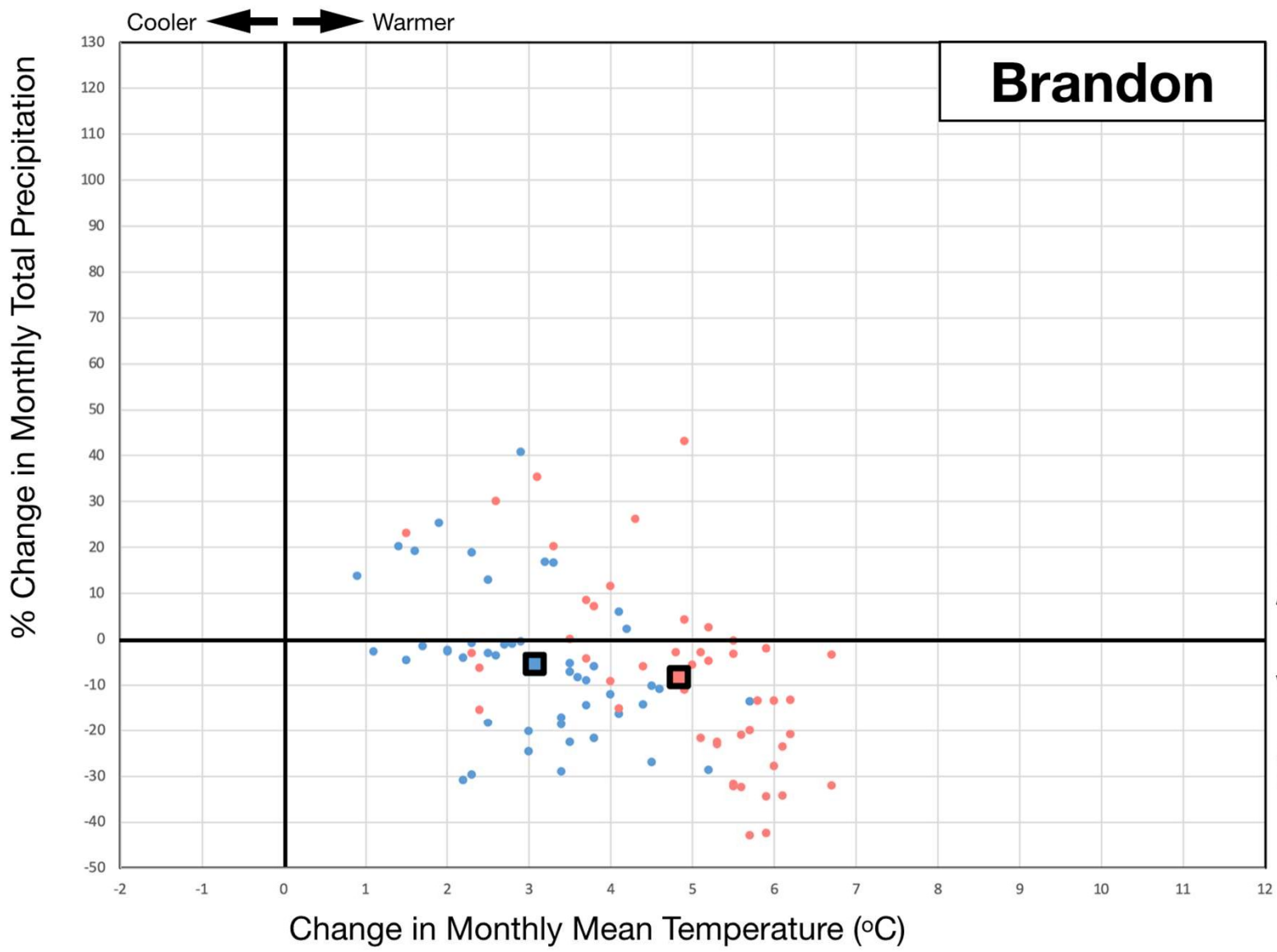
Jul-Aug
24 Models
Relative to
1976-2005 baseline



2051-2080 average:
Change in Mean
Temperature vs
Percent Change in
Total Precipitation

RCP4.5
RCP8.5

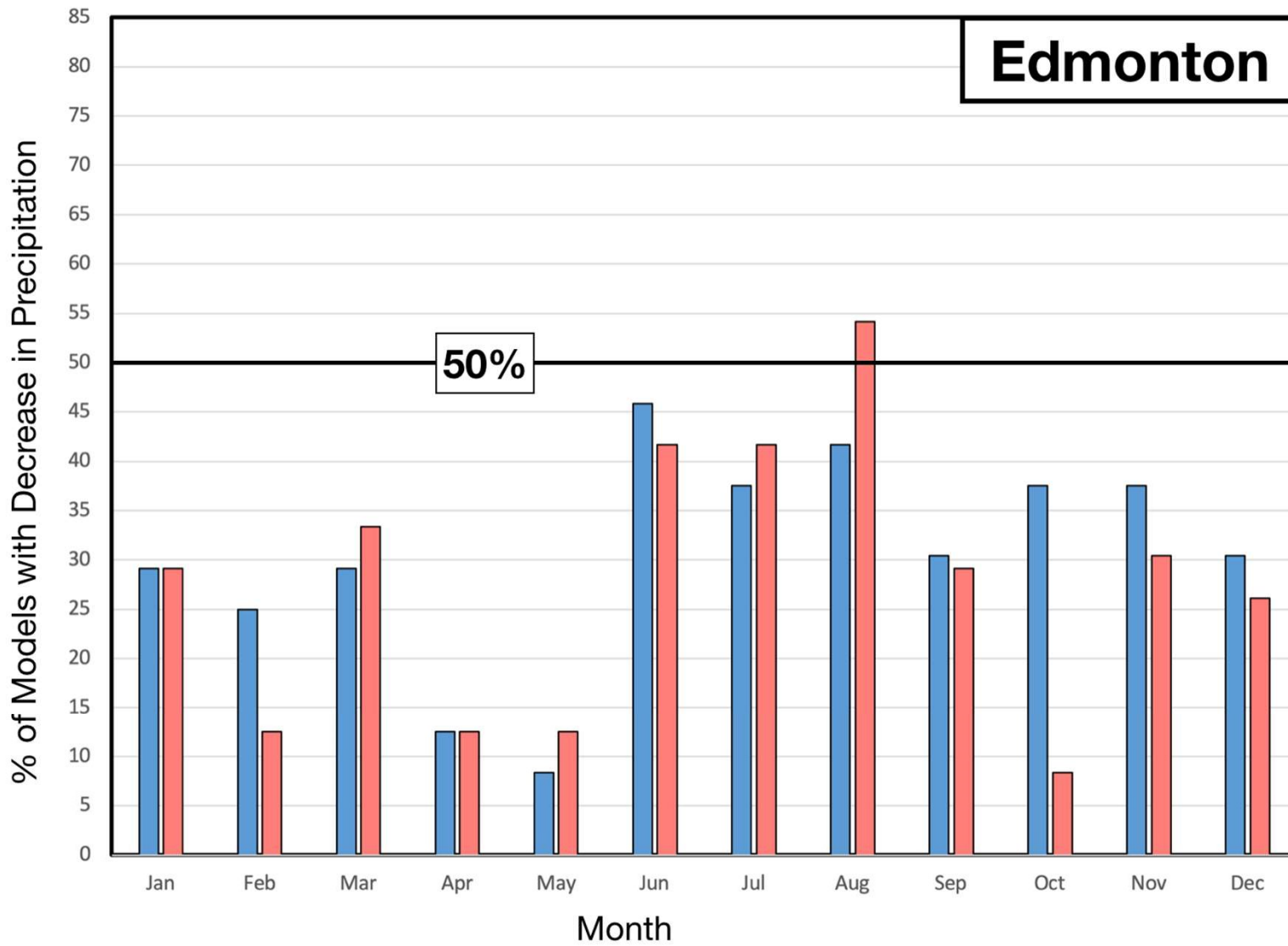
Jul-Aug
24 Models
Relative to
1976-2005 baseline



2051-2080 average:
Change in Mean
Temperature vs
Percent Change in
Total Precipitation

RCP4.5
RCP8.5

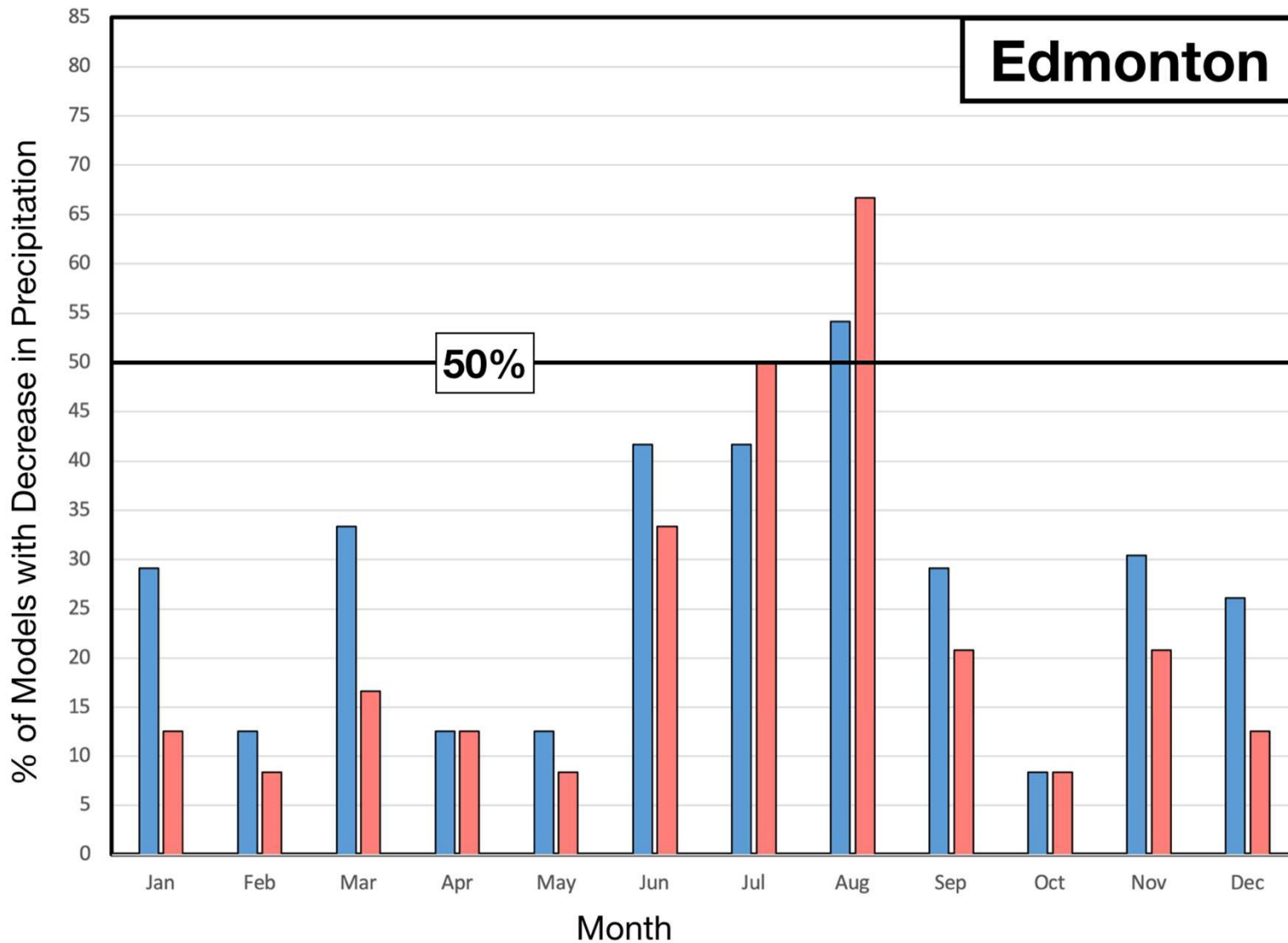
Jul-Aug
24 Models
Relative to
1976-2005 baseline



2021-2050
 Percent of Models with **Decrease in Precipitation**, by Month

RCP4.5
RCP8.5

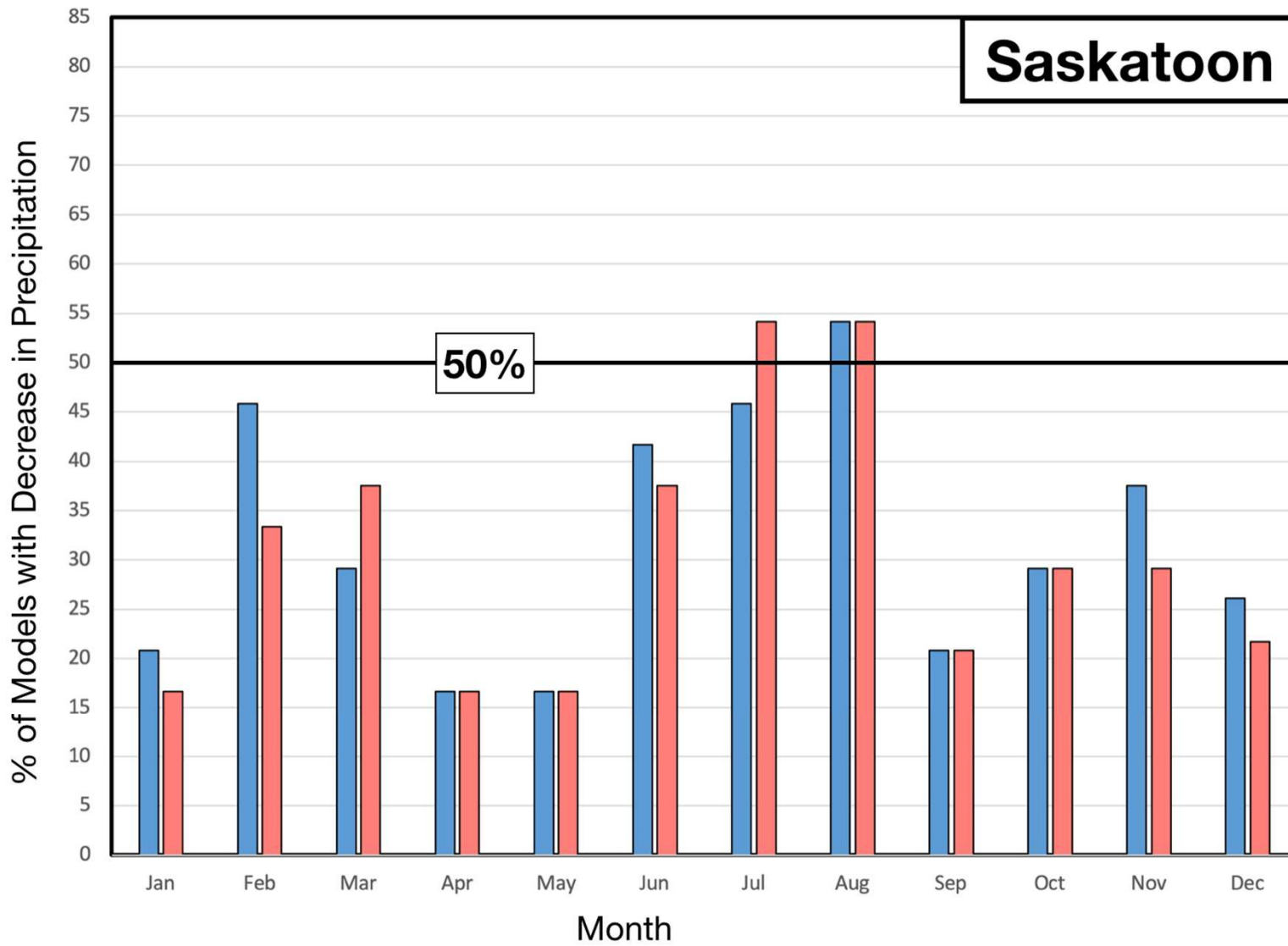
24 Models
 Relative to
 1976-2005 baseline



2051-2080
 Percent of Models with **Decrease in Precipitation**, by Month

RCP4.5
RCP8.5

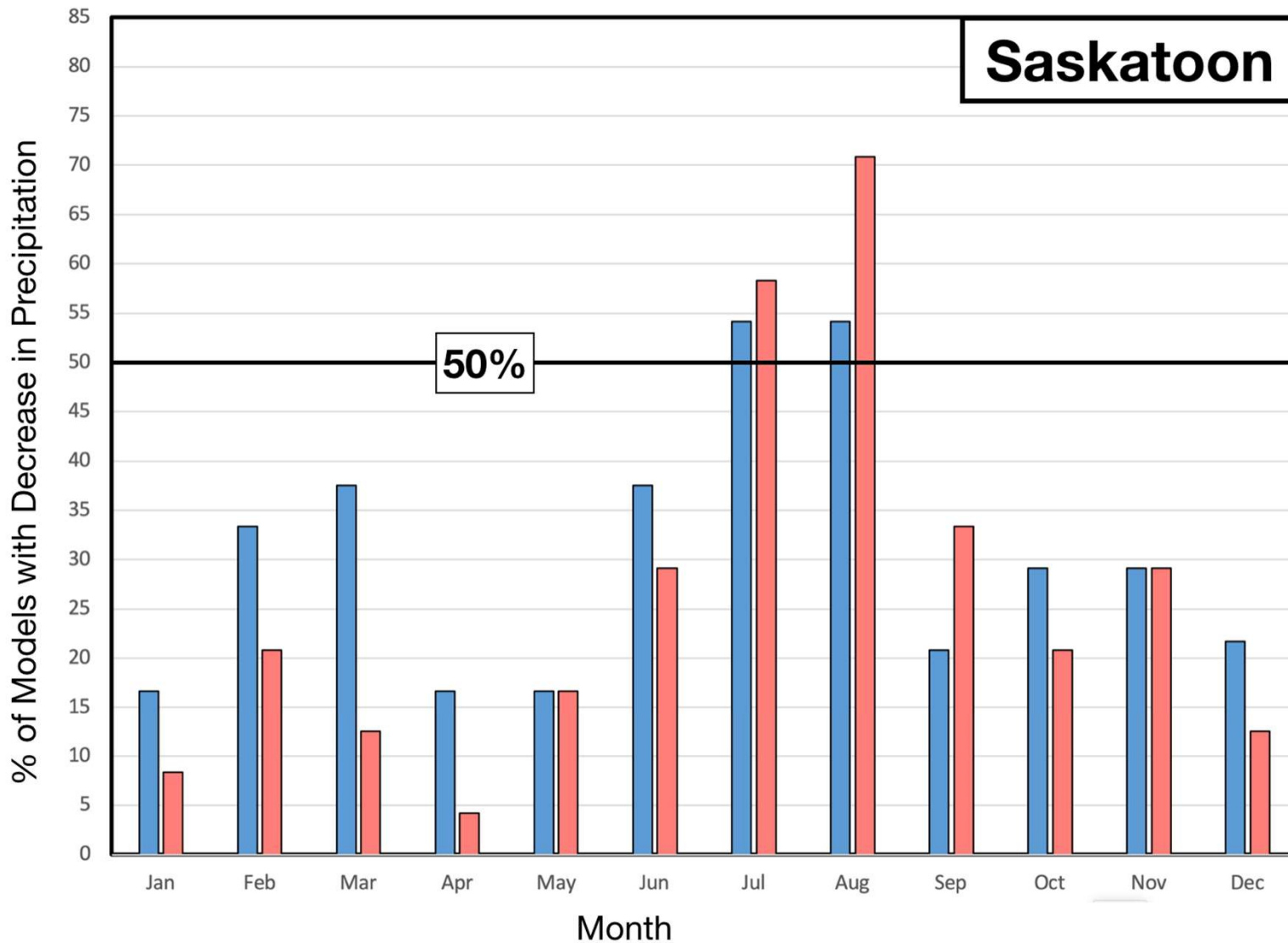
24 Models
 Relative to 1976-2005 baseline



2021-2050
 Percent of Models with **Decrease in Precipitation**, by Month

RCP4.5
RCP8.5

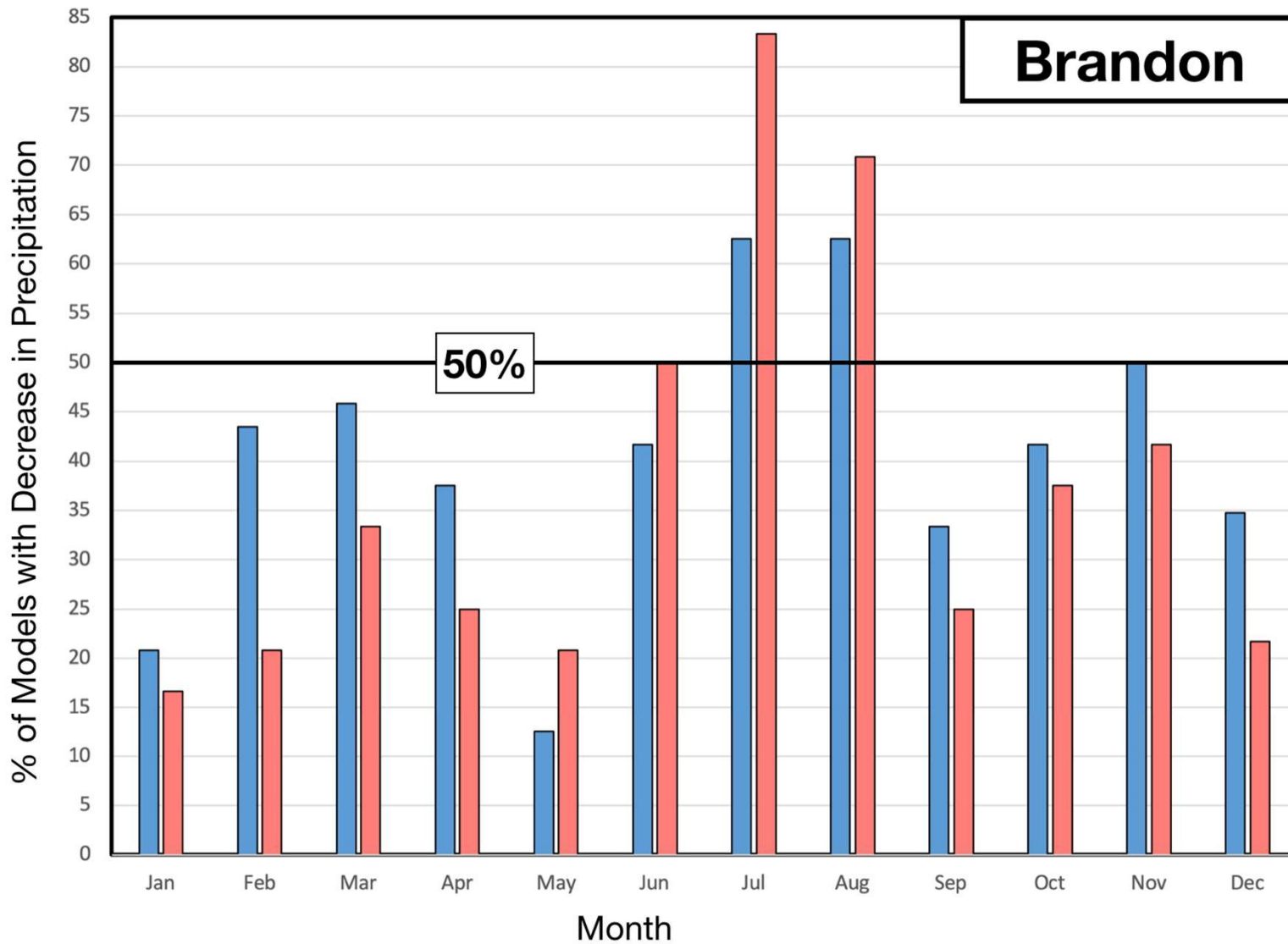
24 Models
 Relative to 1976-2005 baseline



2051-2080
 Percent of Models with **Decrease in Precipitation**, by Month

RCP4.5
RCP8.5

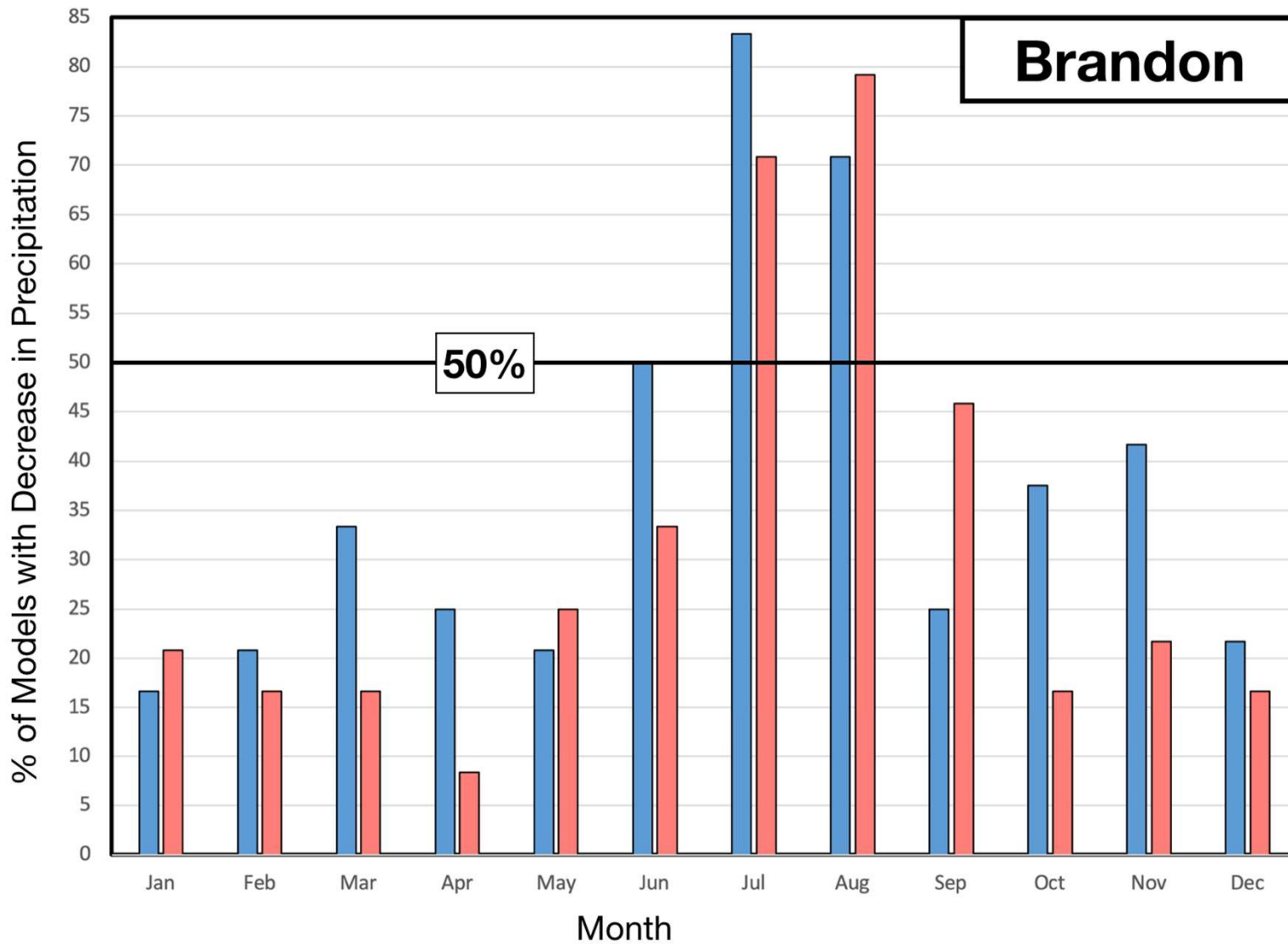
24 Models
 Relative to 1976-2005 baseline



2021-2050
 Percent of Models with **Decrease in Precipitation**, by Month

RCP4.5
RCP8.5

24 Models
 Relative to 1976-2005 baseline

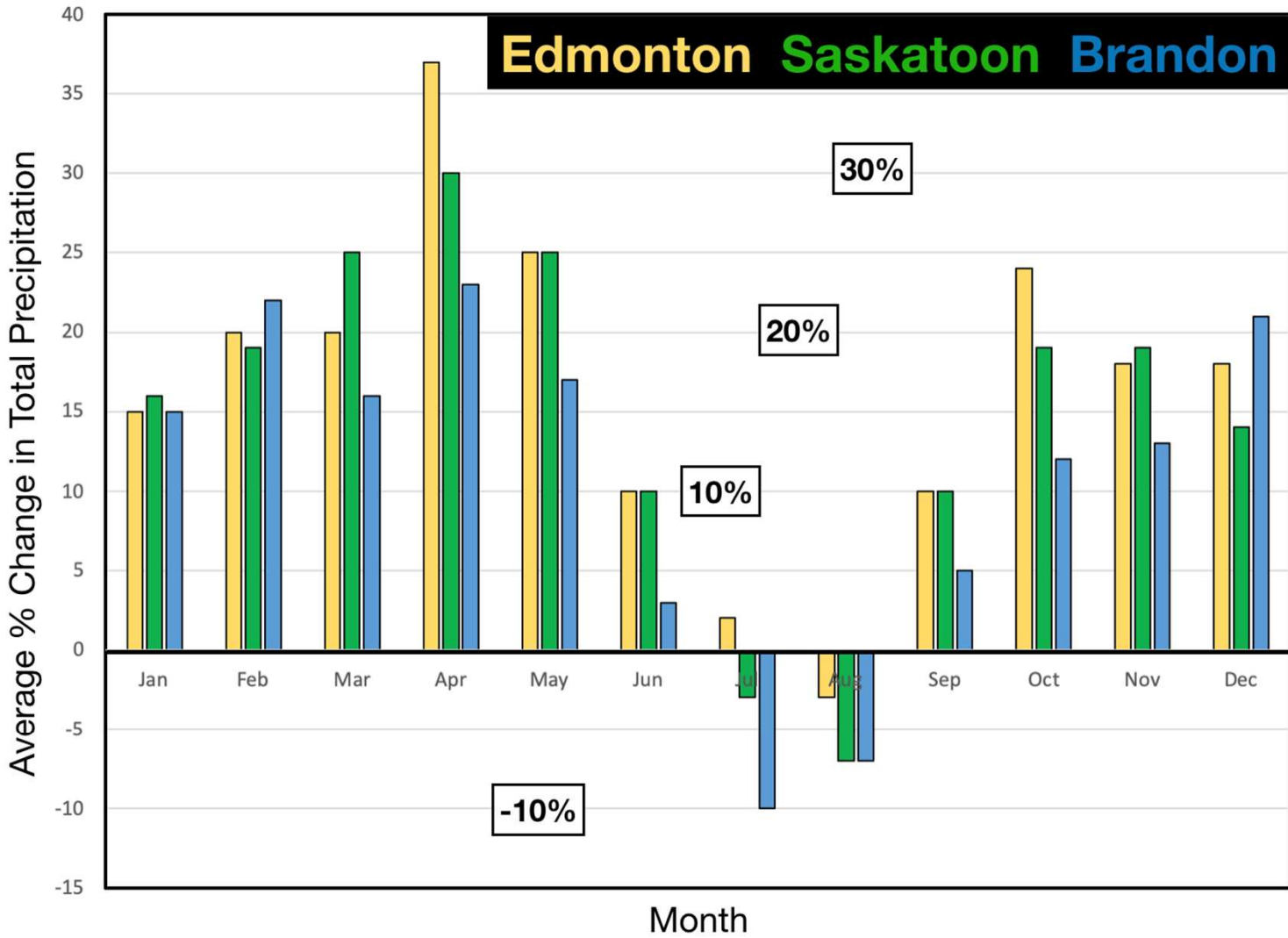


2051-2080
 Percent of Models with **Decrease in Precipitation**, by Month

RCP4.5
RCP8.5

24 Models
 Relative to
 1976-2005 baseline

Edmonton **Saskatoon** **Brandon**



2051-2080
Average Percent
Change in
Precipitation, by
Month

RCP8.5

24 Models
Relative to
1976-2005 baseline

Wetter
↑
Drier
↓



Prairie Provinces Water Board
Committees on Flow Forecasting & Hydrology Workshop
27 November 2019



The Climate Atlas of Canada

Danny Blair

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THE UNIVERSITY OF
WINNIPEG



Prairie
Climate Centre