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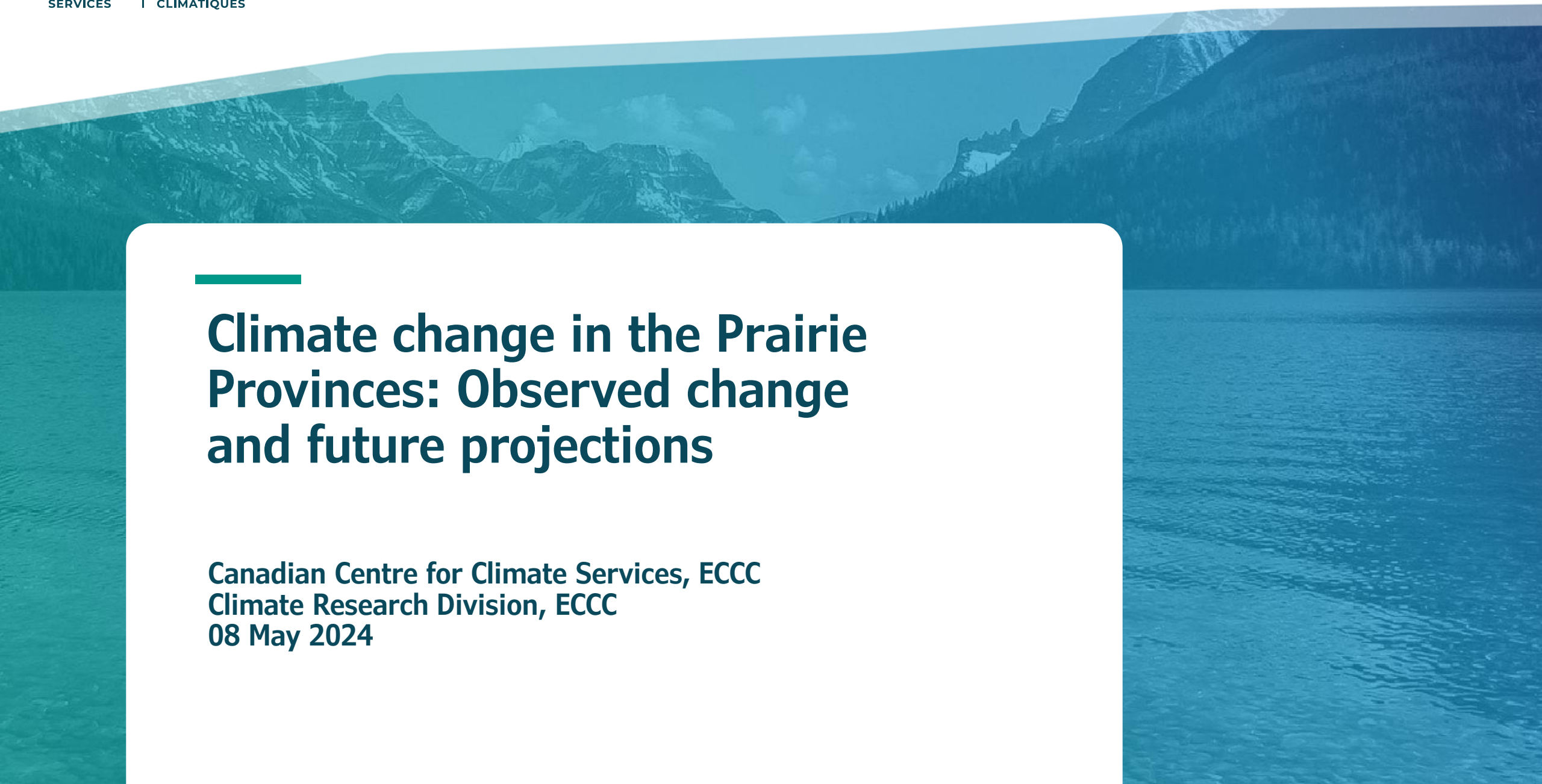
Environment and Climate Change Canada | Environnement et Changement climatique Canada

Canada



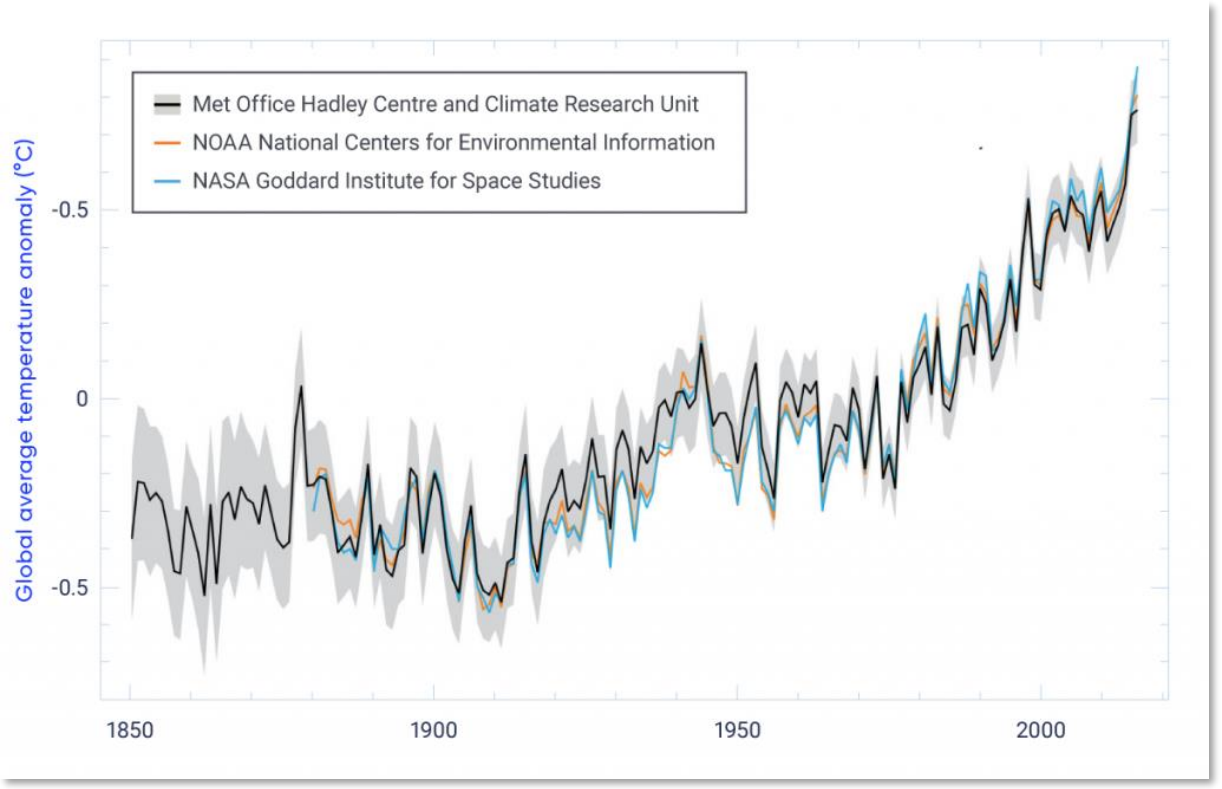
Climate change in the Prairie Provinces: Observed change and future projections

Canadian Centre for Climate Services, ECCC
Climate Research Division, ECCC
08 May 2024

Global temperature change

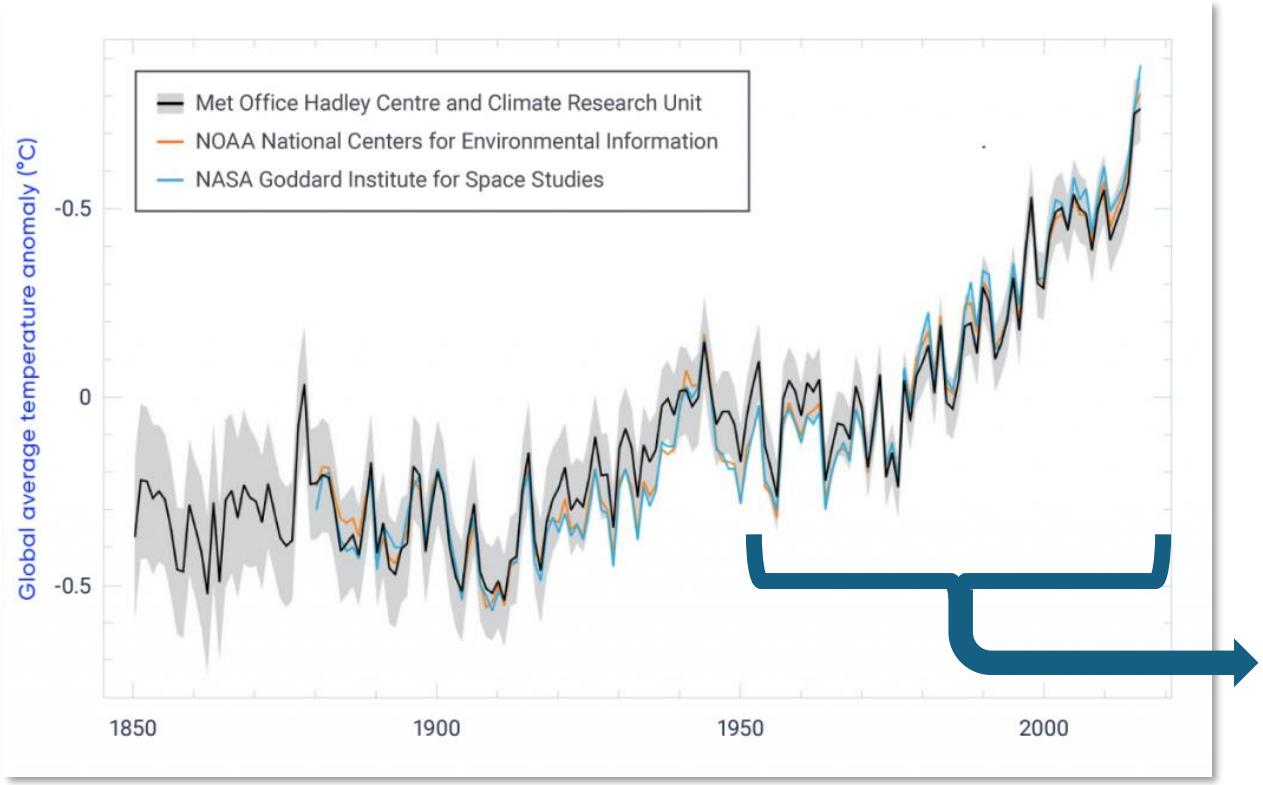
- The global climate is changing primarily due to human-caused emissions of greenhouse gases
- Canada is warming at roughly double the global mean rate

Global Temperature Change: 1850-present



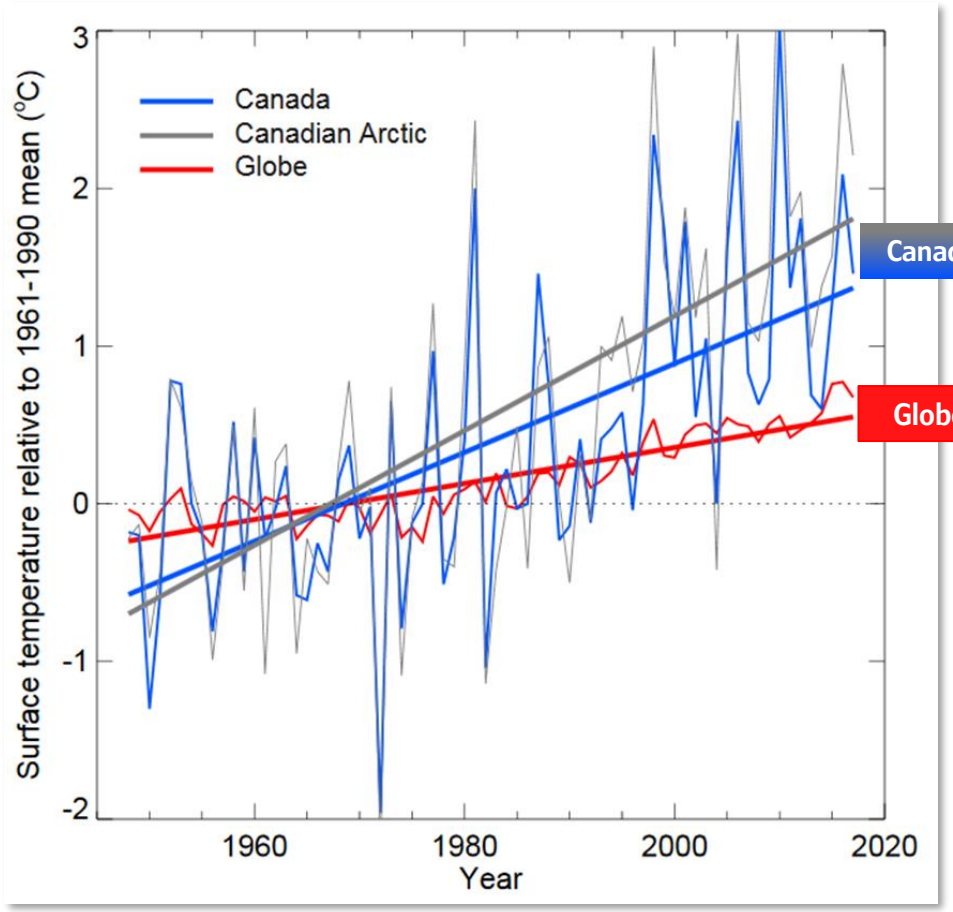
Source: *Canada's Changing Climate Report (2019):* https://changingclimate.ca/CCCR2019/

Global temperature change



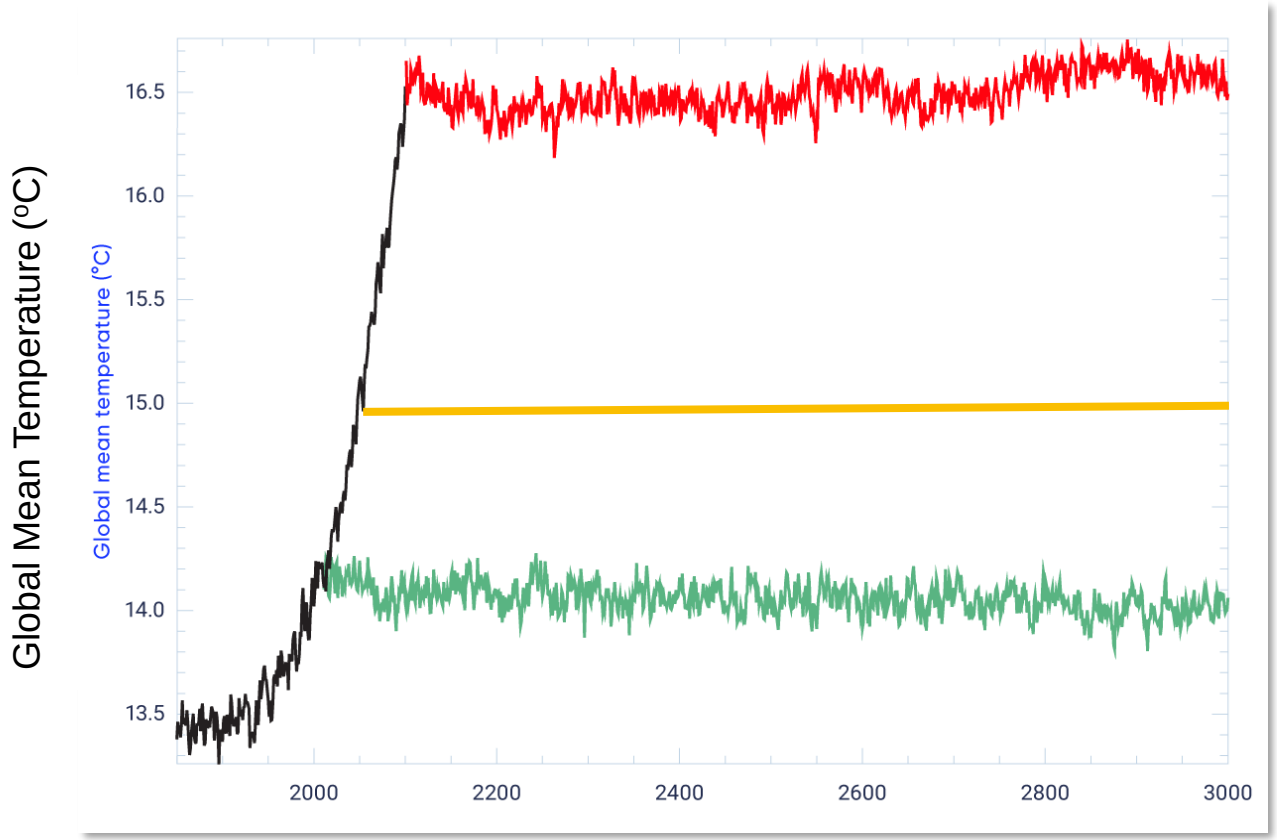
Source: *Canada's Changing Climate Report (2019):* https://changingclimate.ca/CCCR2019/

Climate change in Canada vs Globe



Reaching net zero

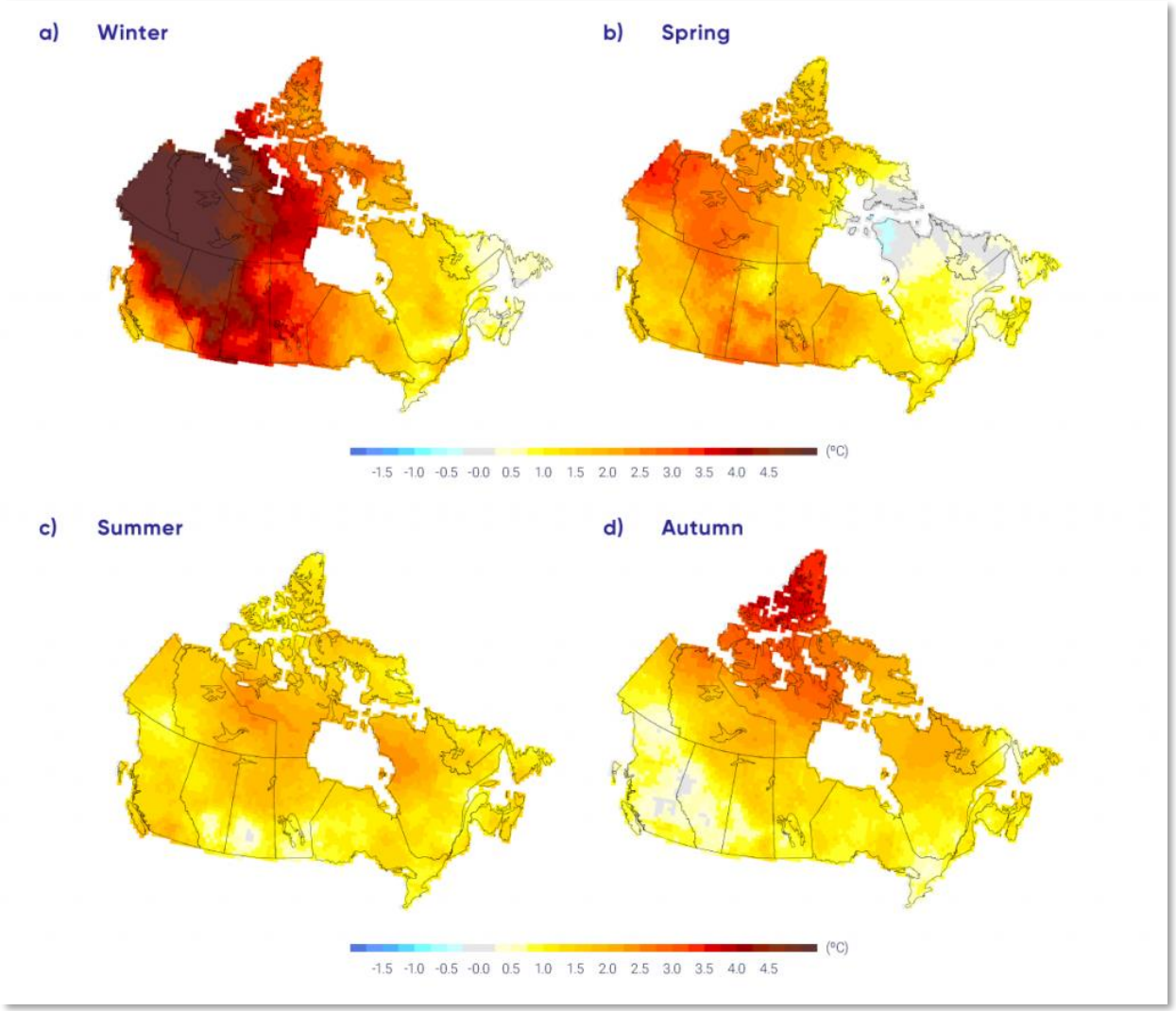
- The climate will continue to warm until global greenhouse gas emissions are reduced to net-zero, at which point the temperature will stabilize
- Climate model simulations show that zeroing emissions stabilizes temperature
- Global mean surface temperature simulated by the Canadian Earth System Model following a cessation of emissions in 2010 (green), 2050 (yellow) and 2100 (red)**



*Sources: *Gillet et al., 2021, Nature Climate Change (https://www.nature.com/articles/ngeo1047) , **ECCC, CCCma*

TEMPERATURE CHANGE

- The change in temperature is not uniform; some regions and seasons are warming more than average
  - Graphic: 1948-2016



Source: *Canada's Changing Climate Report (2019): https://changingclimate.ca/CCCR2019/*

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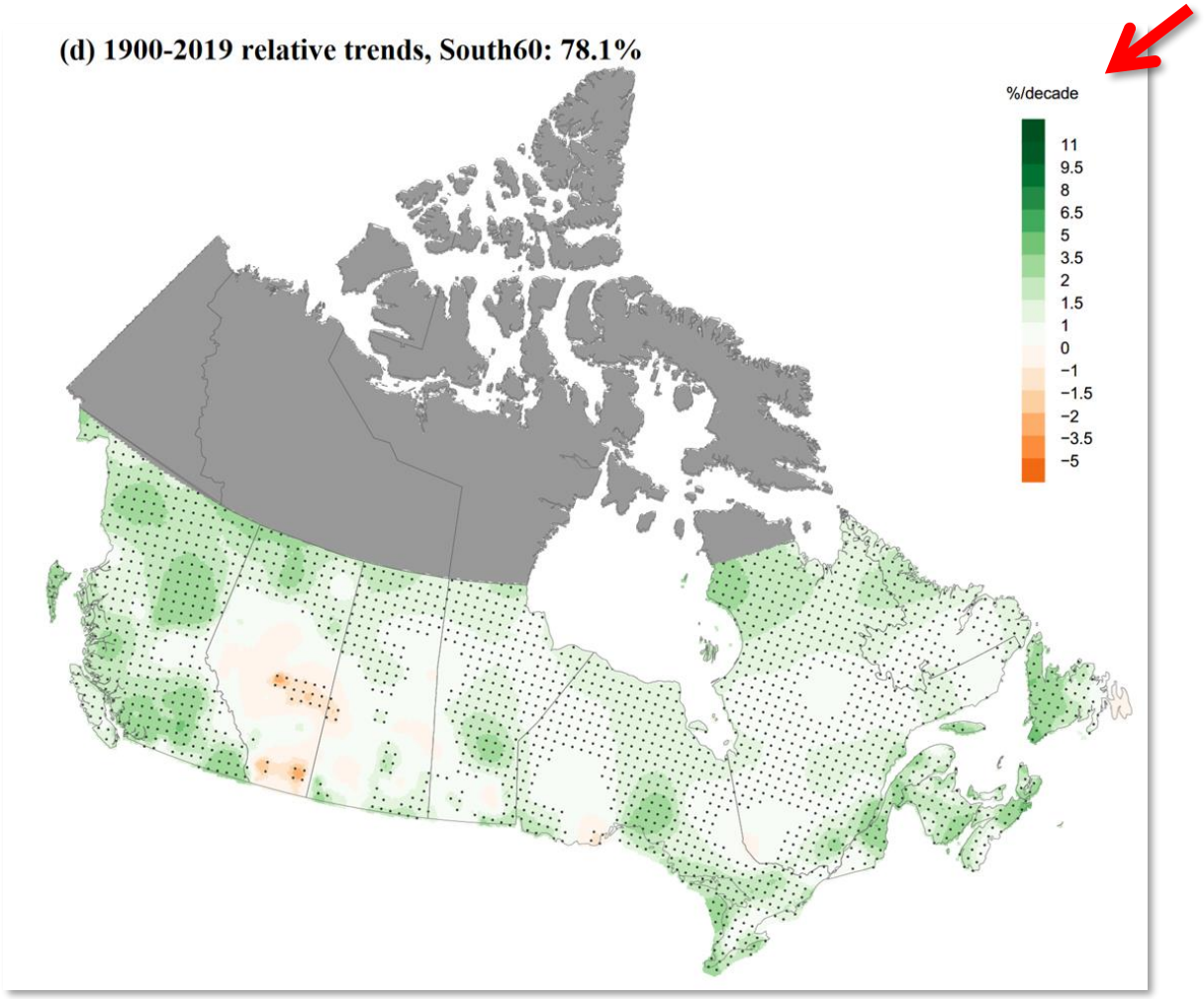
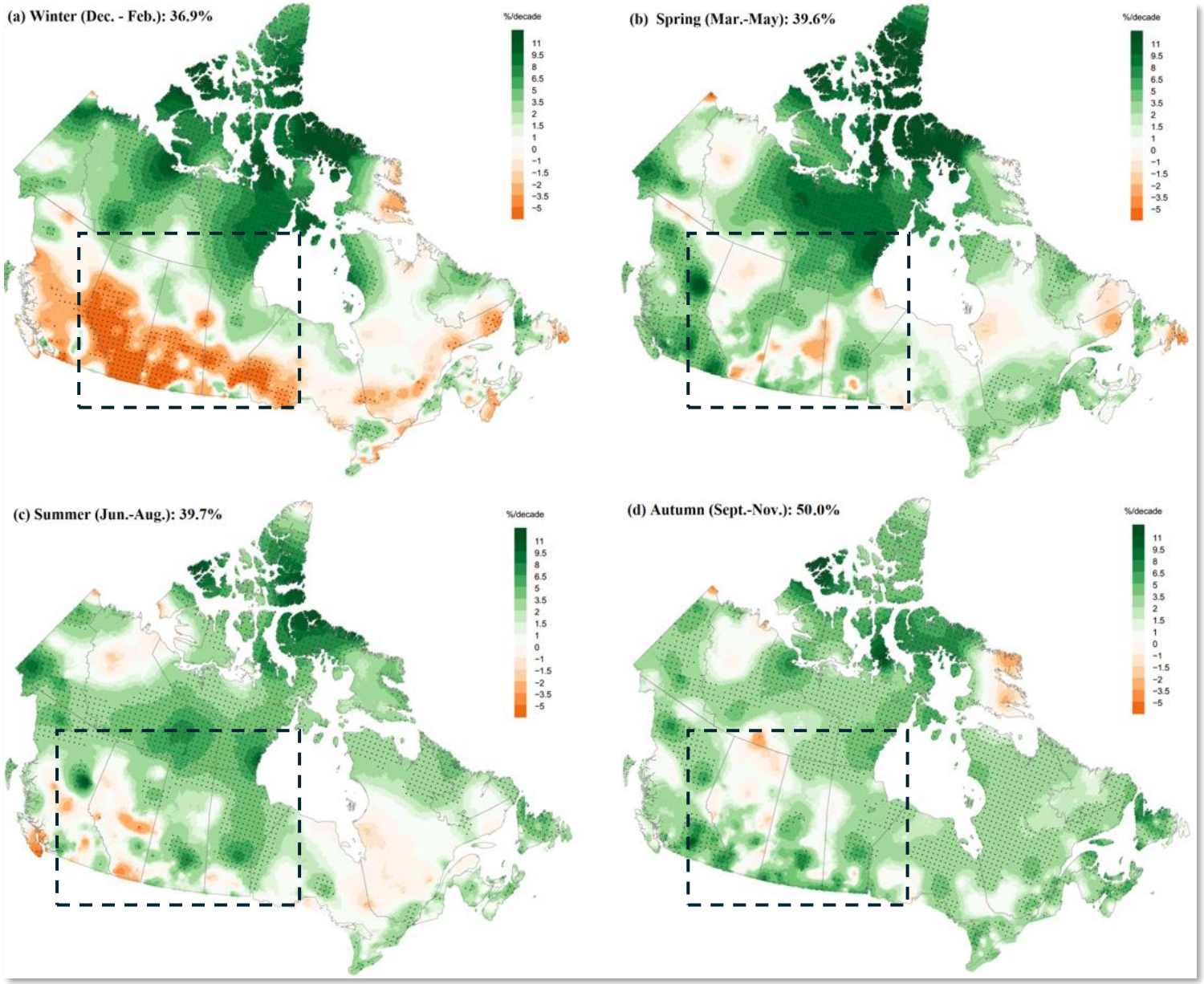
PRECIPITATION CHANGE

- Overall, Canada has seen an increase in precipitation
  - Areas of a significant trend (at the 5% level) are marked with black dots
  - Trends are expressed in % of the corresponding 1961-90 mean values at the grid points
  - The % of grid points with a significant trend is in the title line



Source: *Wang et al., 2023, Journal of Climate: Observed Precipitation Trends Inferred from Canada's Homogenized Monthly Precipitation Dataset*

- On a seasonal basis in the Prairies, winter precipitation has declined markedly
- Graph: % change/decade over the period 1948-2019
  - Areas of a significant trend (at the 5% level) are marked with black dots
  - Trends are expressed in % of the corresponding 1961-90 mean values at the grid points
  - The % of grid points with a significant trend is in the title line



Source: *Wang et al., 2023, Journal of Climate: Observed Precipitation Trends Inferred from Canada's Homogenized Monthly Precipitation Dataset*

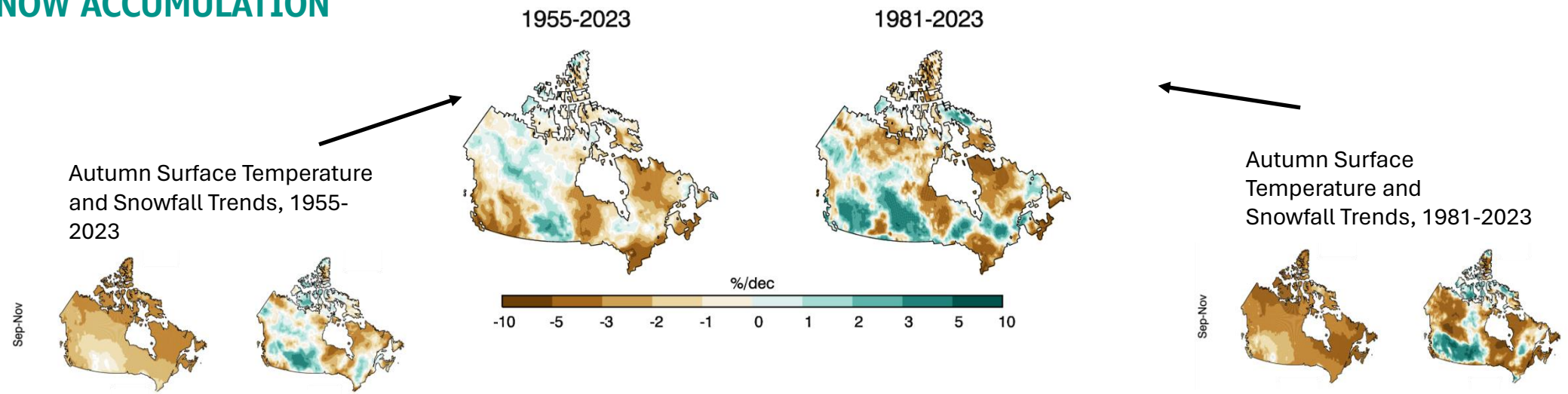
Changes in snow

- Natural variability has a strong influence on trends in snow cover in the Prairie region
- Some parts of the Prairies have experienced significant increases in snow accumulation driven by heavier snowfall in early fall

- Trends in maximum seasonal snow accumulations and snow cover duration (not shown) are spatially variable across the majority Canada
- Snow increases in the prairies since 1955 are driven by cold and snowy conditions in the fall

TREND IN SEASONAL SNOW ACCUMULATION

Snow Season (Sept. – March)



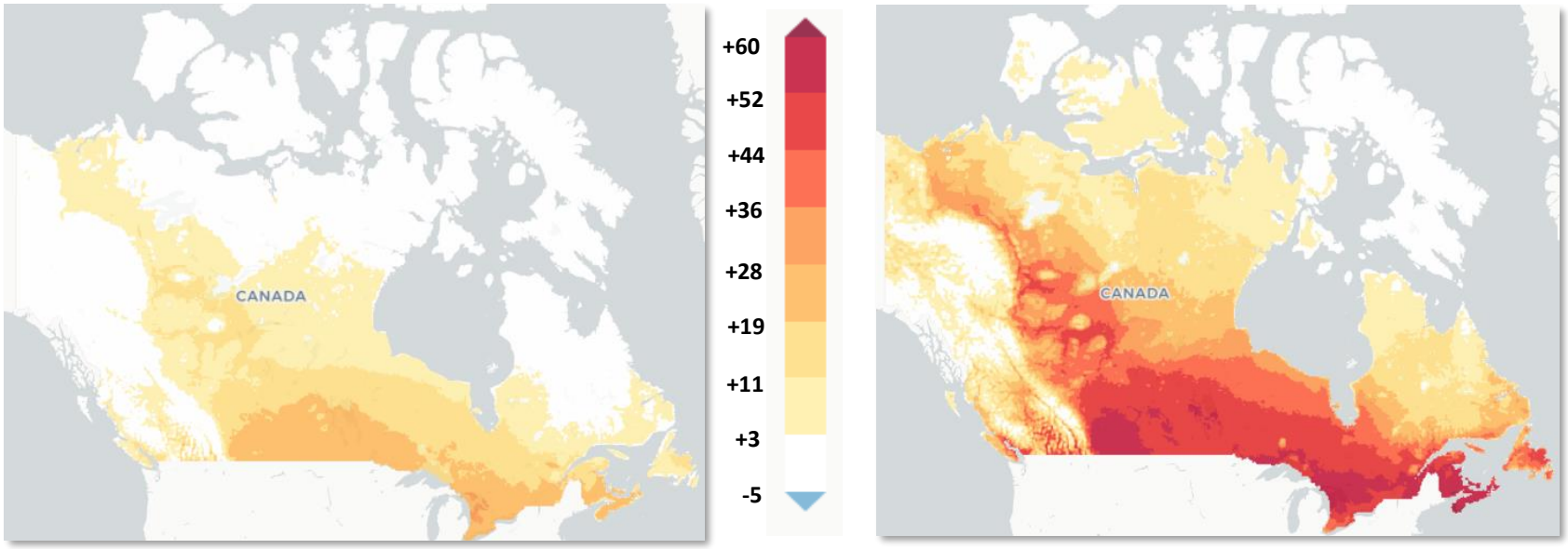
Source: *Lawrence Mudryk, CRD/ECCC, preliminary analysis for CCCR 2025*

Projected change in the number of days with maximum humidex > 30

LOW EMISSIONS
SSP1-2.6 (2071-2100)
June - August

Change relative to 1971-2000

HIGH EMISSIONS
SSP5-8.5 (2071-2100)
June - August



Source: *ClimateData.ca*

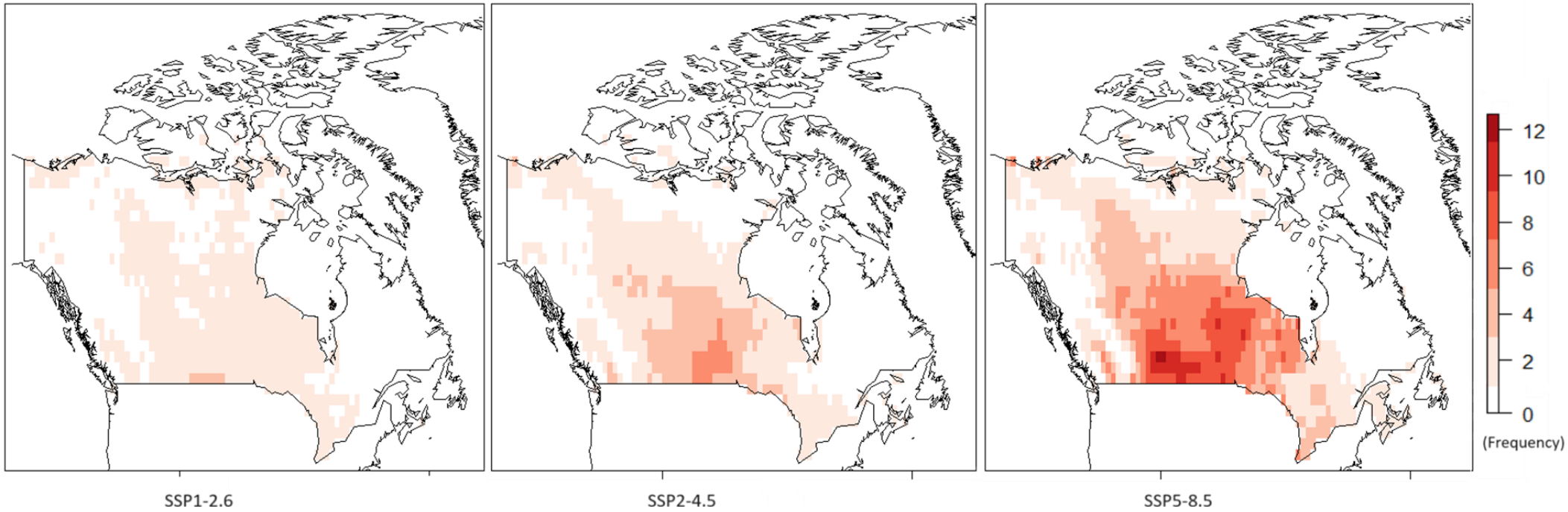
HOT AND HUMID WEATHER

- Parts of the Prairies, which have not historically experienced hot and humid weather, are projected to see large increases in the number of days with maximum Humidex > 30

Severe drought

- Prairie regions are projected to experience an increase in severe drought events, particularly under a high emissions scenario

Projected number of times that annual Standardized Precipitation Evapotranspiration Index (SPEI) drops below the severe drought threshold of -1.5 over the 20-year period of 2081-2100 (based on the median of an ensemble of climate models)



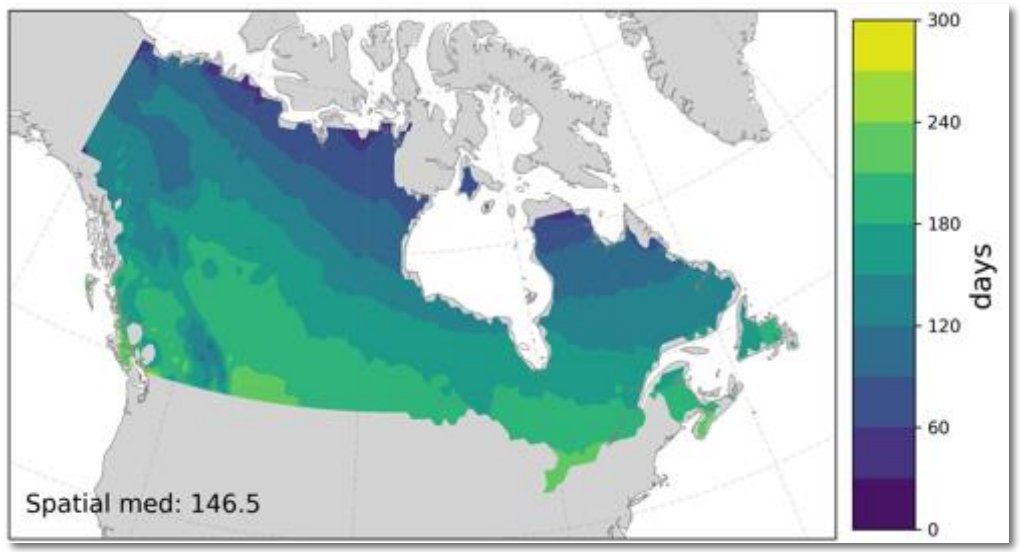
Source: *Tam et al. (2024)*

Fire weather

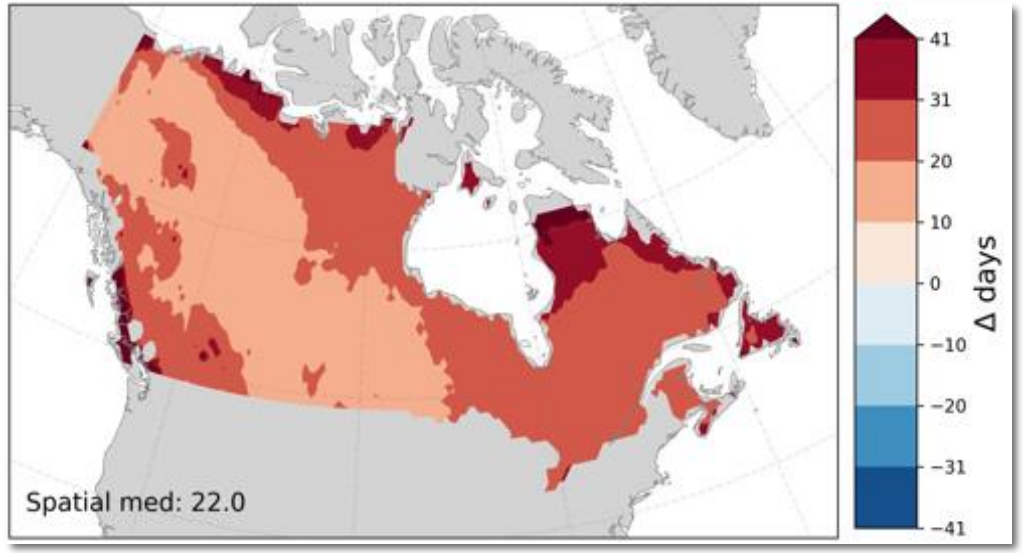
- Prairie regions are projected to experience an increase in severe drought events, particularly under a high emissions scenario

Changes in the length of the season where the weather is conducive to wildfires as represented by the fire weather index

1971 to 2000



Change - high emissions for 2041 to 2070



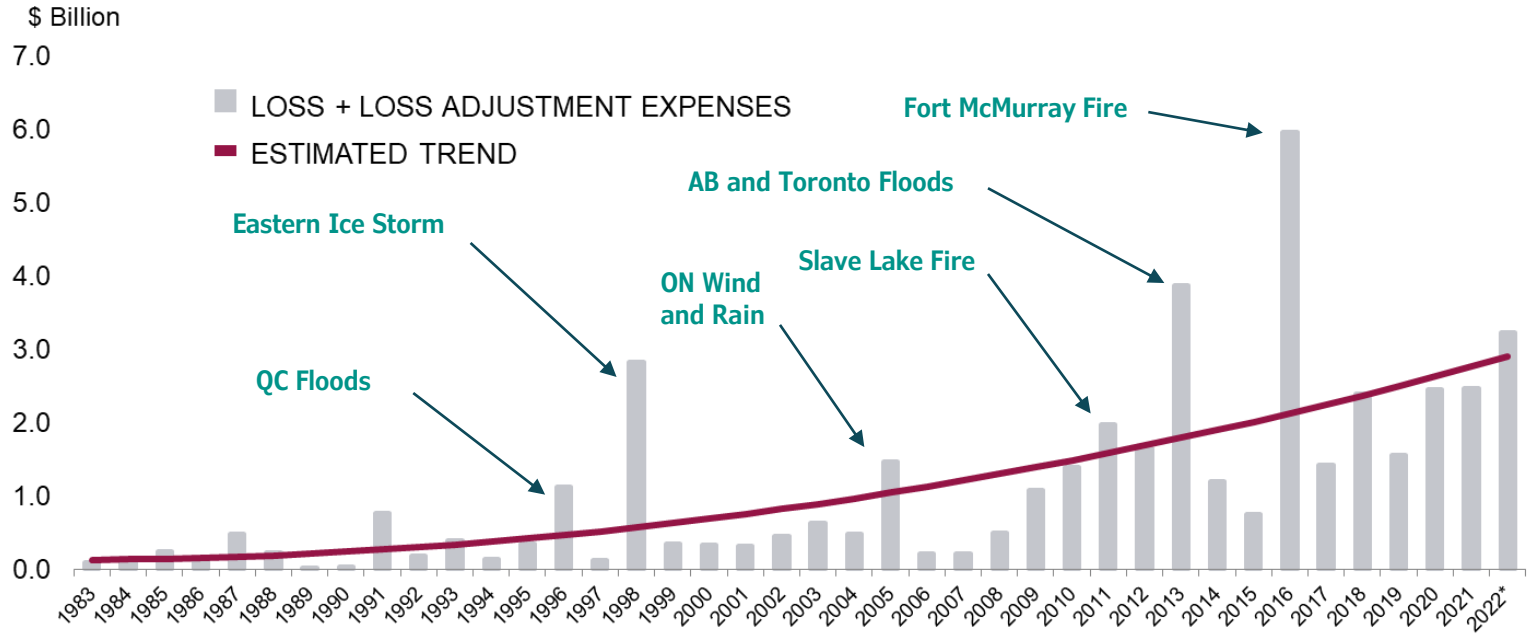
Soon to be available at *ClimateData.ca*

INCREASING EXTREME EVENTS

- The frequency and intensity of climate-related extreme events is increasing in Canada
- Extreme events, like floods, heatwaves, wildfires, and severe storms, are increasingly damaging to our economy, ecosystems and built environment

Insured catastrophic* losses in Canada

*A catastrophic loss = 1 event costing $30 (25 prior to March 2022) million or more in insured damages



Source: IBC Facts Book, PCS, CatIQ, Swiss Re, Munich Re & Deloitte
*Values in 2022$ CAN, *2022 preliminary*

* Catastrophic loss = 1 event costing $30 million ($25M prior to March 2022) or more in insured damages

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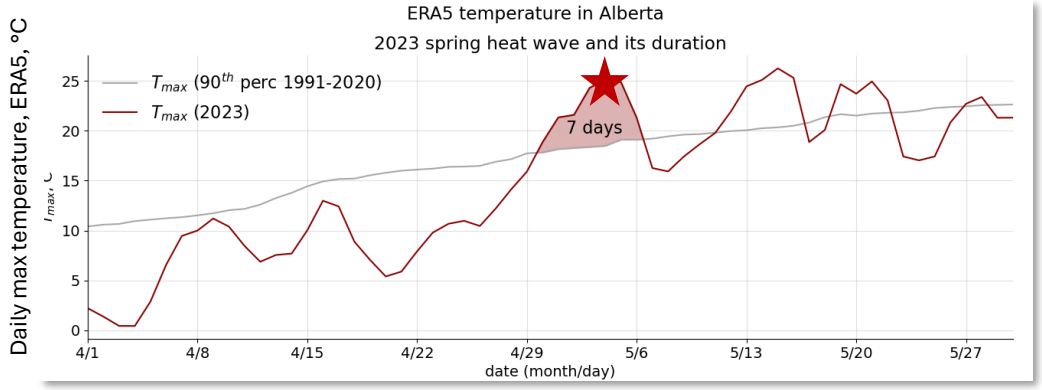
Alberta Heatwave May 2023

INCREASING EXTREME EVENTS

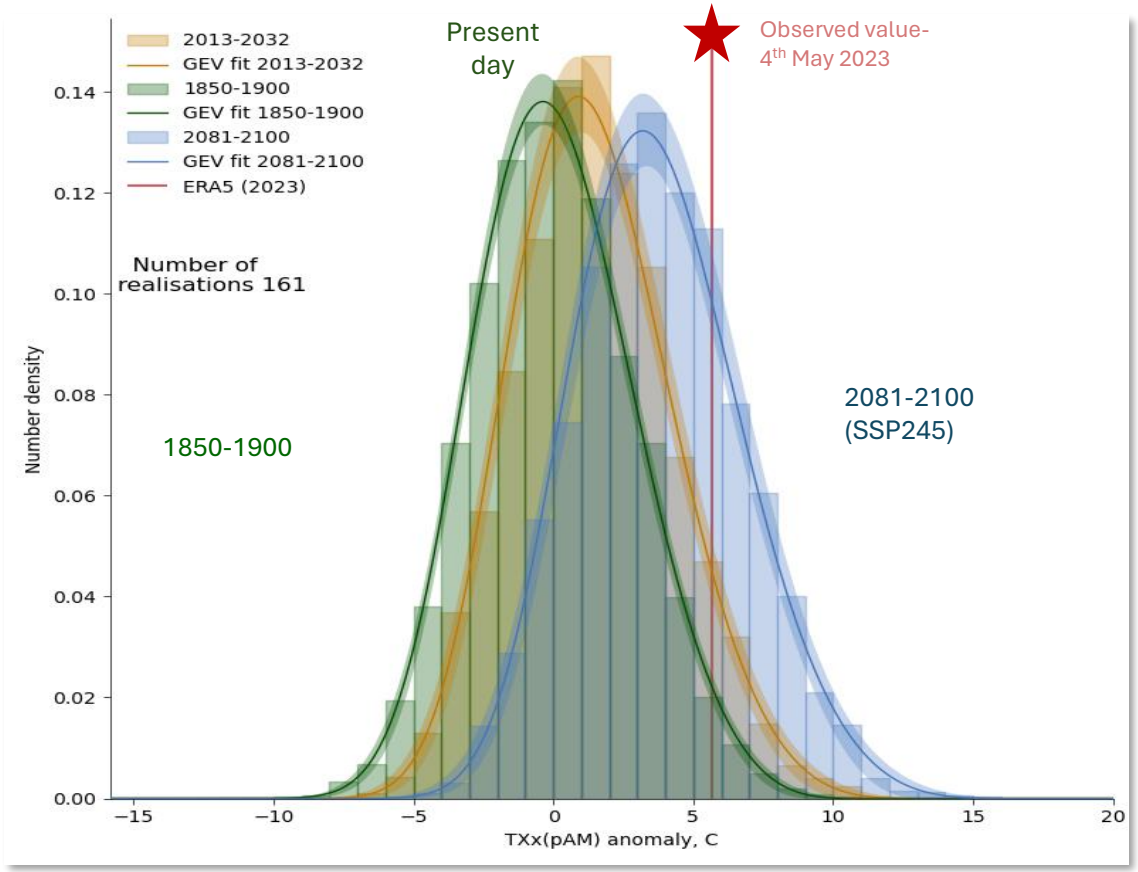
CONCLUSIONS:

- Climate change made this event about 3 times more likely
- Such an event would occur about once in 4 years by the end of the century in a scenario with ~2.7°C global warming (SSP2-4.5)

Alberta-average daily max temperatures in April-May 2023



Distributions of Alberta maximum temperature anomalies in May from 22 climate models



Source: *Malinina et al., 2023.*

ClimateData.ca

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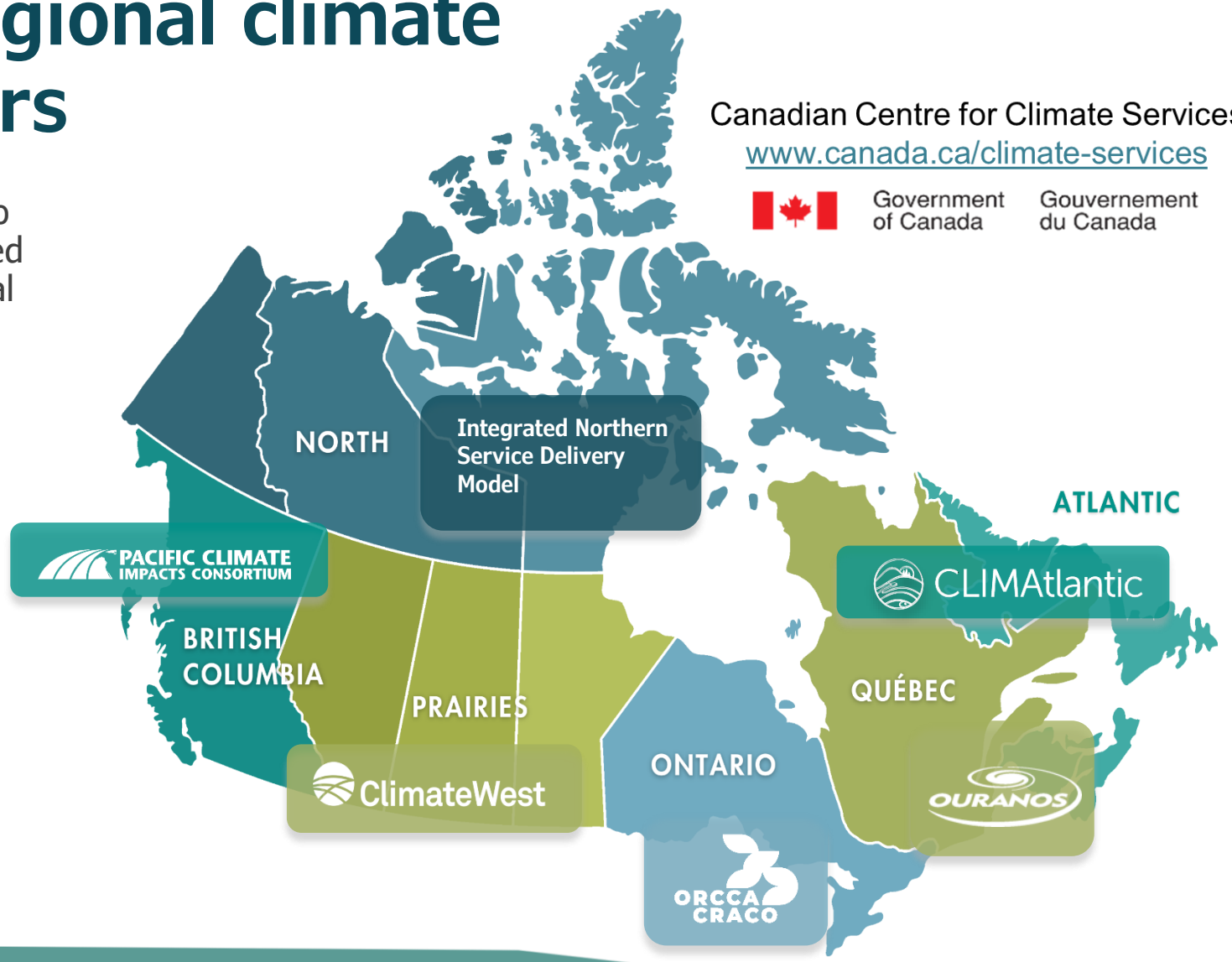
How can you access and use climate information?

- Climate services aims to equip decision makers in climate-sensitive sectors with better information to help them adapt to climate variability and change
- Climate services recognizes that decision makers need climate information in a form that is compatible with the decisions they need to make

National and regional climate service providers

- Climate services are available to Canadians through a coordinated network of national and regional climate service providers



ClimateWest
Building Prairie Resilience

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ClimateWest is a regional climate services hub supported by the Governments of Canada, Alberta, Manitoba, and Saskatchewan

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Summary

- The climate in the Prairies is changing, and this includes changing risks associated with impactful extreme events
- Only when net-zero global GHG emissions are maintained will the climate stabilize; there is no going back to previous climate regimes
- Climate services are available in Canada to support climate-smart decision making and resilient infrastructure design
- **Adapting to climate change means planning for the increased risks that a future climate will bring**

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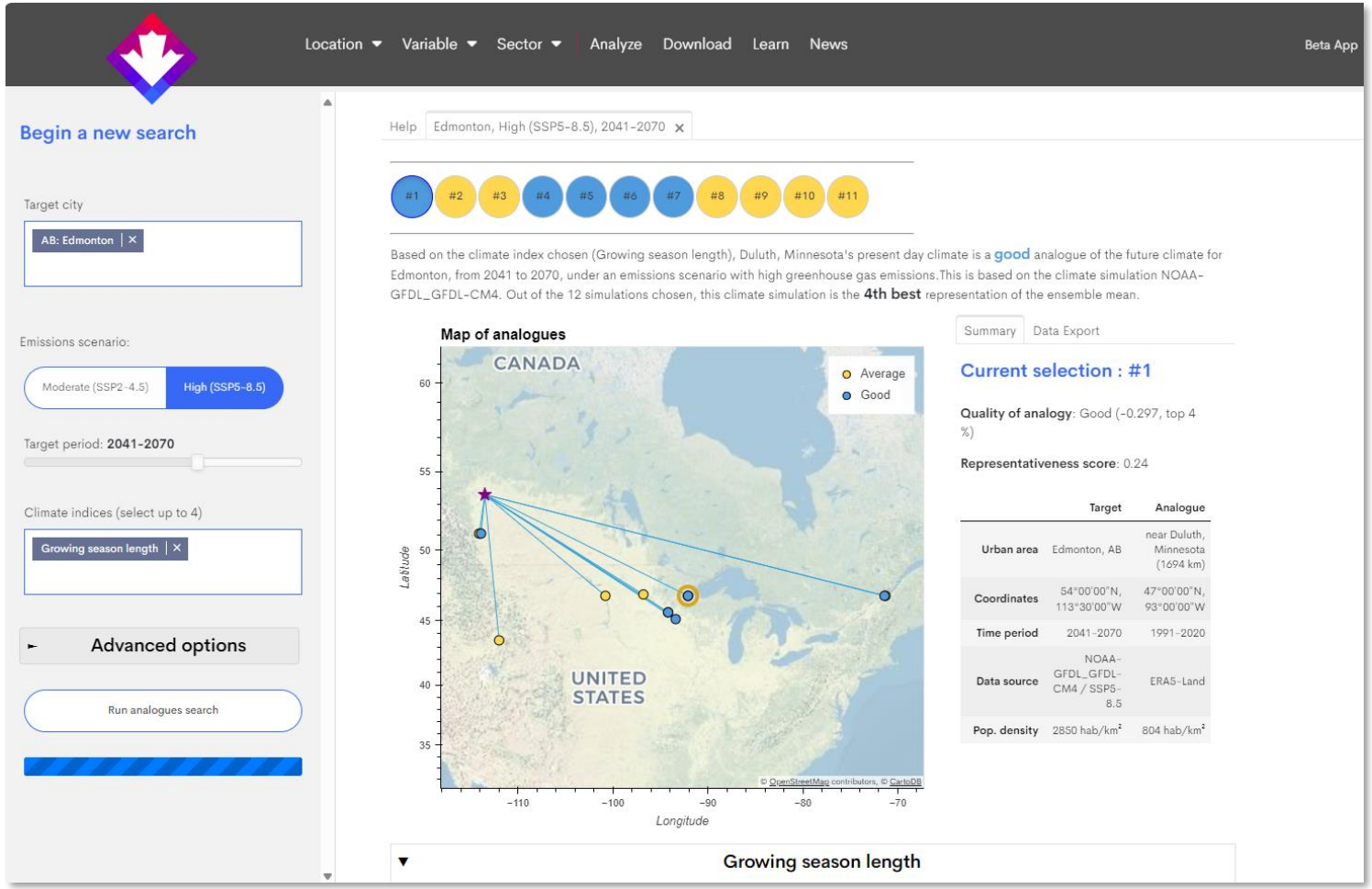
Thank you

Questions?

CCCS Website
canada.ca/climate-services
canada.ca/services-climatiques

Climate Services Support Desk
1-833-517-0376
ccsc-cccs@ec.gc.ca

Spatial Analogues Tool



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