University of Saskatchewan

Leveraging Climate Data to Support Better Research Outcomes

Dr. Bryan Mood
Department of Soil Science

Advancements in Agricultural Research Seminar Series
March 11, 2025 1530hrs

UNIVERSITY OF SASKATCHEWAN

Land Acknowledgement

I acknowledge that I live and work on **Treaty 6 Territory** and **the Homeland of the Métis**. We pay our respect to the First Nations and Métis ancestors of this place and reaffirm our relationship with one another.

University of Saskatchewan

Introduction

Stantec

University of Saskatchewan

Justification

UNIVERSITY OF SASKATCHEWAN

UNIVERSITY OF SASKATCHEWAN

Big crop dwindles amid heat and lack of rain

By Kevin Hursh

Reading Time: 2 minutes

Published: August 7, 2024
Opinion

In my area of southwestern Saskatchewan, crops have been going backward for many weeks. While not abundant, rainfall had been timely and crops looked pretty good until the tap turned off and the thermometer hit 30 and even 35 plus for days on end. | File photo

Agriculture / News / Saskatchewan

'It's really bad here': Sask. farmers need rain as heat punishes canola, cereal crops

"The news going around right now is that there's so much moisture out there ... but that's not representative of the whole province."

Alec Salloum

Published Jul 26, 2024 • Last updated Jul 26, 2024 • 5 minute read

6 Comments

Local News

'Extreme heat' blasts Sask. crops, increases fire risk

"Another hot, dry week has many producers worried about their crops," the weekly provincial crop report says.

Julia Peterson

Published Jul 25, 2024 • 2 minute read

Join the conversation

Saskatchewan

Sask. farmer says Wednesday storm may have many farmers filing insurance claims

Wind gusts over 100 kilometres an hour; golf ball-sized hail

Laura Sciarpelletti · CBC News · Posted: Aug 22, 2024 5:30 PM CST | Last Updated: August 22, 2024

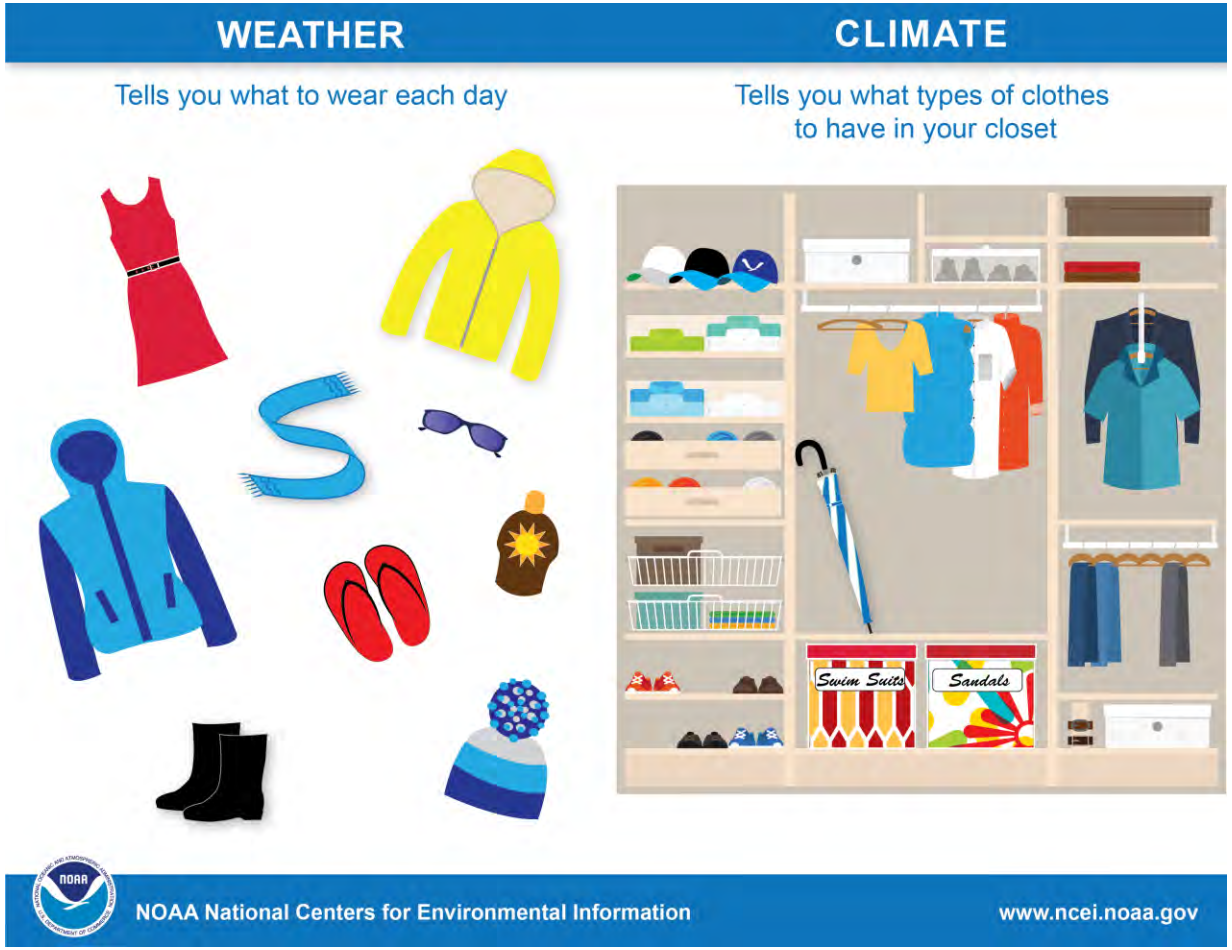
Troy Weppler says his farm West of Swift Current (pictured) was spared from Wednesday's storm. But he thinks many farmers in southern Saskatchewan will make crop insurance claims due to the hail. (Submitted by Troy Weppler)

University of Saskatchewan

What is Climate Change?

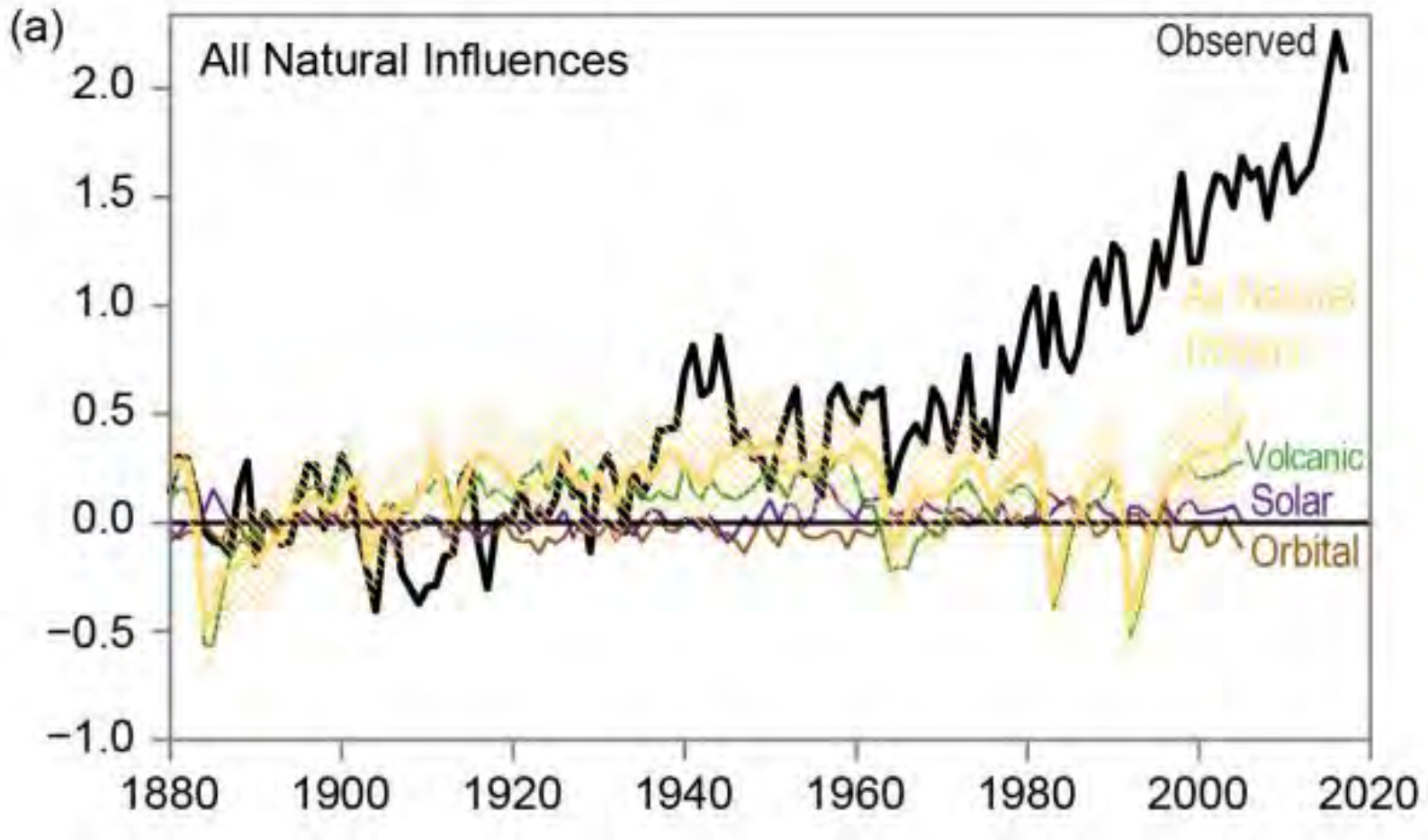
University of Saskatchewan

Weather v. Climate

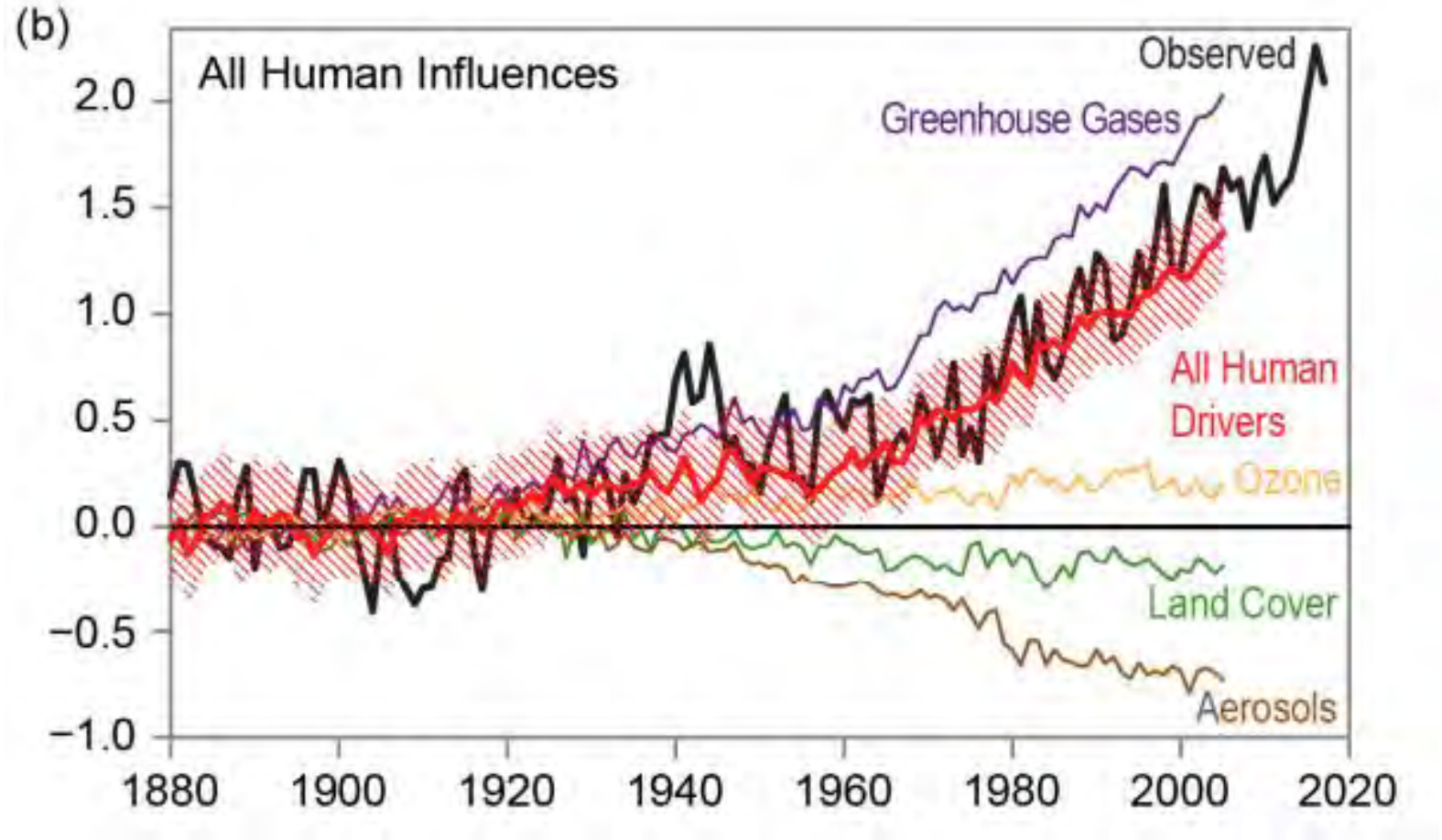


UNIVERSITY OF SASKATCHEWAN

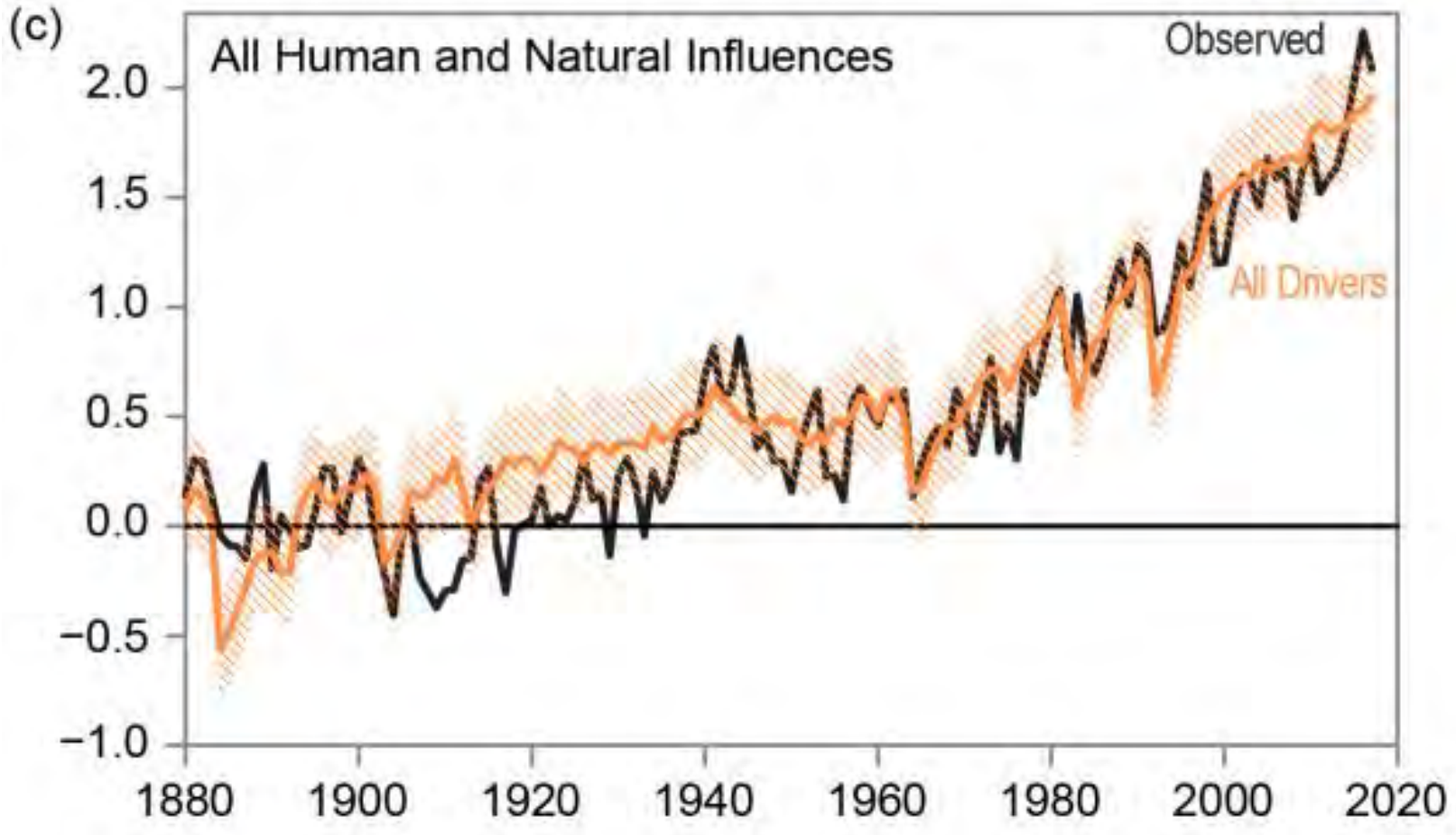
Climate Without Human Drivers



Climate With Only Human Drivers



Combined


(c)
All Human and Natural Influences
Observed
All Drivers
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
1880
1900
1920
1940
1960
1980
2000
2020

University of Saskatchewan

Carbon in our Atmosphere

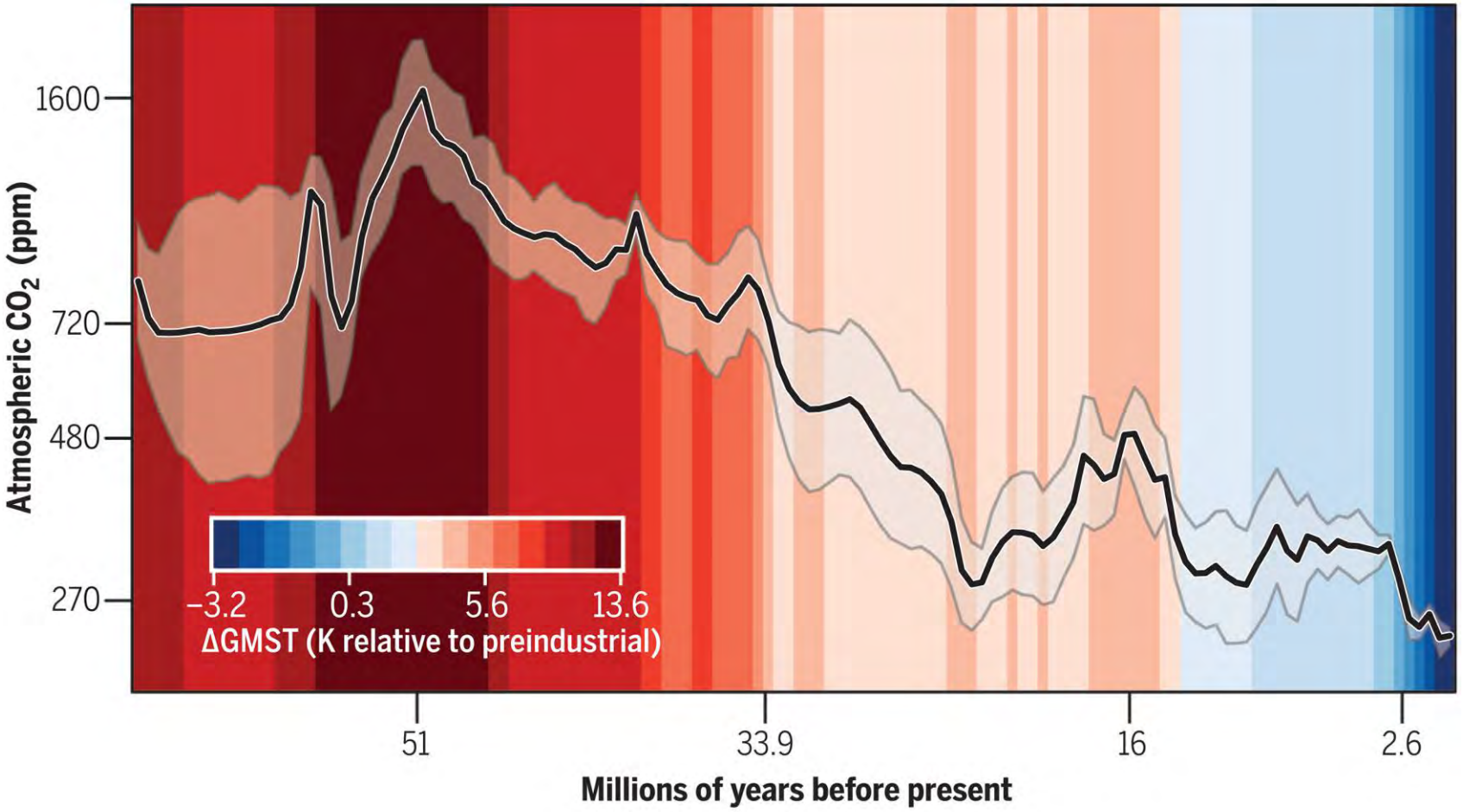
425.40 ppm

338.9 ppm in 1980

285 ppm in 1860s

UNIVERSITY OF SASKATCHEWAN

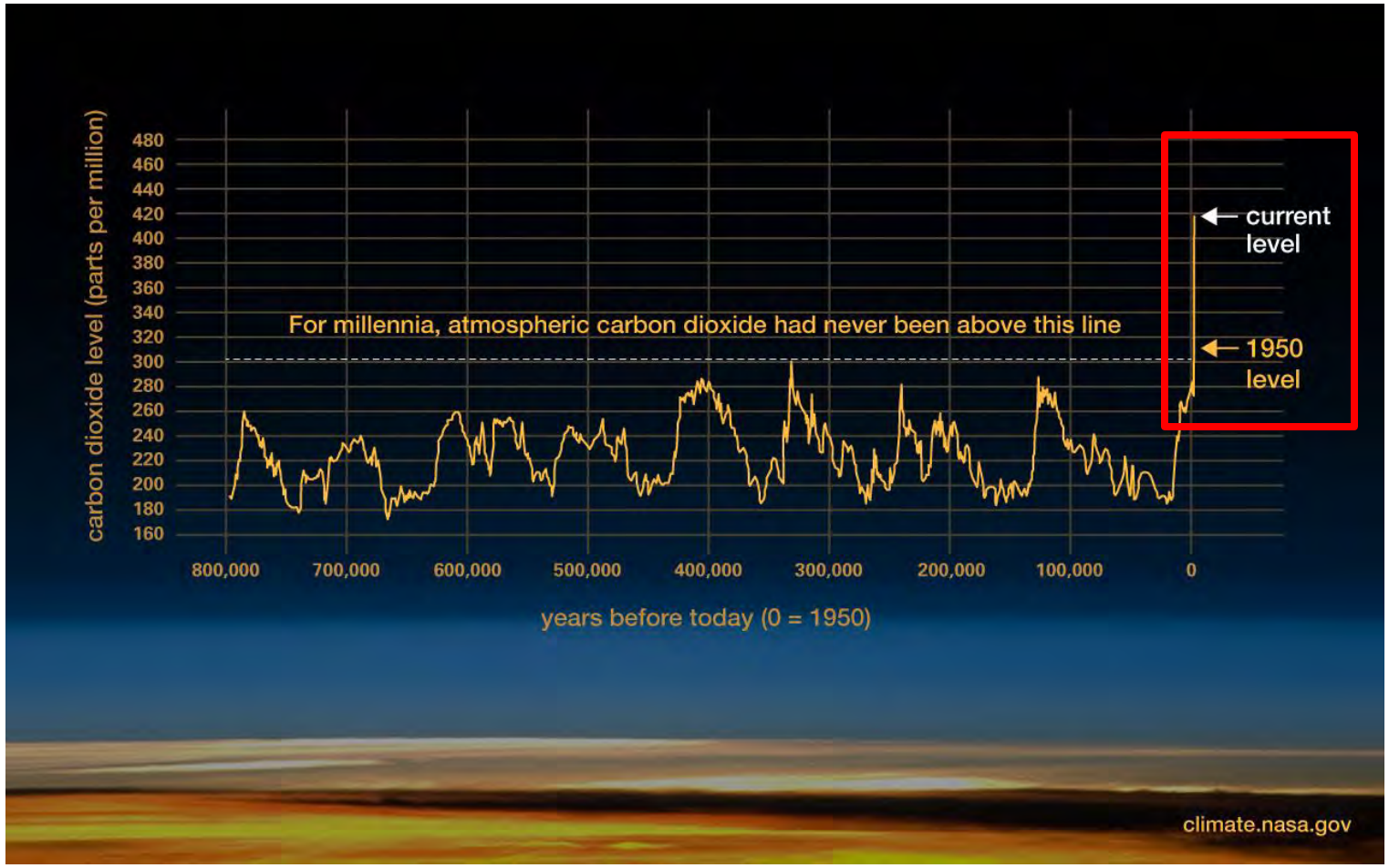
Natural Climate Change



Cenozoic CO2 Proxy Integration Project (CenCO2PIP) Consortium*†, Hönisch, B., Royer, D. L., Breecker, D. O., Polissar, P. J., Bowen, G. J., ... & Zhang, L. (2023). Toward a Cenozoic history of atmospheric CO2. *Science*, *382*(6675), eadi5177.

UNIVERSITY OF SASKATCHEWAN

Natural Climate Change

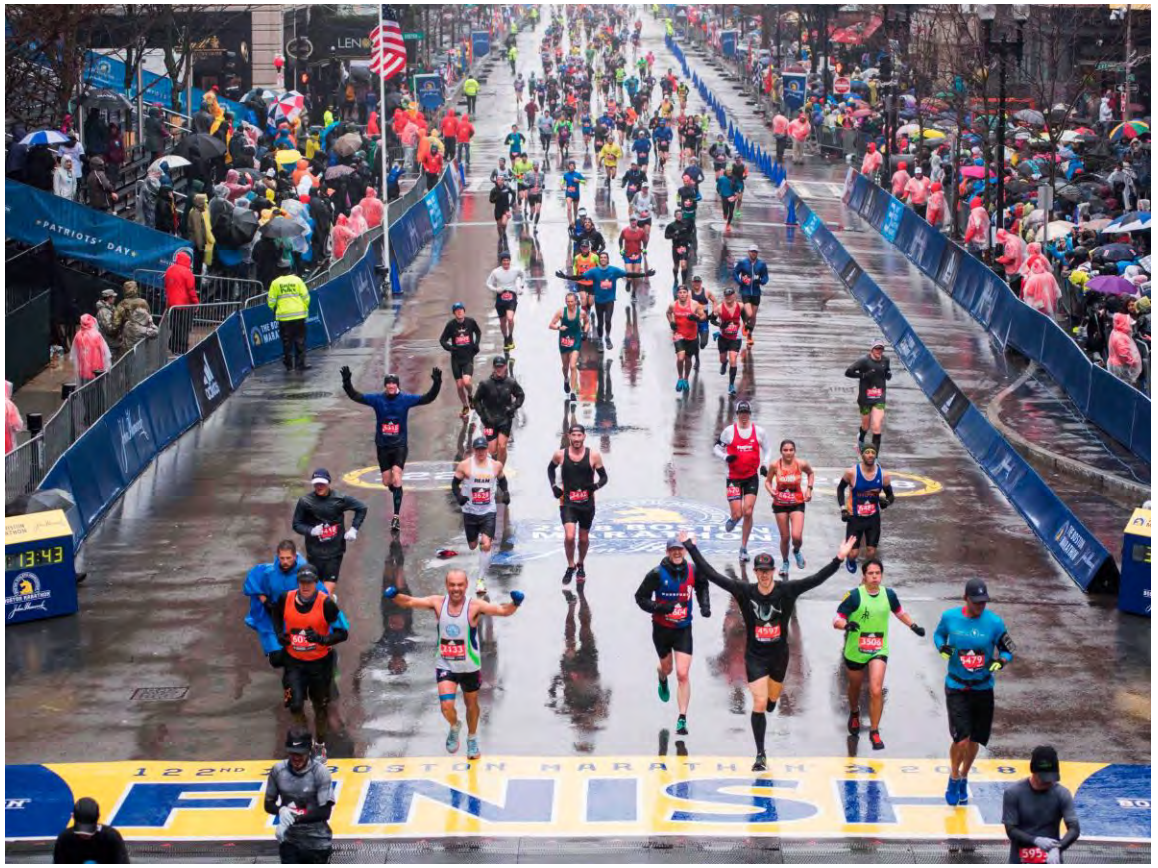


University of Saskatchewan

Human-Driven Climate Change

University of Saskatchewan

Human-Driven Climate Change



UNIVERSITY OF SASKATCHEWAN

WHAT DOES OUR FUTURE LOOK LIKE?

UNIVERSITY OF SASKATCHEWAN

It Depends on Us

POLICY

Sustainable Development ⟷ Free Markets

INEQUALITY

Low ⟷ High

CONSUMPTION

Low ⟷ High

POPULATION GROWTH

Low ⟷ High

COLLABORATION

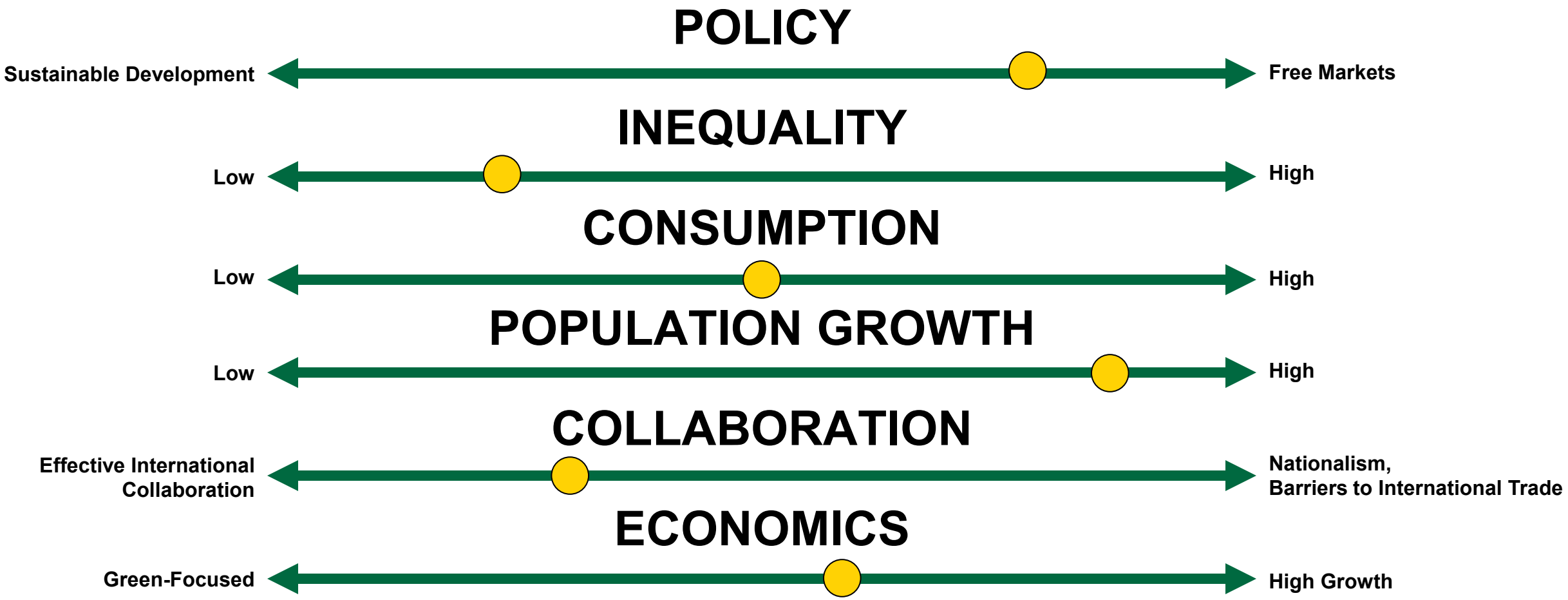
Effective International Collaboration ⟷ Nationalism, Barriers to International Trade

ECONOMICS

Green-Focused ⟷ High Growth

UNIVERSITY OF SASKATCHEWAN

It Depends on Us



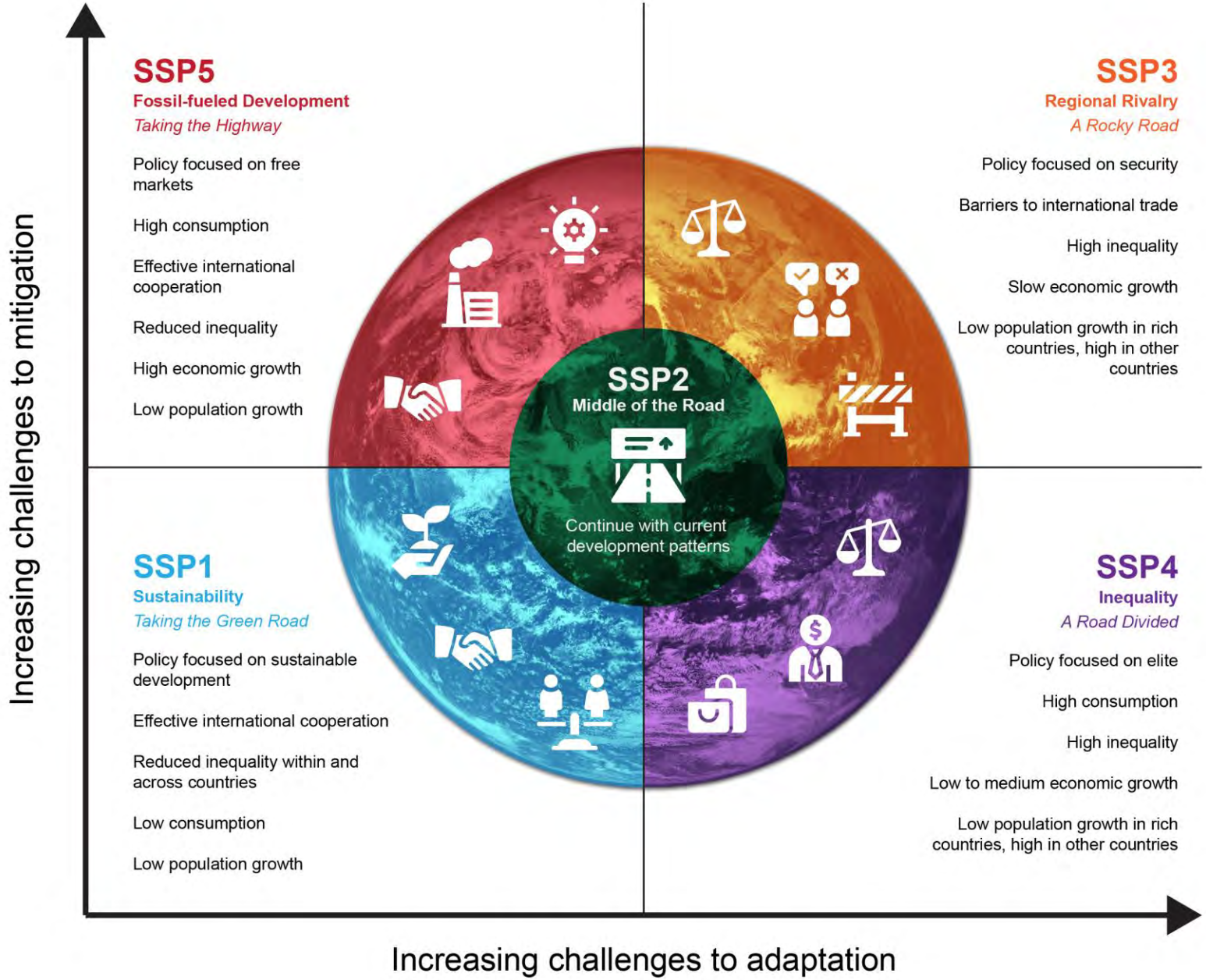


Image from climatedata.ca

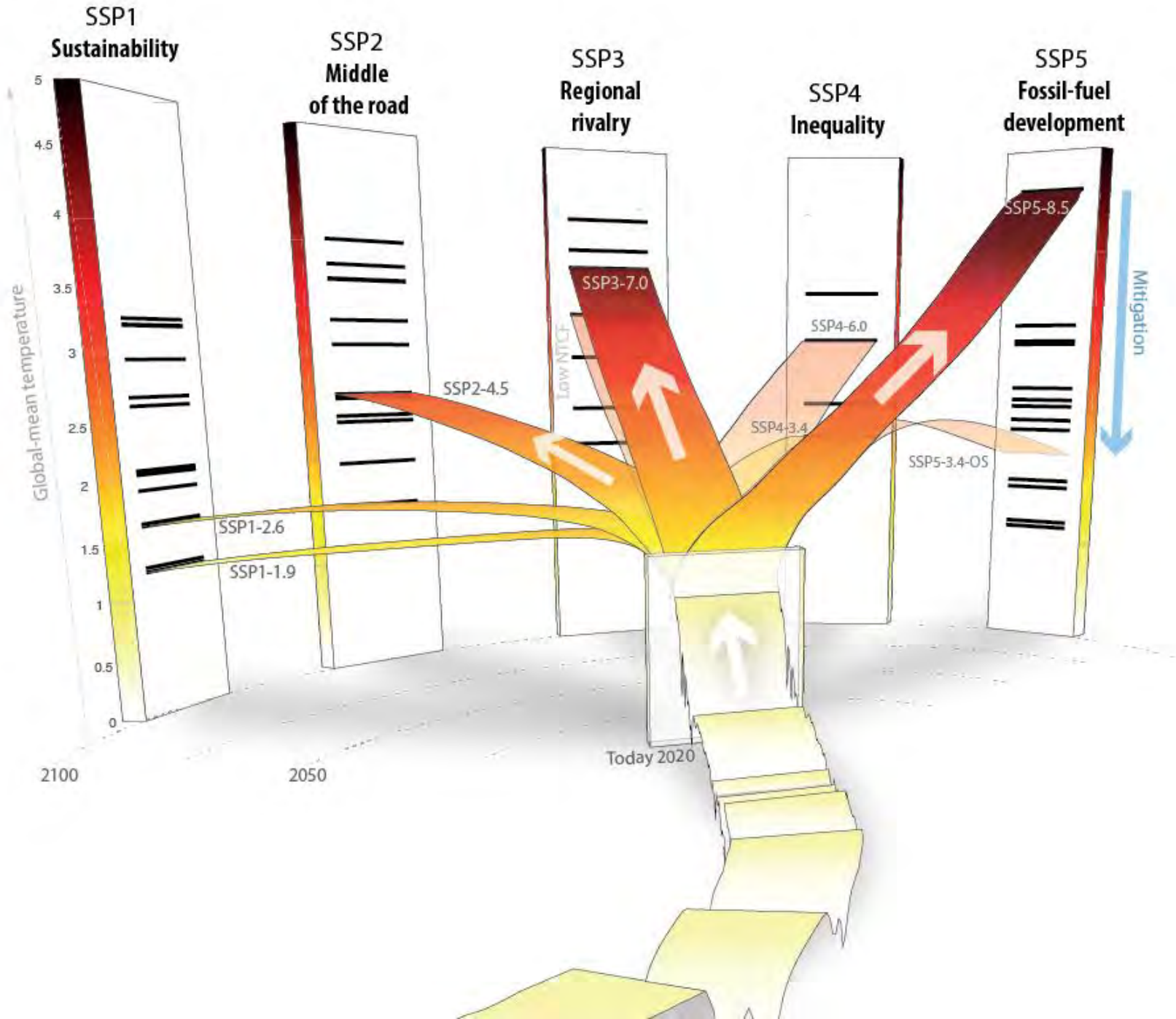
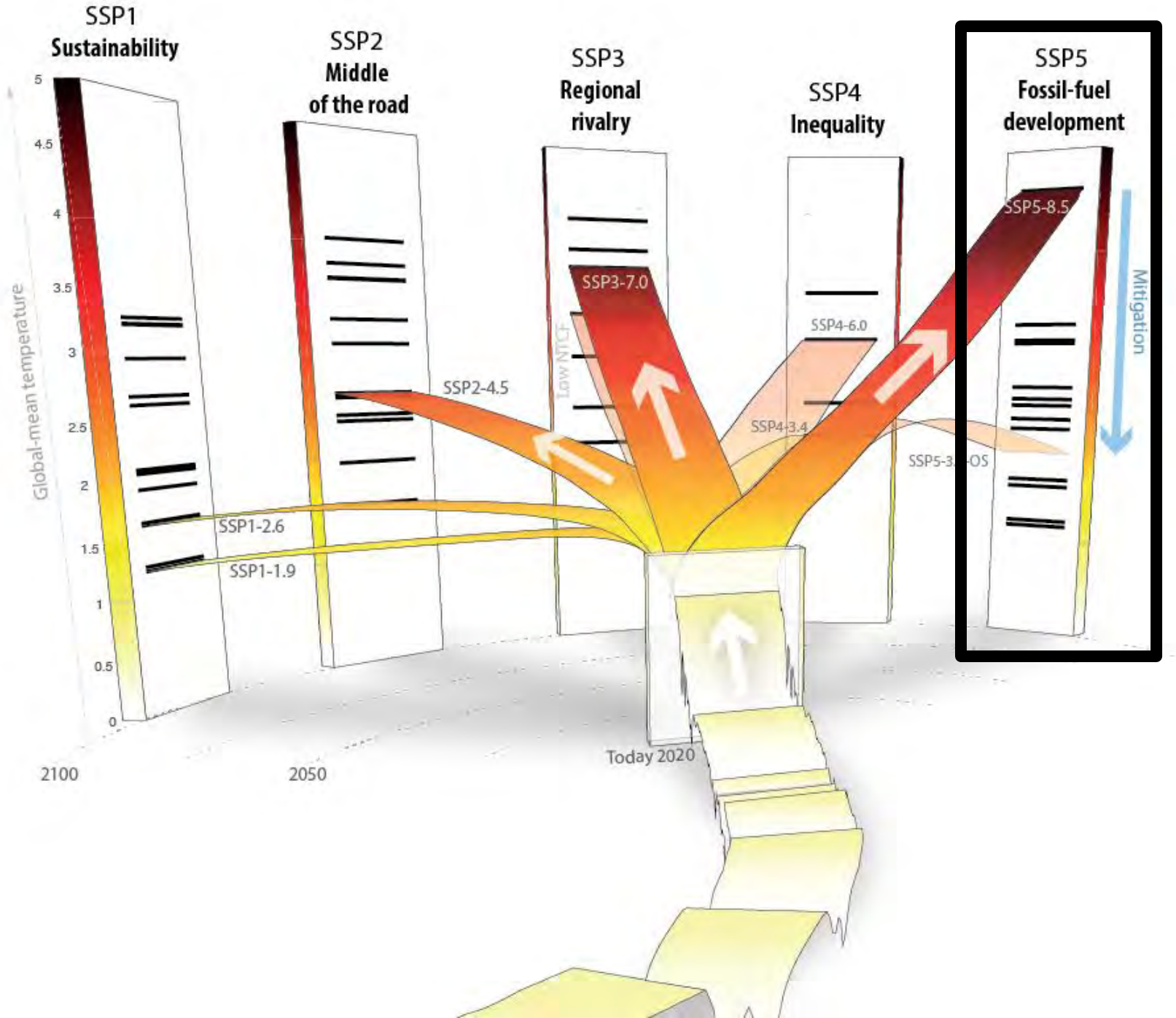


Image from climatedata.ca

Image from climatedata.ca


SSP1
Sustainability
SSP2
Middle
of the road
SSP3
Regional
rivalry
SSP4
Inequality
SSP5
Fossil-fuel
development
Global-mean temperature
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
SSP5-8.5
Mitigation
SSP3-7.0
SSP4-6.0
SSP2-4.5
Low NTCF
SSP4-3.4
SSP5-3
OS
SSP1-2.6
SSP1-1.9
2100
2050
Today 2020

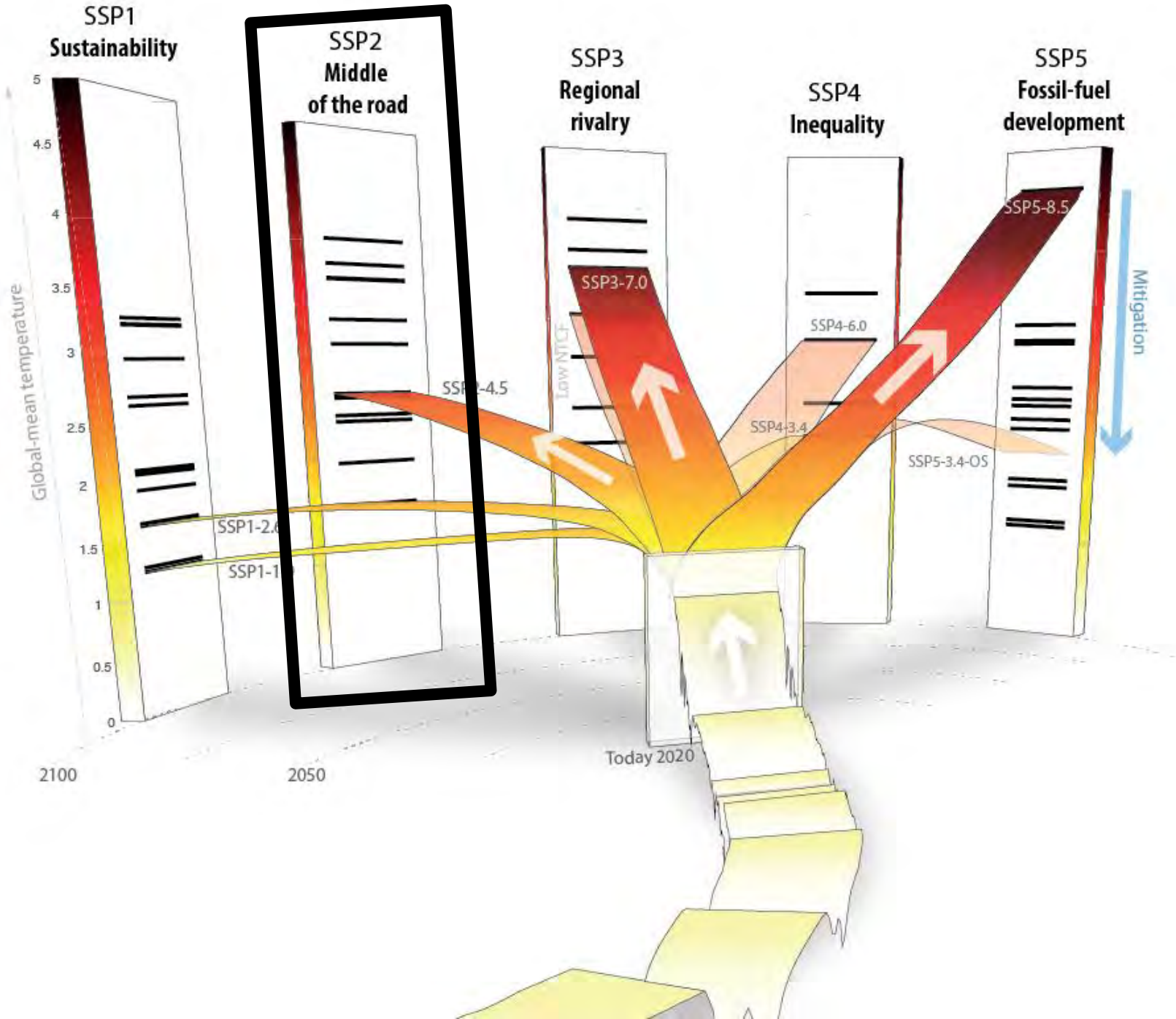
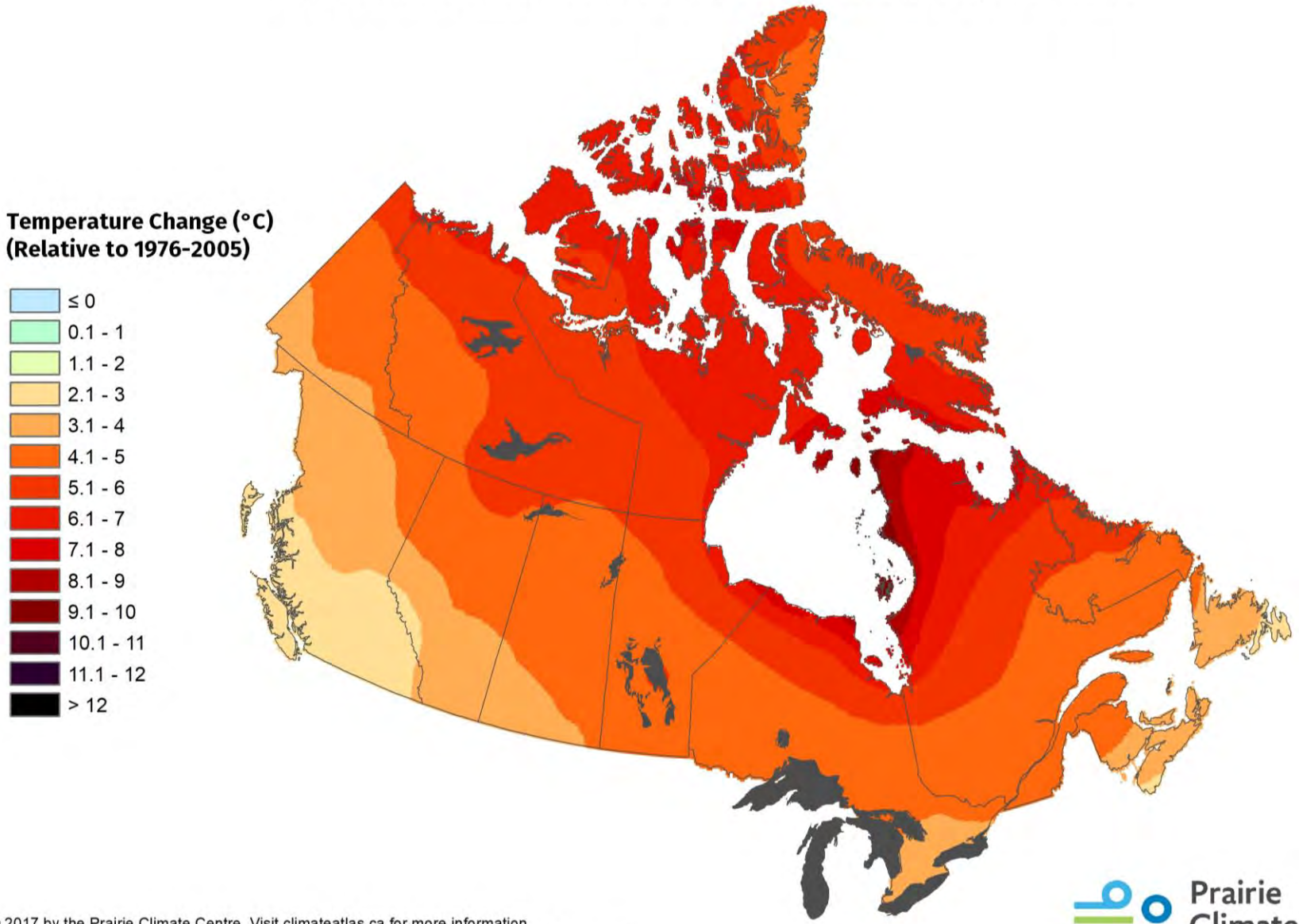


Image from climatedata.ca

2051-2080 Projected Change in Mean Temperature: January

Under the RCP4.5 scenario, relative to a baseline of 1976-2005



Map Data: Ensemble of 12 CMIP5 models (BCSD Statistically Downscaled Climate Scenarios) provided by the Pacific Climate Impacts Consortium, University of Victoria (pacificclimate.org).

Prairie Climate Centre
From Risk to Resilience

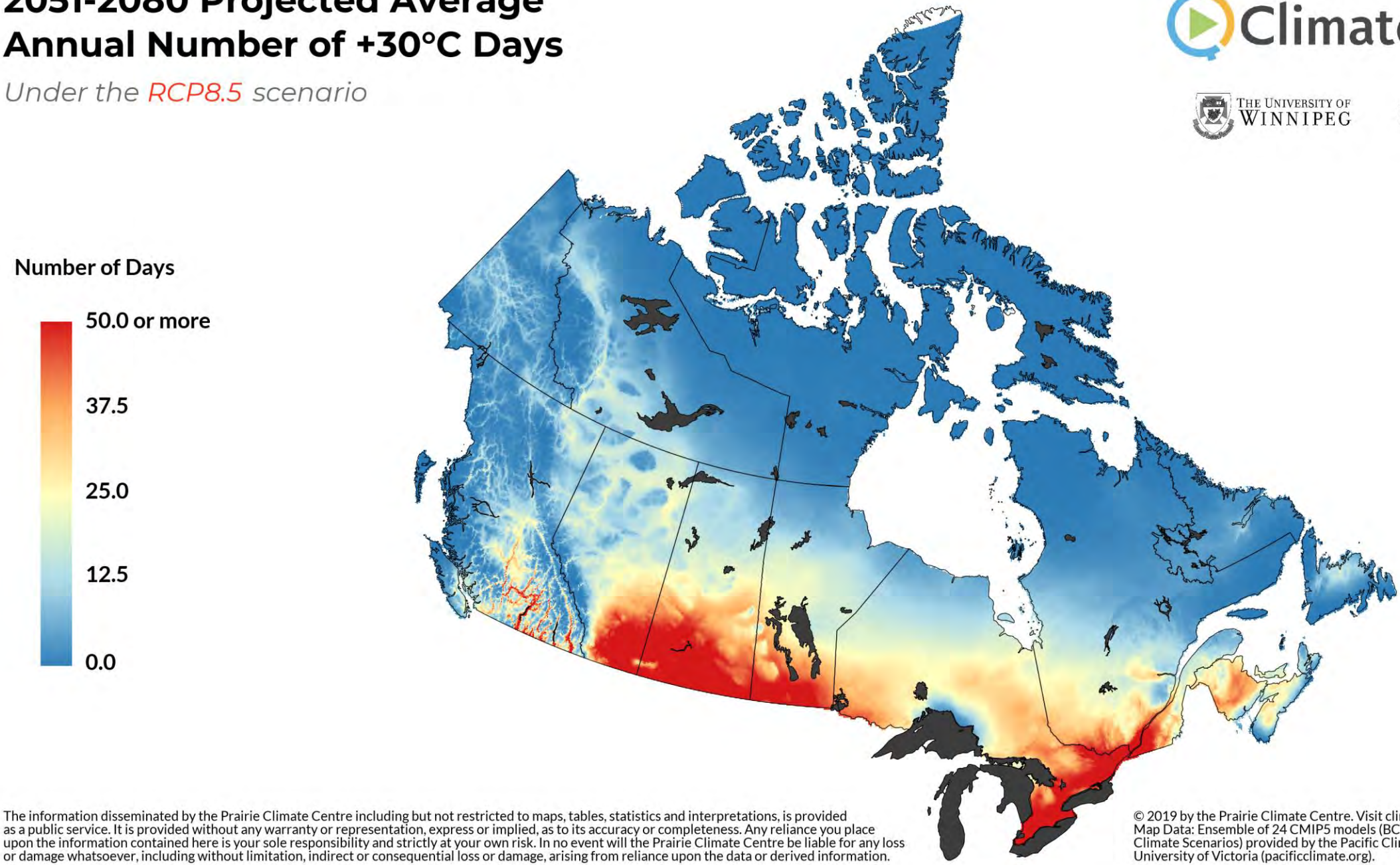
2051-2080 Projected Average Annual Number of +30°C Days

Under the RCP8.5 scenario

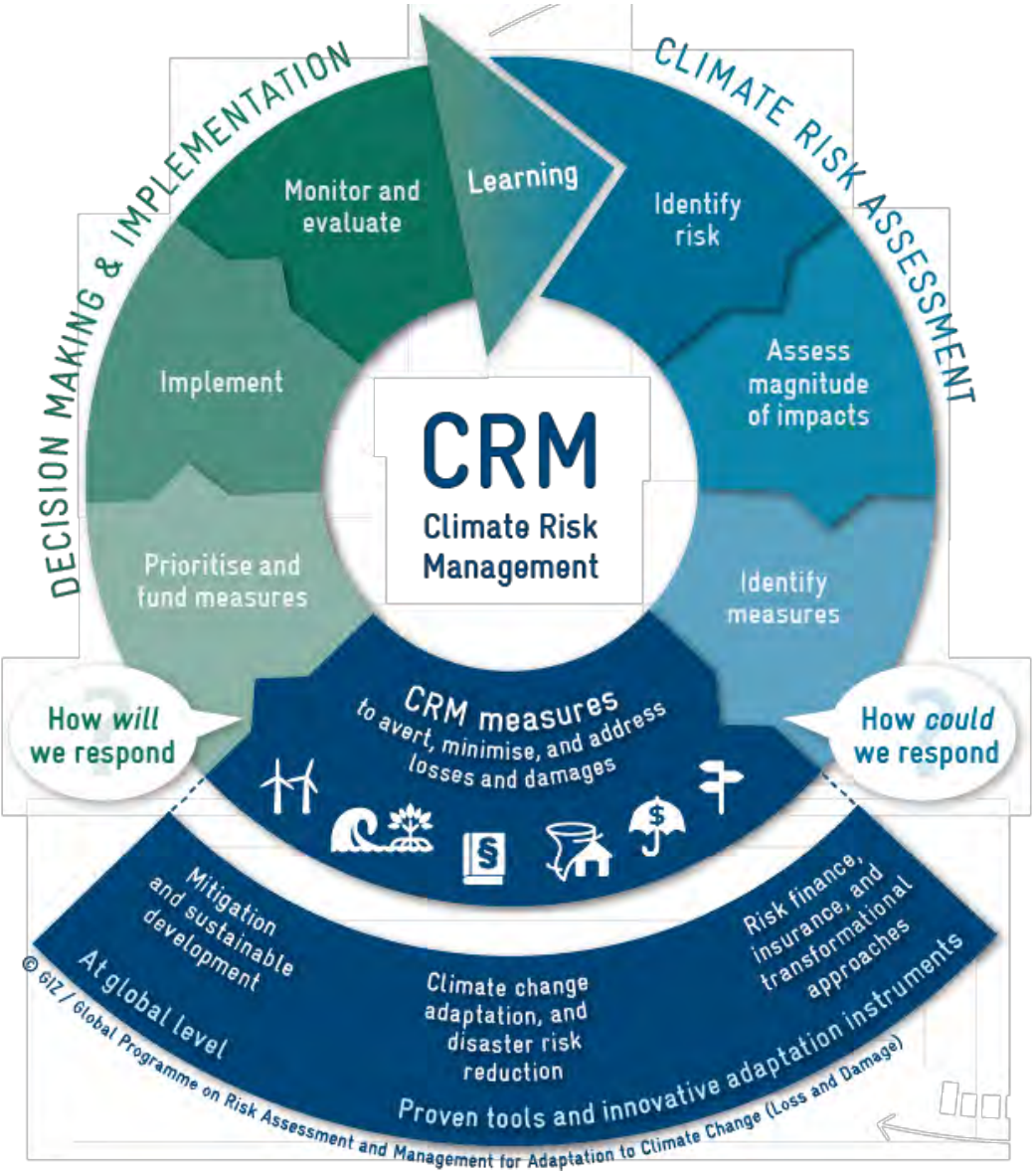
ClimateAtlas.ca

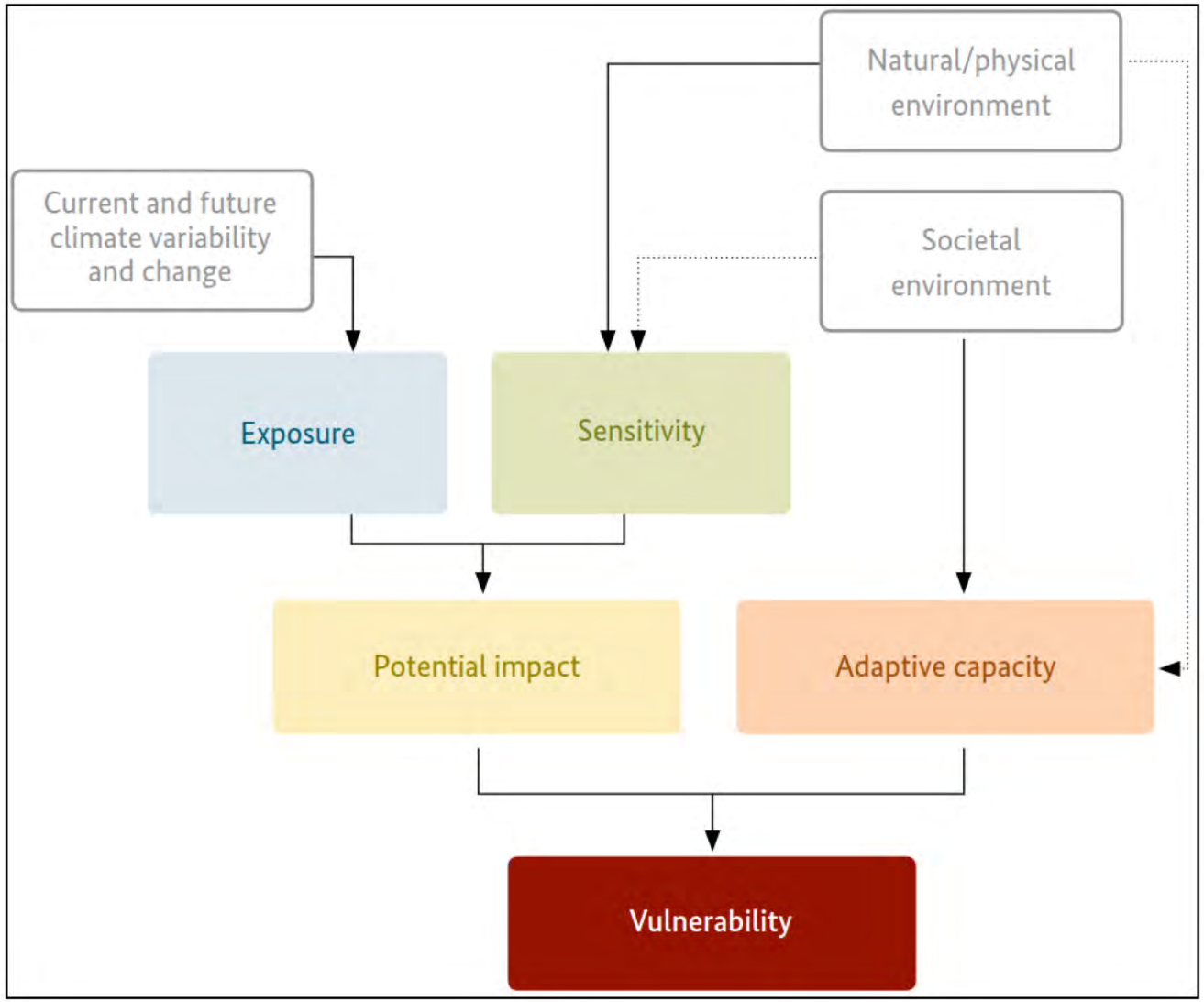
The University of Winnipeg

Prairie Climate Centre
From Risk to Resilience

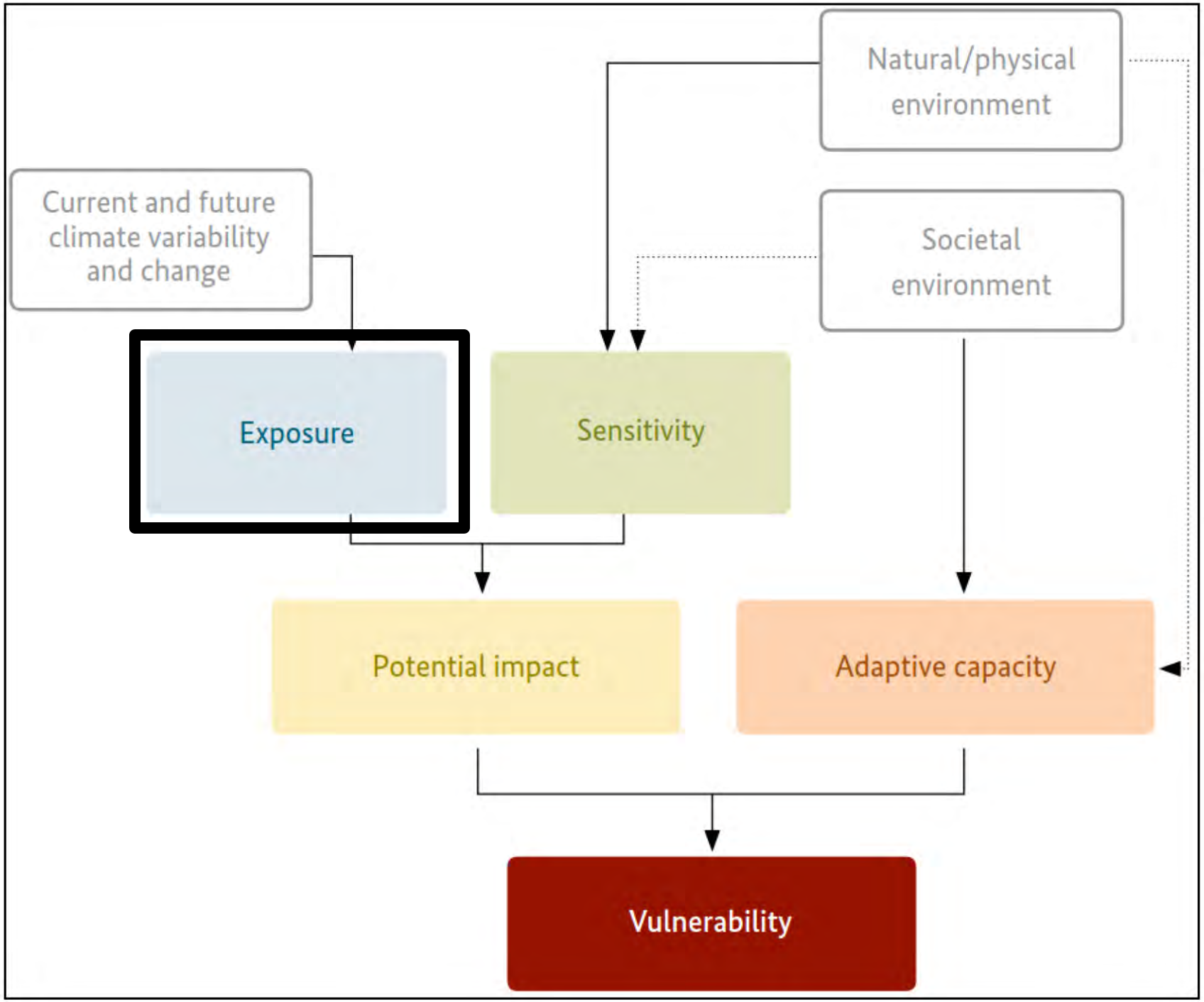


Map Data: Ensemble of 24 CMIP5 models (BCCAQv2 Statistically Downscaled Climate Scenarios) provided by the Pacific Climate Impacts Consortium, University of Victoria (pacificclimate.org).

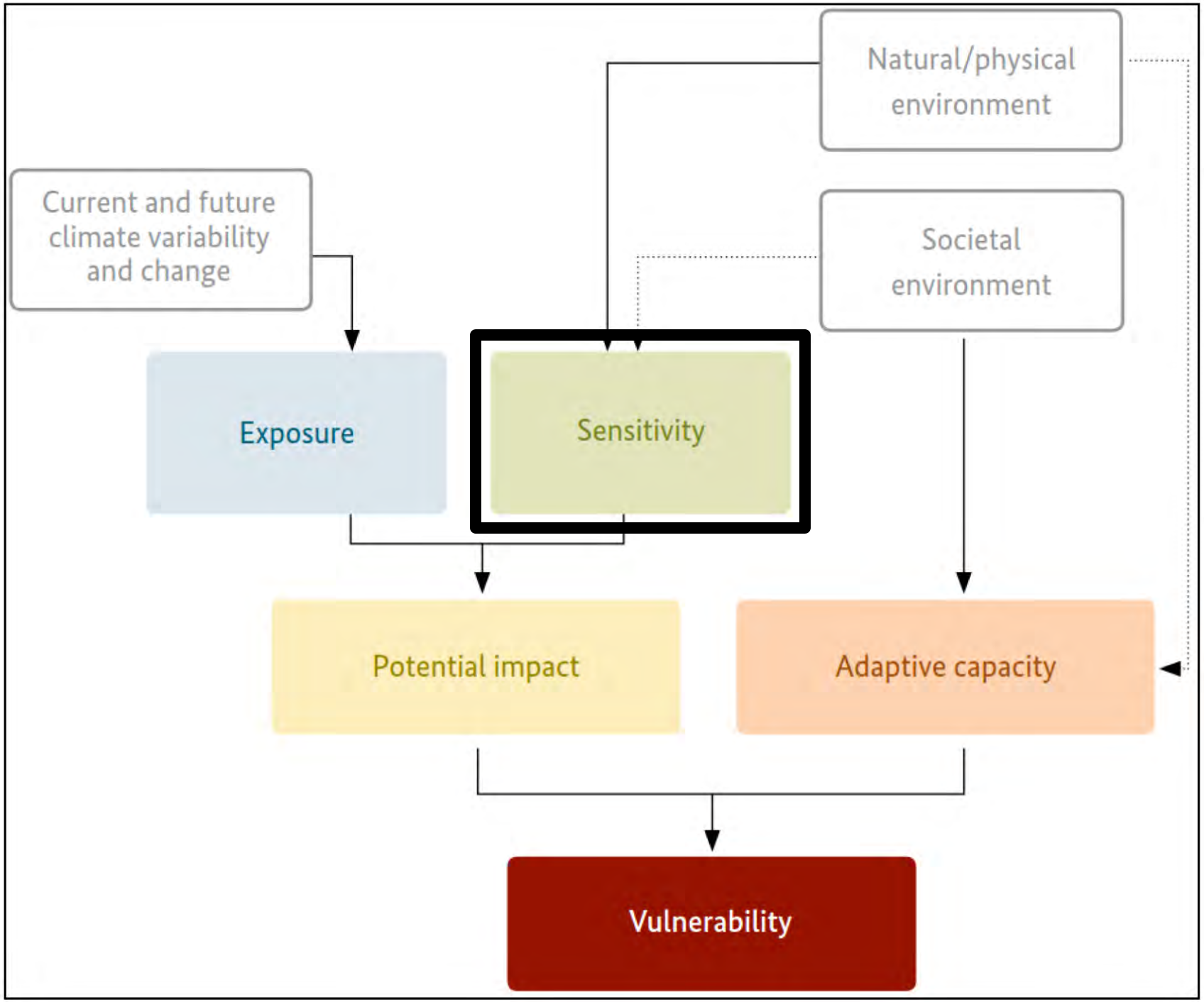

DECISION MAKING & IMPLEMENTATION
CLIMATE RISK ASSESSMENT
Monitor and evaluate
Learning
Identify risk
Assess magnitude of impacts
Identify measures
Prioritise and fund measures
Implement
CRM
Climate Risk Management
How will we respond
How could we respond
CRM measures
to avert, minimise, and address losses and damages
Mitigation and sustainable development
Climate change adaptation, and disaster risk reduction
Risk finance, insurance, and transformational approaches
At global level
Proven tools and innovative adaptation instruments
© GIZ / Global Programme on Risk Assessment and Management for Adaptation to Climate Change (Loss and Damage)

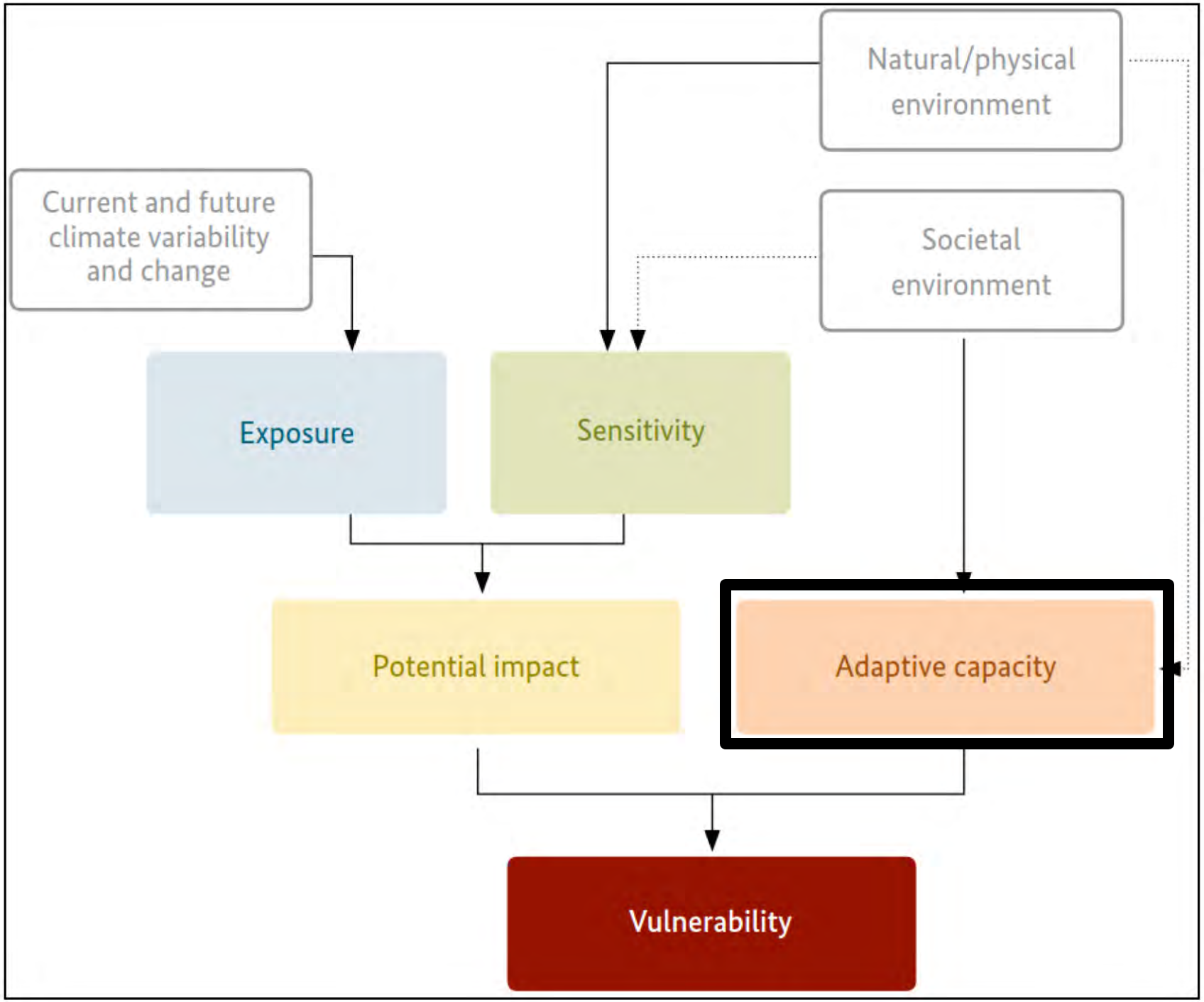

Natural/physical environment
Current and future climate variability and change
Societal environment
Exposure
Sensitivity
Potential impact
Adaptive capacity
Vulnerability


Ocean chemistry
Marine heatwave
Mean ocean temperature
Coastal flood
Relative sea level
Snow, glacier and ice sheet
Severe wind storm
Mean wind speed
Fire weather
Drought
Aridity
Heavy precipitation and river flood
Mean precipitation
Frost
Extreme heat
Mean air temperature


Natural/physical environment
Current and future climate variability and change
Societal environment
Exposure
Sensitivity
Potential impact
Adaptive capacity
Vulnerability


Mean air temperature
Extreme heat
Frost
Mean precipitation
Heavy precipitation and river flood
Aridity
Drought
Fire weather
Mean wind speed
Severe wind storm


Natural/physical environment
Current and future climate variability and change
Societal environment
Exposure
Sensitivity
Potential impact
Adaptive capacity
Vulnerability

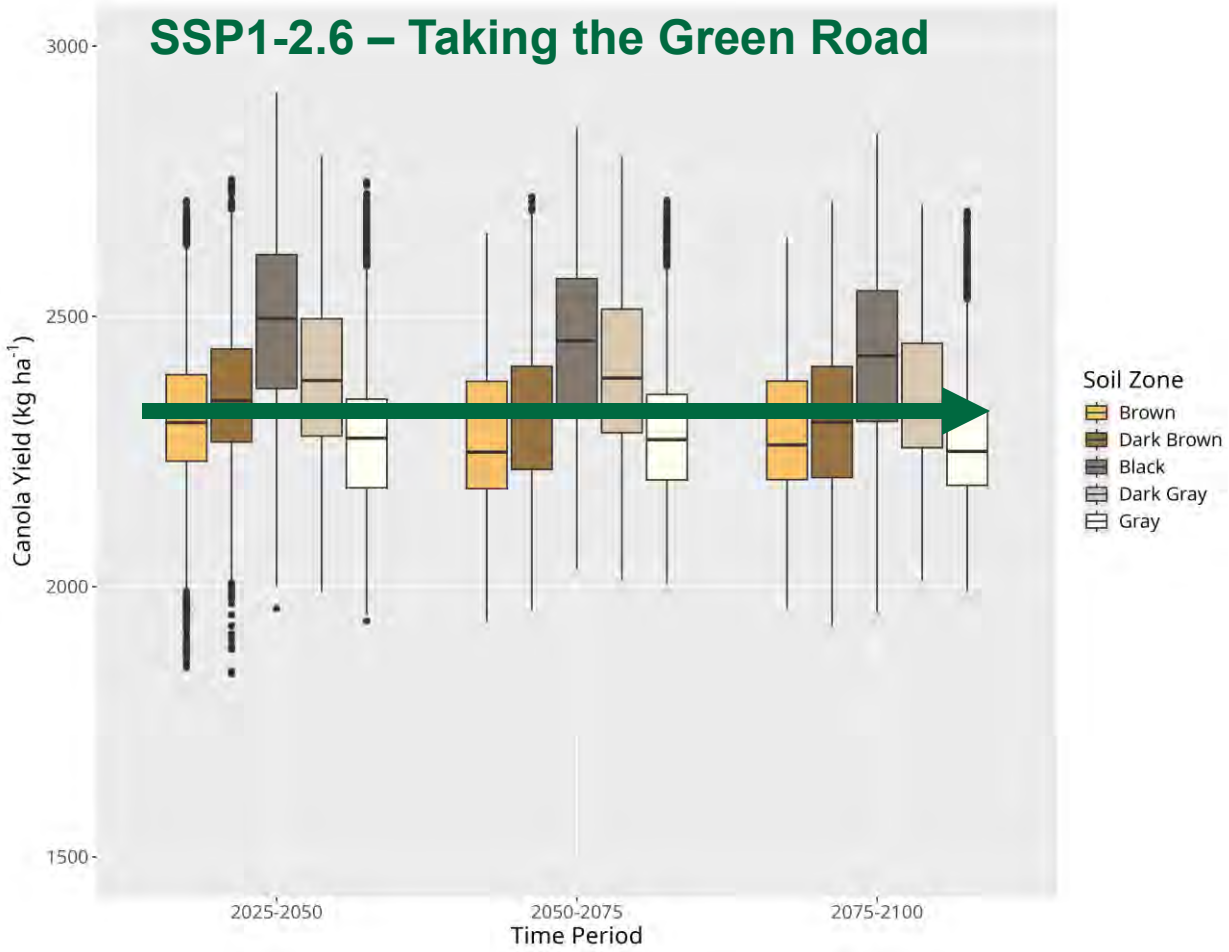

Natural/physical environment
Current and future climate variability and change
Societal environment
Exposure
Sensitivity
Potential impact
Adaptive capacity
Vulnerability


Mean air temperature
Extreme heat
Mean precipitation
Heavy precipitation and river flood
Aridity
Drought
Fire weather
Mean wind speed
Severe wind storm

University of Saskatchewan

Climate Change Vulnerability, Risk, and Resilience

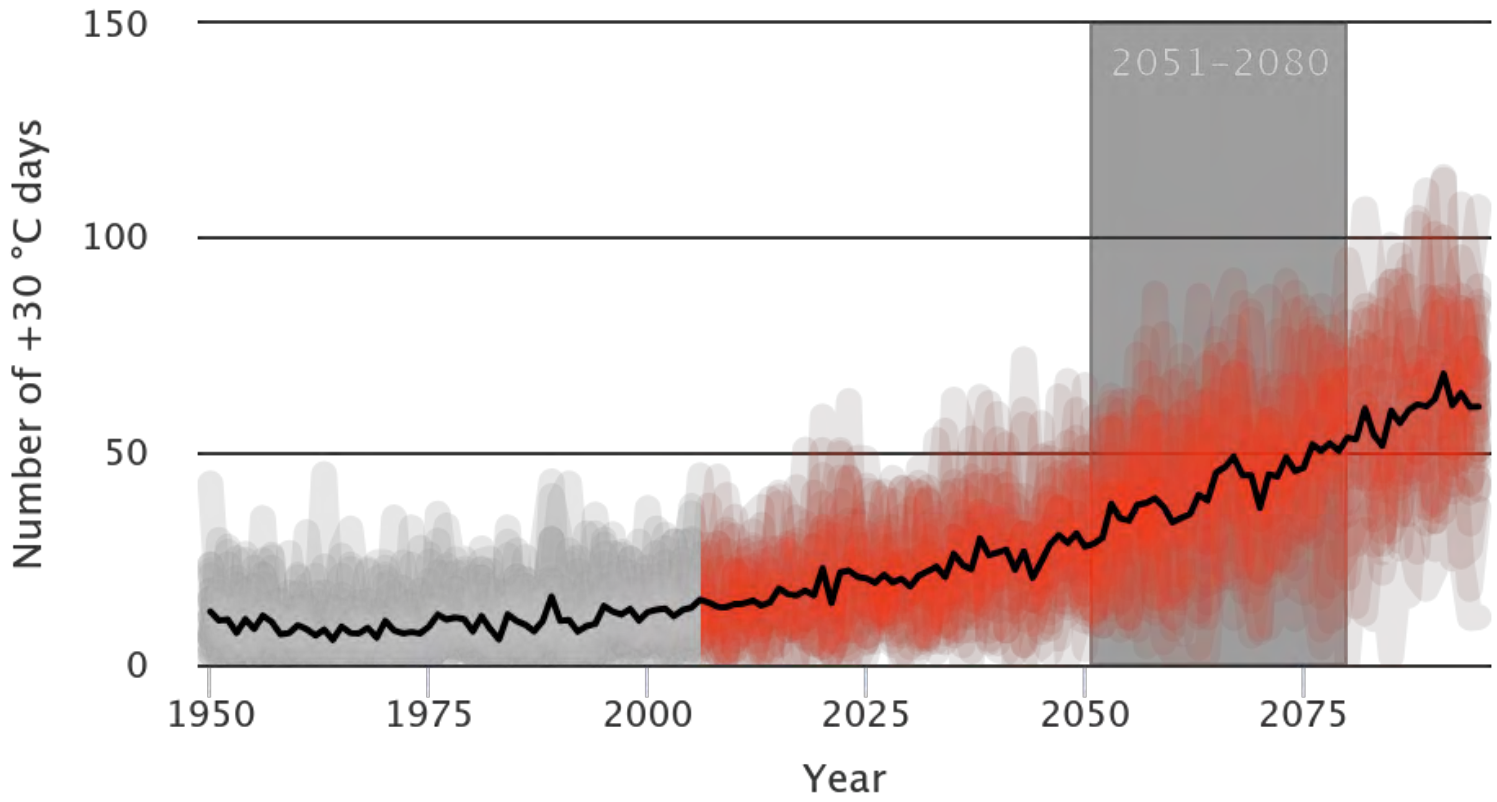
Likelihood		Consequence				
		Negligible 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
	5 Almost certain	Moderate 5	High 10	Extreme 15	Extreme 20	Extreme 25
	4 Likely	Moderate 4	High 8	High 12	Extreme 16	Extreme 20
	3 Possible	Low 3	Moderate 6	High 9	High 12	Extreme 15
	2 Unlikely	Low 2	Moderate 4	Moderate 6	High 8	High 10
	1 Rare	Low 1	Low 2	Low 3	Moderate 4	Moderate 5



UNIVERSITY OF SASKATCHEWAN

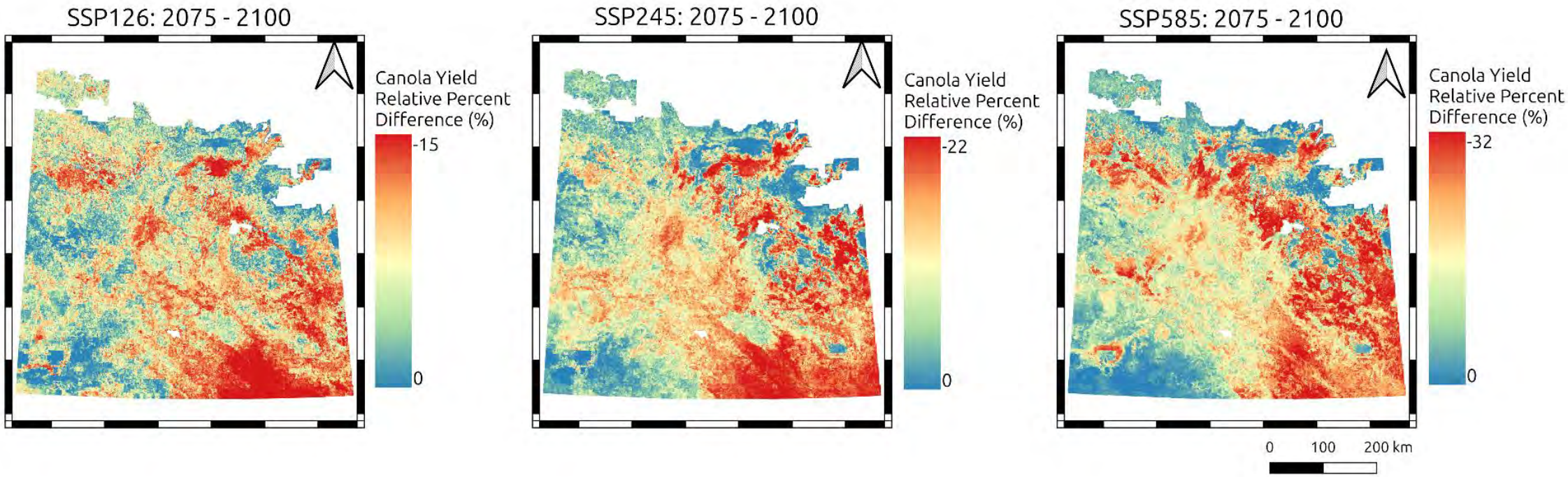
Number of +30 °C days

Saskatoon (Municipality)



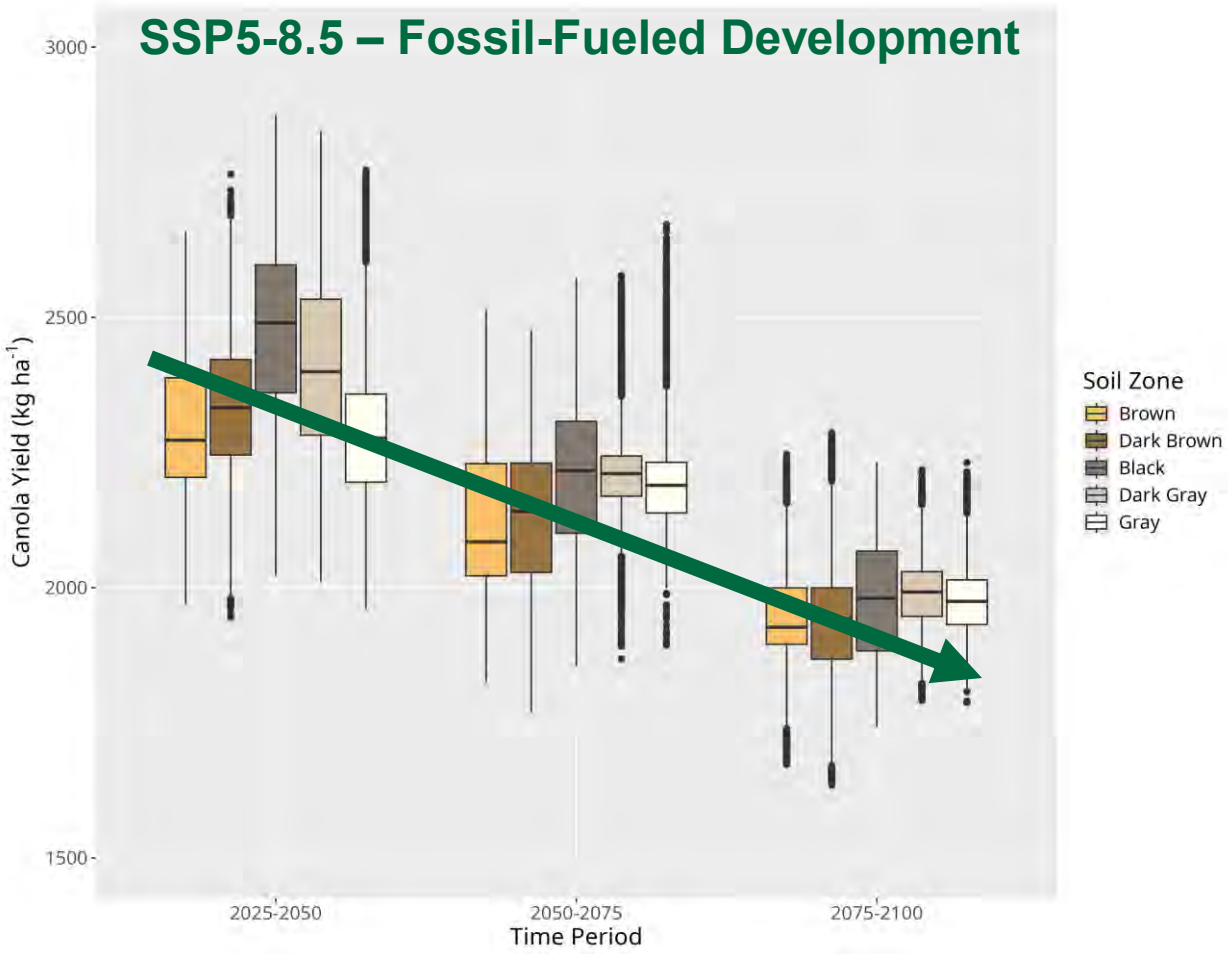
University of Saskatchewan

Future Canola Yield Change



Climate Change Vulnerability, Risk, and Resilience

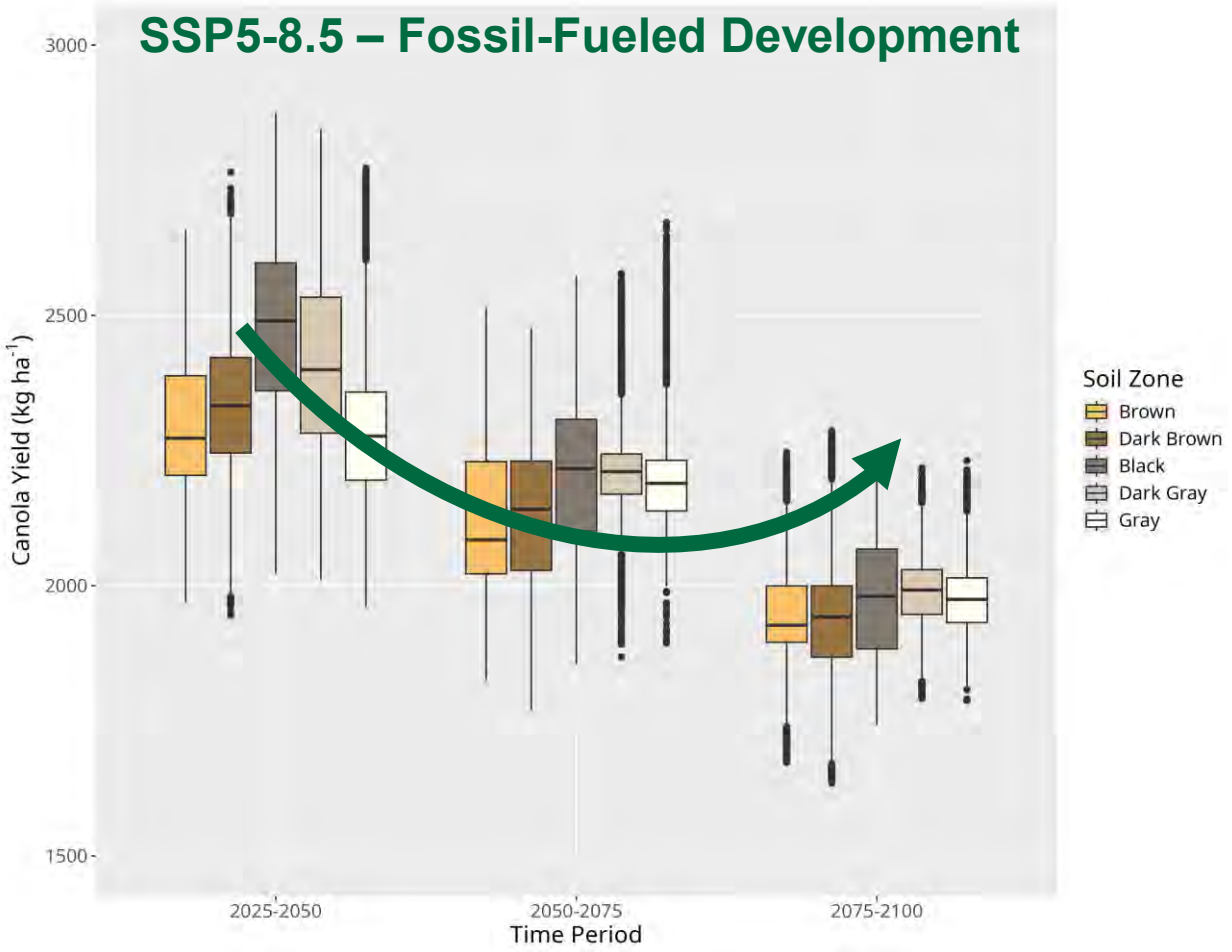
Likelihood		Consequence: Negligible 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
	5 Almost certain	Moderate 5	High 10	Extreme 15	Extreme 20	Extreme 25
	4 Likely	Moderate 4	High 8	High 12	Extreme 16	Extreme 20
	3 Possible	Low 3	Moderate 6	High 9	High 12	Extreme 15
	2 Unlikely	Low 2	Moderate 4	Moderate 6	High 8	High 10
	1 Rare	Low 1	Low 2	Low 3	Moderate 4	Moderate 5



University of Saskatchewan

Climate Change Vulnerability, Risk, and Resilience

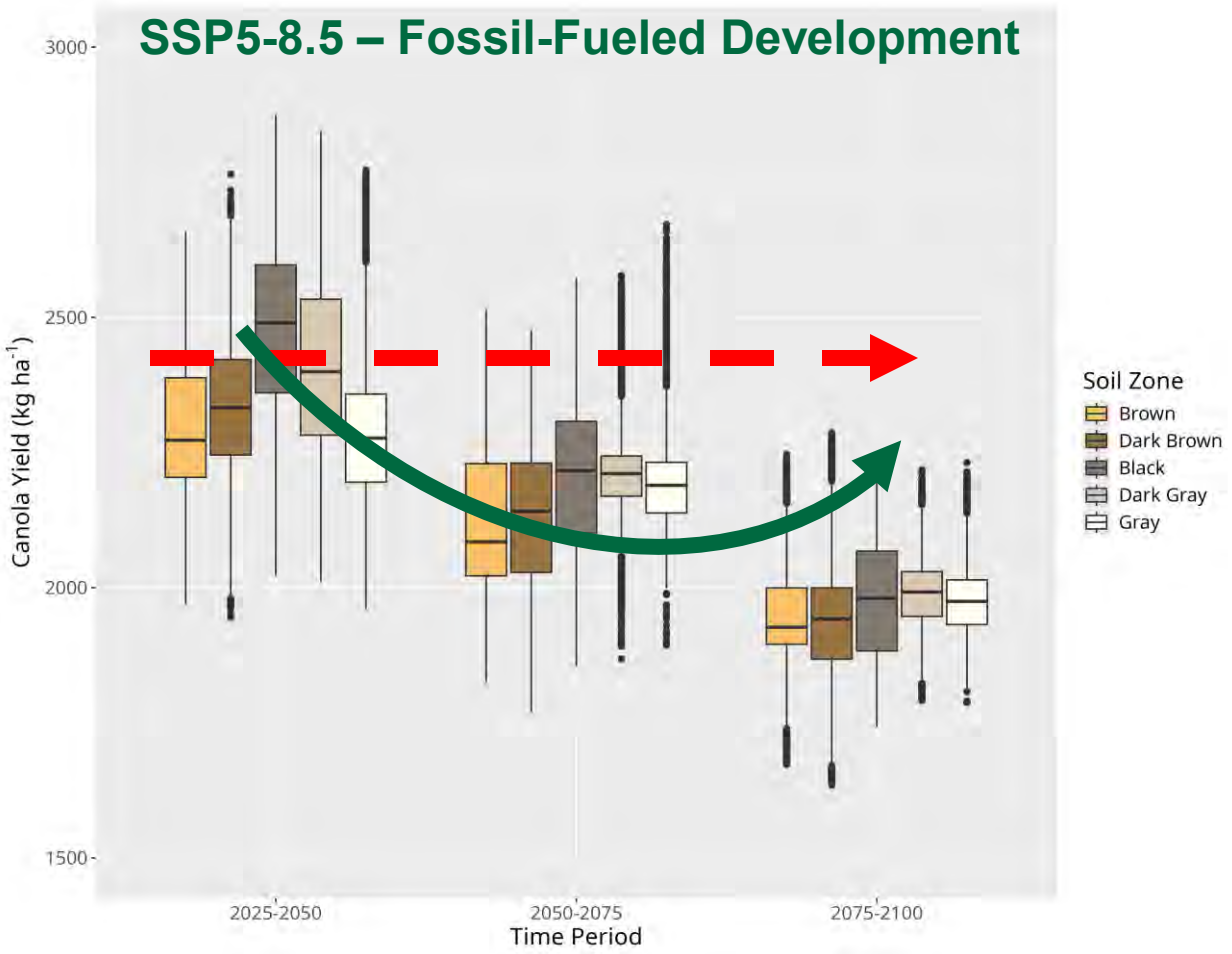
Likelihood	Negligible 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
5 Almost certain	Moderate 5	High 10	Extreme 15	Extreme 20	Extreme 25
4 Likely	Moderate 4	High 8	High 12	Extreme 16	Extreme 20
3 Possible	Low 3	Moderate 6	High 9	High 12	Extreme 15
2 Unlikely	Low 2	Moderate 4	Moderate 6	High 8	High 10
1 Rare	Low 1	Low 2	Low 3	Moderate 4	Moderate 5



UNIVERSITY OF SASKATCHEWAN

Climate Change Vulnerability, Risk, and Resilience

Likelihood	Negligible 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
5 Almost certain	Moderate 5	High 10	Extreme 15	Extreme 20	Extreme 25
4 Likely	Moderate 4	High 8	High 12	Extreme 16	Extreme 20
3 Possible	Low 3	Moderate 6	High 9	High 12	Extreme 15
2 Unlikely	Low 2	Moderate 4	Moderate 6	High 8	High 10
1 Rare	Low 1	Low 2	Low 3	Moderate 4	Moderate 5



University of Saskatchewan

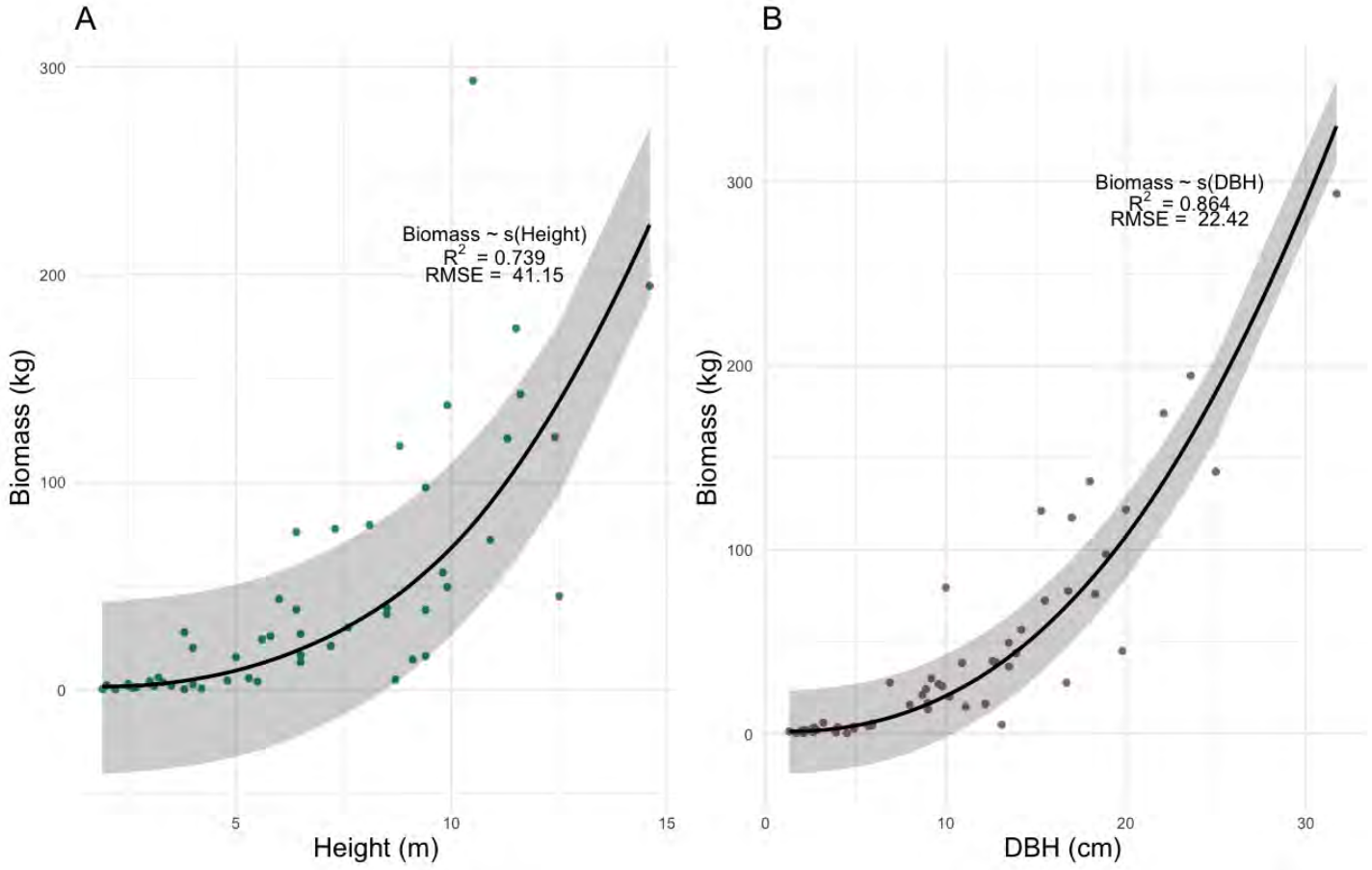
Climate Change Vulnerability, Risk, and Resilience

University of Saskatchewan

Climate Change Vulnerability, Risk, and Resilience

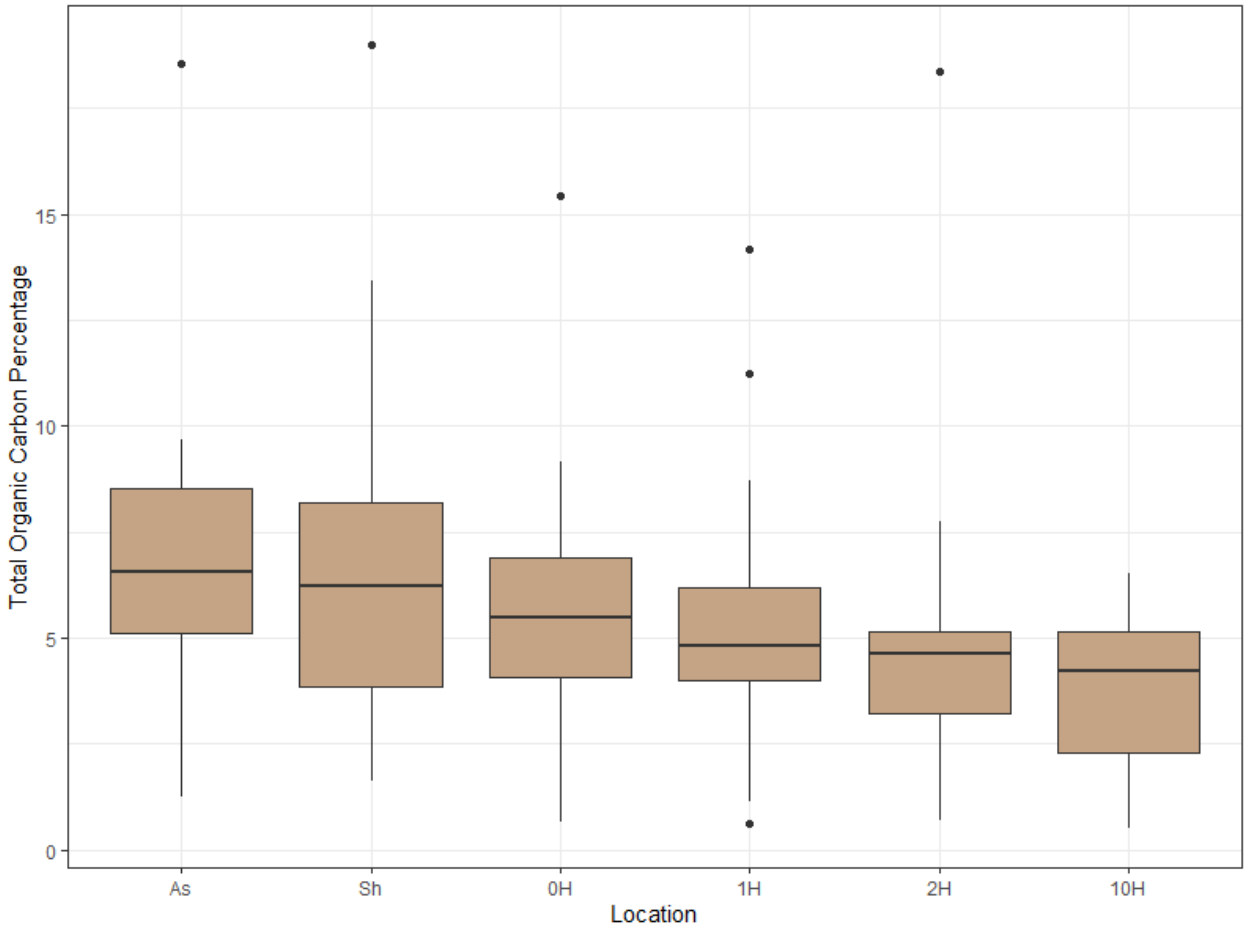
UNIVERSITY OF SASKATCHEWAN

Climate Change Vulnerability, Risk, and Resilience



UNIVERSITY OF SASKATCHEWAN

Climate Change Vulnerability, Risk, and Resilience



University of Saskatchewan

Climate Adaptation and Resilience

Adaptation

Canola Yield

- Quantified future risks and consequences to canola
- Identified locations of higher risk

Can we leverage this information to support policy, planning, or research priorities?

Resilience

Shelterbelts and Aspen Bluffs

- Higher soil moisture retention
- Ecosystem services
- Store significant carbon

What else do they provide?

Ongoing research, share your thoughts!

UNIVERSITY OF SASKATCHEWAN

Questions?

Contact:
Bryan Mood
bryan.mood@usask.ca
(306) 966 6869