

BC's Changing Climate

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**Forests, Lands and Natural Resource Operations
Victoria, BC**



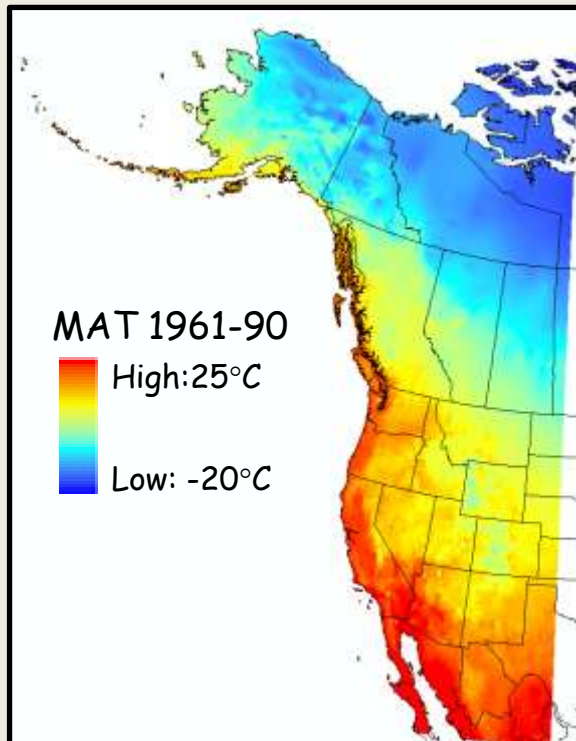
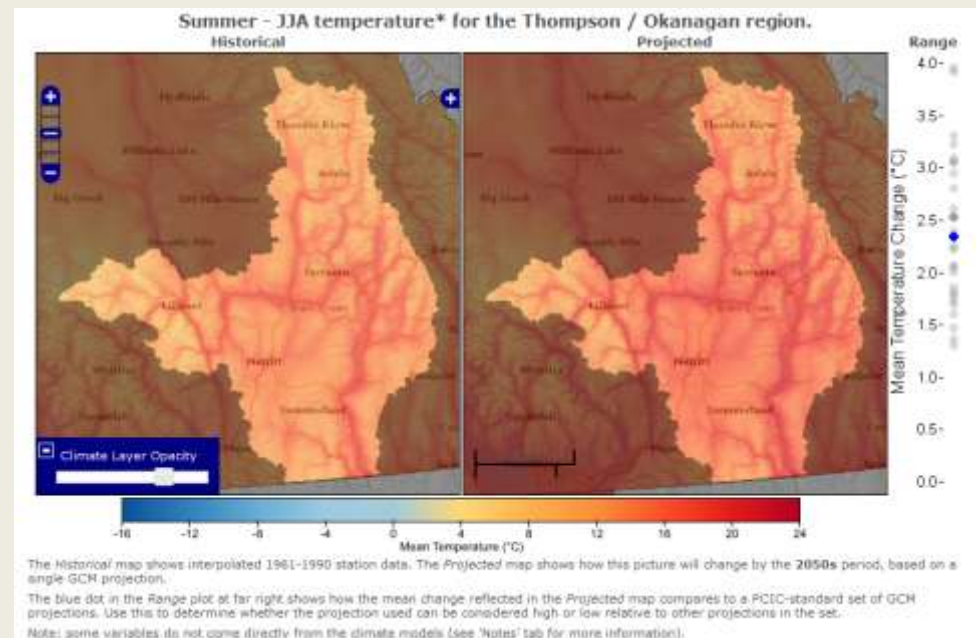
Outline

- Observed changes in climate
- Projected changes in climate
- Gaps and priorities for future work
- Summary

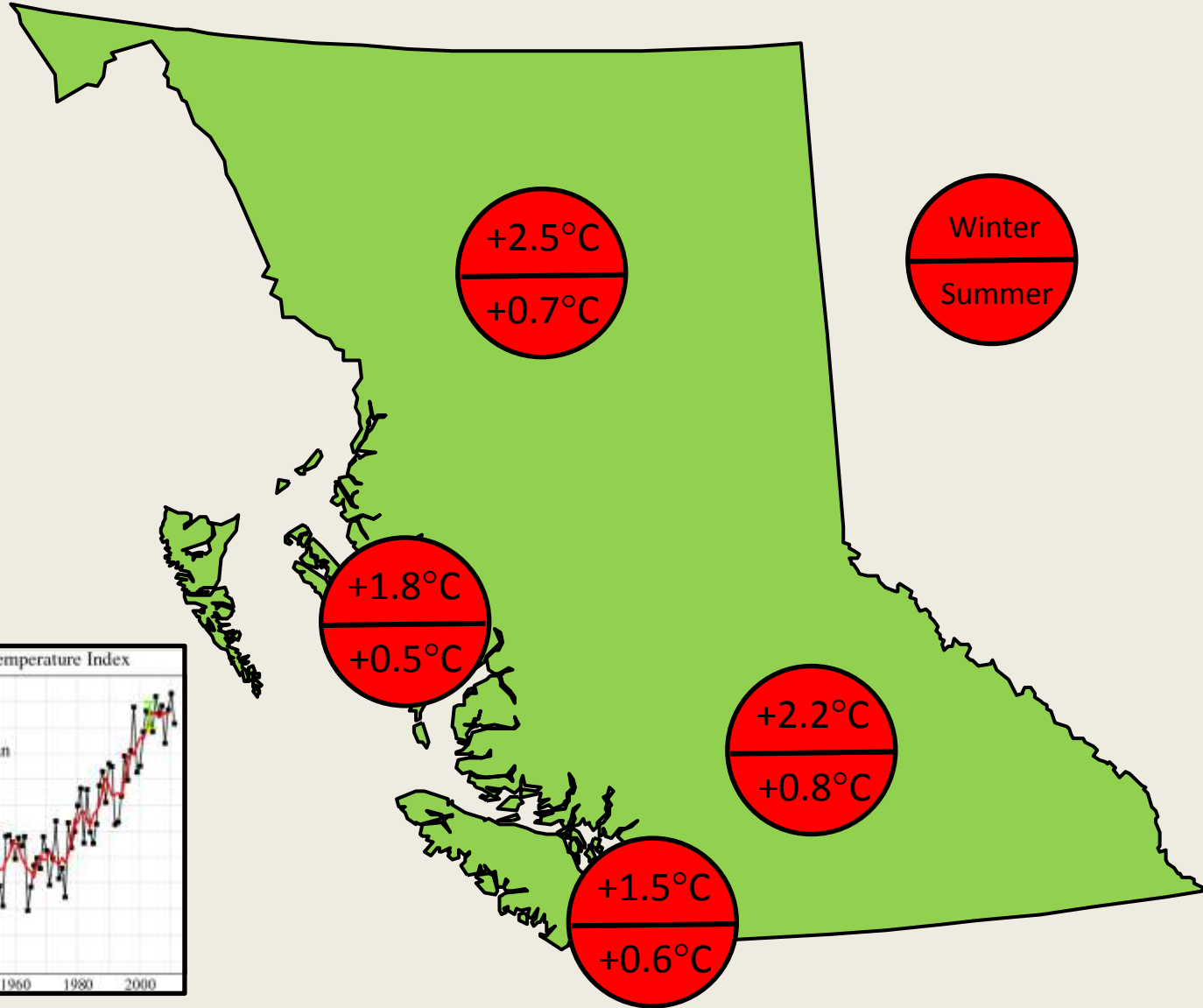
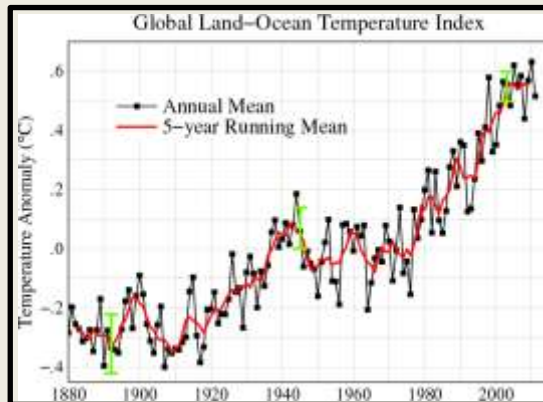


Acknowledgements

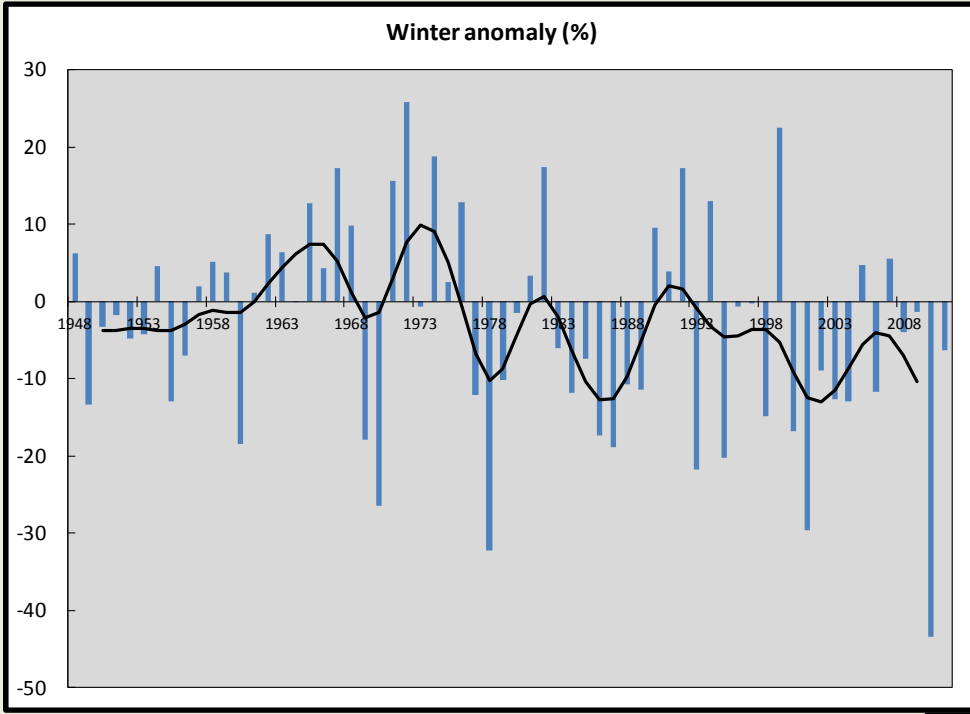
- Trevor Murdock, Gerd Bürger et al., PCIC
- Tongli Wang, UBC



Increase in winter and summer air temperature in BC 1901-2010



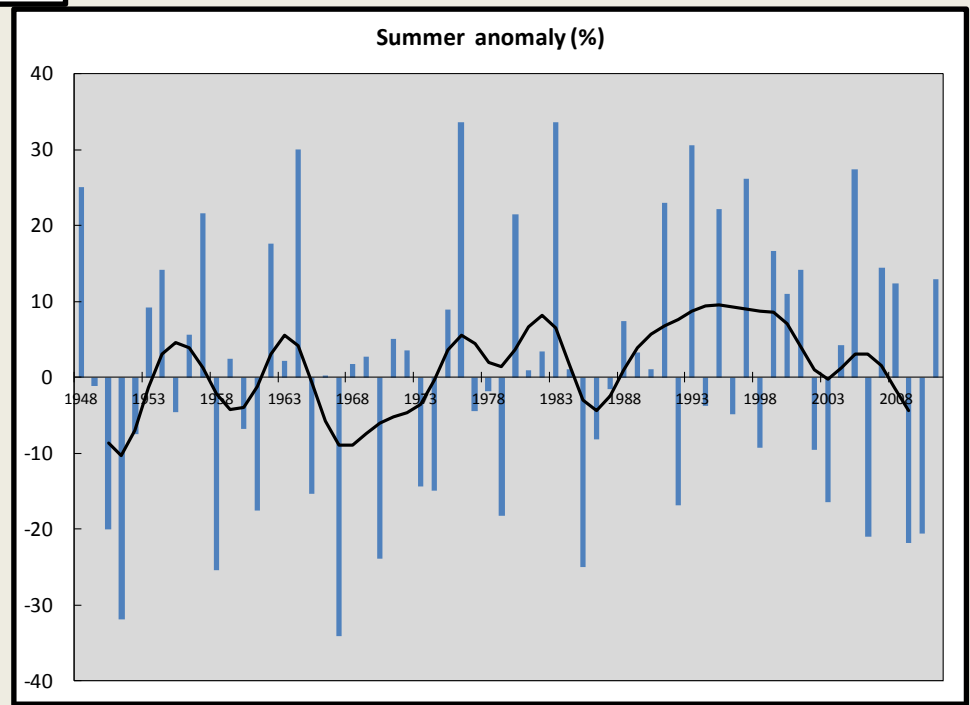
(Adapted from Zhang et al. 2000, Moore et al. 2010, Pike et al. 2010, Environment Canada 2011, http://data.giss.nasa.gov/gistemp/graphs_v3/)



BC precipitation trend 1948-2011

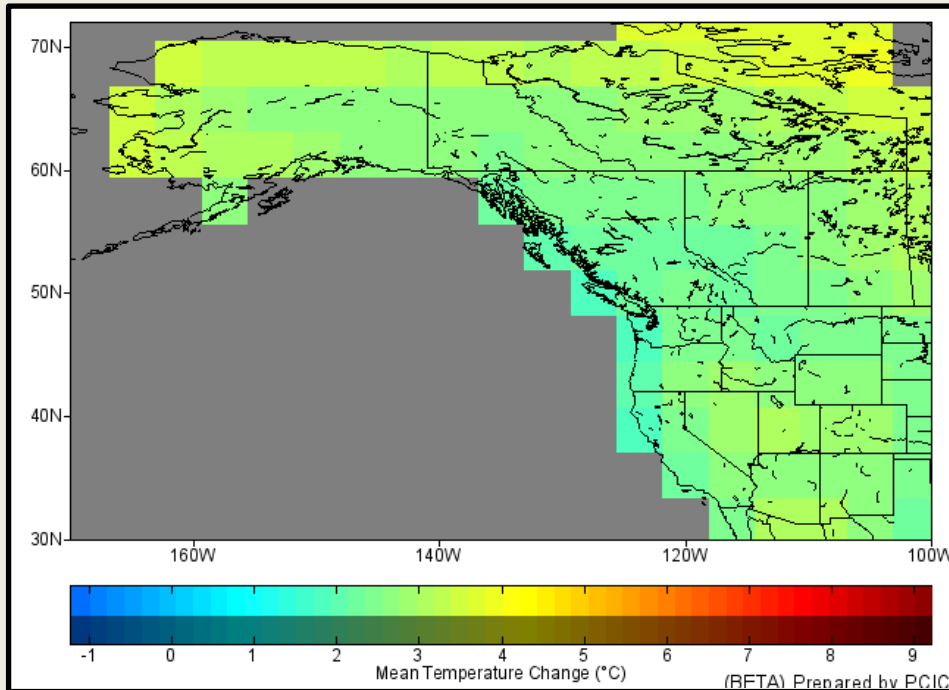
% difference in precipitation from 1961-90 normals

- Yearly anomaly
- Moving average

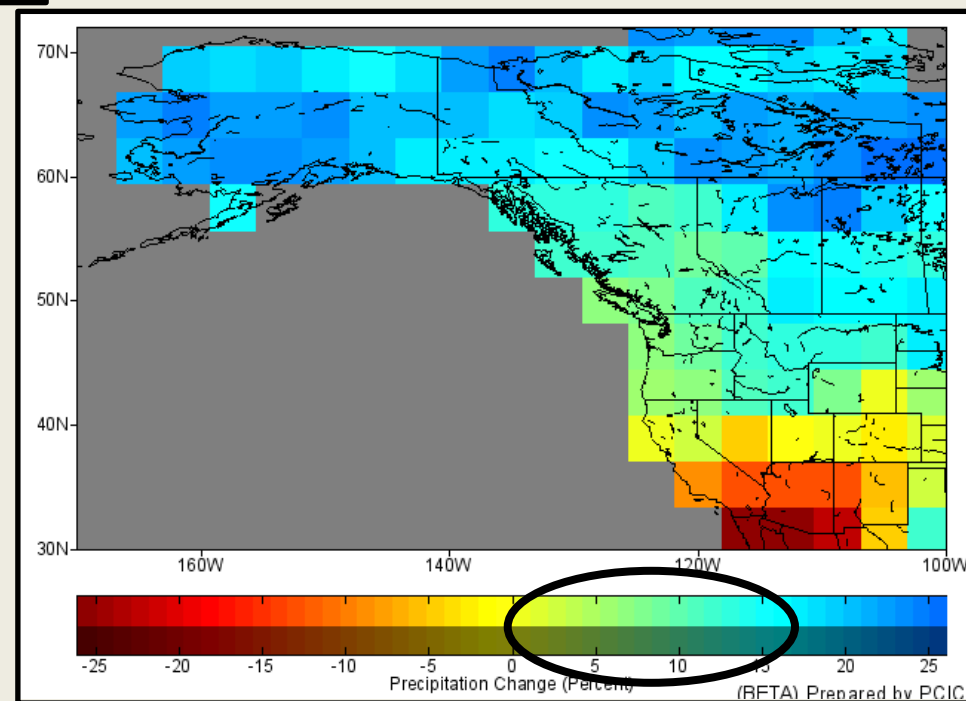


(Source: Environment Canada, Trends and Variations web site)

Examples of projected change
by 2050s from CGCM3r1 A2



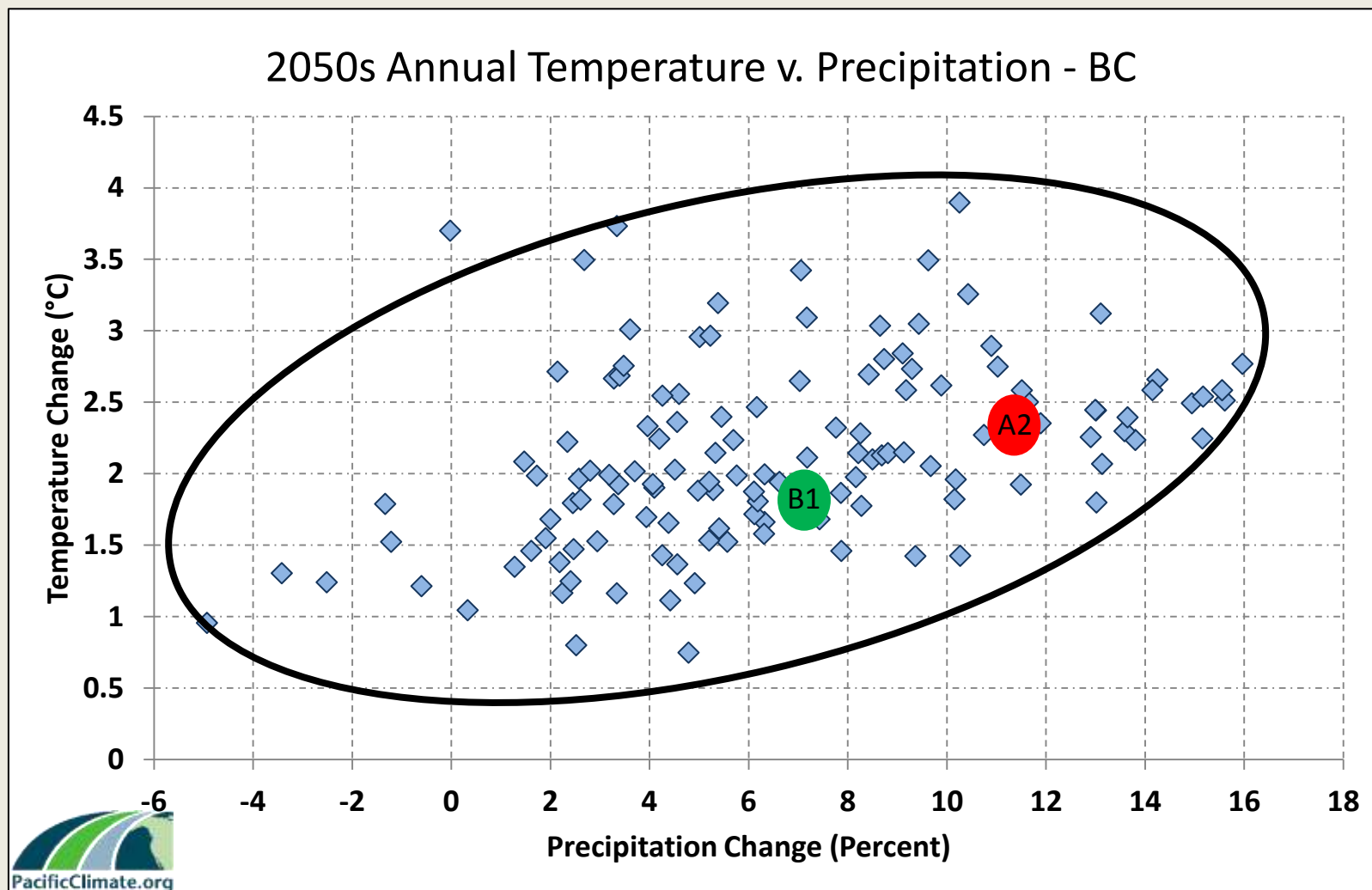
Mean annual precipitation change (%)



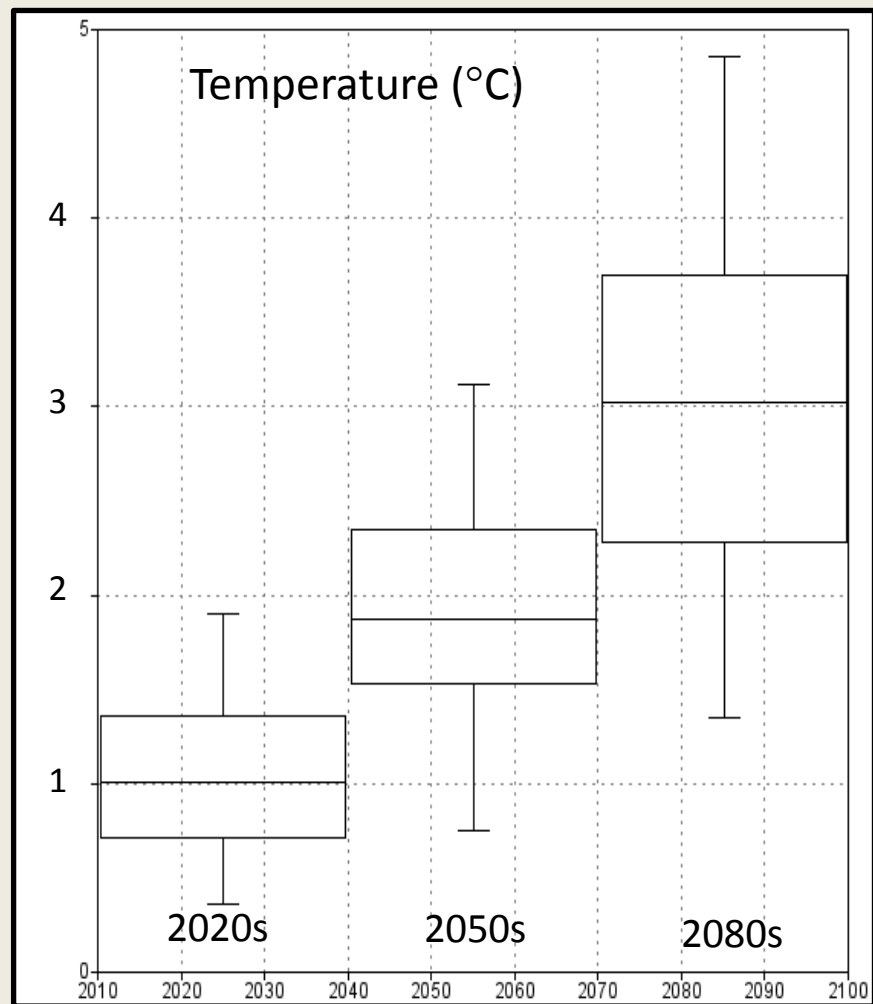
Mean annual temperature change (°C)

(<http://pacificclimate.org>)

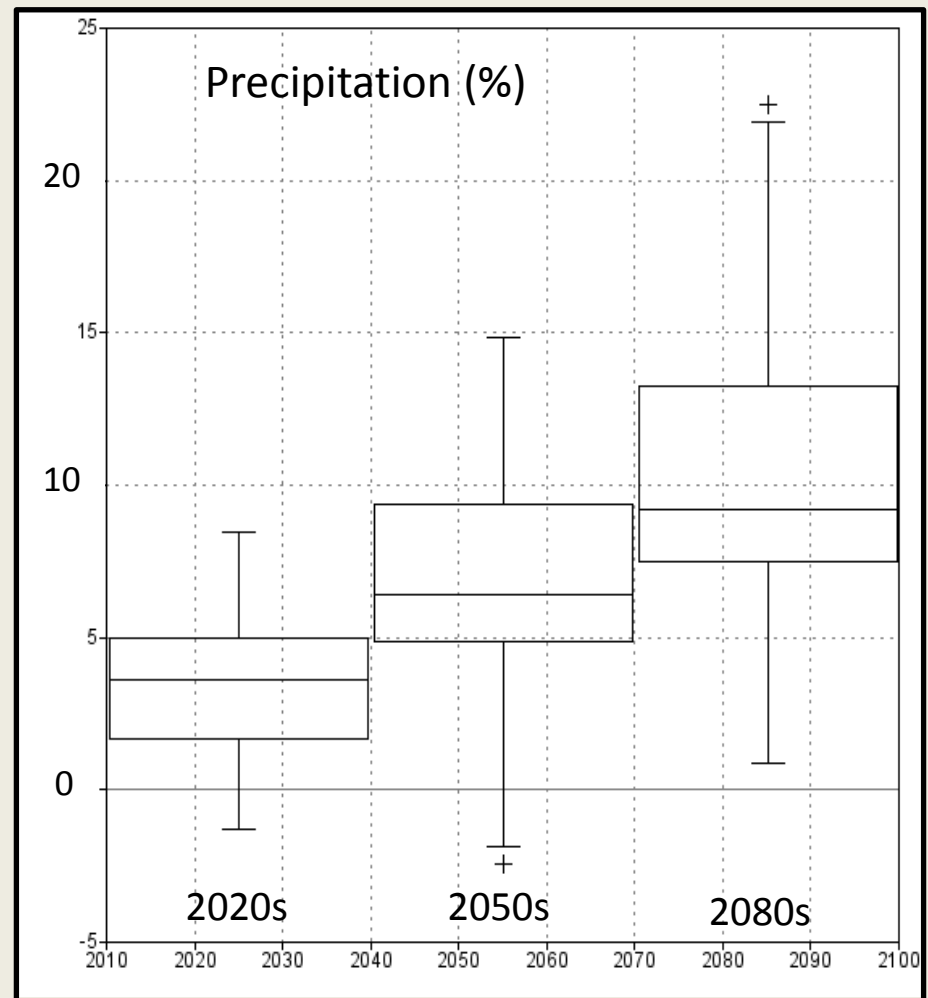
15 GCMs and 3 emission scenarios provide a wide range of climate projections



(Adapted from Murdock and Spittlehouse 2011, PCIC)

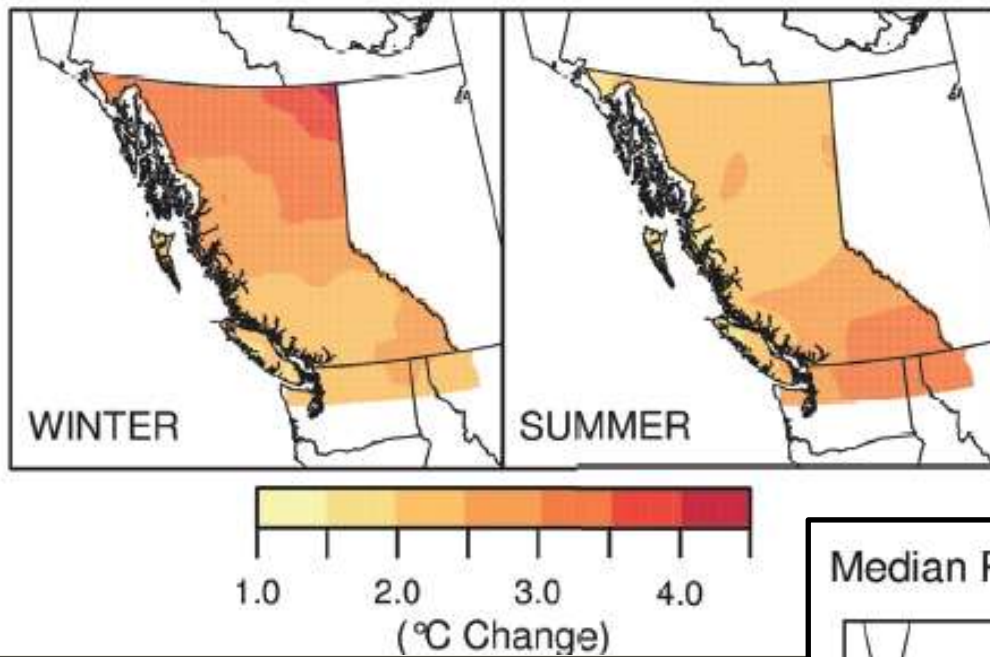


Range of projected change in annual temperature and precipitation for 2020s, 2050s and 2080s

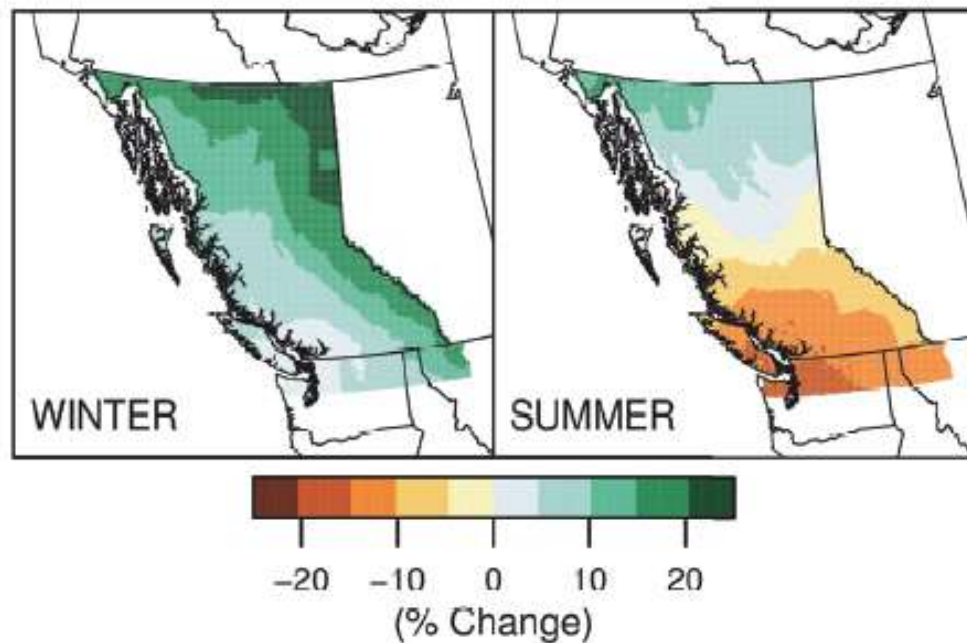


(Source: PCIC Regional Analysis Tool)

Median Temperature Change Projected for the 2050s



Median Precipitation Change Projected for the 2050s



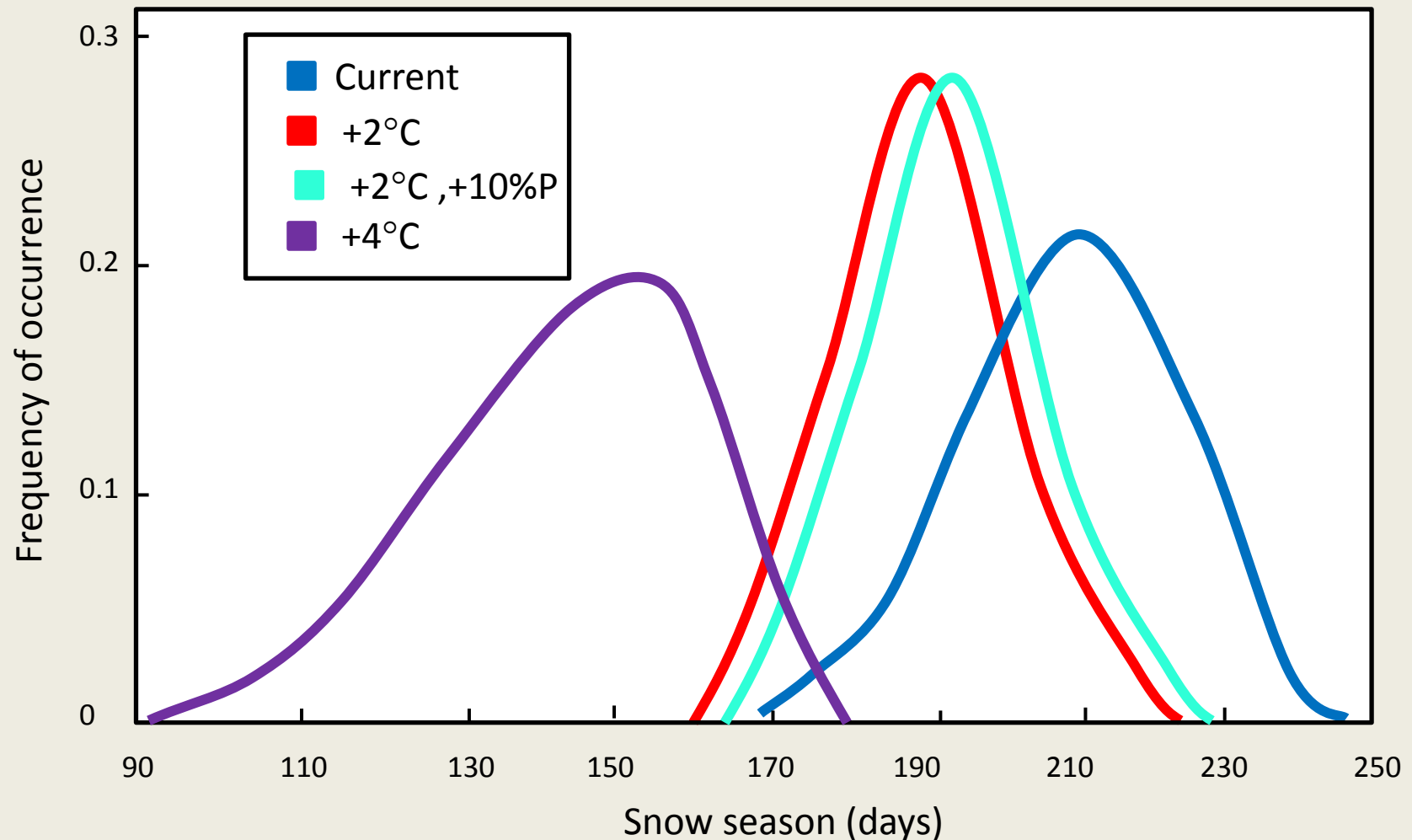
(Zweirs et al. 2011, PCIC)

Temperature and precipitation extremes

- 1 in 20 year temperature extremes become 1 in 2 to 5 years by 2050s
- Cold extremes show a corresponding decrease in frequency or cease
- 1 in 20 year precipitation extremes become 1 in 10 year events by 2050s
- Dry periods more intense (southern BC)

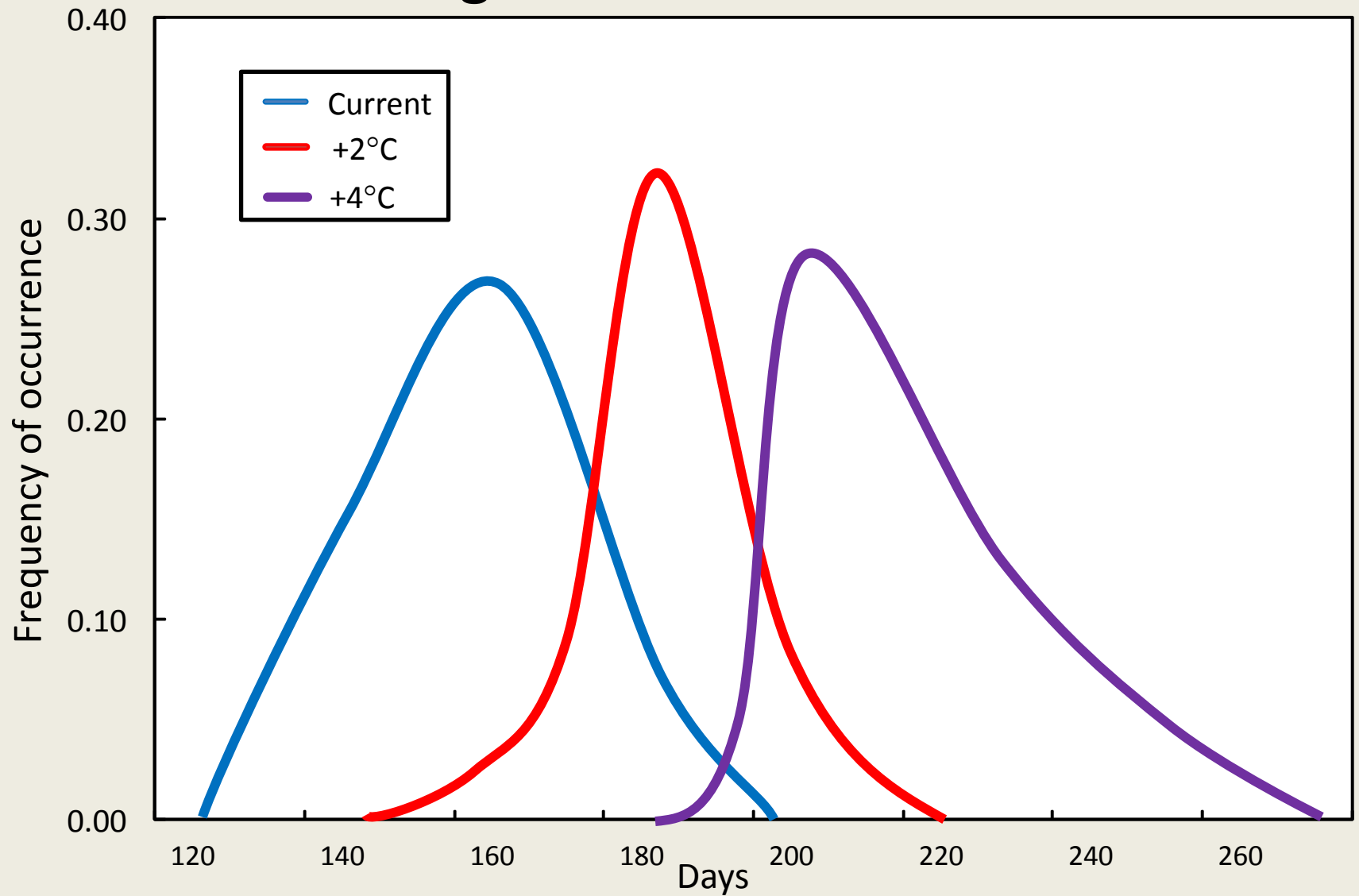
(Kharin et al. 2007, Bürger et al. 2012)

Length of snow season and warming – Okanagan Plateau

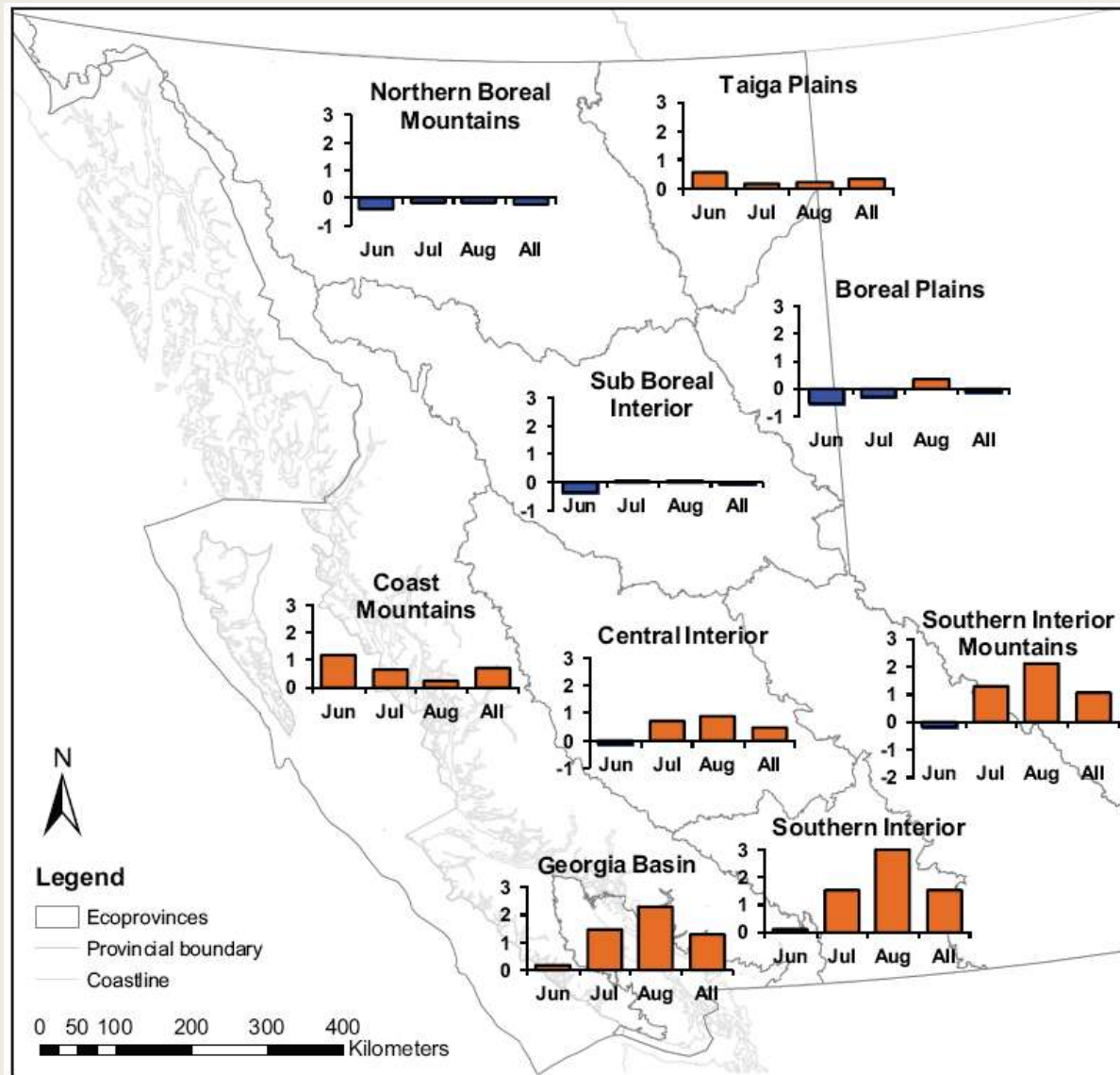


(Murdock and Spittlehouse 2011)

Length of snow free season

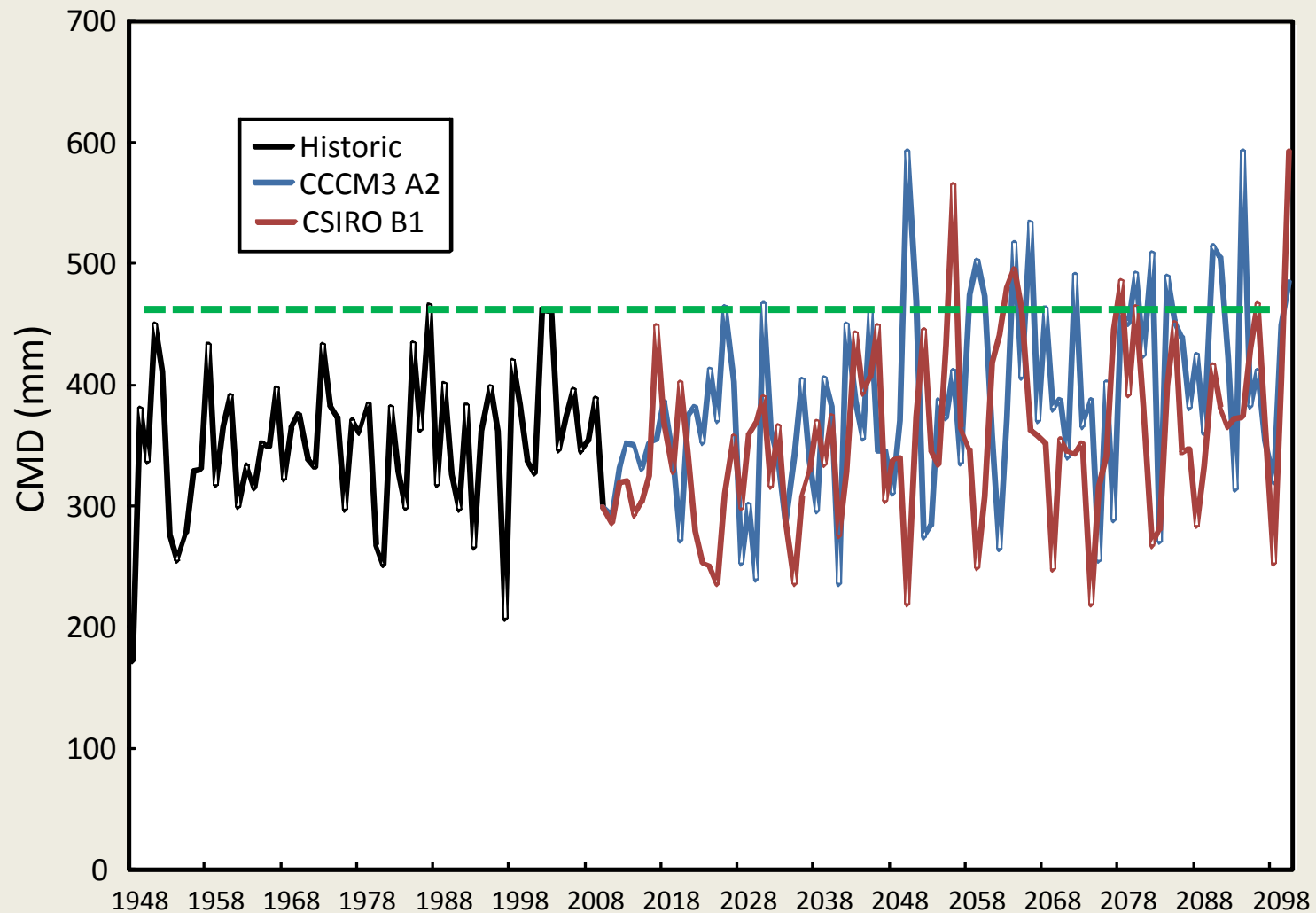


Change in monthly fire severity ratio by 2080s, CRCM4.2 A2 scenario



(Haughain et al. 2012)

Climatic moisture deficit, April-October, Victoria,



Resources

- CFS/USFS – climate change projections <http://cfs.nrcan.gc.ca/projects/3/3>
- EC Can. Climate Change Scenarios Network <http://www.cccsn.ec.gc.ca>
- Pacific Climate Impacts Consortium: Plan2Adapt; Regional Analysis Tool <http://www.pacificclimate.org/>

Climate Variable	Baseline	Projected Change from 1981-1999 Baseline	
		Scenario Median	Range (10th to 90th percentile)
Mean Temperature (°C)	Annual	+0.8 °C	+0.2 °C to +1.2 °C
Precipitation (%)	Annual	+8%	+2% to +12%
	Summer	+1%	0% to +1%
	Winter	+8%	+3% to +13%
Snowfall	Winter	-10%	-12% to -8%
	Spring	-18%	-17% to -19%
Growing DO	Annual	+283 degree days	+177 to +428 degree days
Heating DO	Annual	-648 degree days	-852 to -428 degree days
Frost-Free	Annual	+20 days	+13 to +29 days

The table above shows projected changes in average (mean) temperature, precipitation and several period climate variables from the baseline historical period (1981-1999) to the 2050s for the British Columbia region. The scenario median is a 100-year cycle, chosen from a 1000 standard set of British Columbia model (BCM) projections (see the 'Notes' tab for more information). The range values represent the lowest and highest results within the set. Please note that this summary table does not reflect the 'Season' choice made under the 'Region & Time' tab; however, the setting does affect results obtained under each variable tab.

* These values are derived from temperature and precipitation. Please select the appropriate variable tab for more information.

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- ClimateWNA – standalone software; web version <http://genetics.forestry.ubc.ca/cfgc/ClimateWNA/ClimateWNA.html>

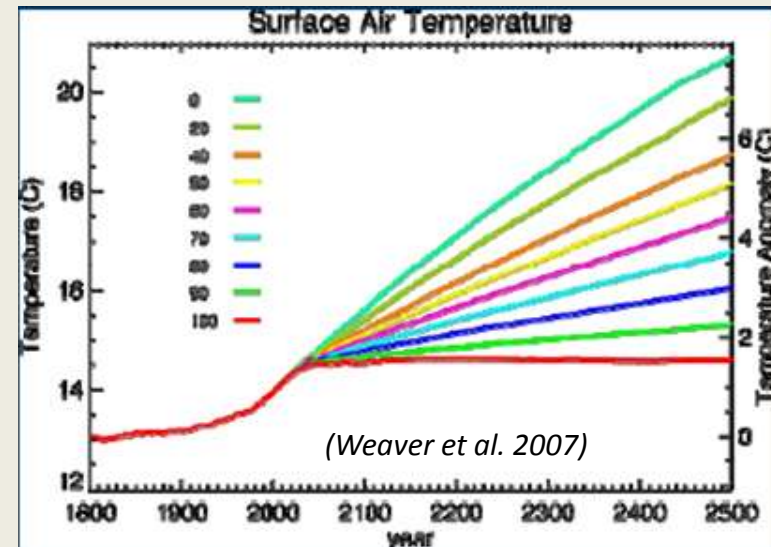
- Murdock and Spittlehouse (2011): Selecting and using climate scenarios for BC <http://www.pacificclimate.org/resources/publications>

Gaps and priorities

- Climate indices, return periods, extremes, time series
- Extrapolating indices from point to spatial
- Site specific climate
- CMIP5 projections for the IPCC 5th Assessment
- Communicating new projections and climate indices – ClimateWNA/BC, web-based tools (e.g. Plan2Adapt)

2°C global temperature change goal

- Proposed to restrict global temperature change to 2°C by 2100 through emissions reduction
- Limit degree of “dangerous” change to the global environment
- All emission scenarios with <60% reduction in emissions break the 2°C threshold by 2100



- GDP, quality of life and emissions

Summary

- **Climate is changing**
- **And it will continue to change**
- **Large spatial and temporal variability and uncertainty in climate projections**
- **Climate indices, extremes, variability**
- **Adaptation - Be realistic about what we can achieve**

