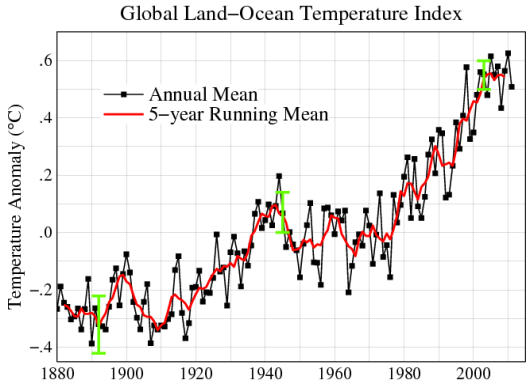
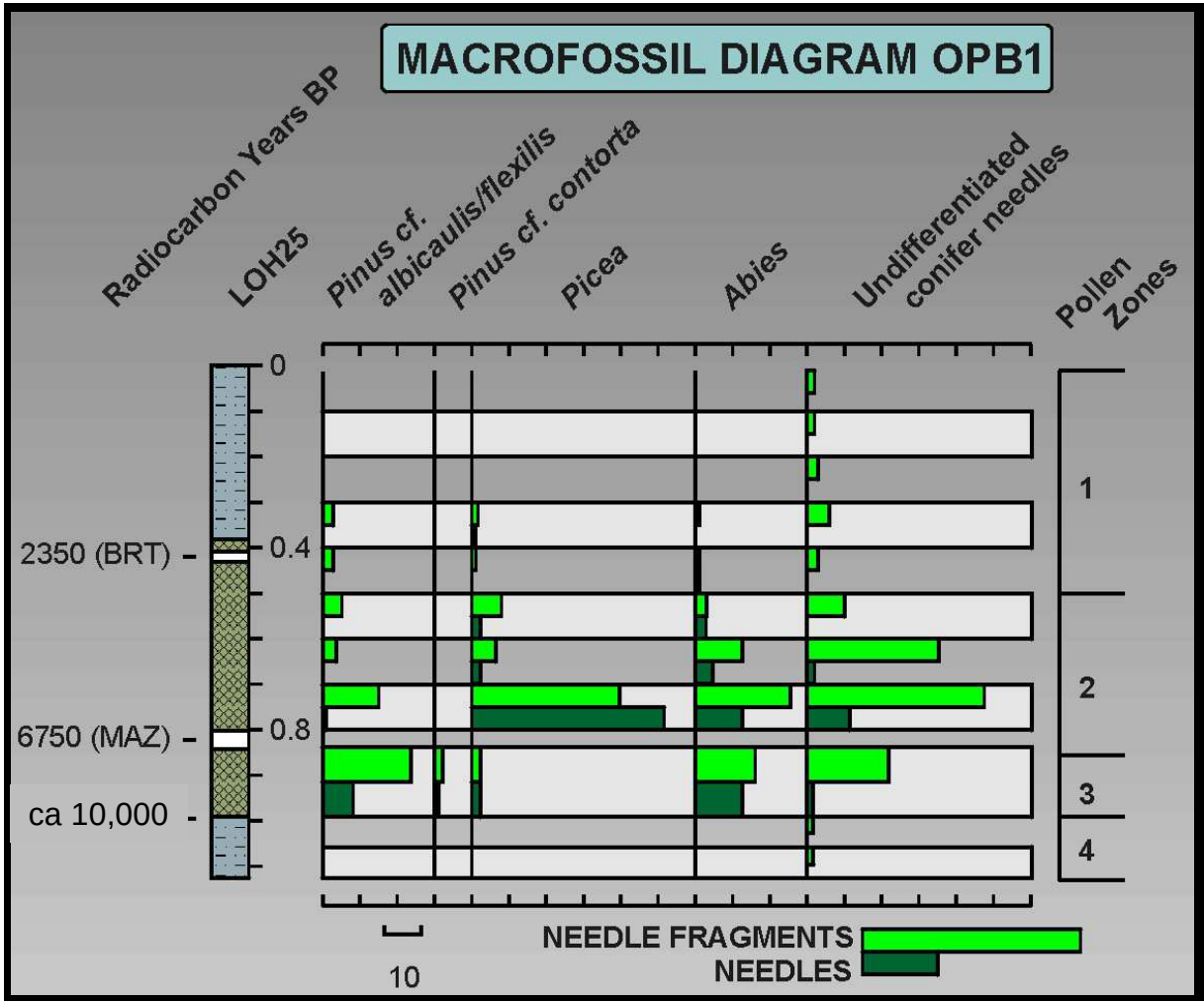
COLUMBIA BASIN TRUST
a legacy for the people

Climate Change in British Columbia



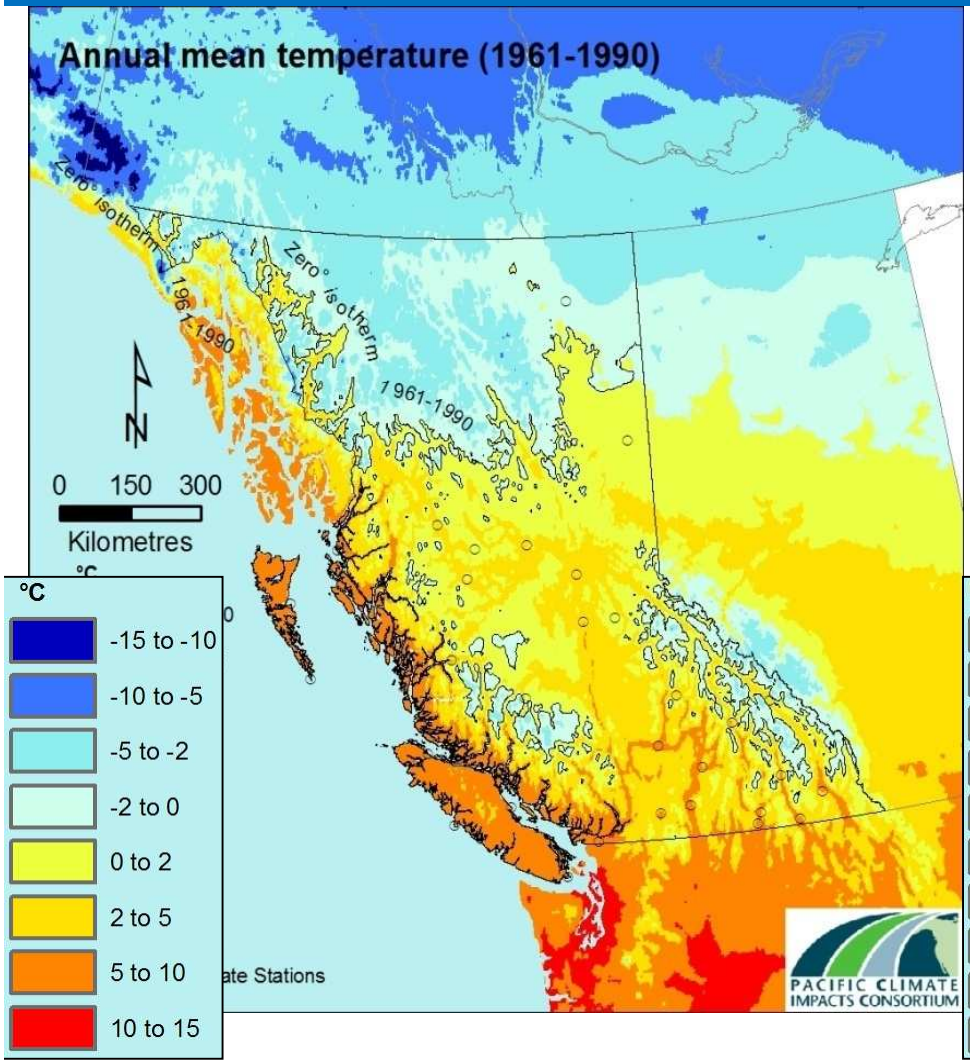
Sediment coring in alpine environments

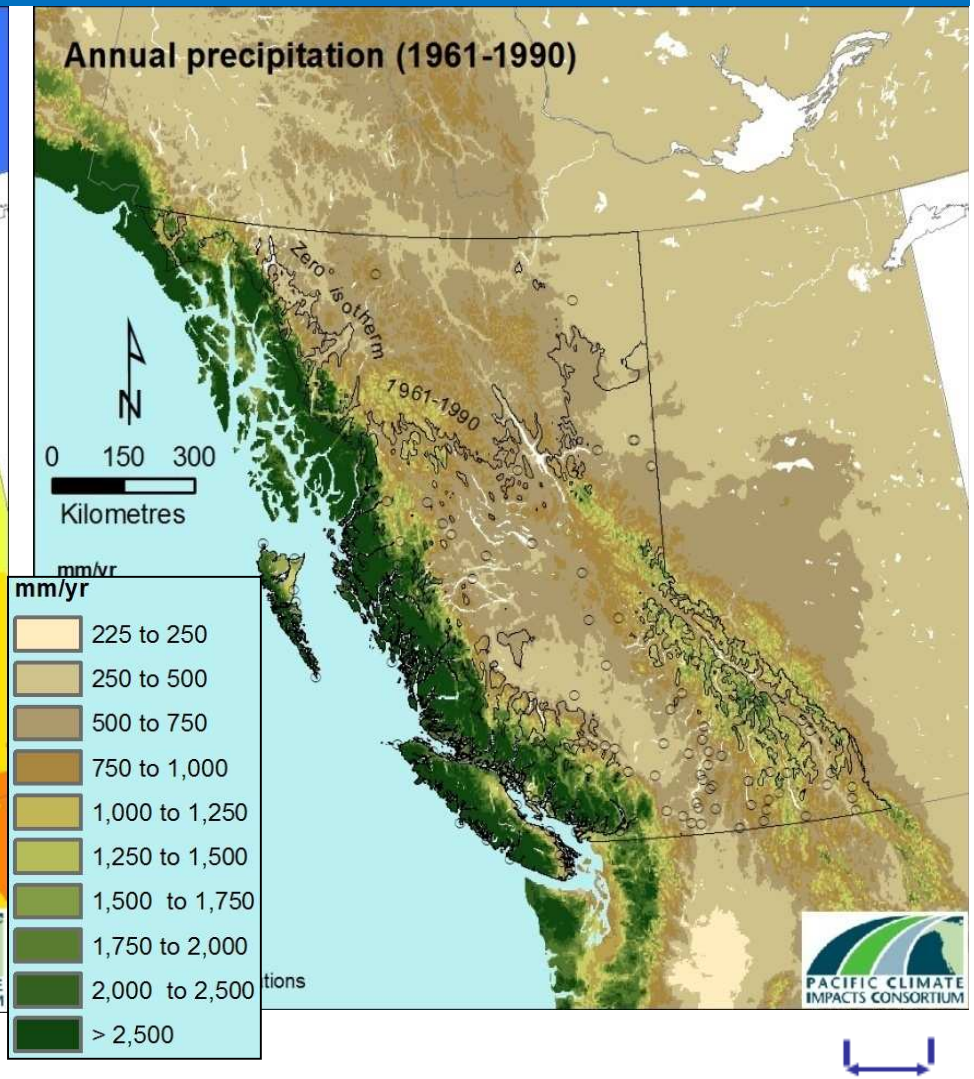

JB



Palaeoenvironmental reconstructions provide perspective - ~3 ^{0} C warmer

BC's Climate





SMALL Temperature Difference
= BIG Climate Difference

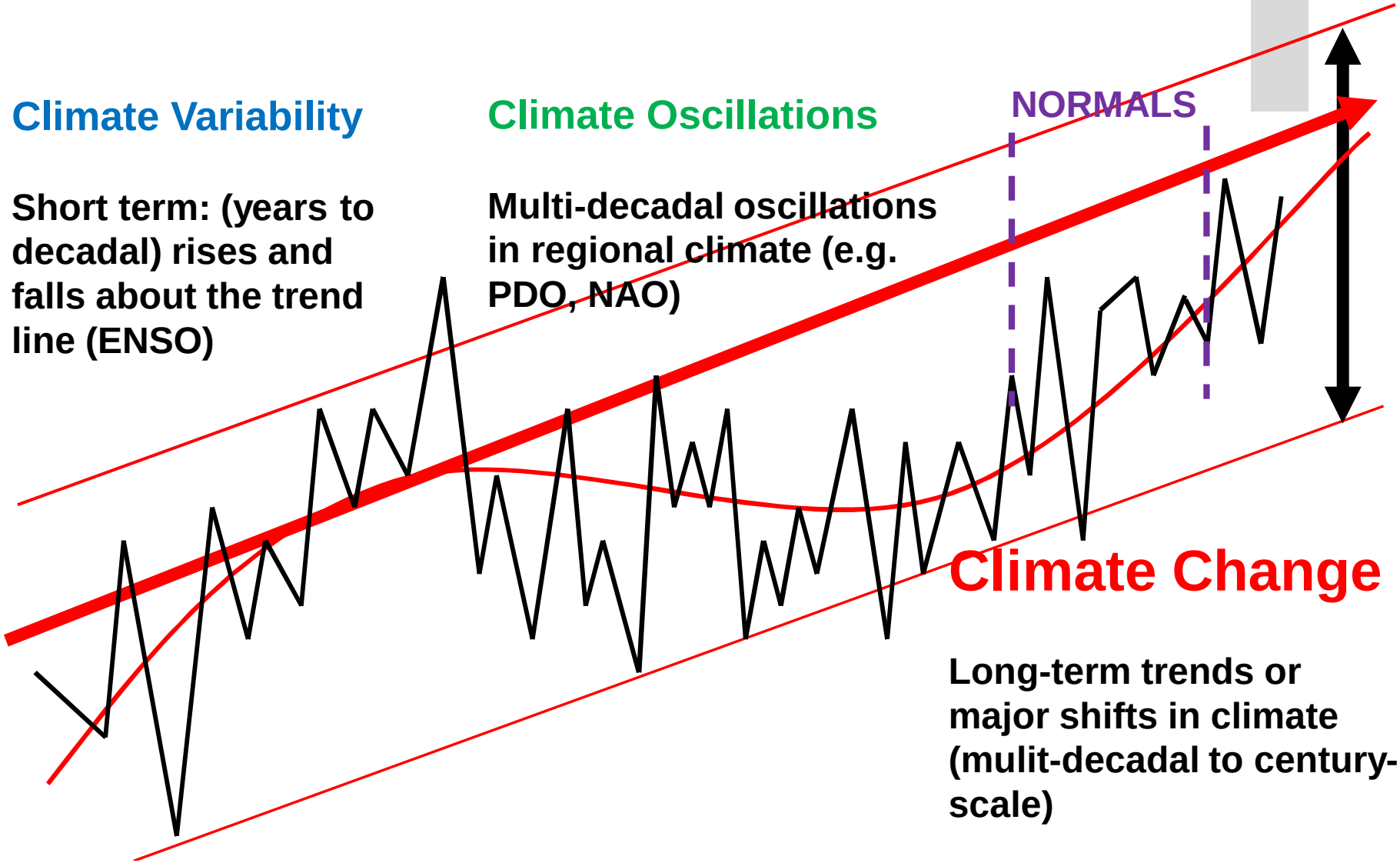
Climate over Time

Climate Variability

Short term: (years to decadal) rises and falls about the trend line (ENSO)

Climate Oscillations

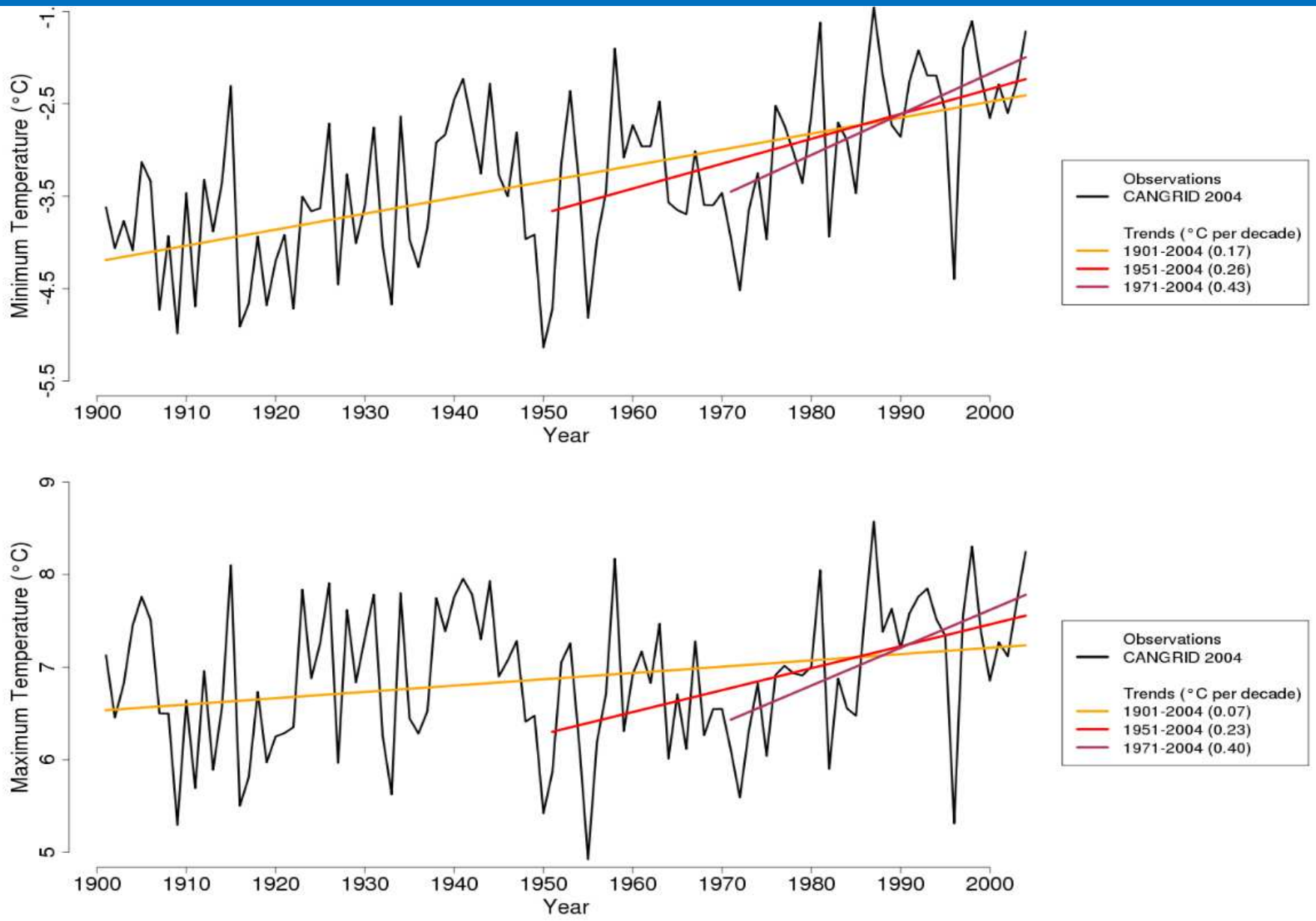
Multi-decadal oscillations in regional climate (e.g. PDO, NAO)



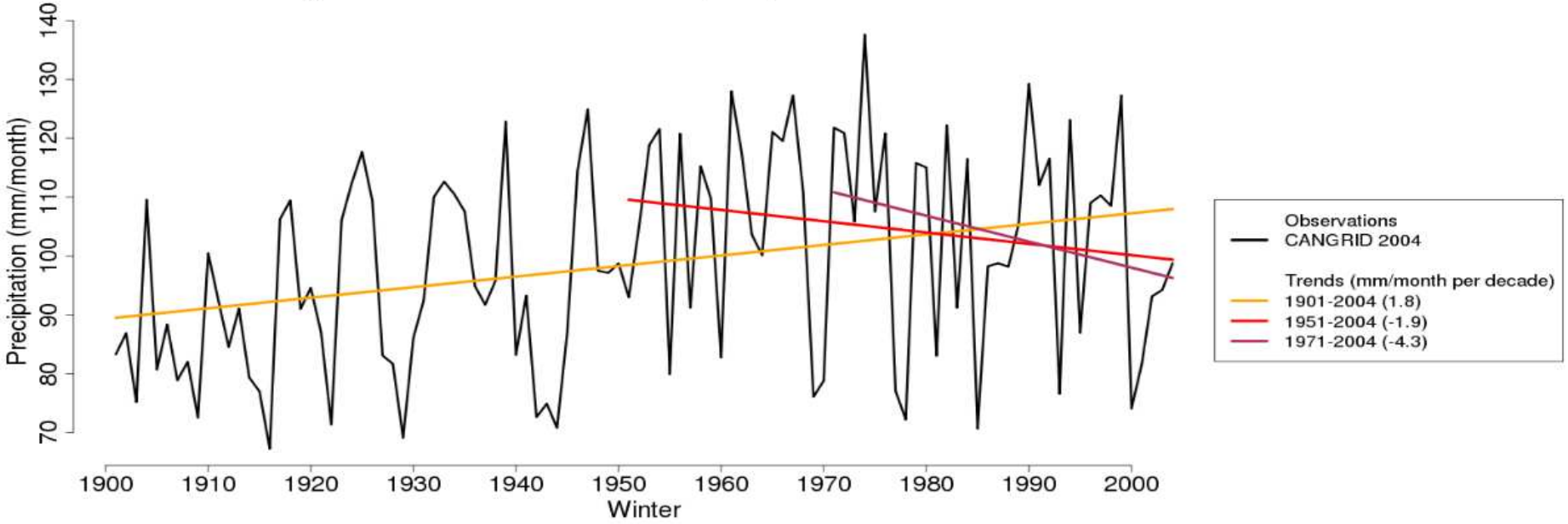
Climate Change

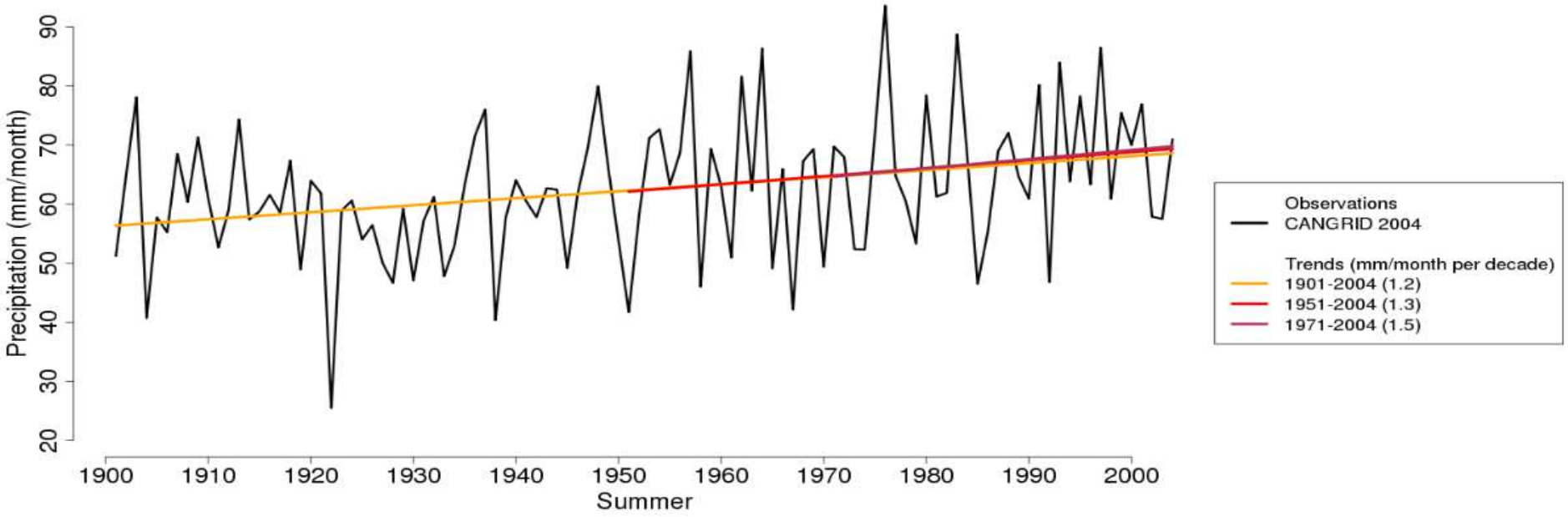
Long-term trends or major shifts in climate (mulit-decadal to century-scale)

BC Temperature Trends



BC Precipitation Trends

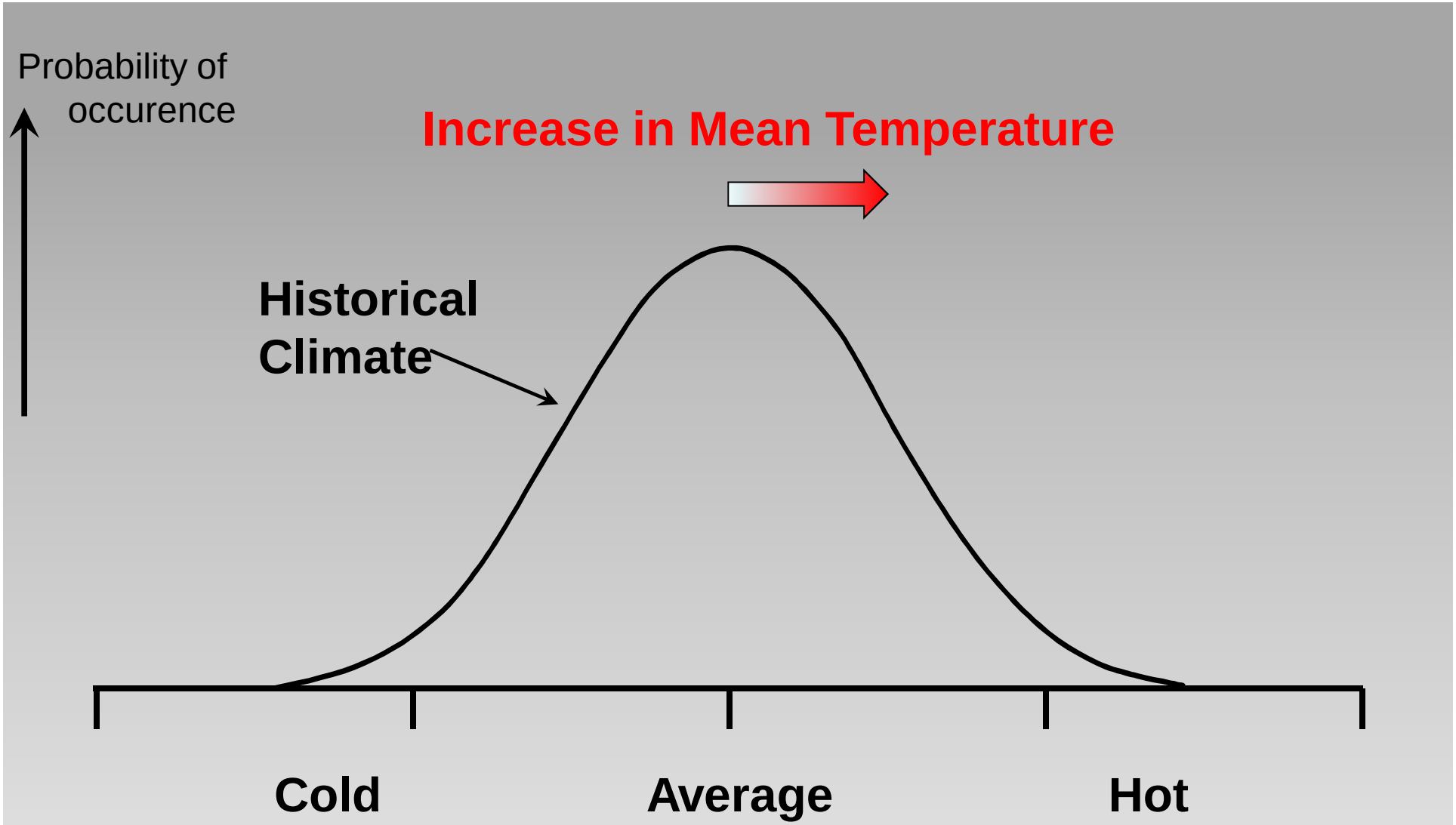




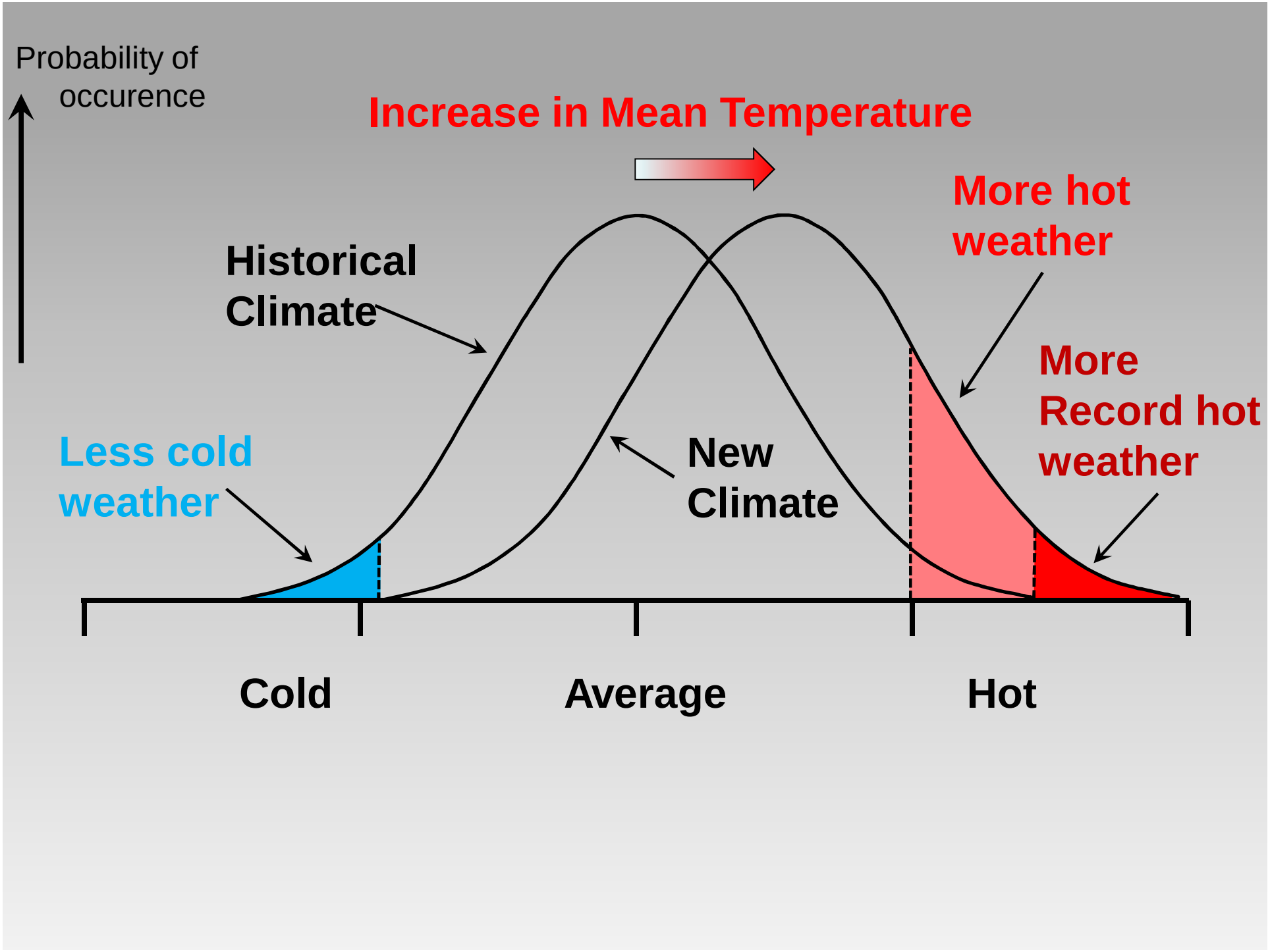
Athabasca Glacier, Jasper National Park Canada in 1917 and 2005. Wheeler Survey photo (above) © 2005 Gary Braasch

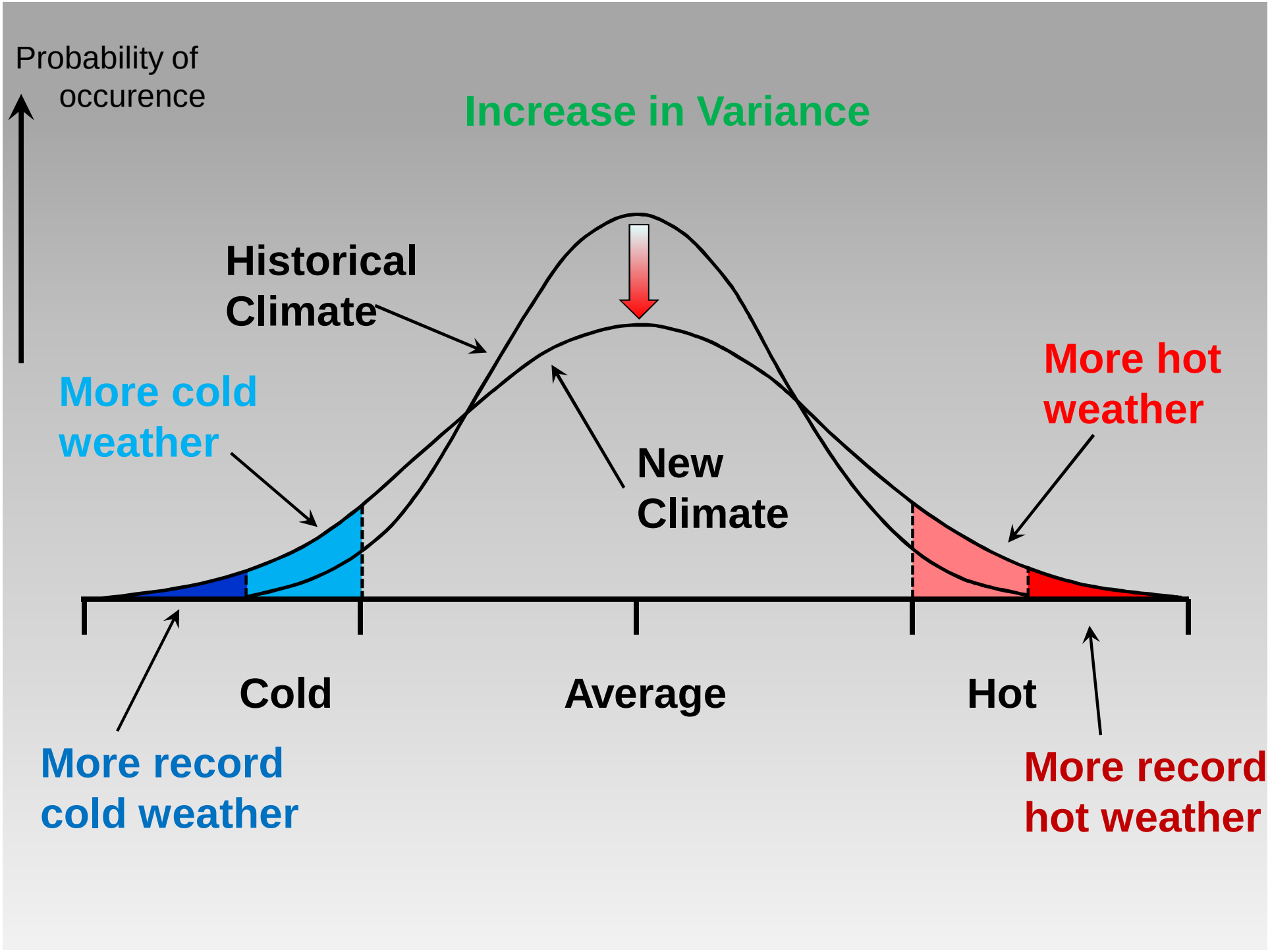
Athabasca Glacier

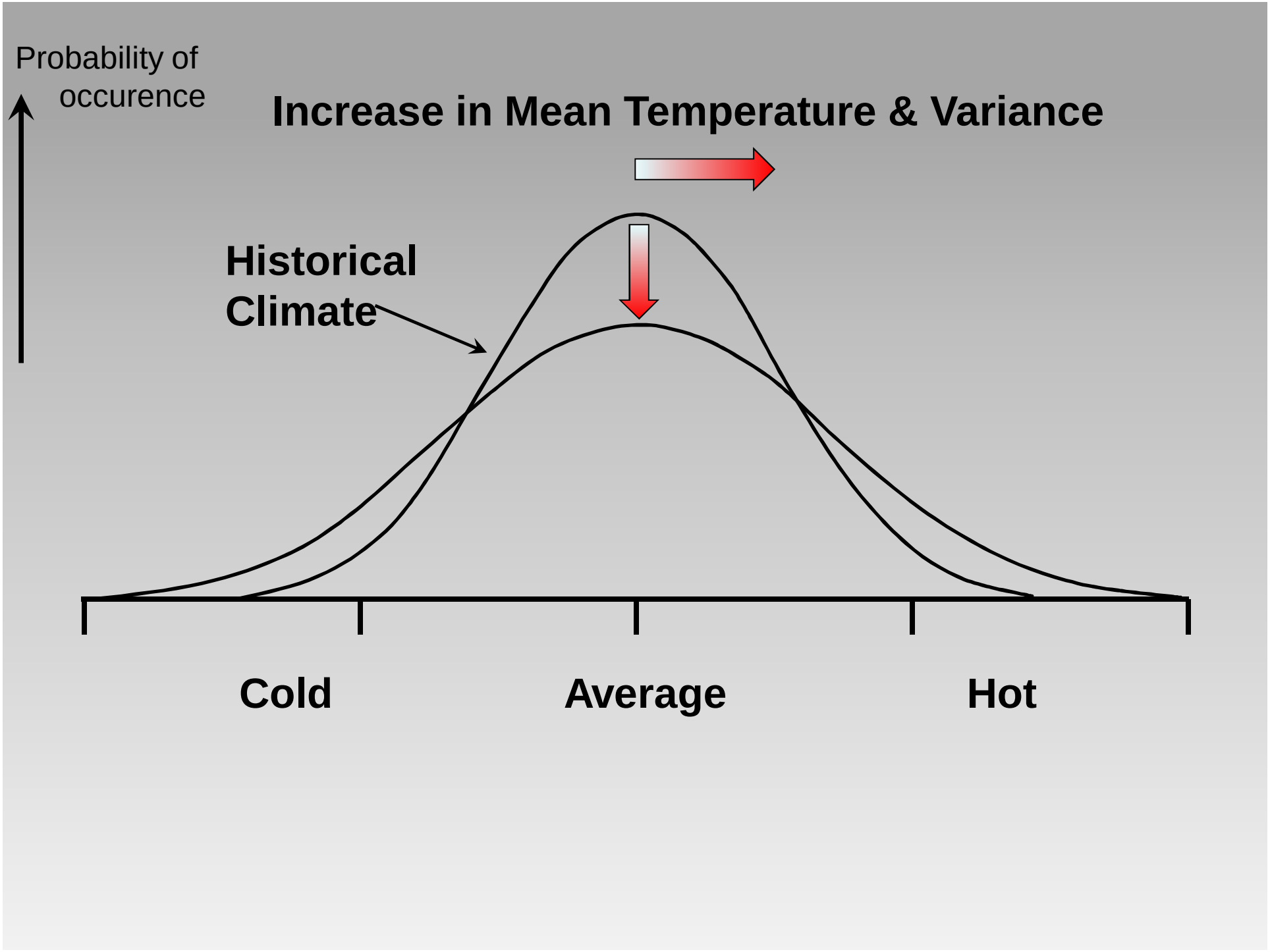
Change in 88 years

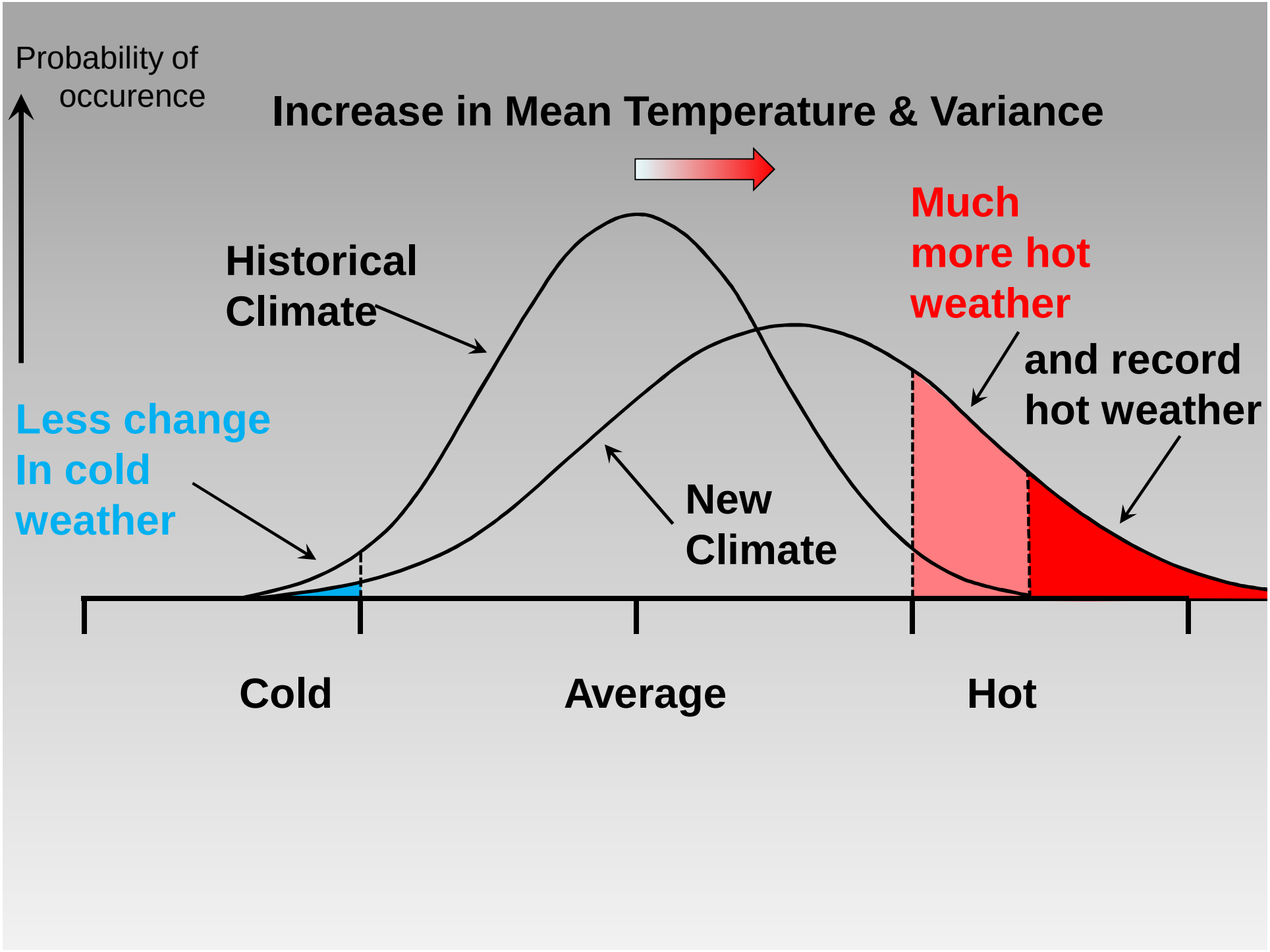


From Trends to Change

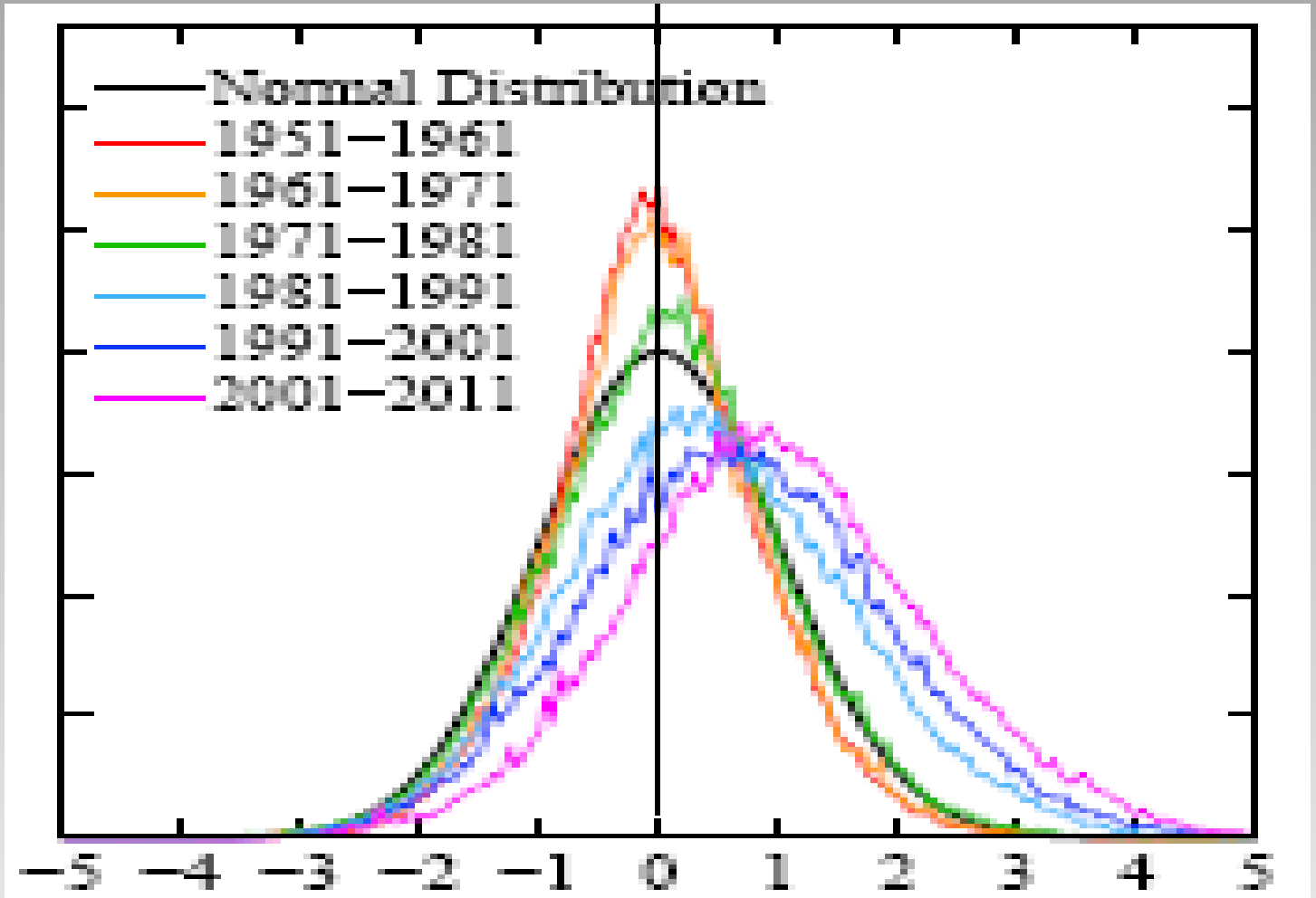

Probability of occurence
Increase in Mean Temperature
More hot weather
Historical Climate
More Record hot weather
Less cold weather
New Climate
Cold
Average
Hot


Probability of occurence
Increase in Variance
Historical Climate
More cold weather
More hot weather
New Climate
Cold
Average
Hot
More record cold weather
More record hot weather


Probability of occurence
Increase in Mean Temperature & Variance
Historical Climate
Cold
Average
Hot


Probability of occurence
Increase in Mean Temperature & Variance
Historical Climate
Much more hot weather
and record hot weather
Less change In cold weather
New Climate
Cold
Average
Hot

The Data

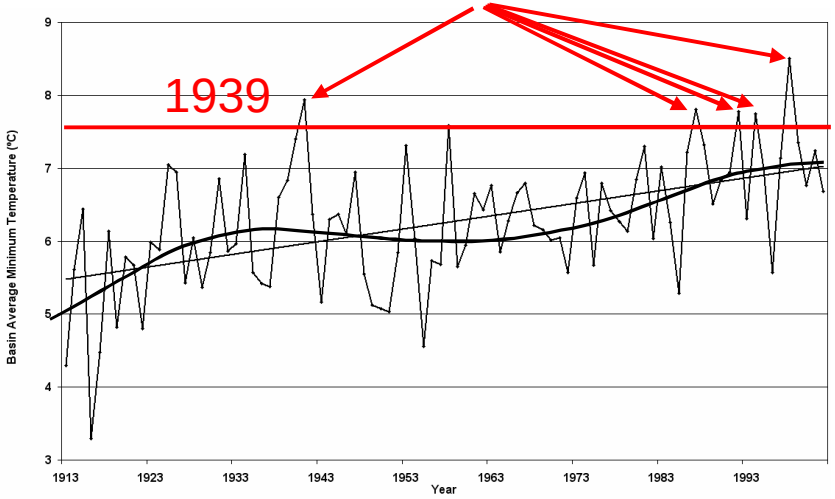


Goddard Institute for Space Studies
New York, N.Y.

Basin Climate Trends – 1913 to 2002 *(from Murdock et al., 2007)*

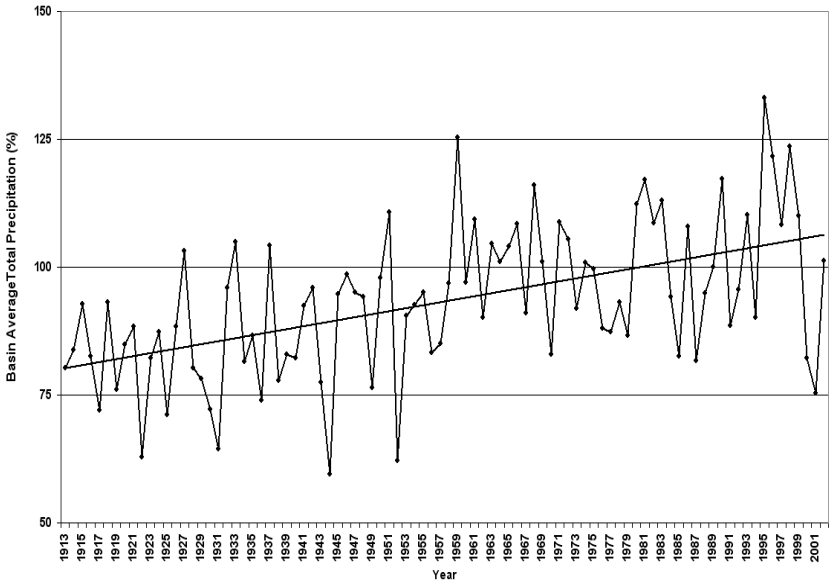
Mean Annual Temperature

+1.5 ºC



Mean Annual Precipitation

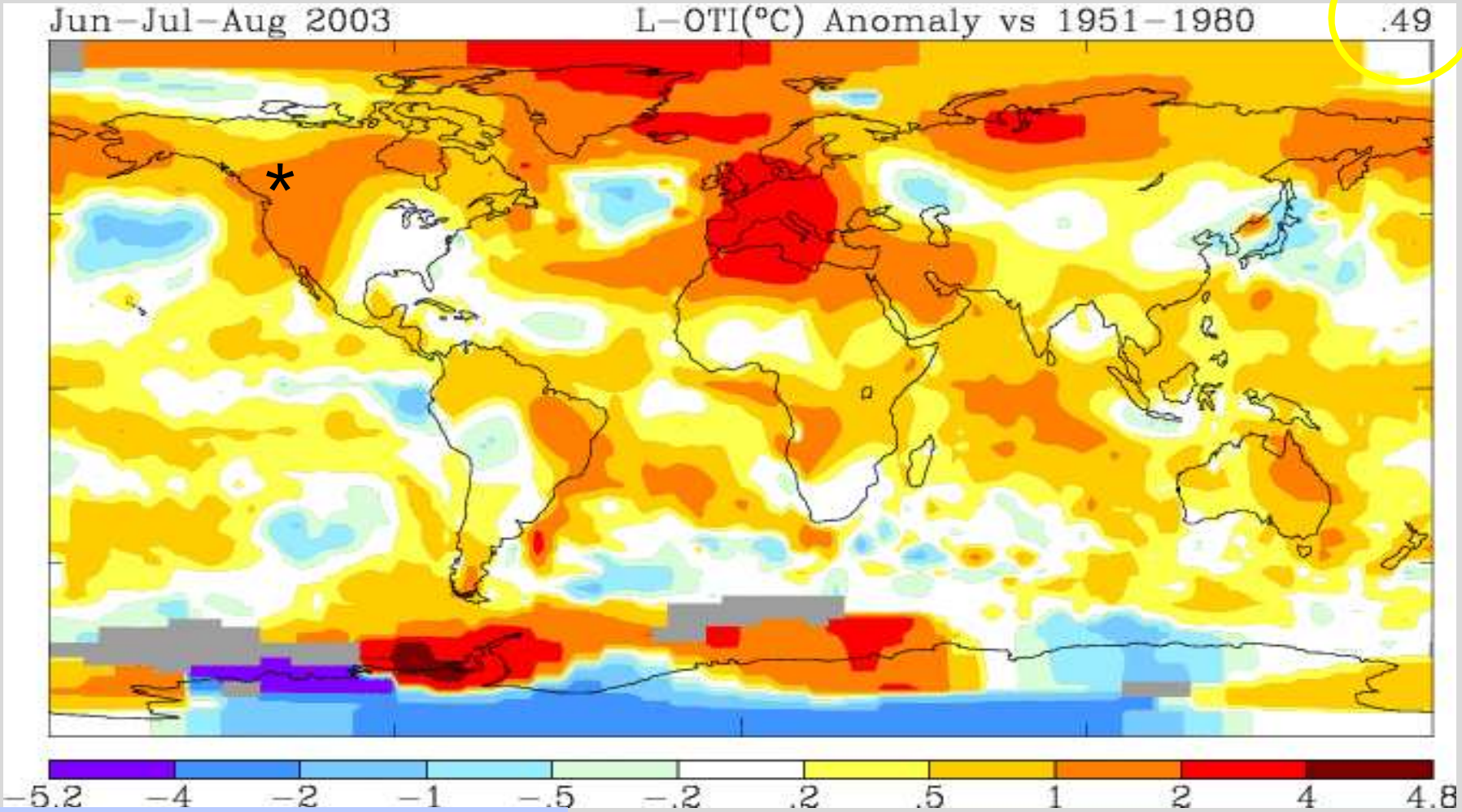
+32% rainfall; -6% snowfall



Note: ***Data from Cranbrook, Golden, Creston, Kaslo, Revelstoke.***

COLUMBIA BASIN TRUST
a legacy for the people

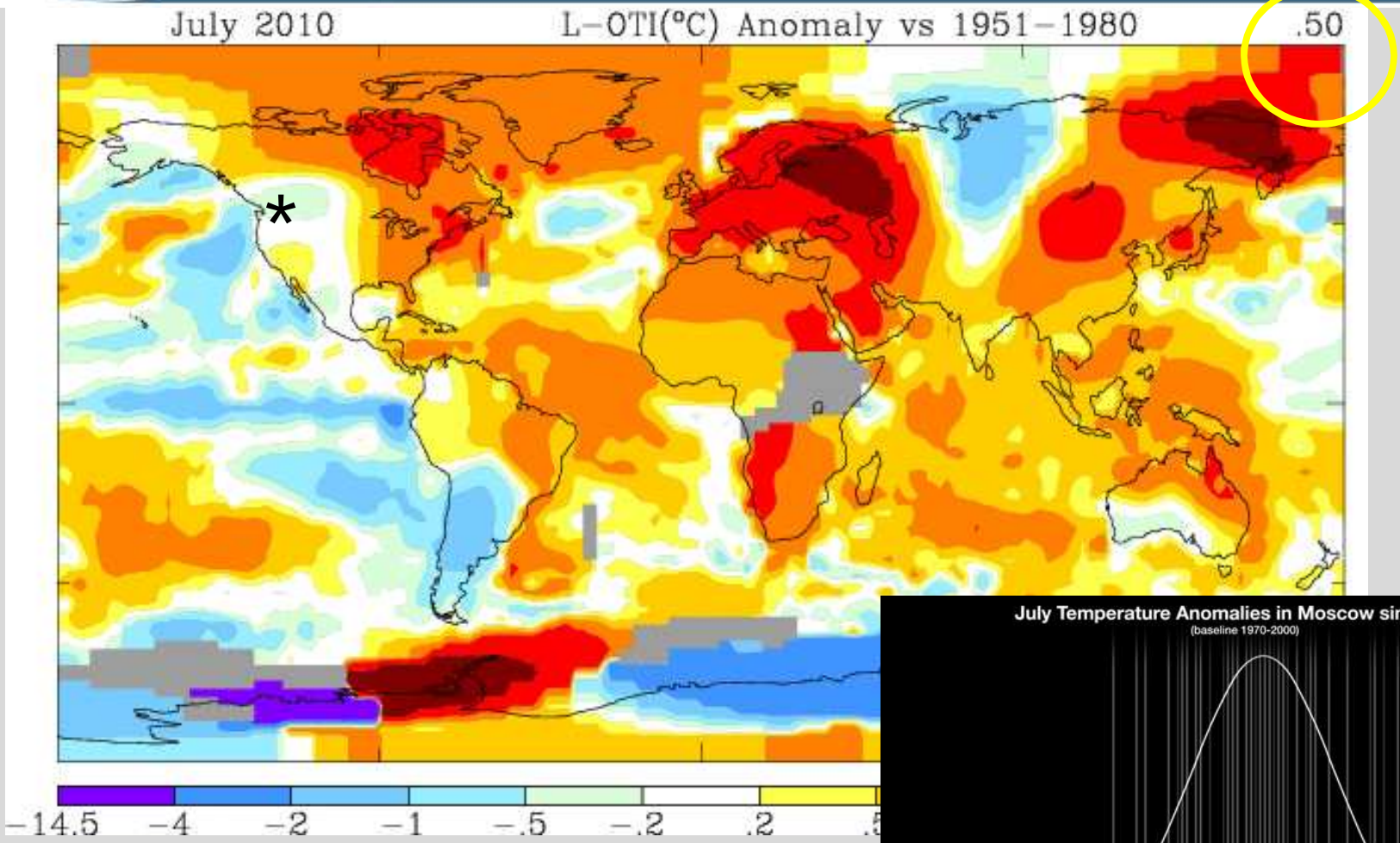
Warming has Spatial Variability

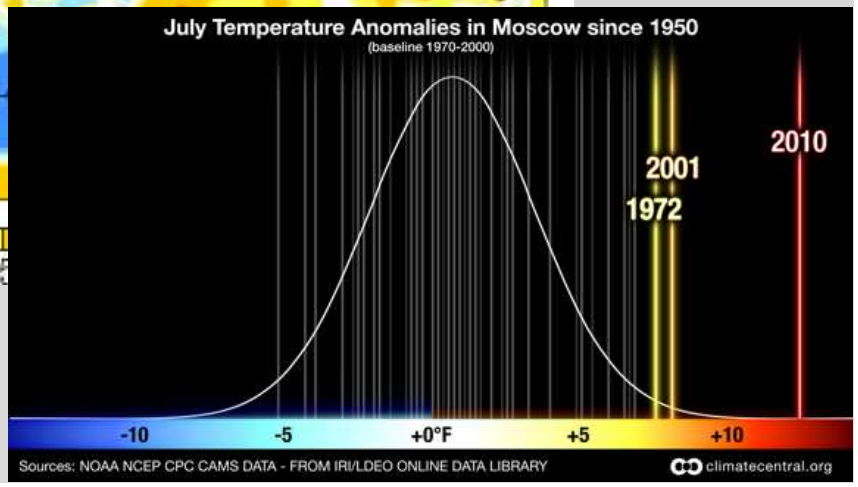


Goddard Institute for Space Studies
New York, N.Y.

COLUMBIA BASIN TRUST
a legacy for the people

Warming has Spatial Variability

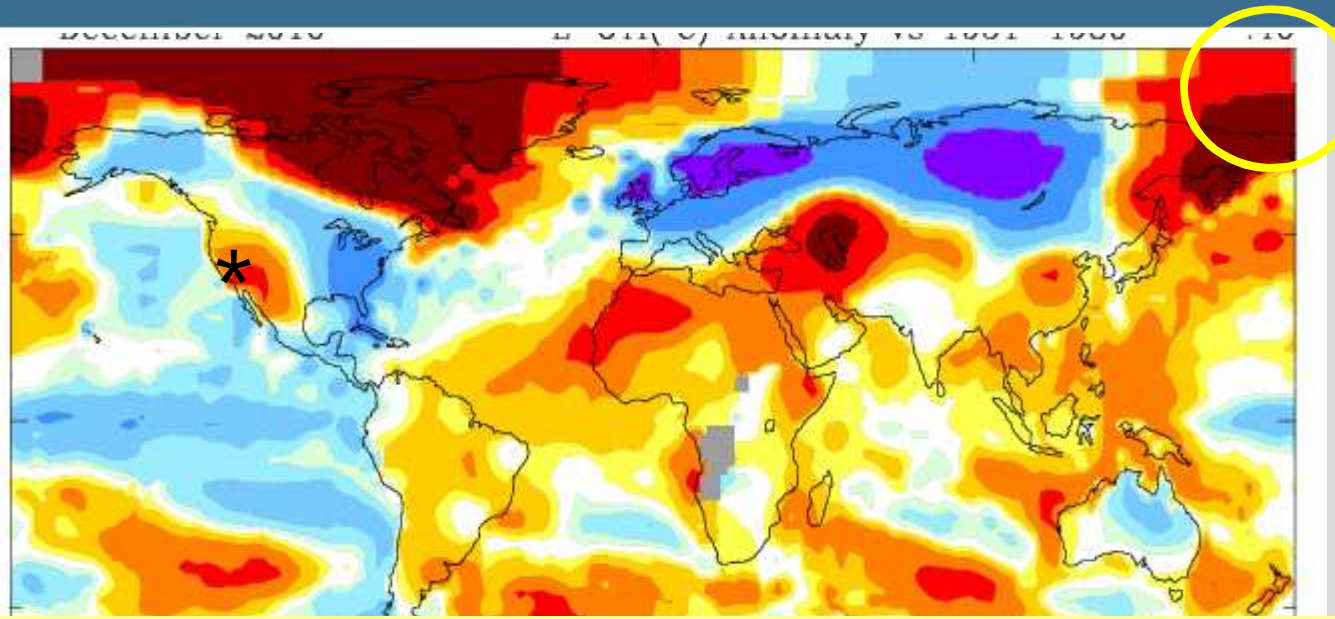




Goddard Institute for Space Studies
New York, N.Y.

COLUMBIA BASIN TRUST
a legacy for the people

Warming has Spatial Variability



"Surface temperature anomalies for the period 17 December 2010 to 15 January 2011. The largest anomalies here exceed 21°C (37.8°F) above average, which are very large values to be sustained for an entire month."

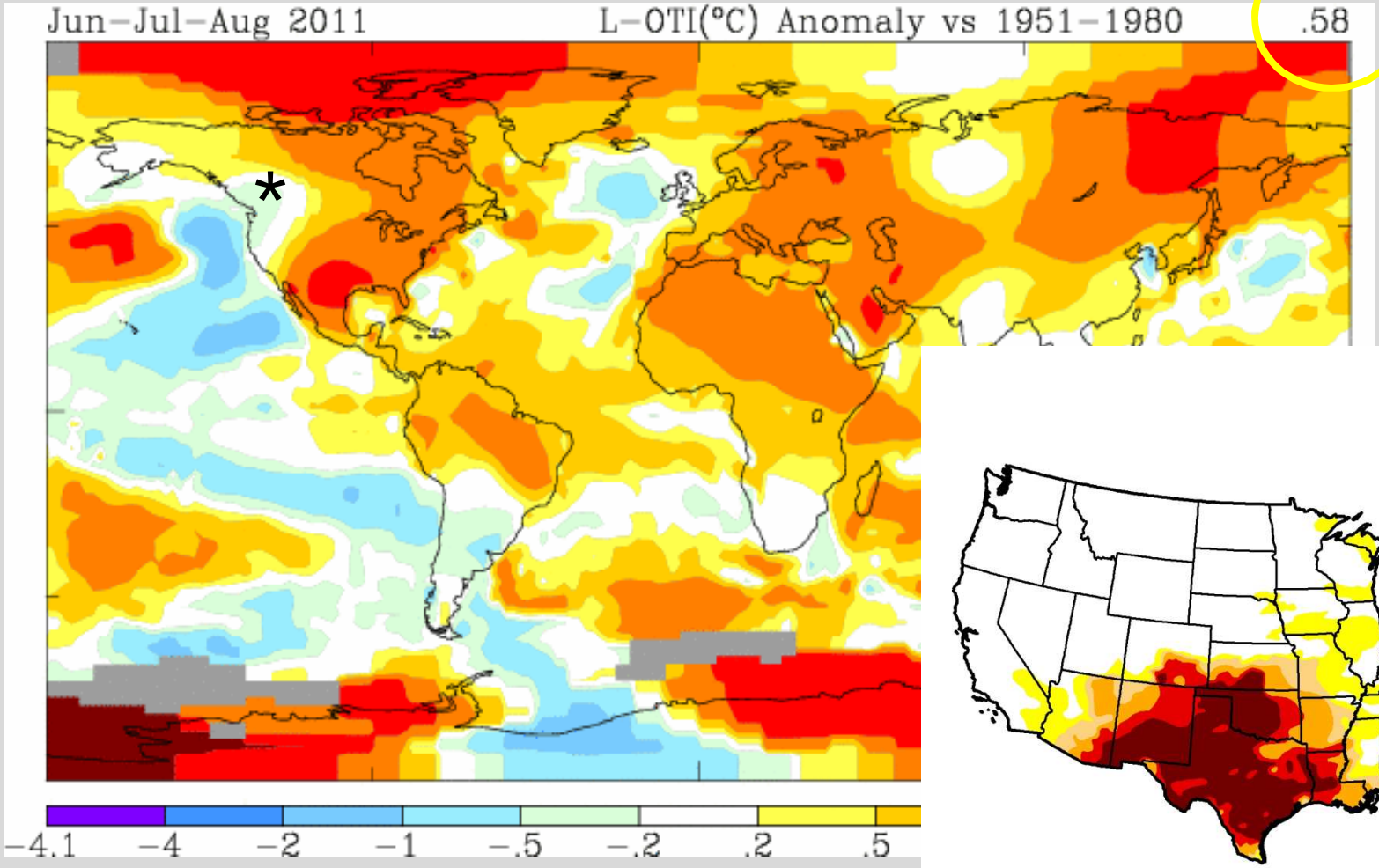
U.S. Department of Commerce | National Oceanic & Atmospheric Administration | NOAA Research

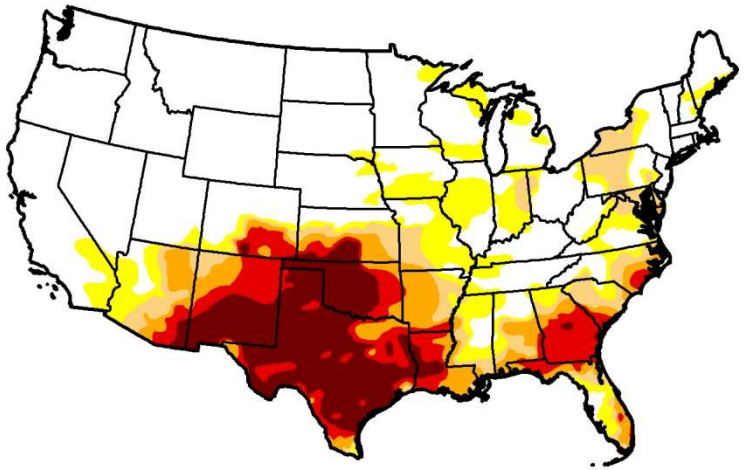
Earth System Research Laboratory
Physical Sciences Division

Goddard Institute for Space Studies
New York, N.Y.

COLUMBIA BASIN TRUST
a legacy for the people

Warming has Spatial Variability



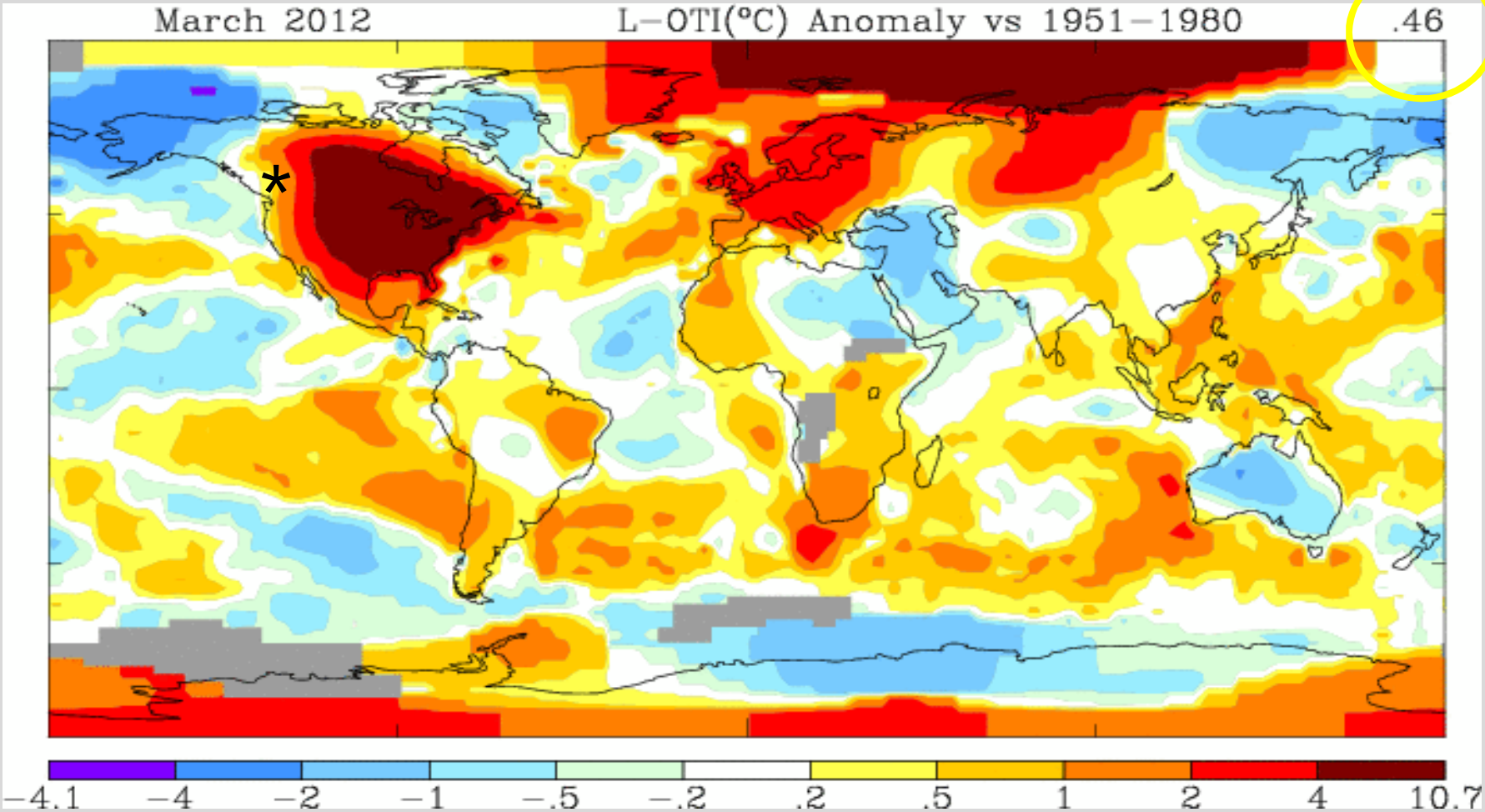


US Drought Monitor – Aug 2, 2011

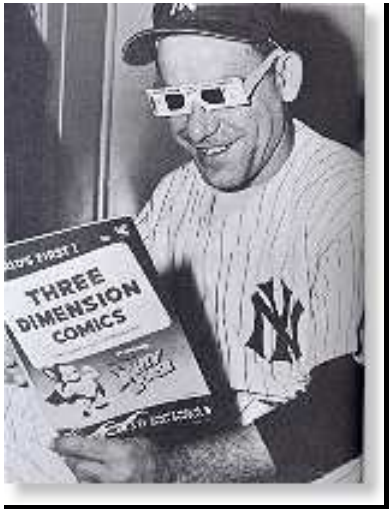
Goddard Institute for Space Studies
New York, N.Y.

COLUMBIA BASIN TRUST
a legacy for the people

Warming has Spatial Variability



Goddard Institute for Space Studies
New York, N.Y.

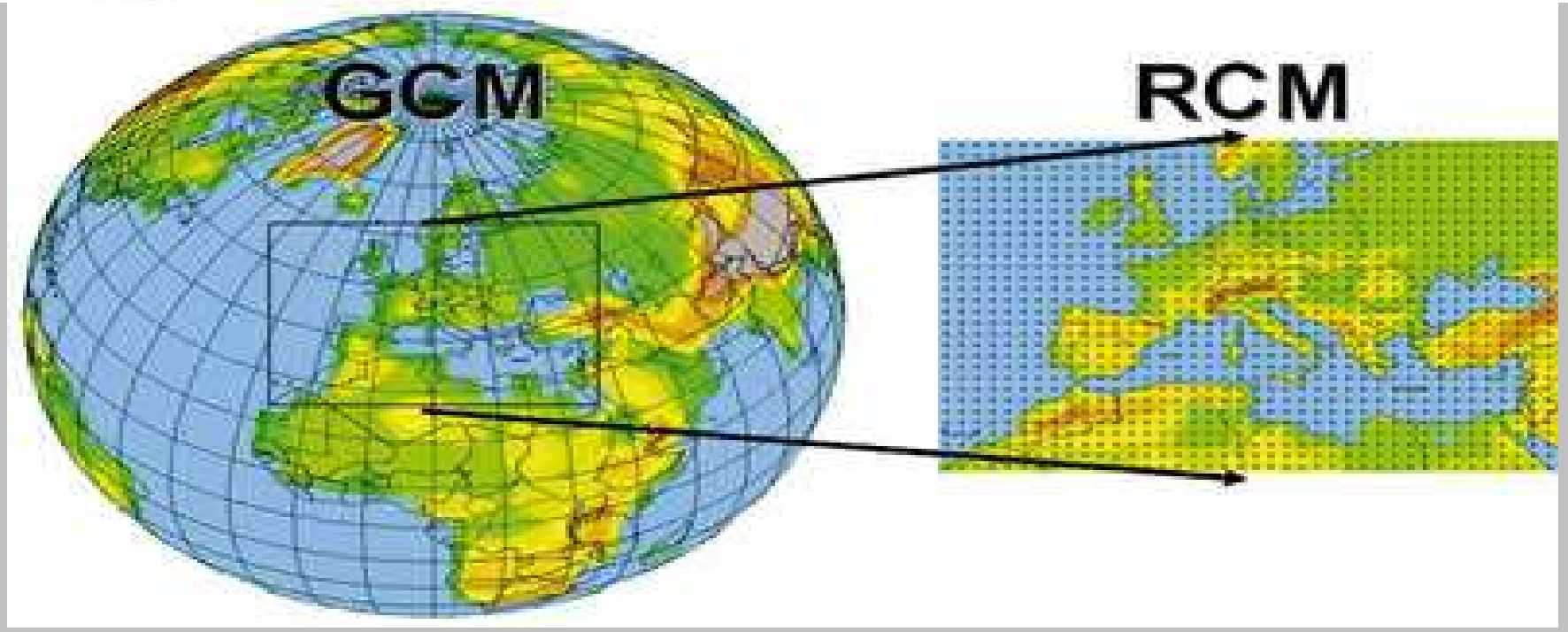


Yogi Berra

Prediction is very difficult, especially about the future.

COLUMBIA BASIN TRUST
a legacy for the people

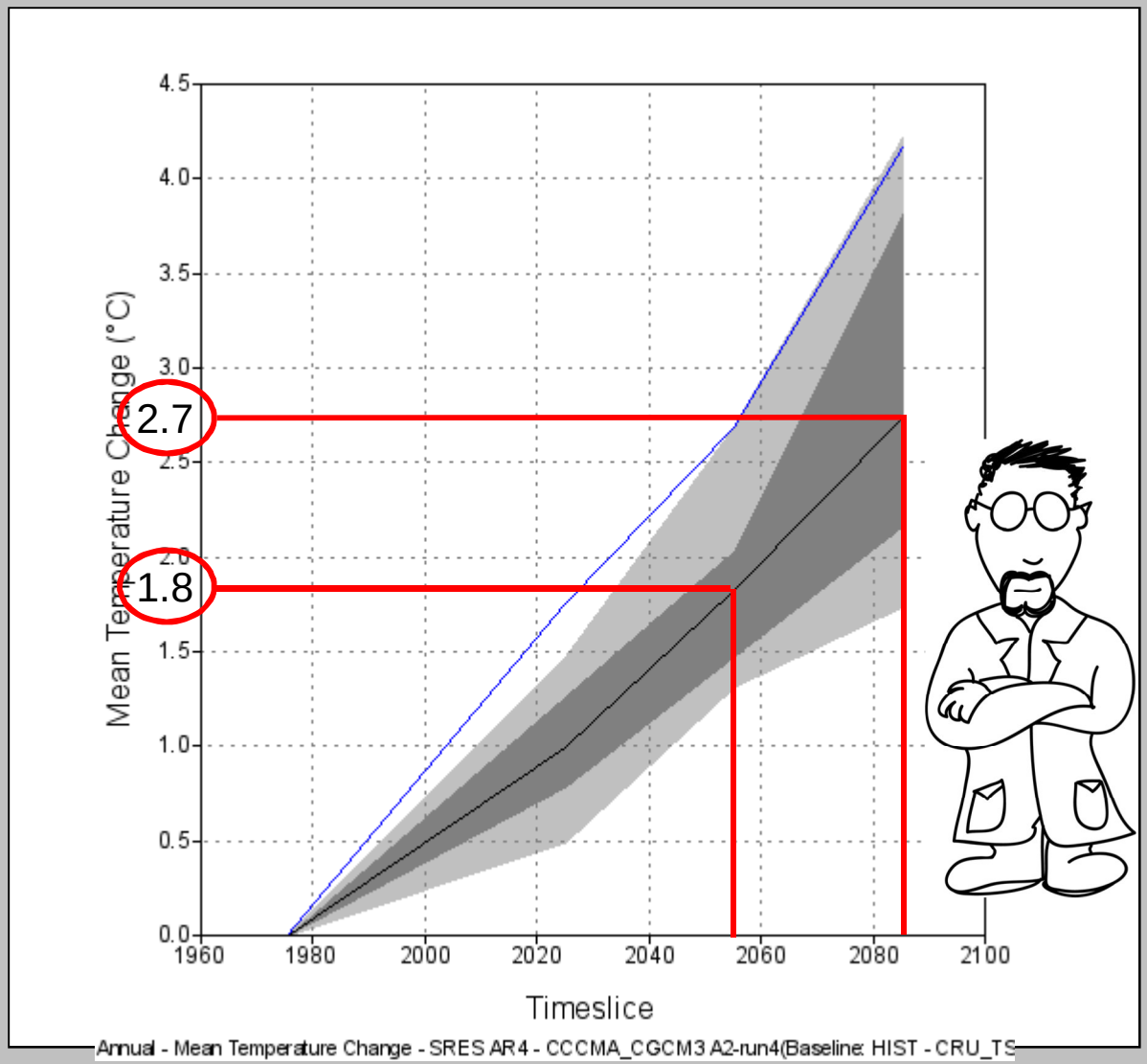
Future Projections



- **Greenhouse gas (GHG) scenarios for the future**

Pacific Climate Impacts Consortium
University of Victoria

Projected Mean Temperature Increase for British Columbia



PLAN2ADAPT

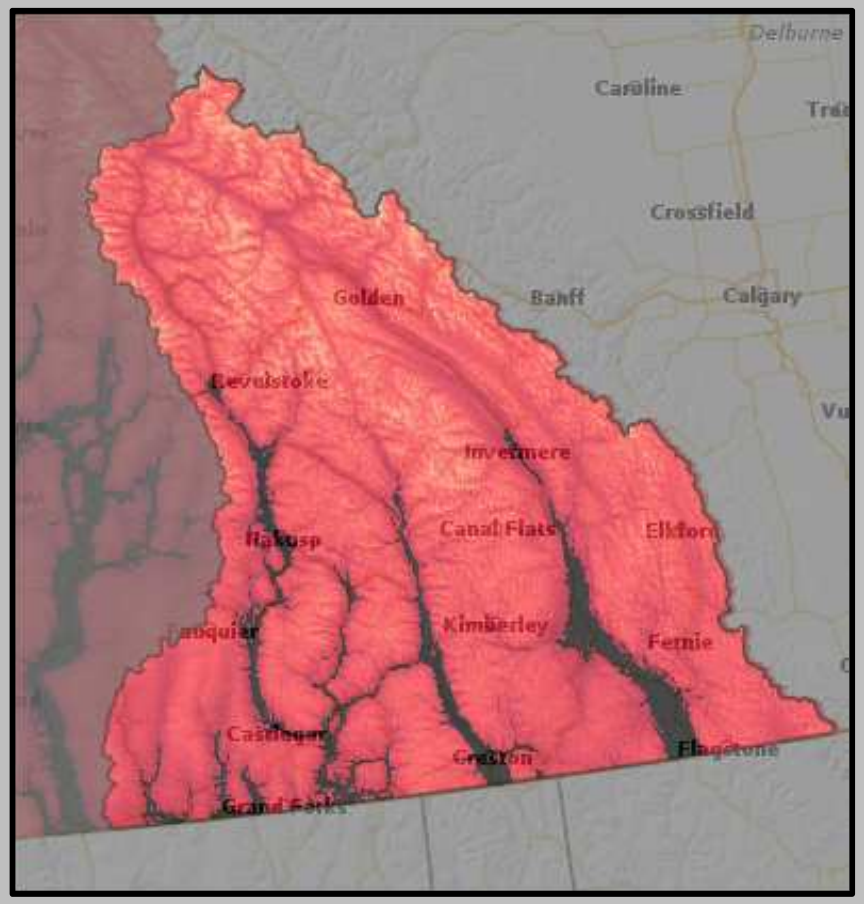
Omineca Forestry Region

Climate Element	Projected future change In the Omineca Region	
	By 2050s	By 2080s
Temperature ºC		
- Annual	**+1.8** (+1.1 to +2.7)	**+2.7** (+1.6 to +4.6)
- Summer	**+1.6** (+1.2 to +2.8)	**+2.8** (+1.7 to +4.5)
- Winter	**+2.0** (+0.6 to +3.0)	**+3.0** (+1.7 to +5.3)
Precipitation (%)		
- Annual	**+6%** (-2% to +11%)	**+8%** (+2% to +16%)
- Summer	**-5%** (-15% to +5%)	**-5%** (-20% to +8%)
- Winter	**+9%** (-1% to +18%)	**+15%** +3% to +27%)
Snowfall (%)		
- Winter	**+4%** (-5 to +12%)	**+2%** (-8 to +15%)
- Spring	**-45%** (-71 to -1%)	**-63%** (-89 to -6%)
Frost-free days	**+21** (+14 to 34)	**+33** (+20 to +57)
Growing degree days	**+239** (+130 to 384)	**+372** (+195 to +688)

Pacific Climate Impacts Consortium
University of Victoria

PLAN2ADAPT

Kootenay Boundary Forestry Region



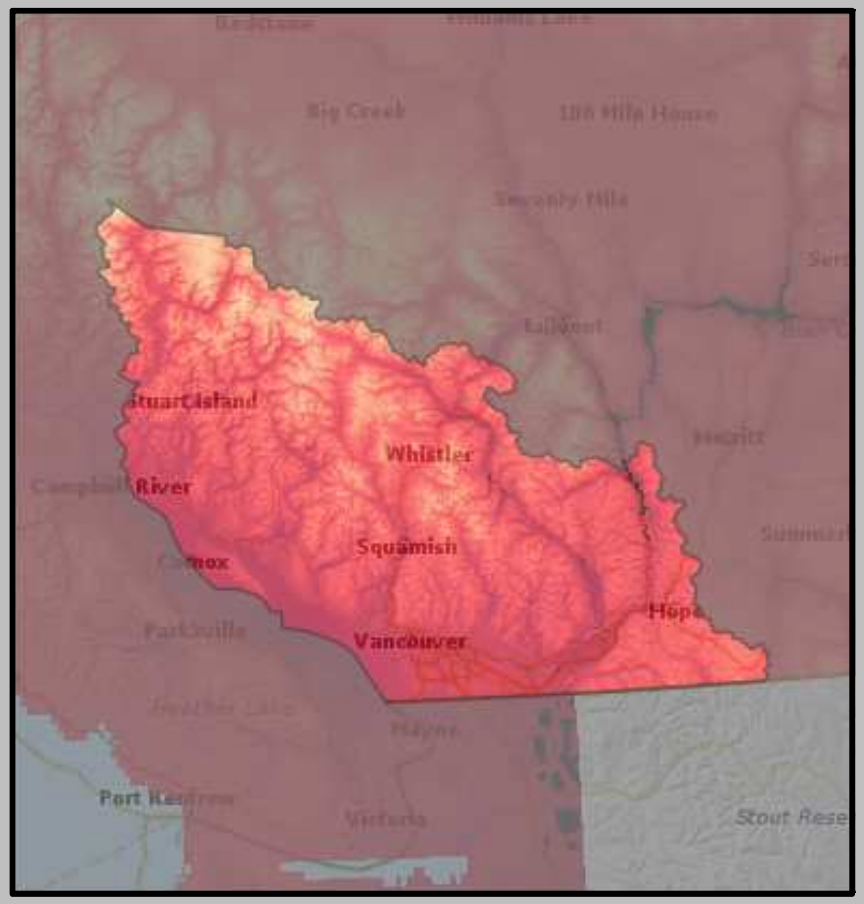
Climate Element	Projected future change In the Kootenay Boundary Region	
	By 2050s	By 2080s
Temperature ºC		
- Annual	**+1.9** (+1.1 to +2.8)	**+2.8** (+1.7 to +4.7)
- Summer	**+2.4** (+1.7 to +3.1)	**+3.5** (+2.1 to +5.7)
- Winter	**+1.7** (+0.8 to +3.3)	**+2.7** (+1.4 to +4.9)
Precipitation (%)		
- Annual	**+5%** (-3% to +11%)	**+6%** (+2% to +13%)
- Summer	**-6%** (-18% to +1%)	**-10%** (-27% to +8%)
- Winter	**+8%** (-2% to +17%)	**+13%** (+2% to +27%)
Snowfall (%)		
- Winter	**-5%** (-12 to +7%)	**-7%** (-21 to +3%)
- Spring	**-48%** (-68 to -5%)	**-69%** (-87 to -11%)
Frost-free days	**+24** (+15 to 35)	**+36** (+21 to +59)
Growing degree days	**+295** (+162 to 437)	**+444** (+240 to +807)

Pacific Climate Impacts Consortium

University of Victoria

PLAN2ADAPT

South Coast Forestry Region



Climate Element	Projected future change In the South Coast Region	
	By 2050s	By 2080s
Temperature ºC		
- Annual	**+1.7** (+1.0 to +2.5)	**+2.7** (+1.5 to +4.2)
- Summer	**+2.0** (+1.4 to +2.7)	**+3.1** (+1.9 to +4.7)
- Winter	**+1.6** (+0.7 to +2.7)	**+2.7** (+1.2 to +4.1)
Precipitation (%)		
- Annual	**+6%** (-2% to +11%)	**+9%** (+2% to +16%)
- Summer	**-14%** (-23% to + 3%)	**-13%** (-34% to -2%)
- Winter	**+6%** (-4% to +15%)	**+10%** (+1% to +24%)
Snowfall (%)		
- Winter	**-24%** (-40 to -10%)	**-33%** (-60 to -15%)
- Spring	**-52%** (-73 to -13%)	**-74%** (-88 to -14%)
Frost-free days	**+24** (+13 to 36)	**+37** (+19 to +58)
Growing degree days	**+336** (+205 to 519)	**+565** (+298 to +913)

Pacific Climate Impacts Consortium
University of Victoria

Changes Summary

Annual

- Temperature increase 1.3-2.7^{o}C by 2050s & 1.8-4^{o}C by 2080s
- Storms likely to become more intense

Winter

- More precip likely, more as rain, esp at low elevations where snowpacks decrease
- Snowmelt could occur as much as 1 month sooner
- Stream flows likely higher

Summer

- Less precip likely
- Lower streamflows begin earlier & extend longer into fall
- Number of frost free days increase
- Wildfire season continues to get longer + higher hazards

PACIFIC CLIMATE IMPACTS CONSORTIUM

PLAN2ADAPT

Preparing for Climate Change British Columbia's communities have already begun to experience climate change. Scientists believe that observed climate changes are the result of past human activities that released greenhouse gases into the atmosphere. They also believe climate change and its impacts will continue for years to come, no matter what we do now to reduce greenhouse gas emissions.

Use this site to help you understand:

- how climate *has changed* in your region;
- how climate *will change* in your region;
- how your region could be impacted; and
- what actions you can take to prepare for climate change.

www.plan2adapt.ca/

Thank you!