

Climate Change and Us



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Outline

- Climate science basics
- BC impacts
- Global implications
- Emission reduction measures & resources; adaptation in BC
- What can we do to adapt and reduce emissions?

Climate science basics.

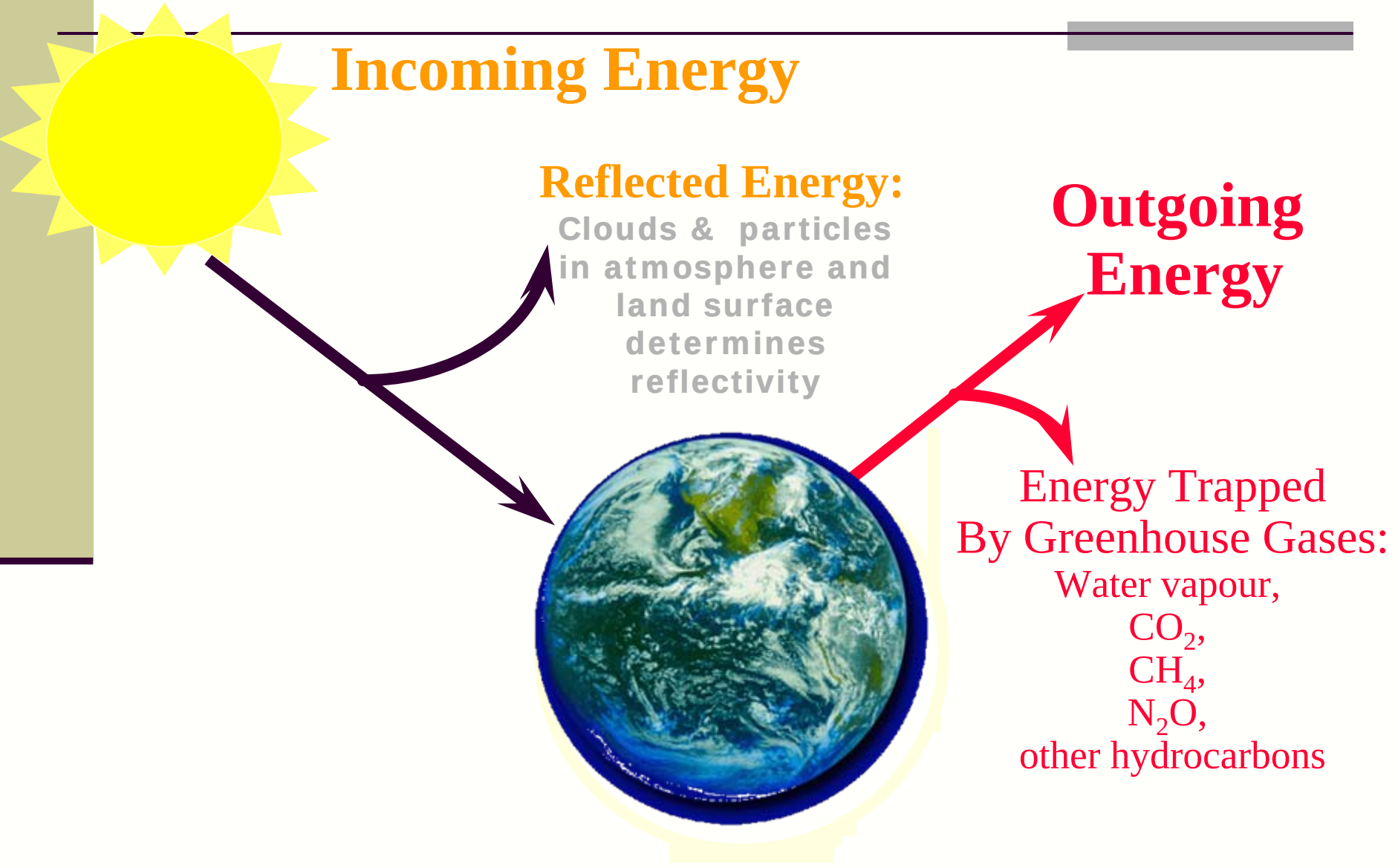
The messages.

- The earth has gone through massive climate changes in the past, well before human society became established
- Most of the warming in the last 50 yrs is attributable to human emissions of GHGs
- Human caused climate change is already evident
- Unabated, the current rate of rise in emissions will lead to dangerous global impacts
- A least a 25%-70% reduction in global emissions by 2050 is needed to stabilize the climate & sustain existing economic and social systems.

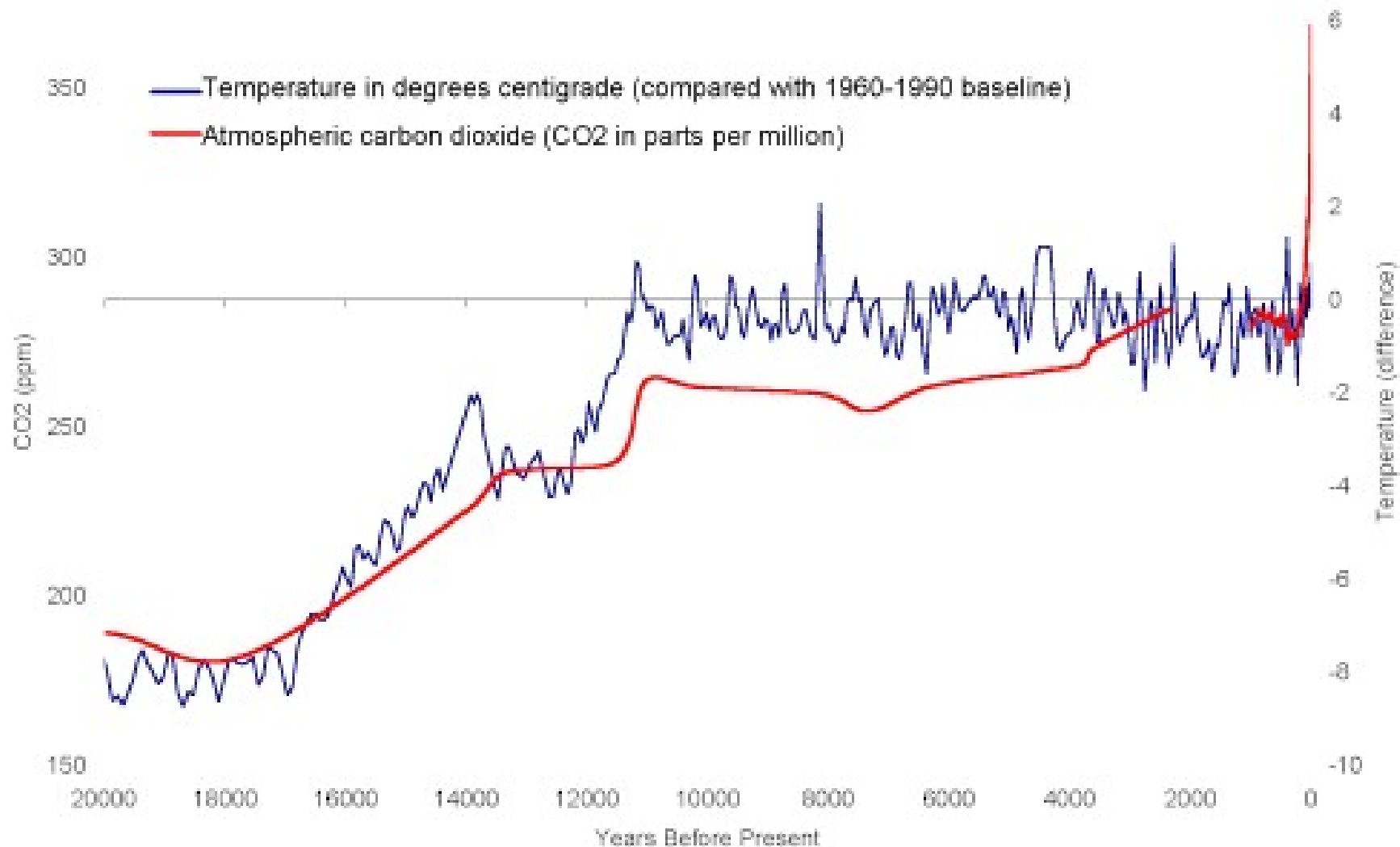
Forces of Climate Change

- Many forces operating at geological time scales of 100 thousand to millions of years dramatically change climate
 - Continental drift
 - Glaciation
 - Variations in the earth's orbit
- Human activity is now changing our climate over a few decades by altering atmospheric chemistry

Incoming solar energy heats the Earth, and outgoing heat radiation cools it off



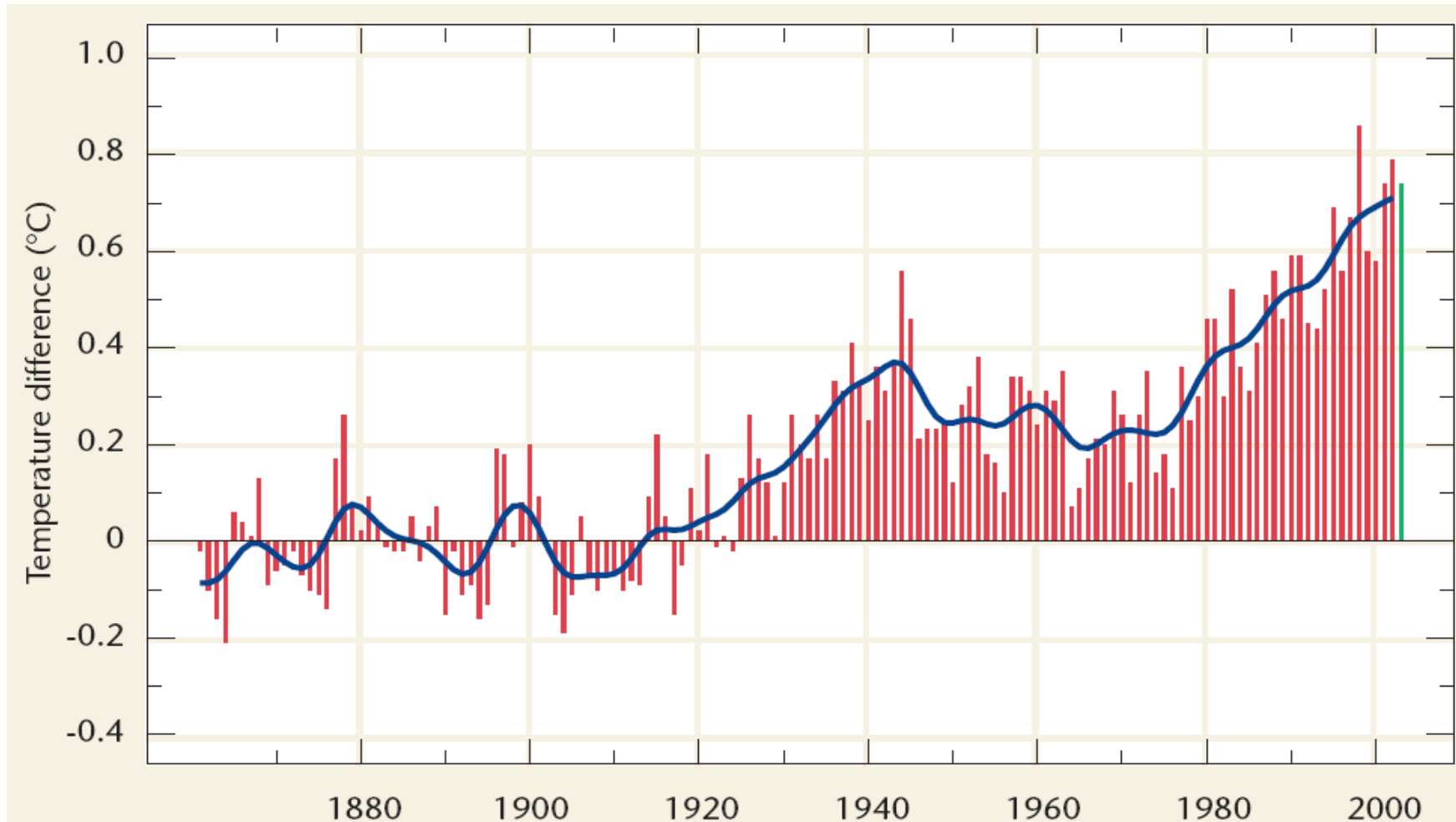
Temperature and CO_2 levels past 20,000 yrs



Observed Climate Change:

Global average temperature based on instrumental data

UK Hadley Centre, 2003



September Sea Ice Cover

1979



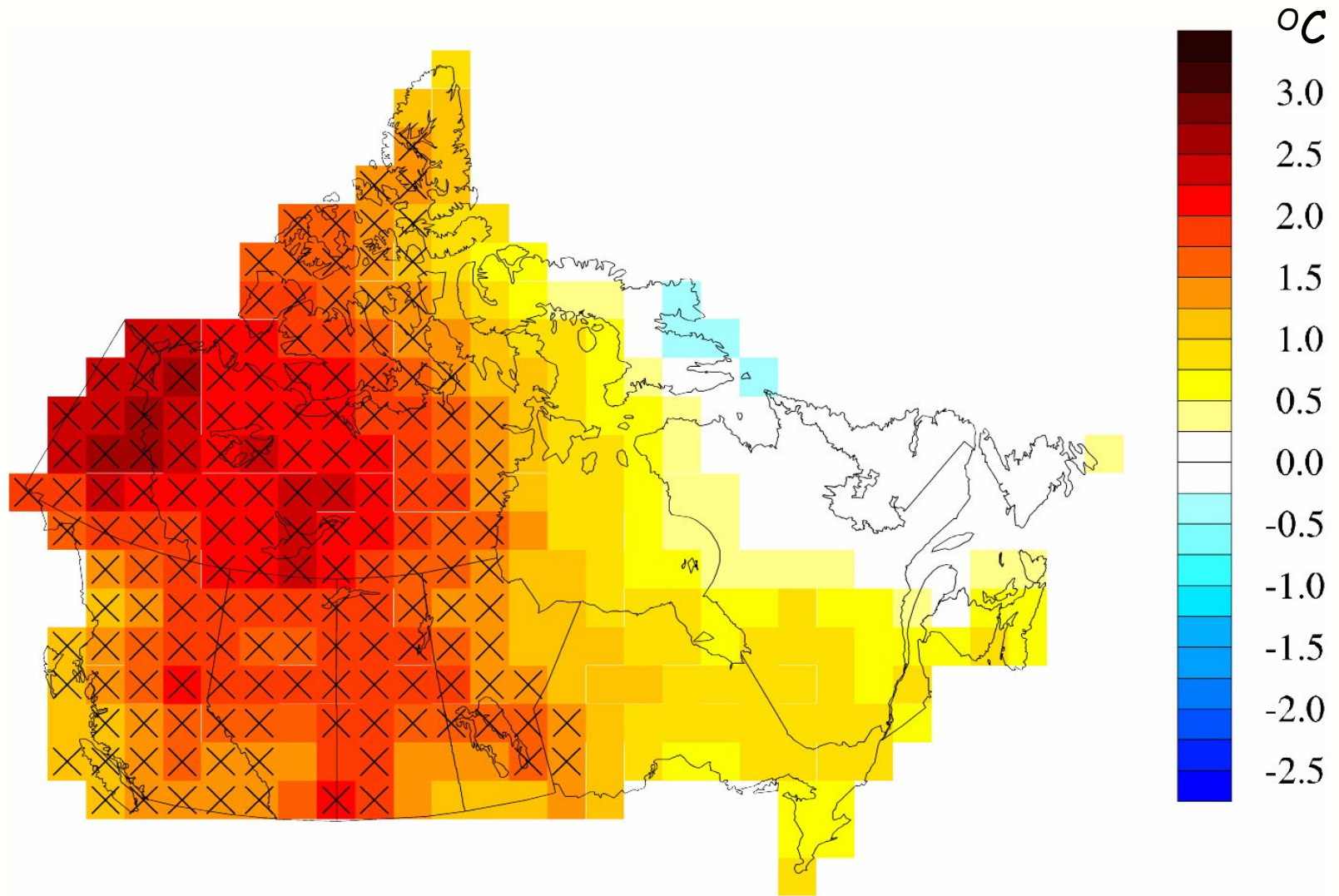
~20%
reduction
in cover

2005



Source:
NASA/Goddard
Space Flight
Center

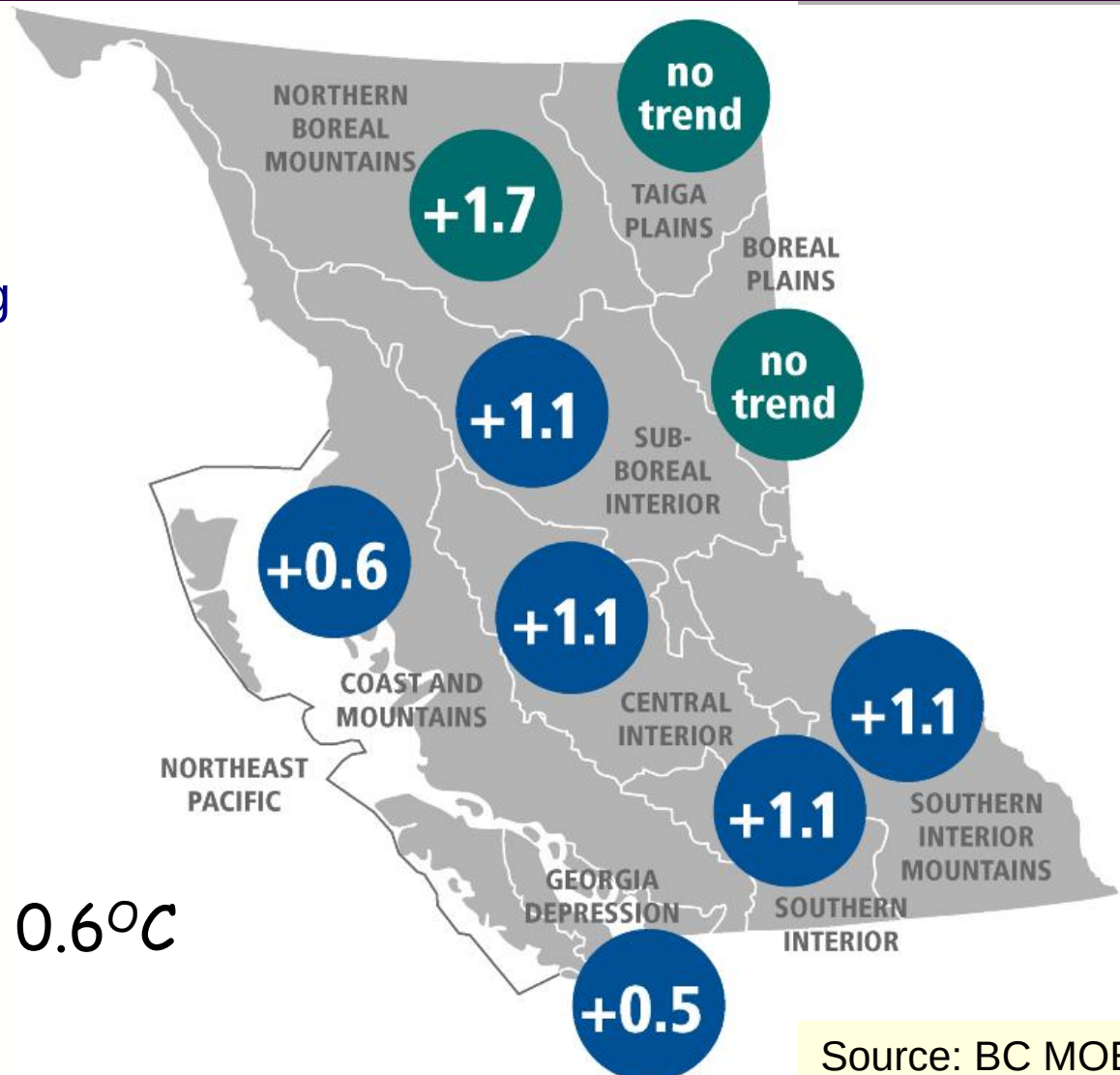
Canada: Mean annual temperature trend relative to historical normal (last 50 years)



BC is warming

Change in Average Temperature, 1895-1995 ($^{\circ}\text{C}/\text{century}$)

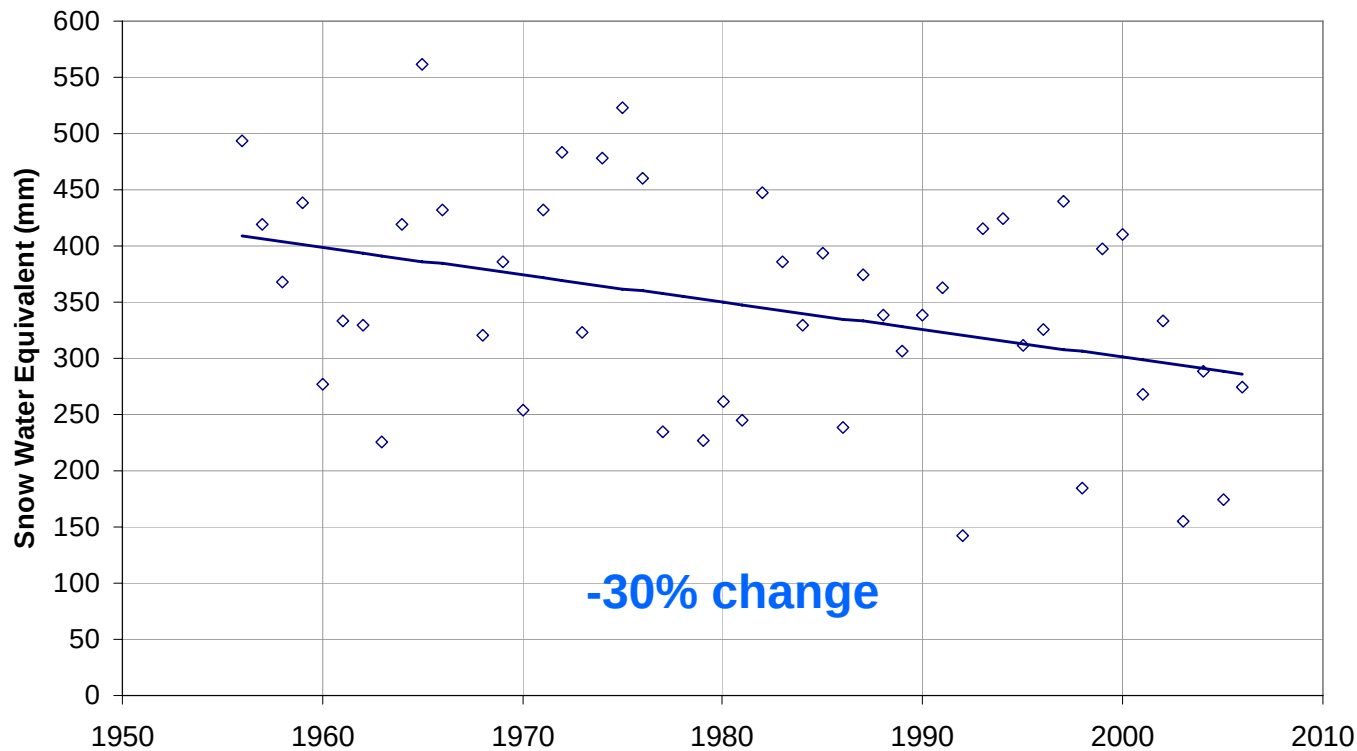
- North warming faster
- Winter warming faster
- Spring coming earlier



Global increase 0.6°C

Warming trend reducing snowpack

1F02 - Anglemont - April 1st Snow Water Equivalent
(Elevation = 1190 metres)
1956 - 2006



Decline
evident in
all low and
mid
elevation
sites in
BC

Mid Winter Thaws Cause Ice Jam Floods- Recent Increase

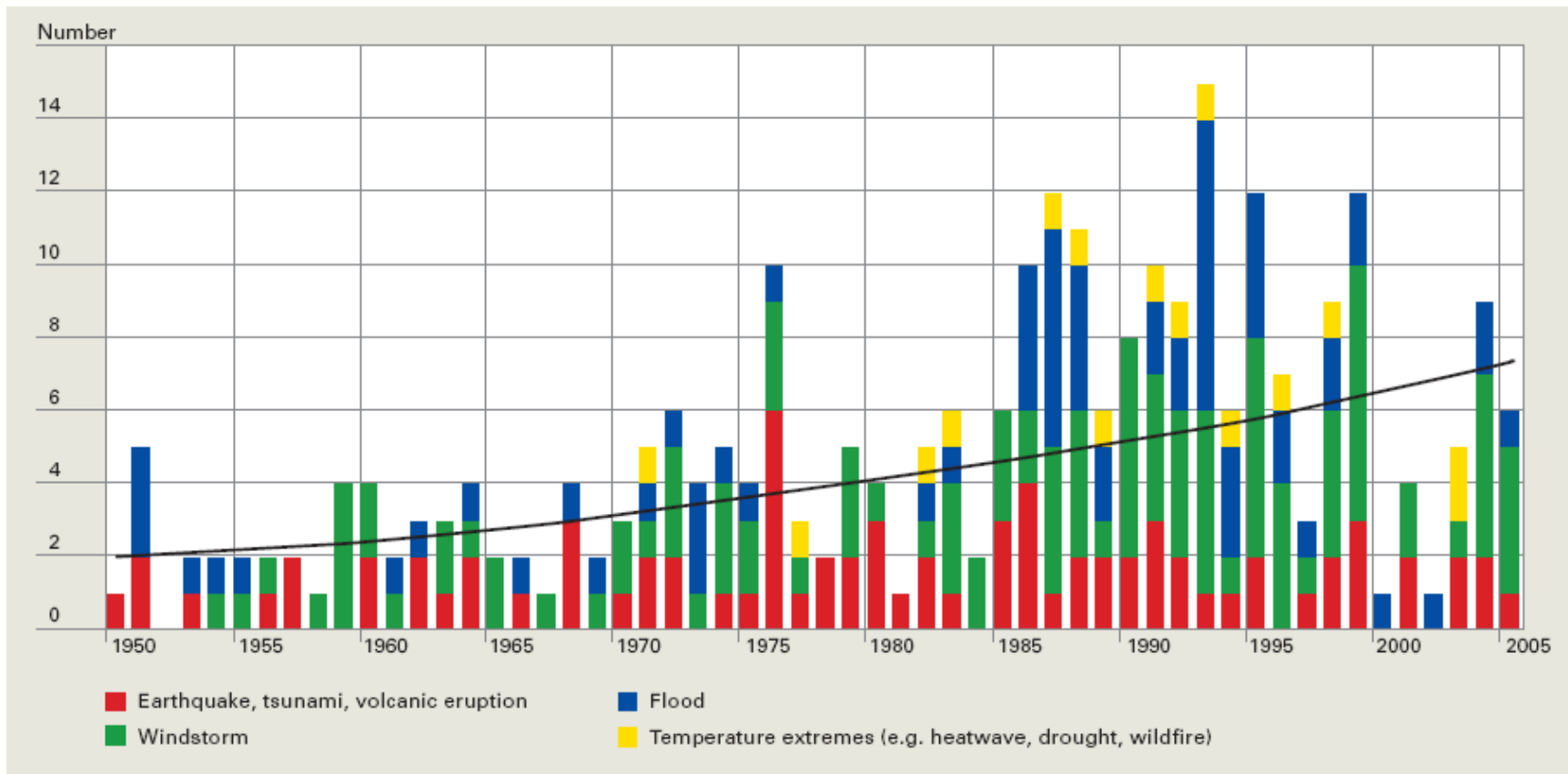


BC: More extreme rainfall events observed



Pemberton- Squamish Flood 2003

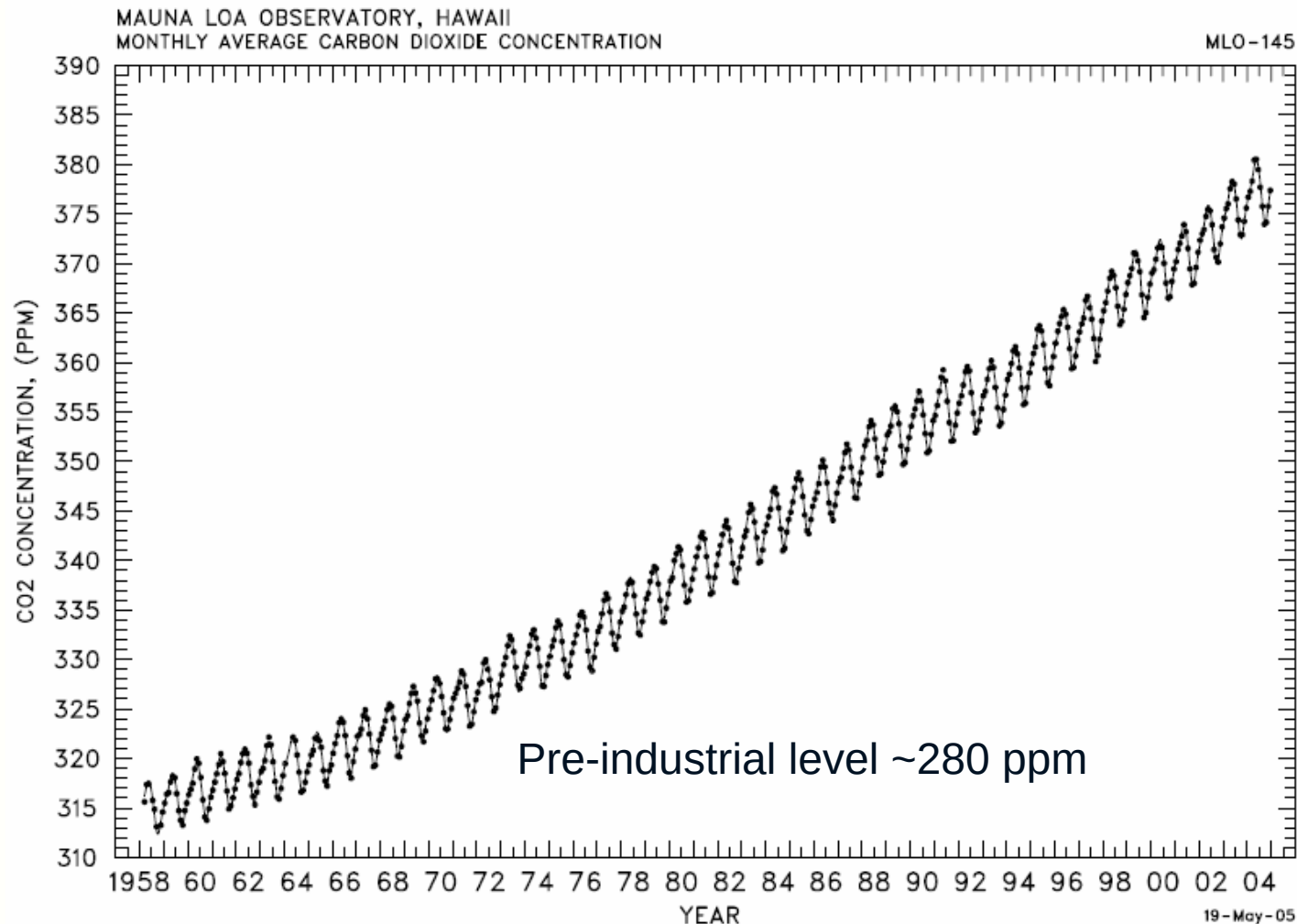
Weather related disasters increasing globally (MunichRe 2005)



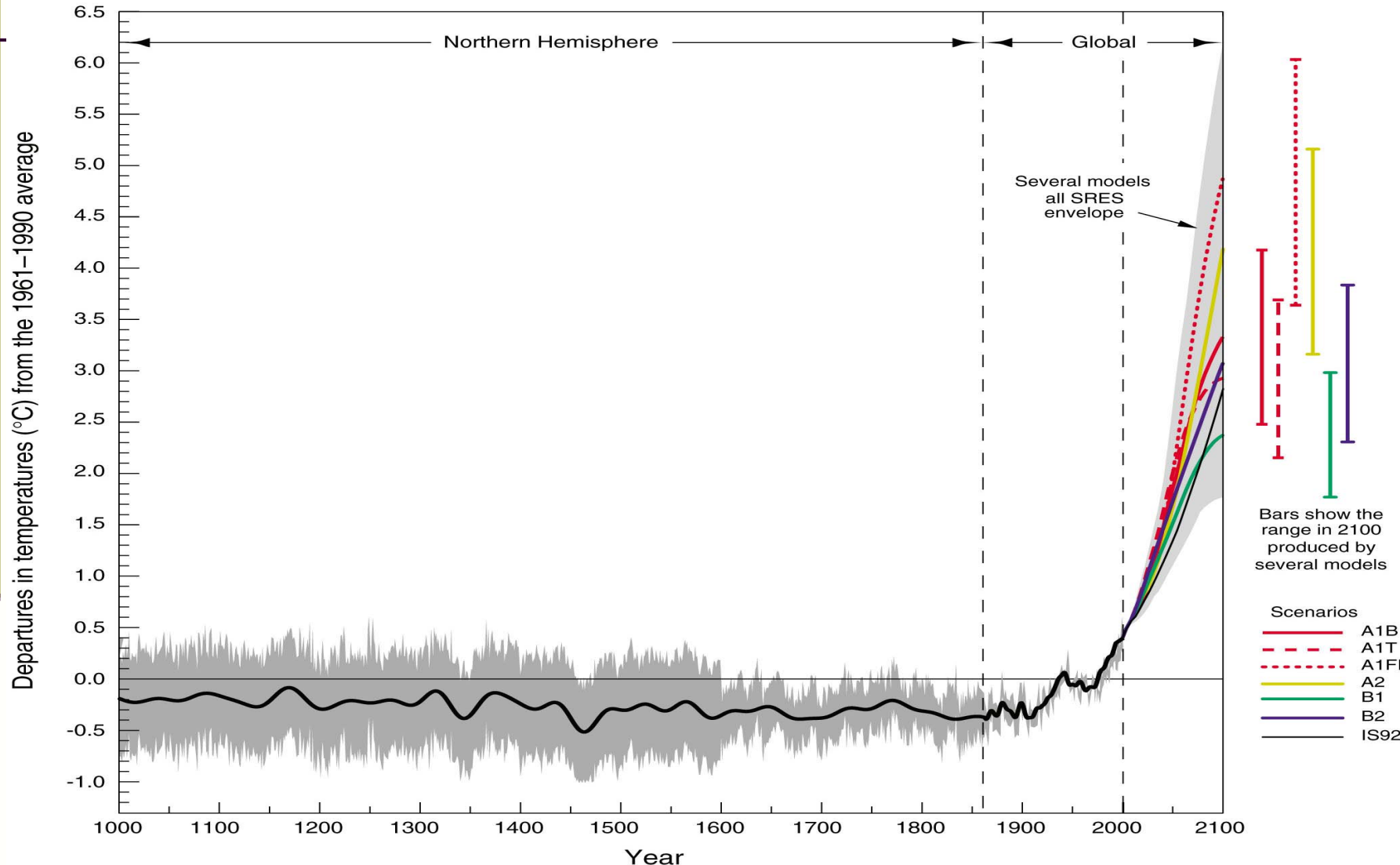
Future Projections

- Little uncertainty that climate will warm due to human influences
- Significant uncertainty about how much globe will warm due to:
 - Uncertainty over future emission pathways
 - Sensitivity of global models and complex feedbacks

Global CO₂ Levels are rising faster than any time in last 20,000 years



Temperature over last 1000 & next 100 years.



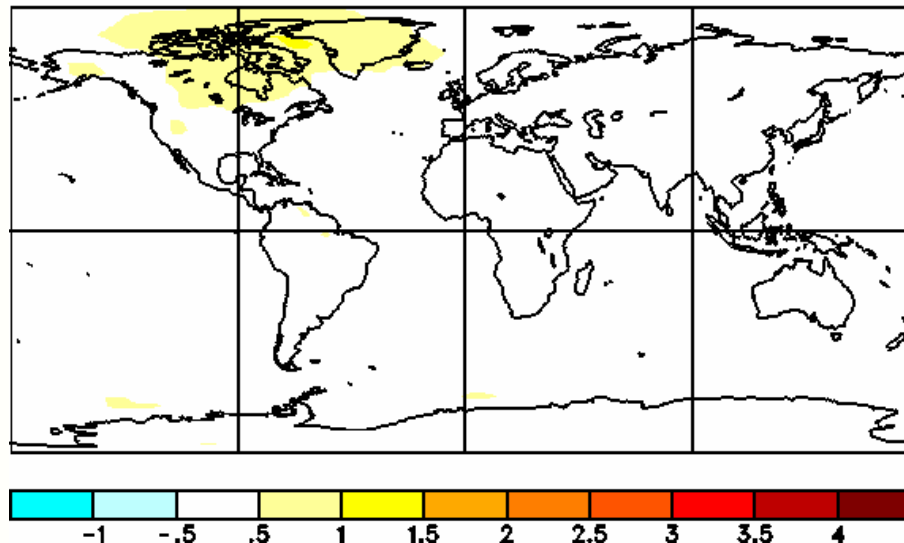
Source: Intergovernmental Panel on Climate Change (IPCC) 2001

View the latest global model animations produced by Environment Canada

www.cccma.ec.gc.ca/diagnostics/diagnostics.shtml

- Select CGCM3/T47 and explore 2 different scenarios, SRES A1B and SRES B1.
- These 2 scenarios present the potential consequences of limited emission reduction efforts but use different economic, technological and social assumptions.

CGCM3.1/T47 SRESA1B 5-YR SURF. TEMP. ANOM. YR=2000 (VS 1981-2000)



BC Projections

Royal BC Museum

Compare consequences of low, medium and high rates of climate change by 2020, 2050 and 2080.

Explore how BC may change in terms of:

- Temperature and precipitation
- Forest Species
- Agricultural Crops
- Home heating and cooling costs

Visit the Museum or view at:

www.pacificclimate.org

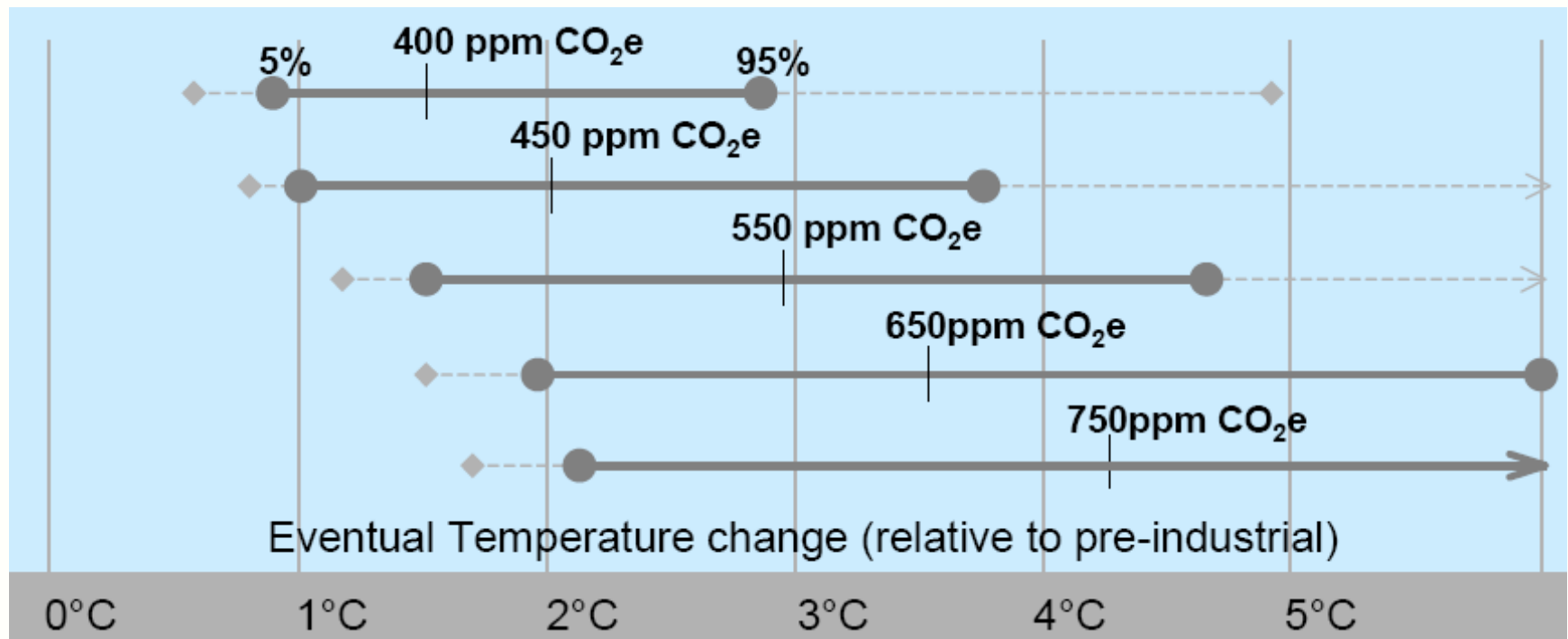
Projections: Global Ecosystem and Agriculture Impacts

(IPCC Draft 2007)

Up to 1 °C	<ul style="list-style-type: none">■ Some ecosystem shifts■ Some increases in agriculture but reduction in tropics
1-2 °C	<ul style="list-style-type: none">■ 25% species lost from current range■ Further increases in agriculture except reduction in tropics
2-3 °C	<ul style="list-style-type: none">■ Most tundra and 50% of boreal forest disappears■ 33% species lost from current range■ Global agriculture peaks except further reduction in tropics■ Large increase in <u>hunger</u>
3-4 °C	<ul style="list-style-type: none">■ Global decrease in agriculture temperate and tropical■ Further increase in <u>hunger</u>
4-5 °C	<ul style="list-style-type: none">■ Further global decrease in agriculture. <u>Hunger.</u>
5-6 °C	<ul style="list-style-type: none">■ Widespread species extinction. <u>Hunger.</u>

At current CO₂e levels expect 1 - 3 °C warming
Stern (2006) proposes target: do not exceed
550 ppm

Current levels 430 ppm CO₂e

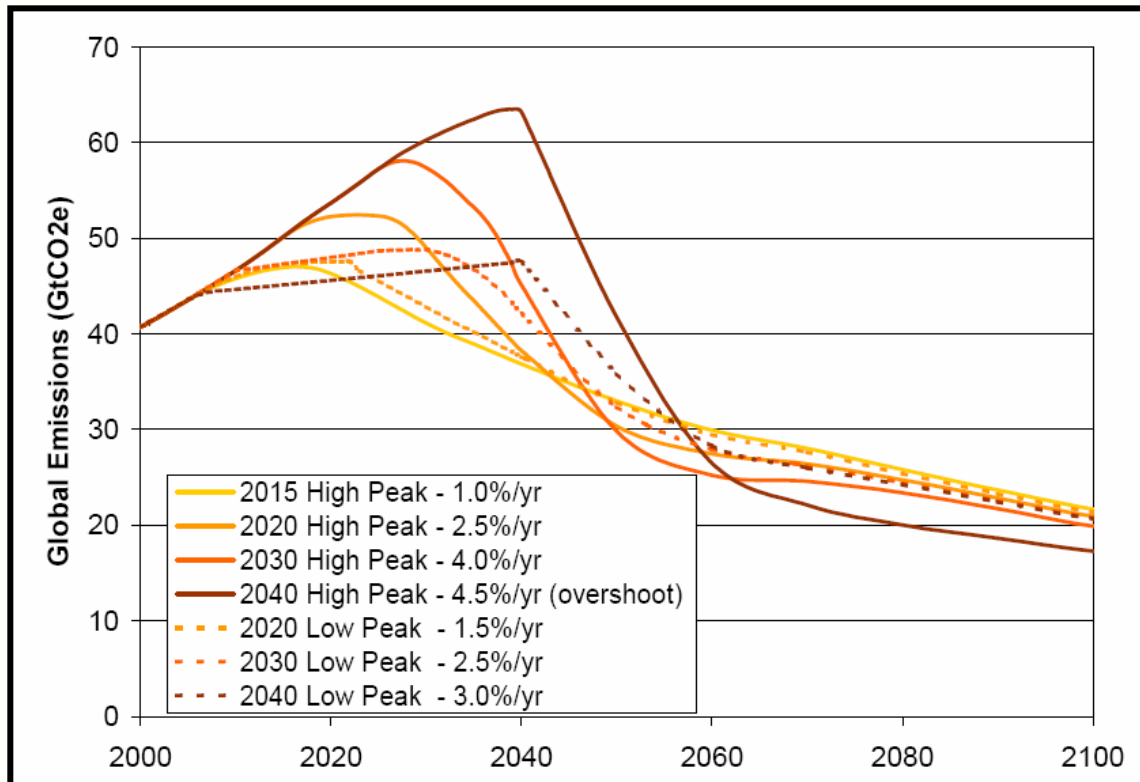


Stern 2006. Report
to the UK gov't

Possibly
Dangerous

Likely Dangerous

Stern 2006: Emission reduction pathways required to stabilize CO_2e at 550ppm by 2100 ($\sim 3^\circ\text{C}$ warming).



Additional reductions needed to avoid risk of dangerous climate change. A 70% reduction below current levels by 2050 needed to stabilize at 450 ppm CO_2e (Currently 430 ppm CO_2e).

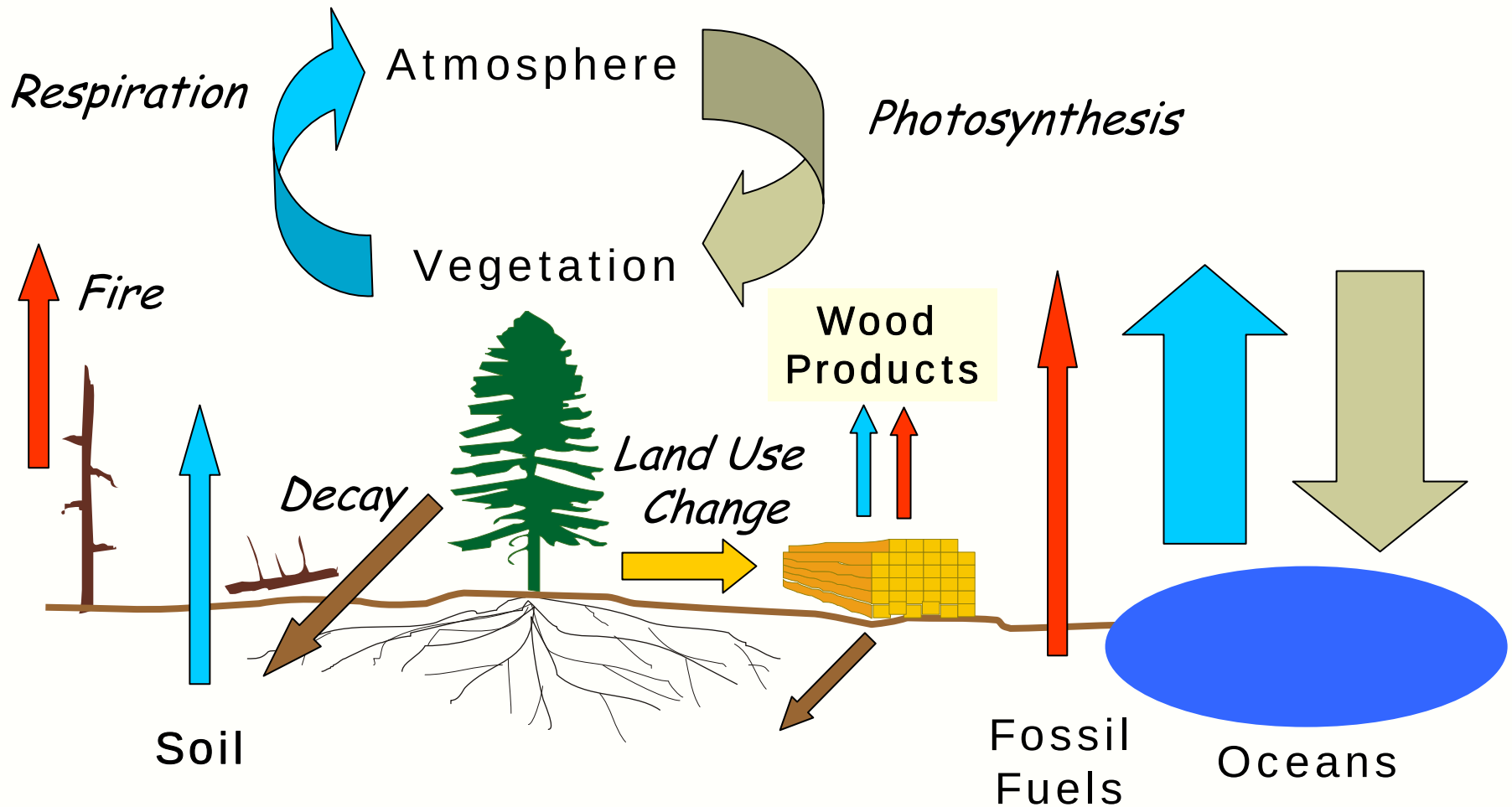
Stern (2006)

“The world does not need to choose between averting climate change and promoting growth and development...it is possible to ‘decarbonise’ both developed and developing economies on the scale required for climate stabilisation...”

Investment, business & insurance industry awareness growing

- Institutional investors & major corporations studying risks and opportunities
- Examples:
 - bcIMC
 - US *Business Environmental Leadership Council*
 - UK Universities Superannuation Scheme
 - Institutional Investors Group on Climate Change (Europe)
 - Sprott Asset Management (Canada)
 - Allianz
 - Munich & Swiss Reinsurance

Carbon *Flows* and Pools



How will it affect our programs?

Protection

Longer fire season



More frequent intense fires

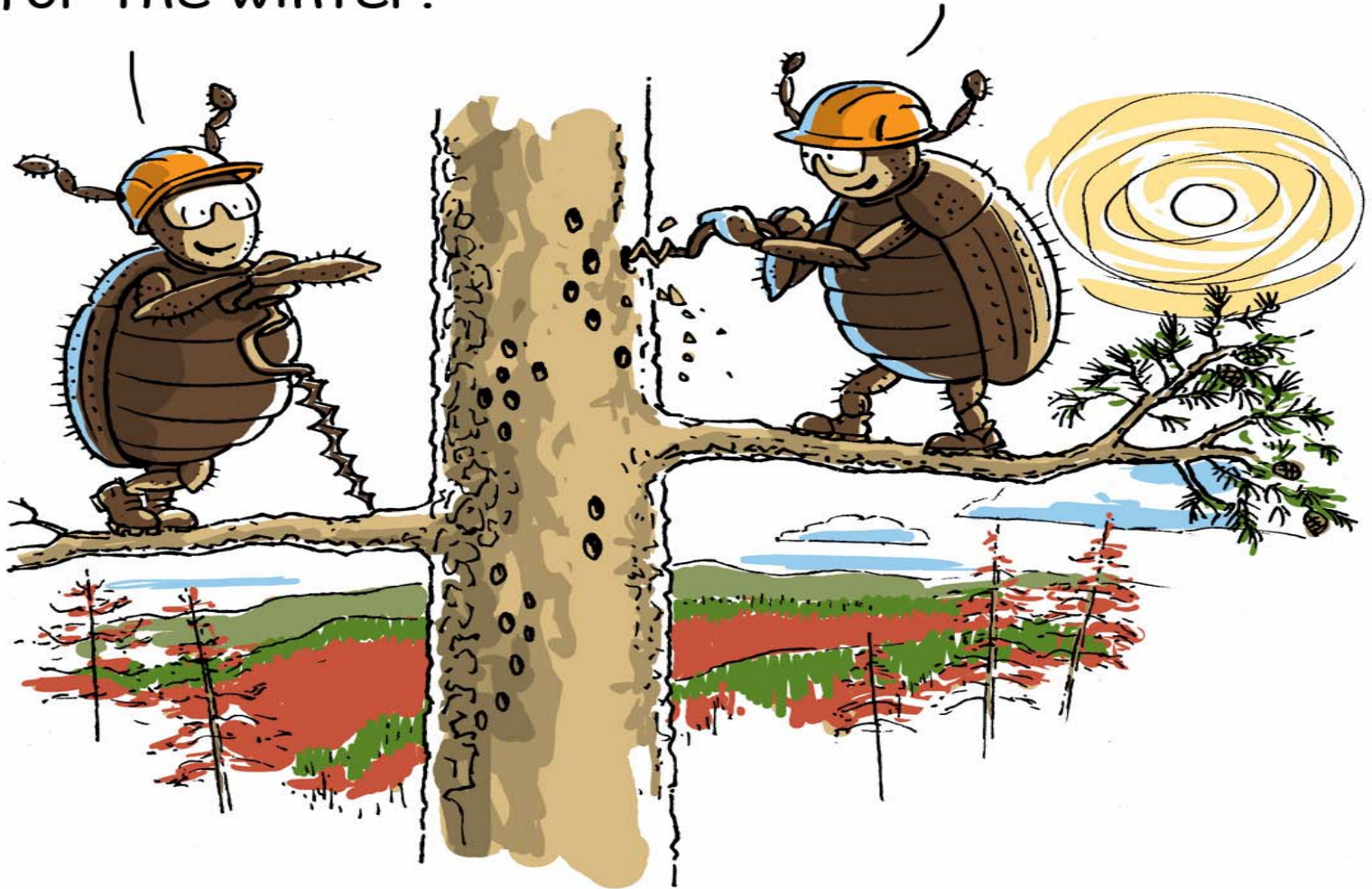


Insects and Disease



Next September, I'll have
reached the rule of 85,
and I'm gonna hang up my
driller. Me and the Missus
are going to head south
for the winter.

Hell, why move? By the
time you're ready to
retire, south will have
moved up here!



Stewardship

- Droughts
- Floods
- Storm damage
- Ecosystem and Species Ranges



- Forest Productivity



Operations



**Shorter winter
harvest season**

**Terrain Stability and
Engineering Design**



Range

- Drought
- Loss of forest that provides barriers to cattle movement
- Potential expansion of range areas



Social, economic, and other impacts

Forest and Range Sectors - local and global



Communities



Non-timber values

Water



Recreation



Species at risk



U.S. Fish and Wildlife

What can we do about it?

1. Foresee impacts
2. Adapt
3. Reduce emissions to slow down the rate of climate change

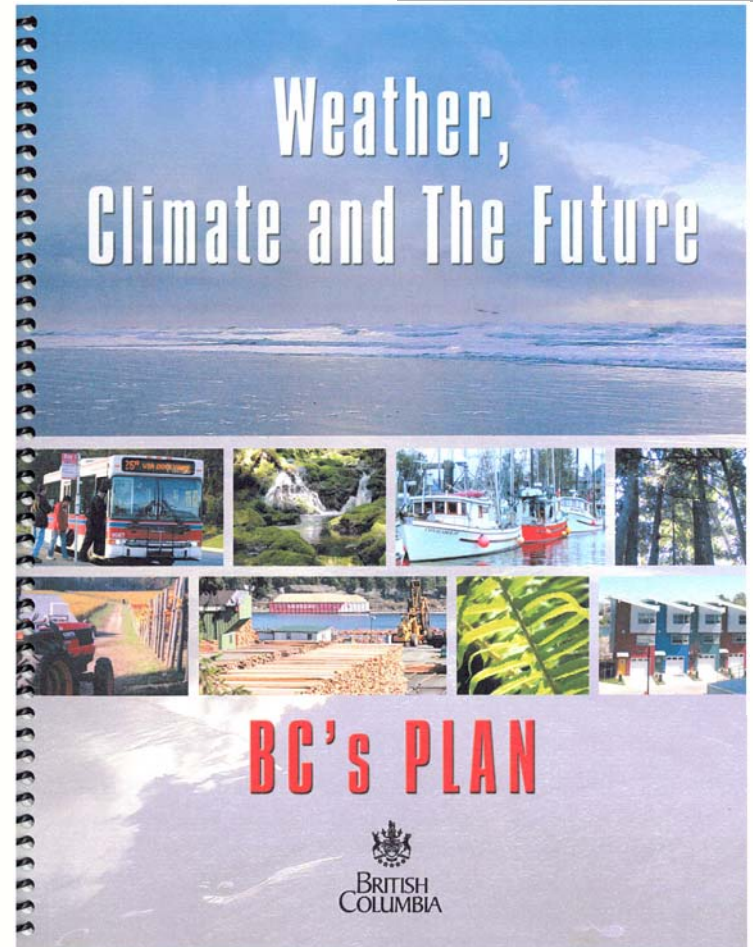
BC has a plan – Weather Climate and the Future – MOE lead

International Leadership

- United Nations
- The United Kingdom - legislation and economics
- Several US States
- World Mayors Council

BC's Climate Change Plan – 40 Actions

- Sustainable energy production and efficient use
- Energy Efficient Buildings Plan
- Reduce government emissions
- Adapt



Adapt – Chief Forester's initiative “Preparing for Climate Change”

- Recommendations
 - Improve knowledge
 - develop capacity to respond
 - Review operational policies and practices
- Technical Advisor in place
- Implement through Future Forest Ecosystems Initiative

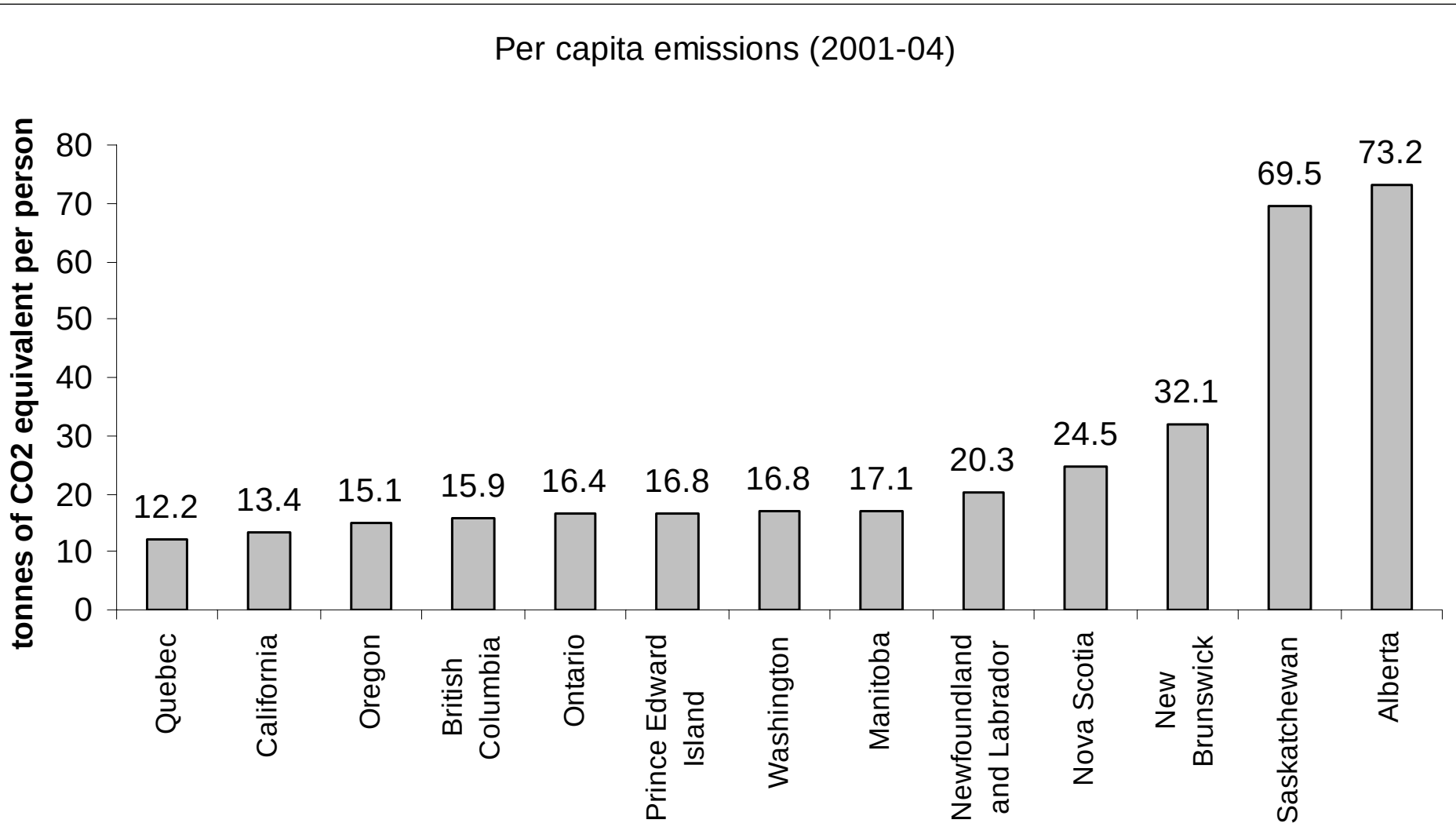


Future Forest Ecosystems Initiative

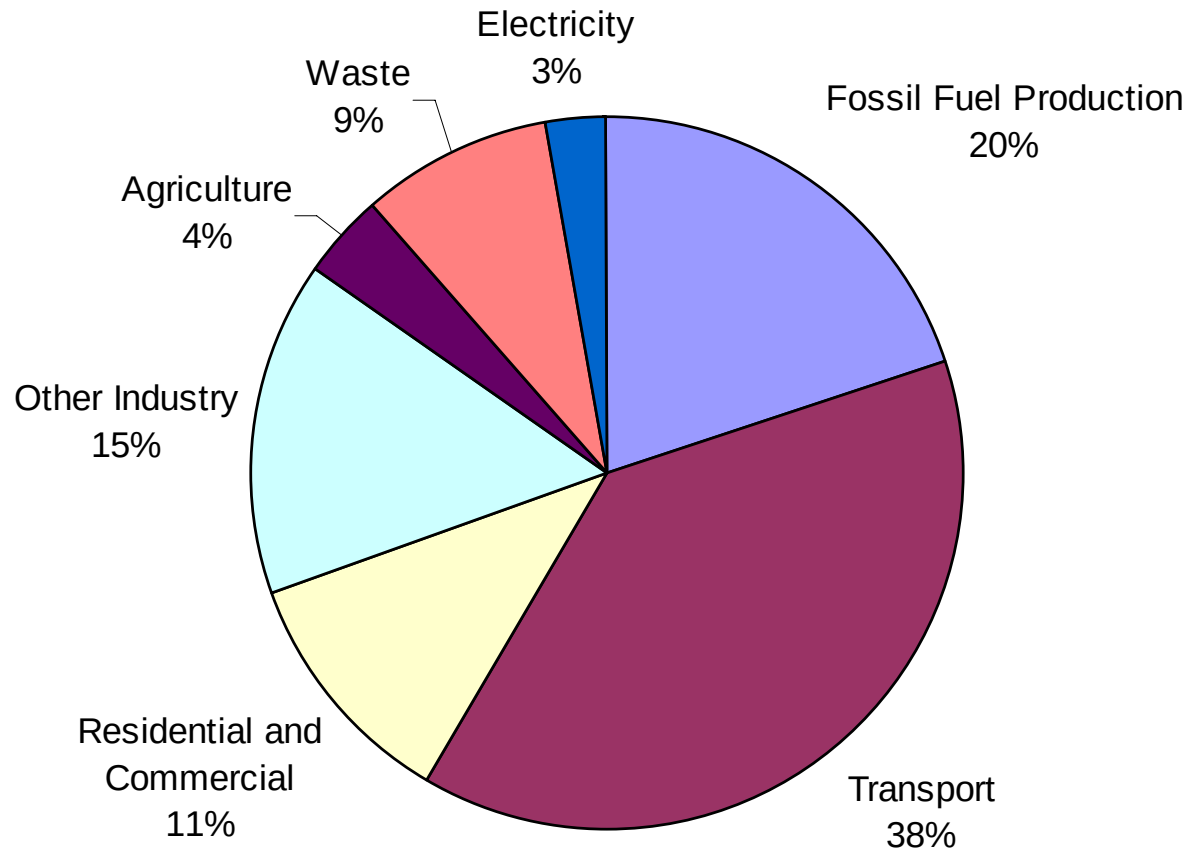
- **Purpose** – adapt forest management framework to changing climate
- **Objectives** – research, forecasting, monitoring, policy evaluation & change, extension
- **Desired outcomes** – forest ecosystems remain resilient to stress & continue to provide basic services, products & benefits to society

Reducing Emissions

per Capita GHG Emissions
by Province & some States



BC's 2004 Greenhouse Gas Emissions per Sector



MOFR Actions

Vehicle Fleets

- Assess energy use
- hybrid vehicles
- alternative fuels



Buildings

- Increase energy efficiency
- explore renewable energy options



Procurement and Operations

What Can We Do Personally?

Think Globally: Act Locally

- At home:
 - Buy EnergyStar appliances;
 - energy efficient lighting buy local goods
 - Consider energy retrofitting your home
- 'En route':
 - Walk, bicycle, carpool, telecommute, take transit
 - Purchase a fuel-efficient vehicle, or use a 'bio'fuel
- Calculate your own emissions
 - See website on bookmark – MOE link

In Summary

- Scientific evidence of climate change strong and growing
- Significant consequences if we do nothing or half-measures
- Key business driver affecting many programs
- BC and MOFR taking important first steps
- Reducing emissions is everyone's business

Questions for this afternoon

In exploring the possibilities for doing my/our part regarding climate change,

- How could I help at home?
- How could I help at work?
- How could we make this fun?
- What other info would help?



Thank you.