Stormy Weather: Climate Change and Sustainability

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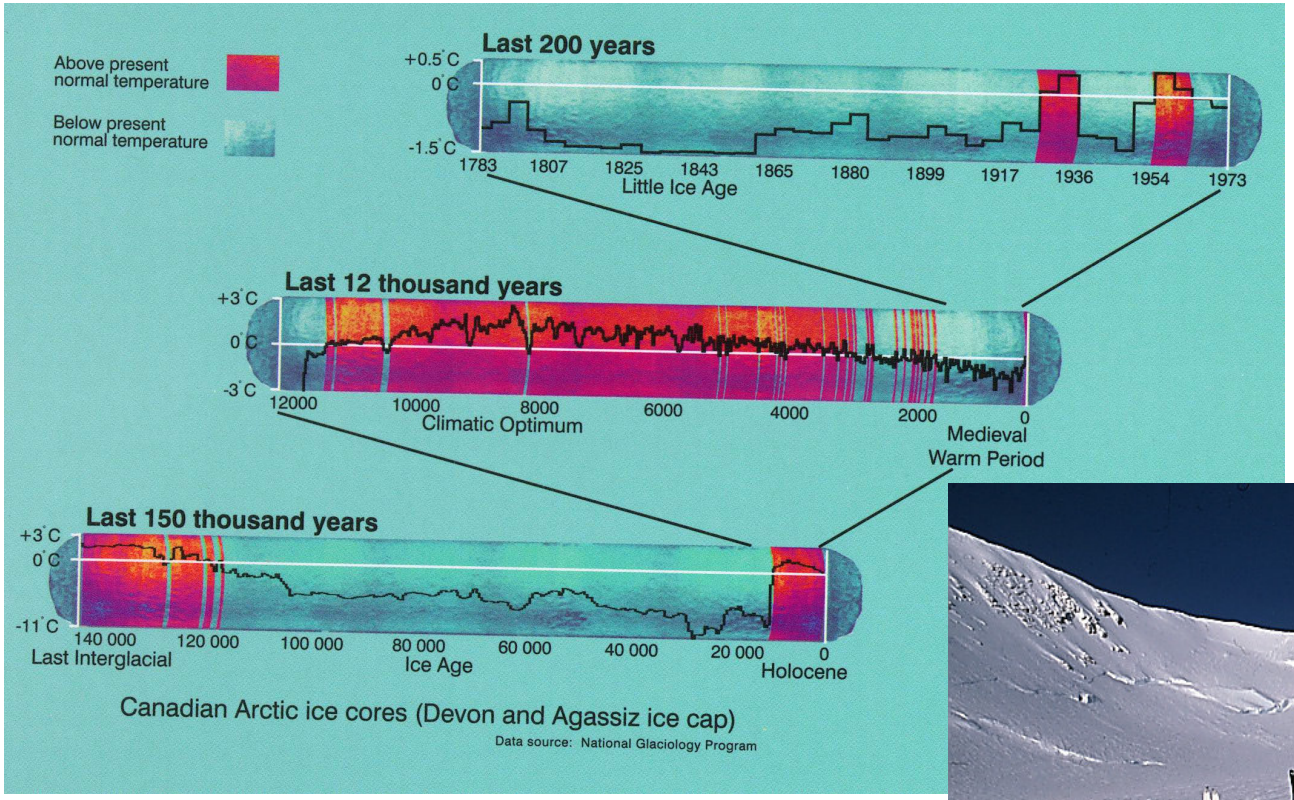
Coffee House Controversies
Thursday, March 4, Roca Jack's

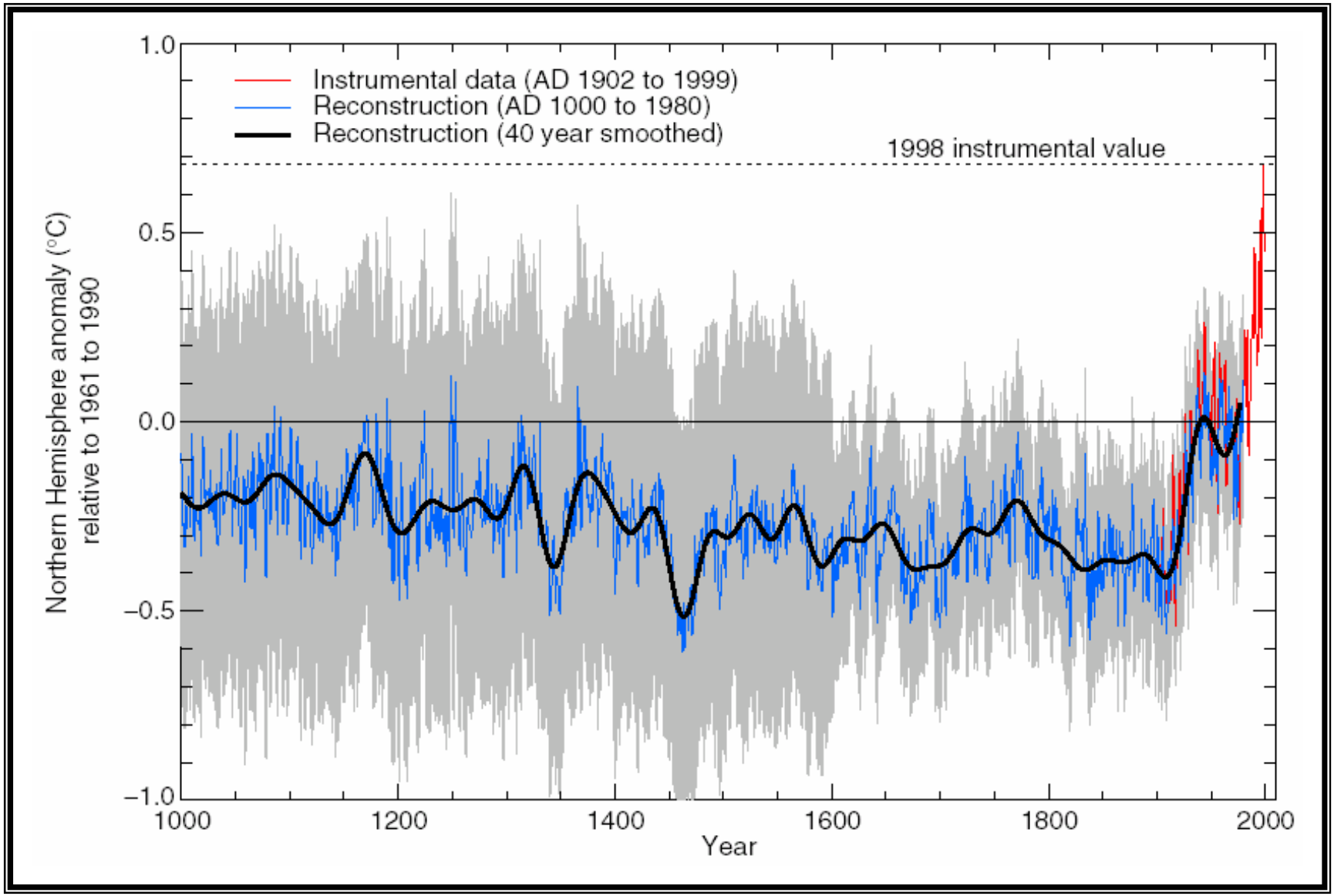
Climate Change Science

Climate is Always Changing



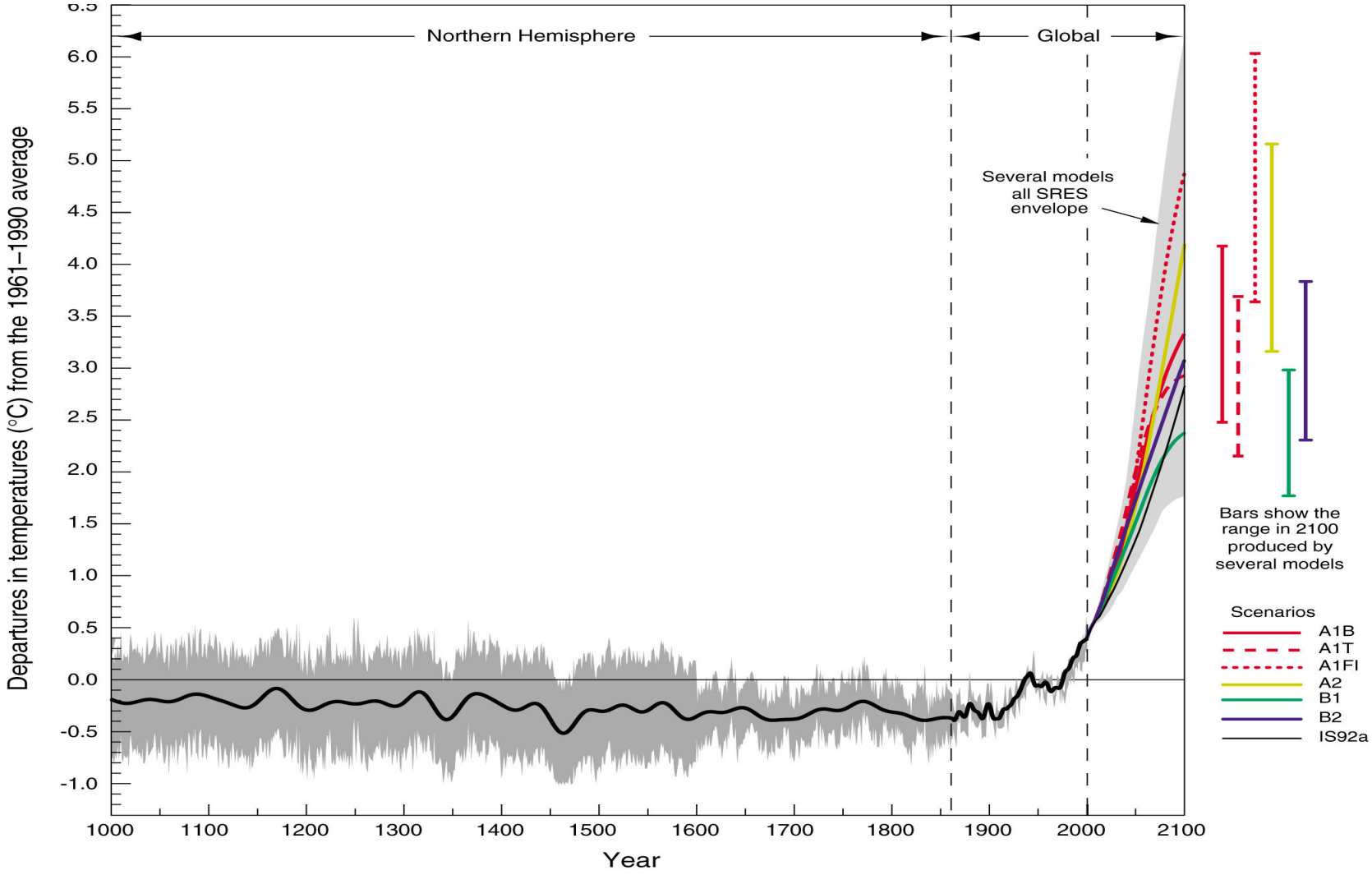
From GSC Misc. Report 71 (2001)

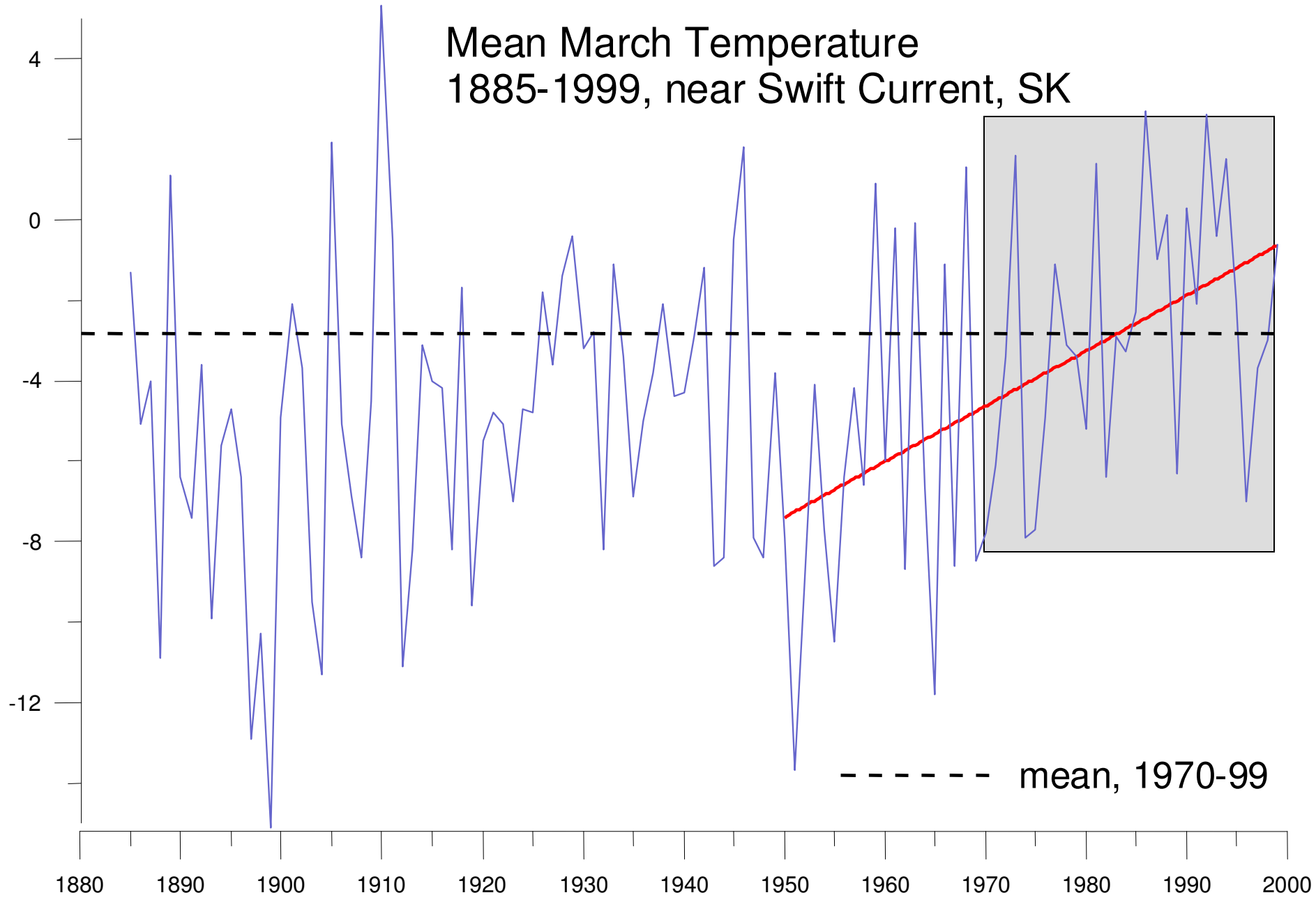
Ice cores, tree rings,
lakes and oceans sediments:
windows on the past



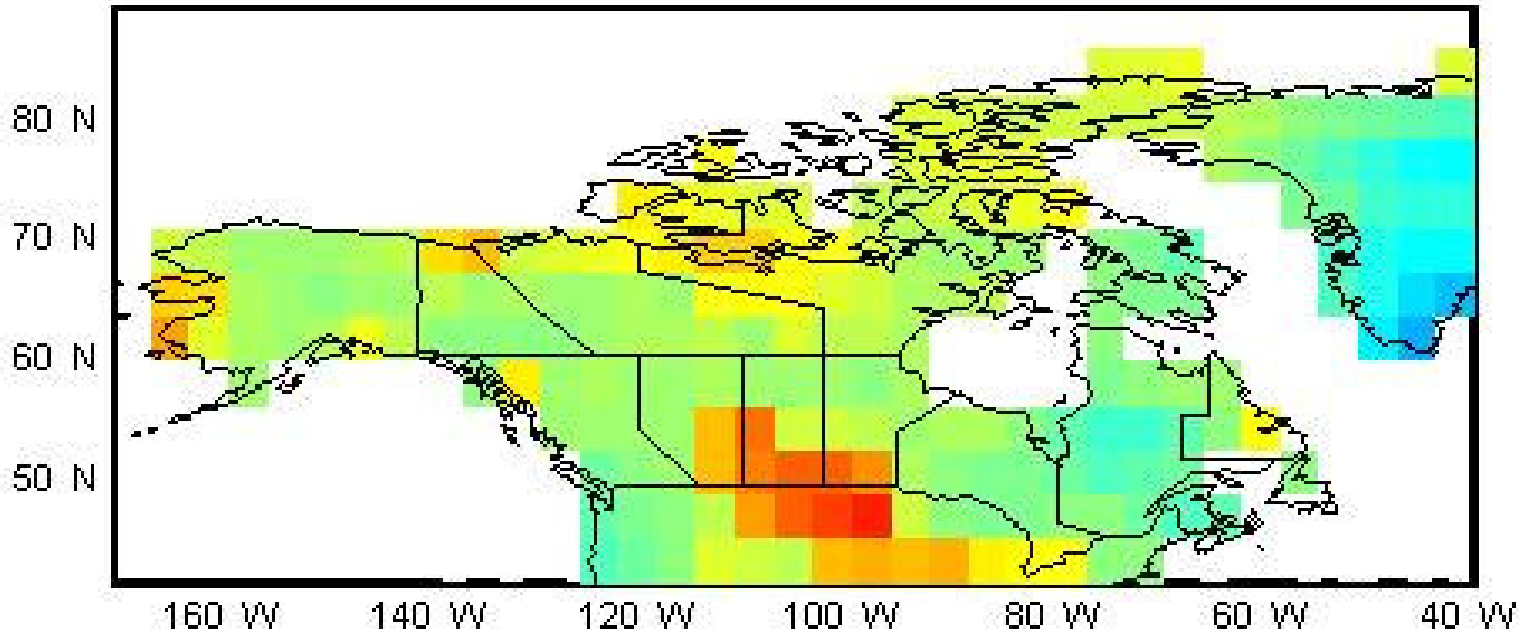
Mann, *et al*., 1999

Past and Future Temperatures

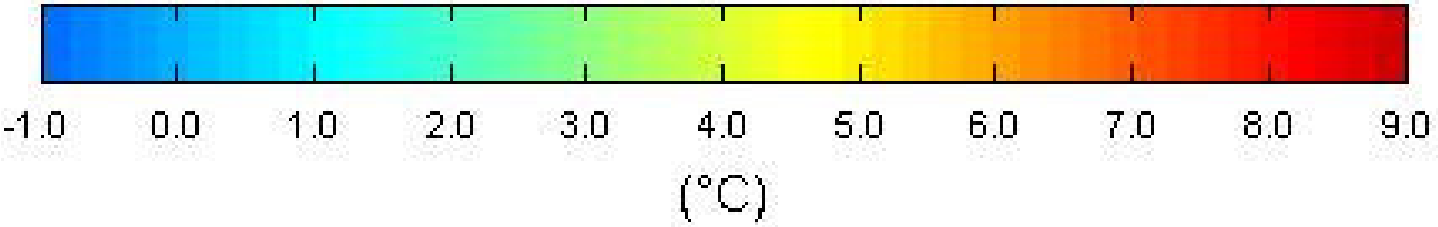



Mean March Temperature
1885-1999, near Swift Current, SK
4
0
-4
-8
-12
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
mean, 1970-99

Canadian Centre for Climate Modelling and Analysis
Global Coupled Model CGCM2 A21
Mean Temperature Change Spring - 2040-2069

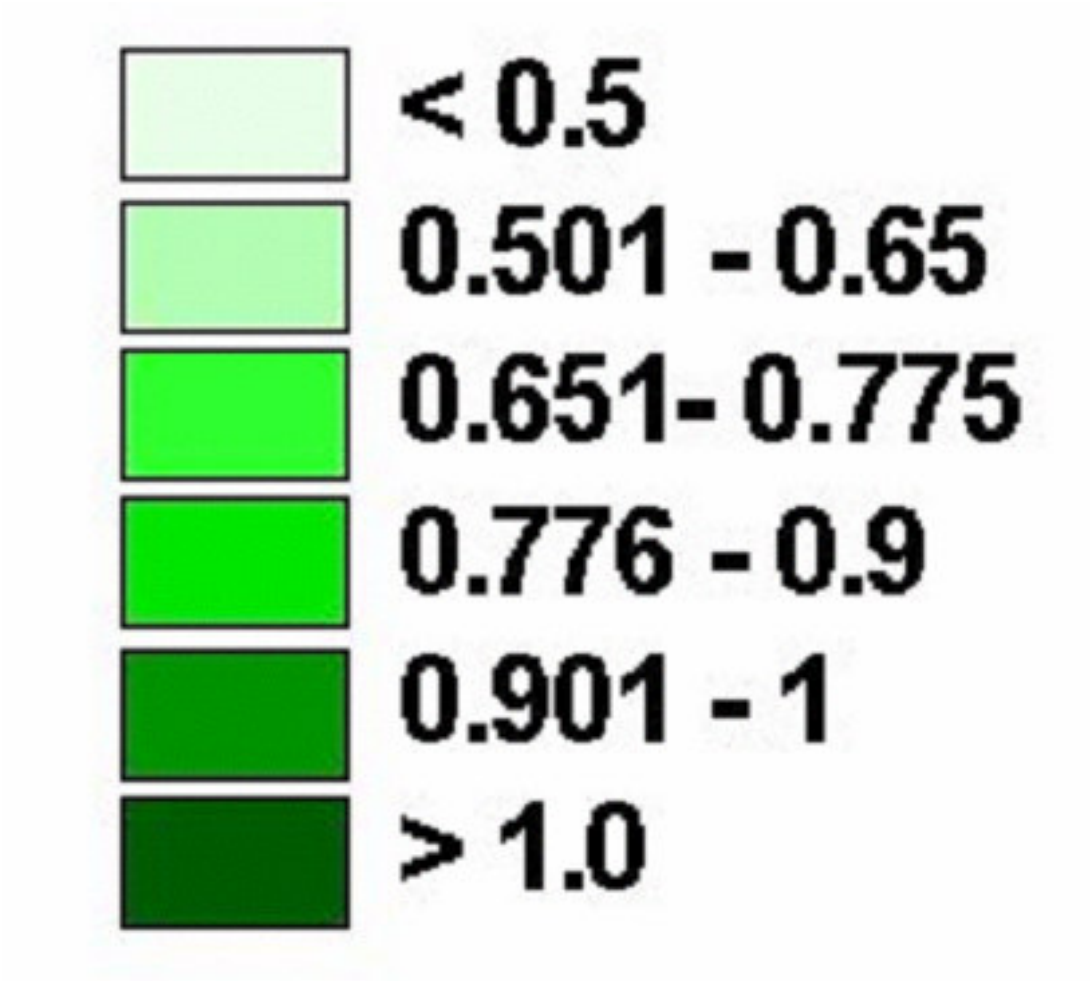


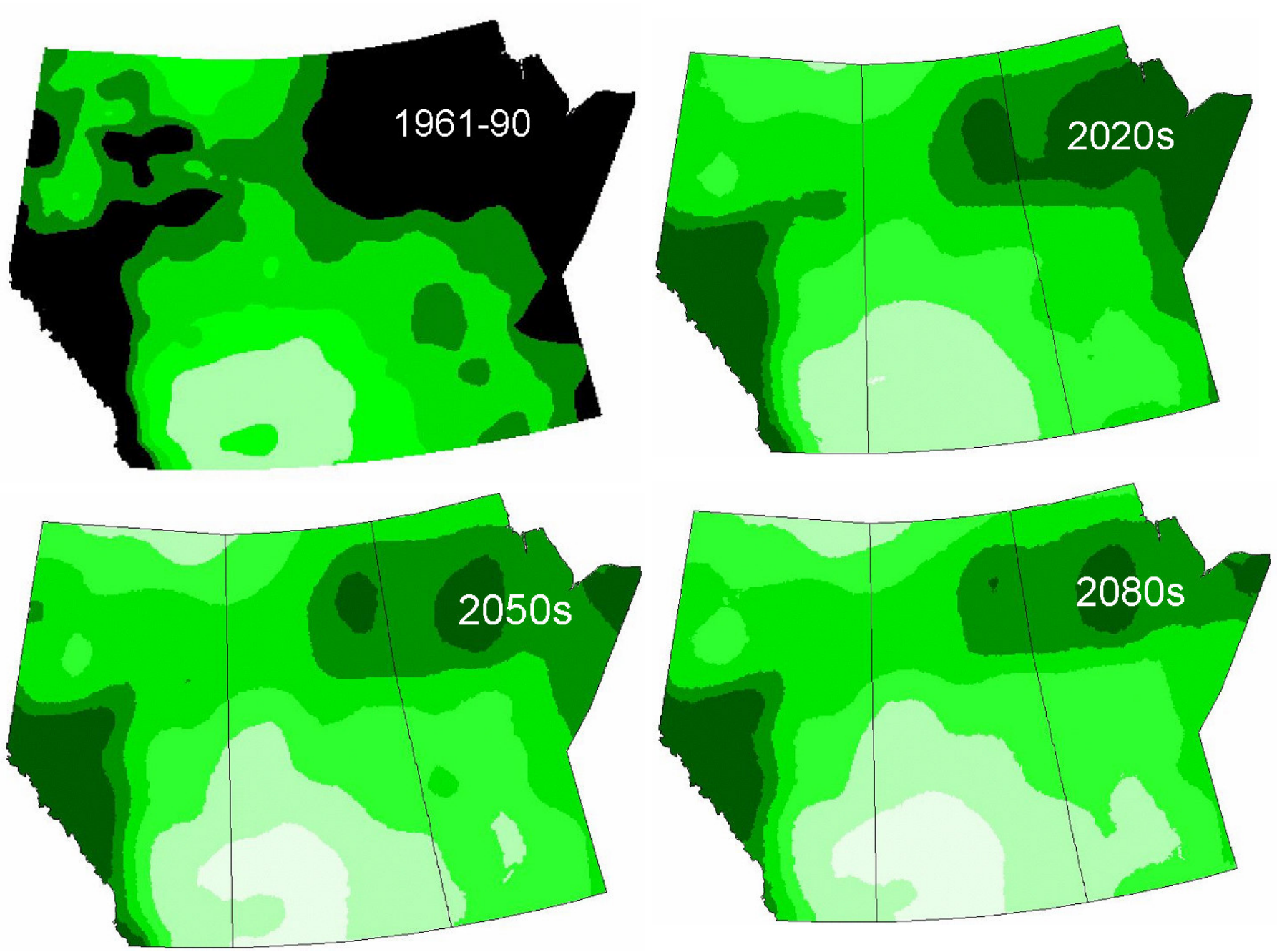
http://www.cics.uvic.ca/scenarios/



Aridity Index: P/PET

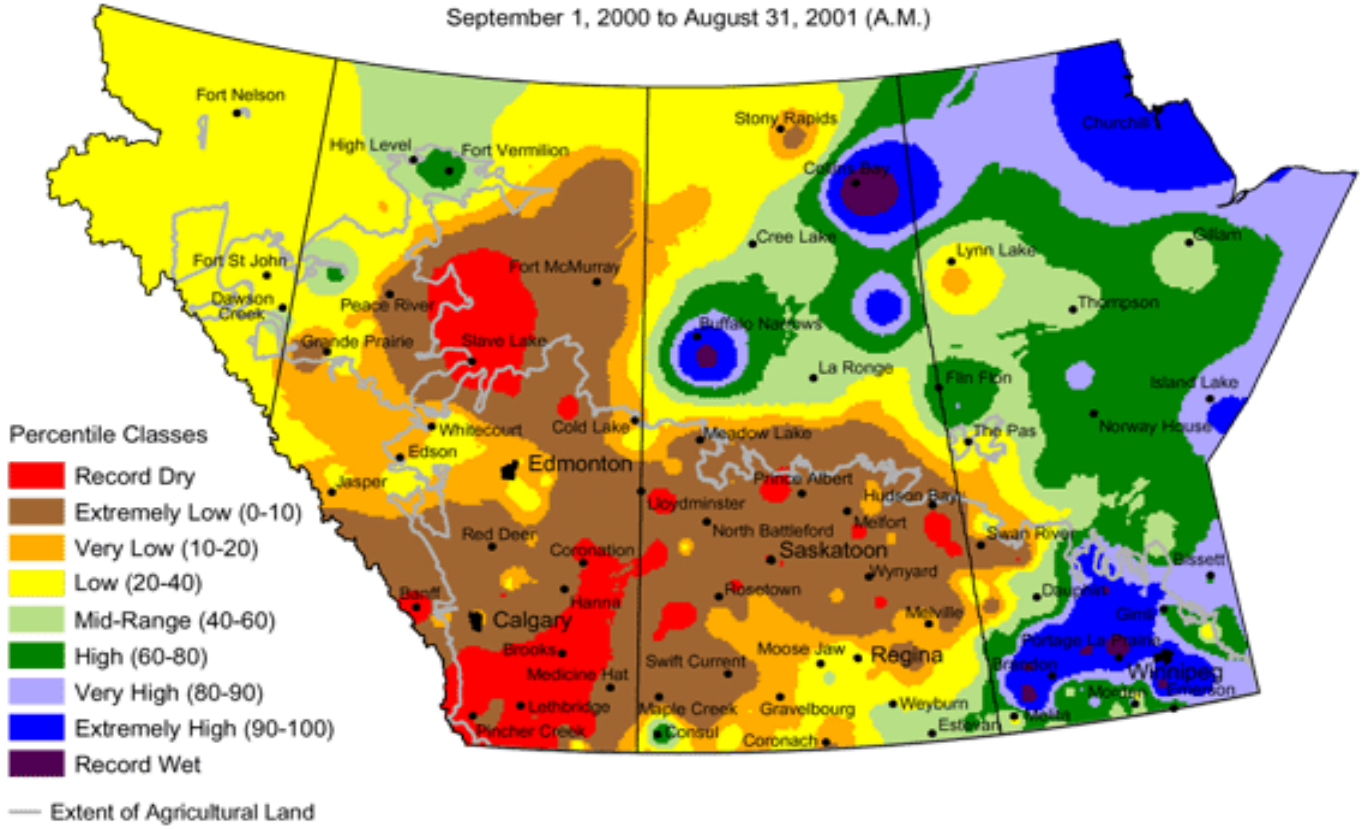
Precipitation / Potential Evapotranspiration




1961-90
2020s
2050s
2080s

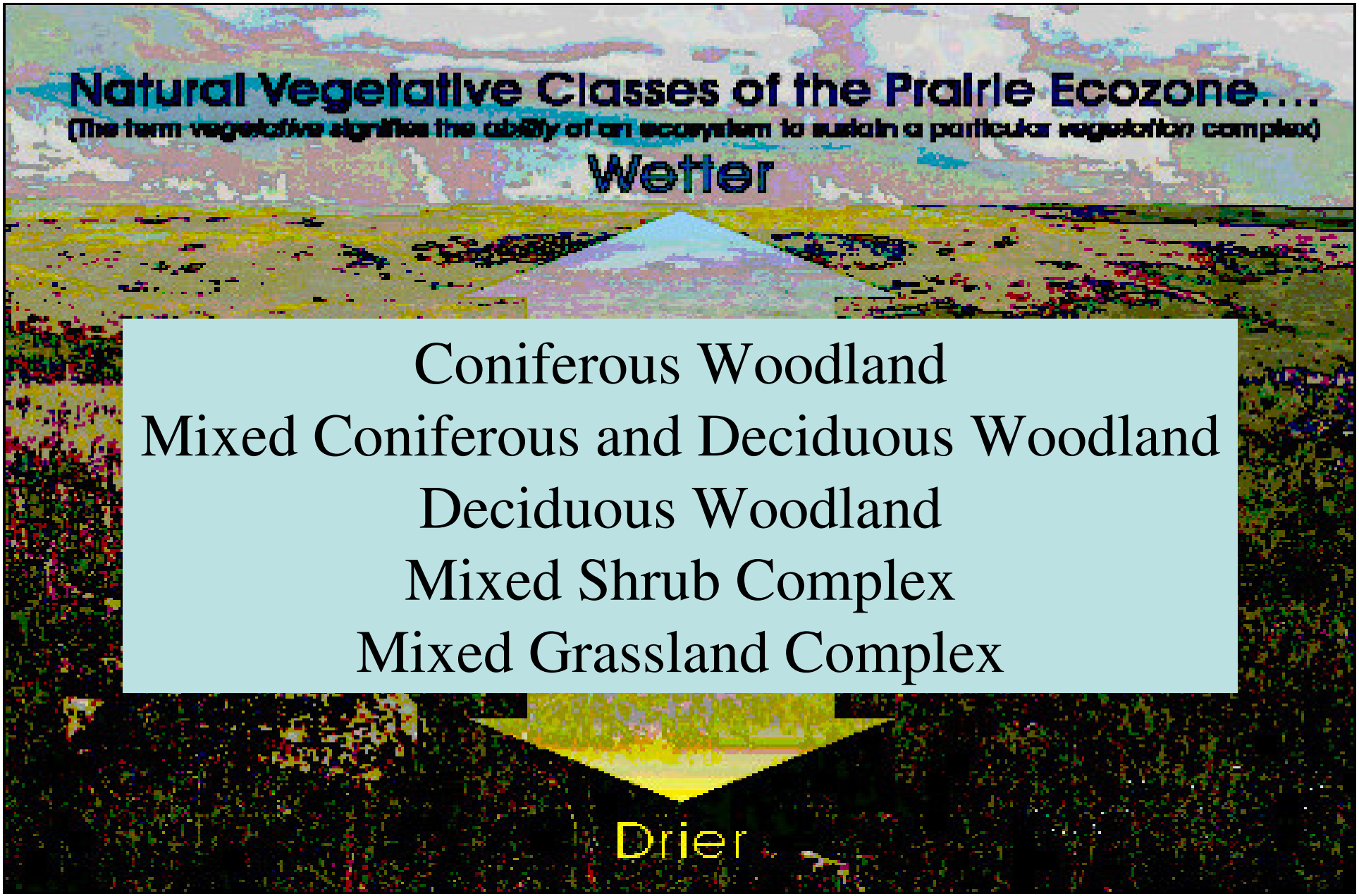
Current Precipitation Compared to Historical Distribution

September 1, 2000 to August 31, 2001 (A.M.)

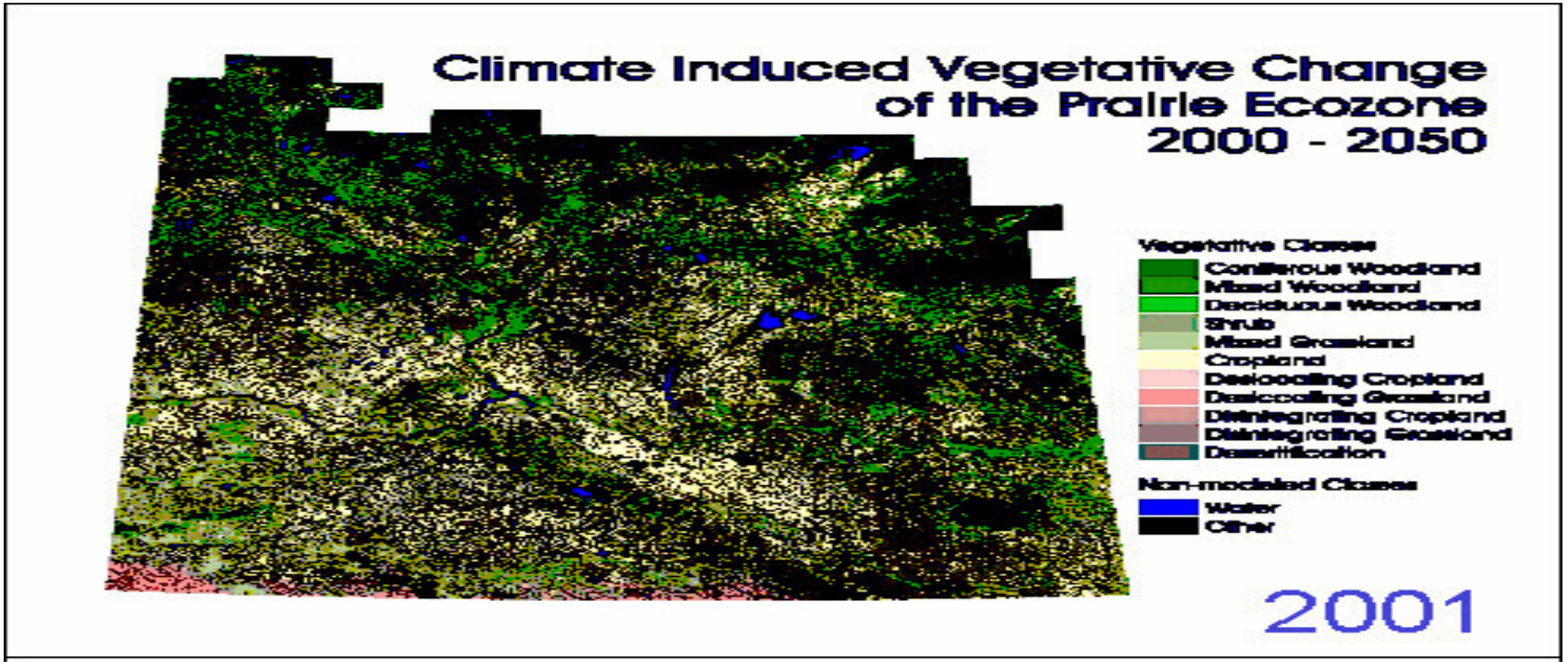


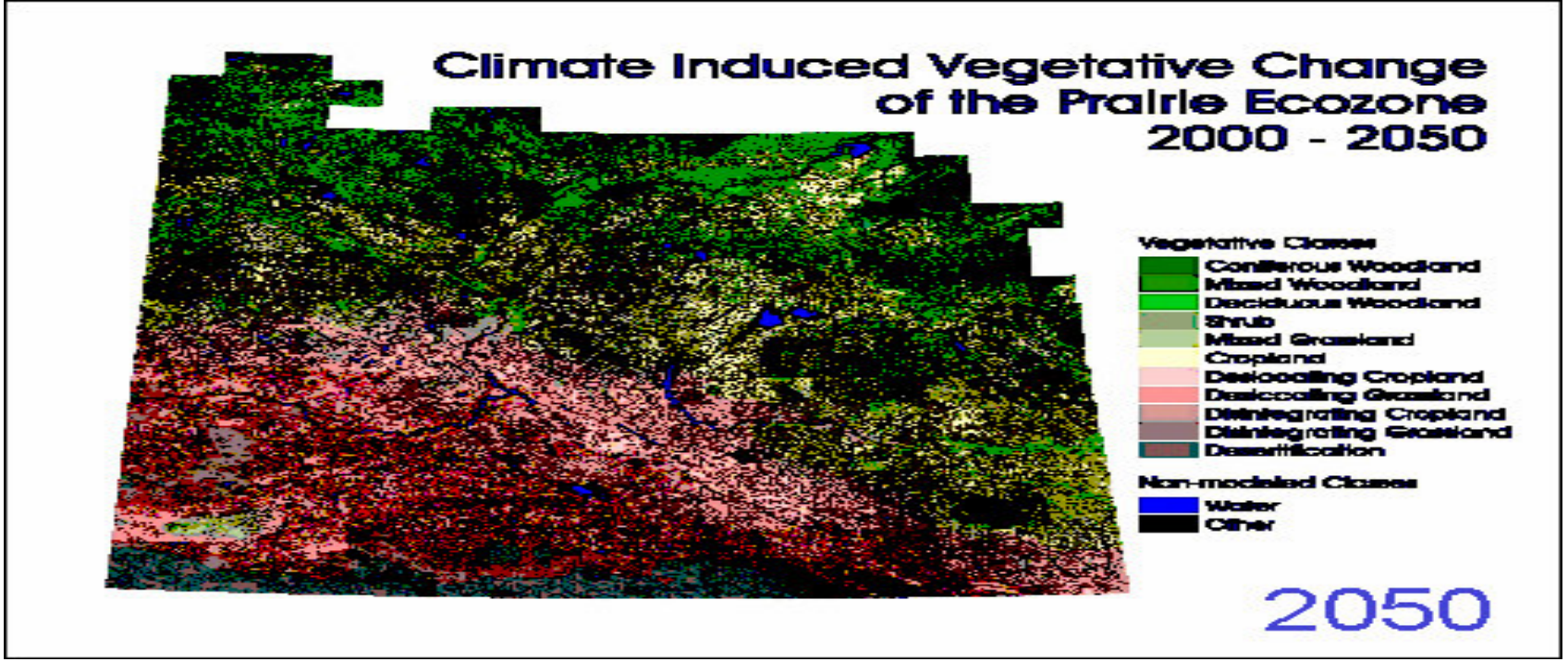
Prepared by PFRA (Prairie Farm Rehabilitation Administration) using data from the Timely Climate Monitoring Network and the many federal and provincial agencies and volunteers that support it.

Climate Change Impacts


Natural Vegetative Classes of the Prairie Ecozone….
(The term vegetative signifies the ability of an ecosystem to sustain a particular vegetation complex)
Wetter
Coniferous Woodland
Mixed Coniferous and Deciduous Woodland
Deciduous Woodland
Mixed Shrub Complex
Mixed Grassland Complex
Drier

Vegetative Transition Occurs as the Ecosystem Dries....


Climate Induced Vegetative Change
of the Prairie Ecozone
2000 - 2050
Vegetative Classes
Coniferous Woodland
Mixed Woodland
Deciduous Woodland
Shrub
Mixed Grassland
Cropland
Desiccating Cropland
Desiccating Grassland
Disintegrating Cropland
Disintegrating Grassland
Desertification
Non-modeled Classes
Water
Other
2001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2050

Potential Impacts

Agriculture

- **precipitation will likely be the limiting factor**
- **predicted increases in temperature will likely lengthen the growing season but higher temperatures and lower soil moisture will adversely affect dryland agriculture**
- **increased crop production may be possible in northern areas where suitable soil exists**
- **extra heat will likely increase potential of insect infestations**
- **given change in crop production variables, production may decline 10-30%**

Forests

- **boreal forest is expected to be impacted the most by climate change**
- **decrease in area biomass and carbon stock with a move to younger age classes and considerable disruption of the southern boundary**
- **growth and productivity could increase in northern areas with suitable sites and decrease in south especially with increased drought disturbances such as fire, insects and diseases could increase**

Water Supply and Demand

- some scenarios indicate an increase in the amount of average annual precipitation, a larger number of extremes in weather, greater frequency of severe storms, increased evaporation, decreased snowpack, and an earlier disappearance of the prairie snowpack
- if the magnitude and frequency of extreme events increases, existing dams and other water control structures might be impacted
- greater need for good quality drinking water for livestock, wildlife and humans
- possibly more conflicts among users over the limited resources

Energy

- potential to be severely impacted
- thermal power stations become less efficient as reservoir water temperatures increase
- hydroelectric production will have to compete with a number of other uses, primarily agriculture
- increased demand for water pumping and summer cooling and decreased winter demand could push electrical utilities into a summer peak position

Natural Environment

- changes in hydrologic cycle due to climatic changes are likely to affect the availability and quality of critical fish habitat
- wildlife species tied to semi-permanent or seasonal wetlands are expected to be affected, e.g. drying of potholes as a result of rising temperatures could lead to reduced production of waterfowl

Recreation and Tourism

- warmer temperatures will encourage algae and plant growth, which may lead to fish kills and reduced recreational fishing as well as reduce the quality of other water-based activities such as swimming and water skiing

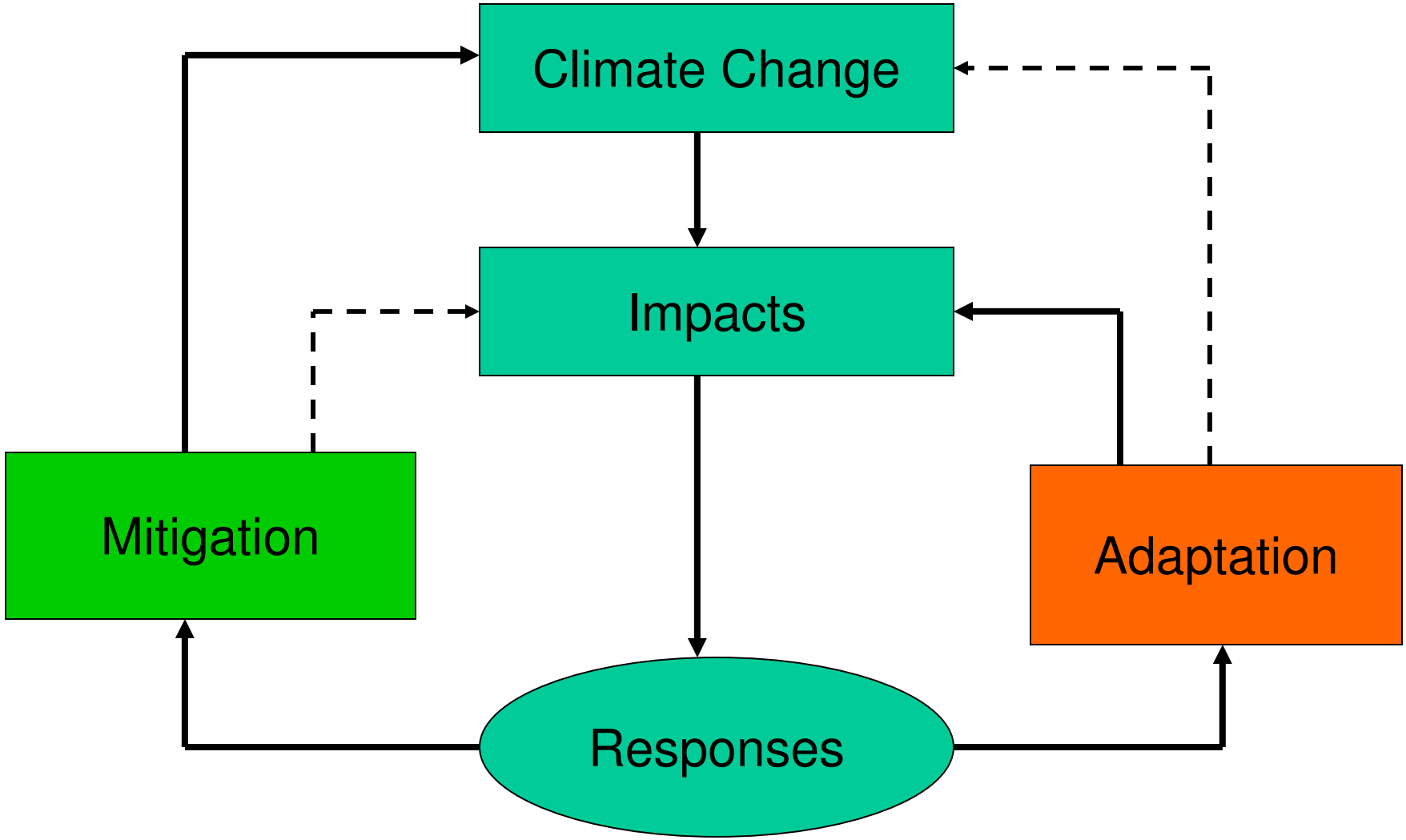
Insurance

- Smaller insurance companies and policy holders may be unable to afford higher premiums which will accompany higher risks
- Underwriters less willing to accept higher risk
- Possible increases to crop insurance premiums
- Taxpayers may be asked to carry increased costs

Health

- direct effects – increased mortality and illness due to expected increases in temperatures and duration of heat waves; fewer cold-related deaths
- indirect effects – aggravated respiratory and allergic disorders

Addressing Climate Change:
Mitigation and Adaptation



Dealing with climate change

- **<u>Mitigation:</u> a reduction in the emission of greenhouse gases through several mechanisms (Kyoto).**
- **<u>Adaptation:</u> adjustments in natural or human systems taken in response to actual or expected climate conditions.**

Why adaptation is important?

1. Mitigation will not prevent climate change from occurring.
2. It is necessary to take advantage of new opportunities (longer growing season) and avoid some of the negative impacts (extreme weather variability, drought)

Forms of adaptation

- Anticipatory or reactive
- Autonomous or planned
- Public or private

Types of adaptation to climate change

	Anticipatory	Reactive
Natural Systems		• Changes in length of growing season • Changes in ecosystem composition • Wetland migration
Human Systems — Private	• Purchase of insurance • Construction of houses on silts • Redesign of oil rigs	• Changes in farm practices • Changes in insurance premiums • Purchase of air-conditioning
Human Systems — Public	• Early-warning systems • New building codes, design standards • Incentives for relocation	• Compensatory payments, subsidies • Enforcement of building codes • Beach nourishment

No-regrets adaptation options

- Due to the uncertainty in climate change projections, it is recommended that initial adaptation responses be “no regrets” in their nature. No regrets options are adaptations that provide benefits regardless of future climate changes (such as improving planning and preparedness for droughts and severe floods).

Questions?