Climate Change Impacts to Air Quality, Goods Movement, and Agriculture

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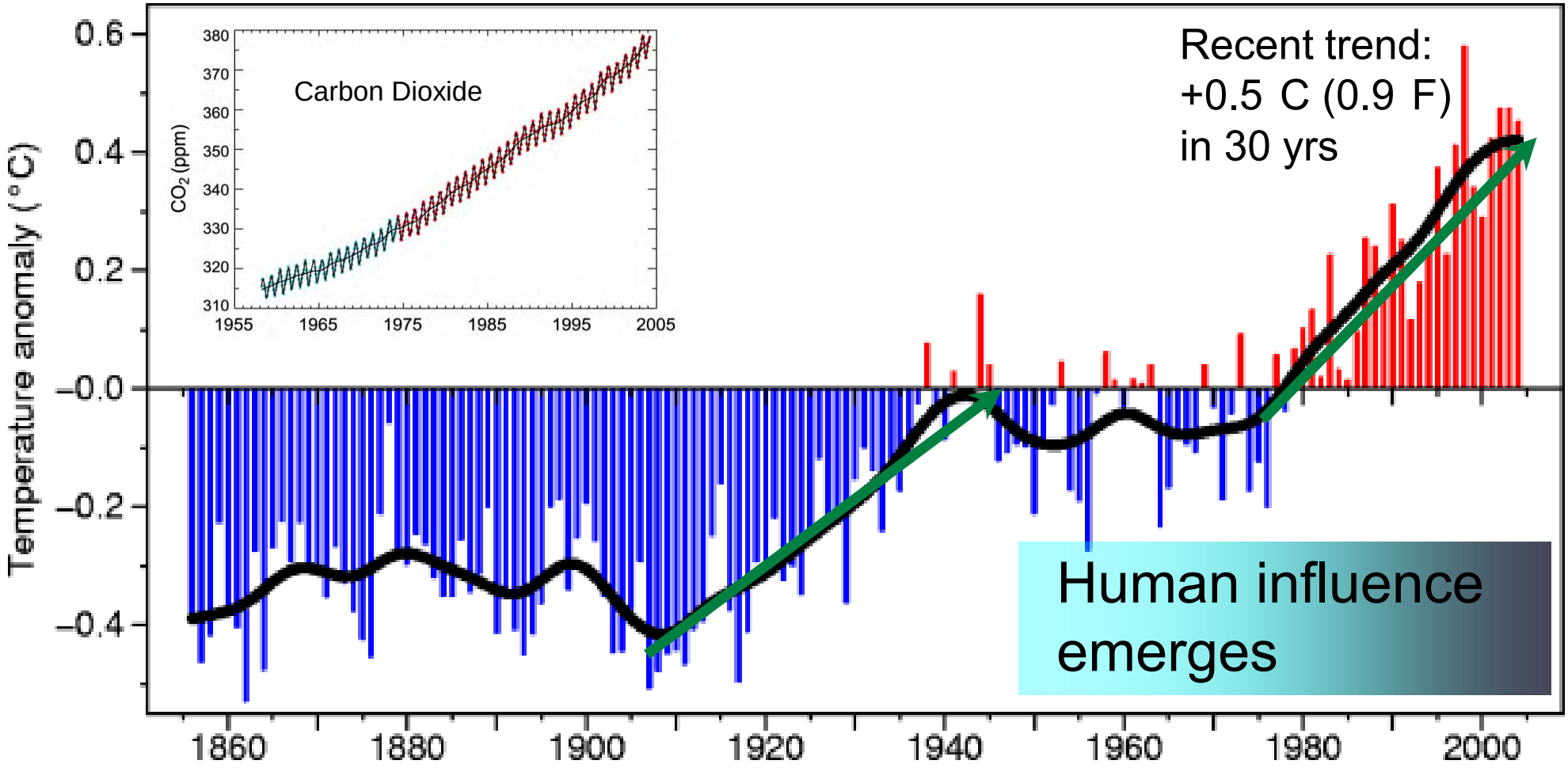
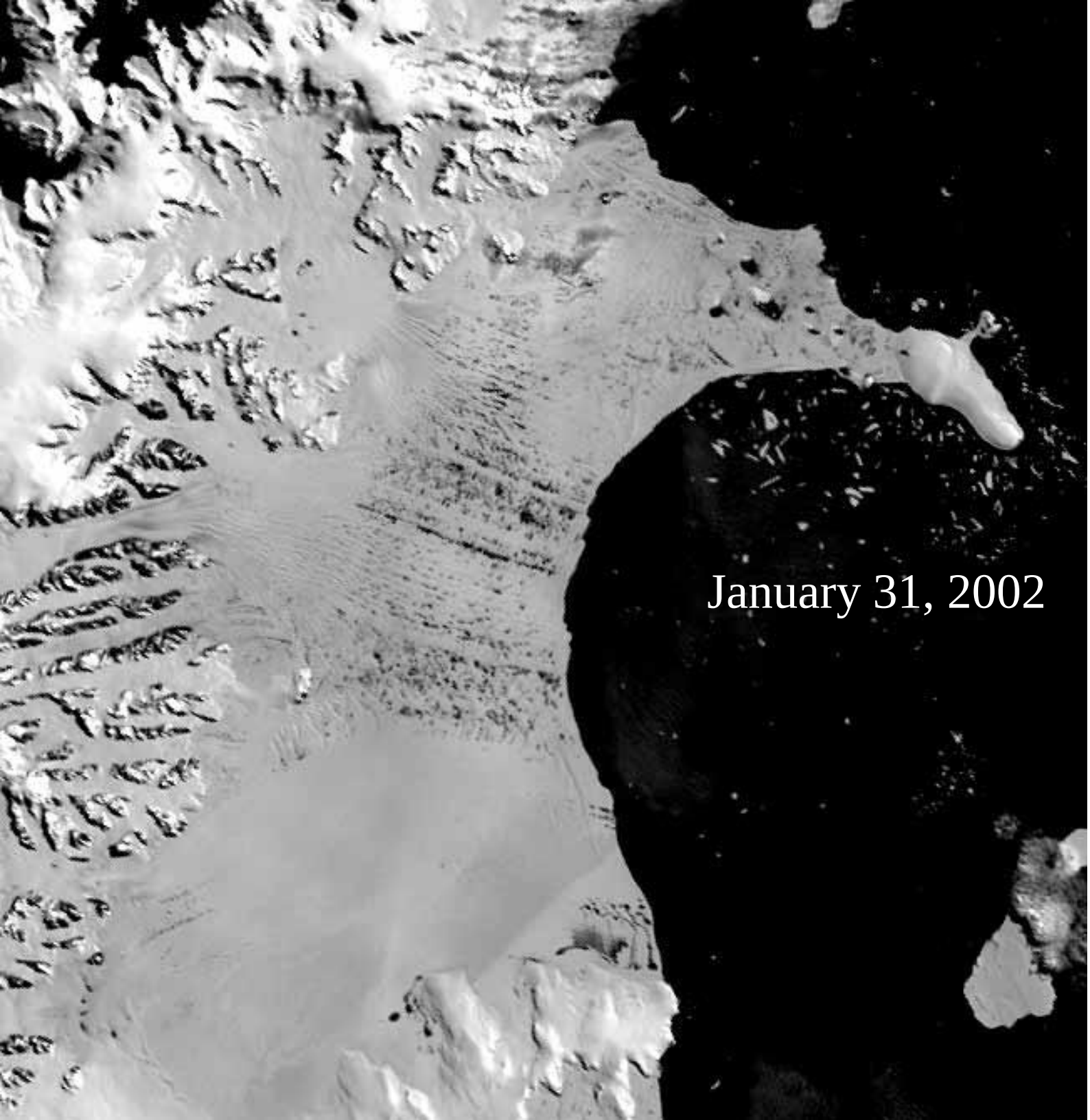
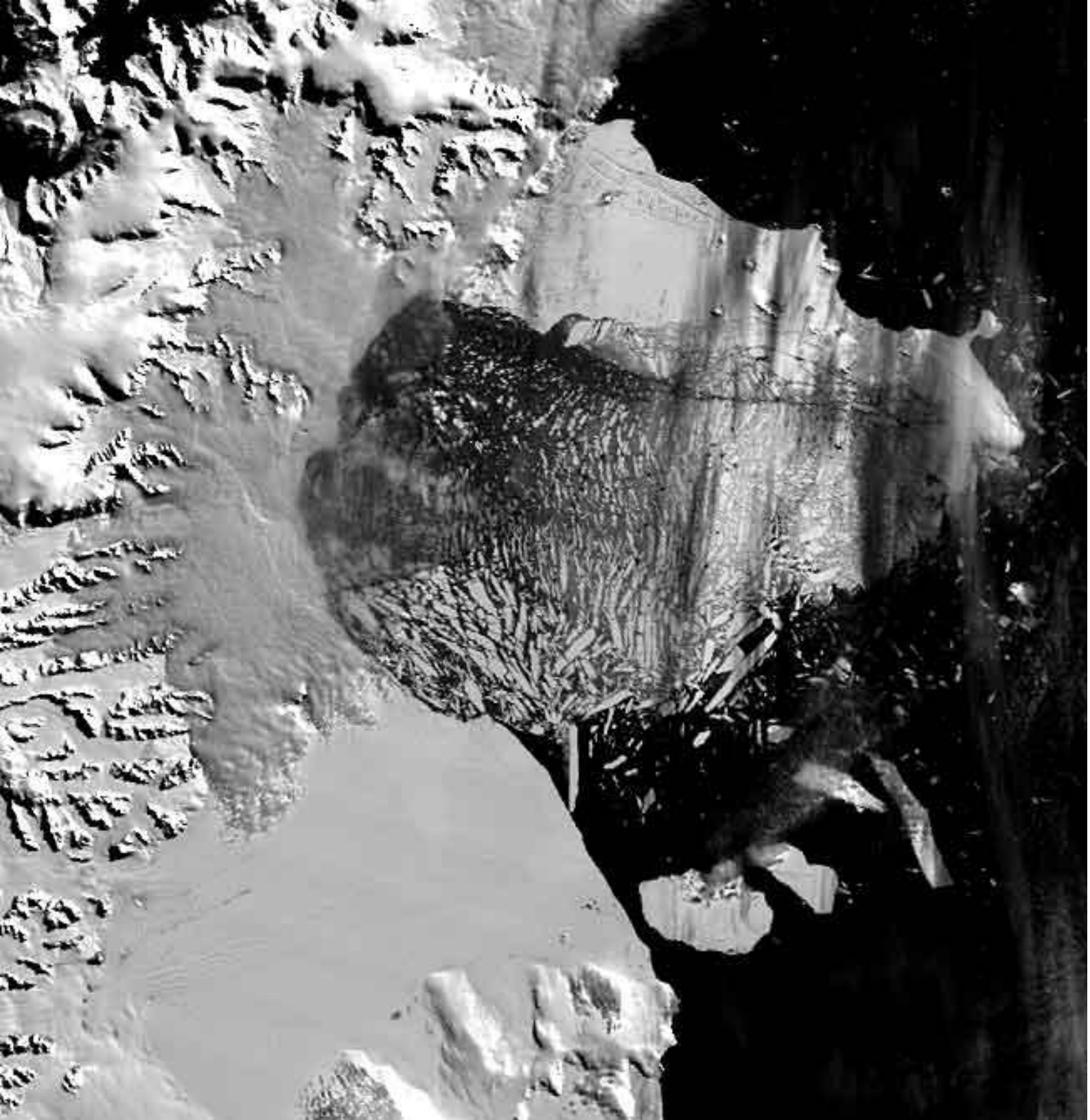
Recent Climate Change





Larsen B
Ice shelf
Antarctica

MODIS data
Courtesy NSIDC



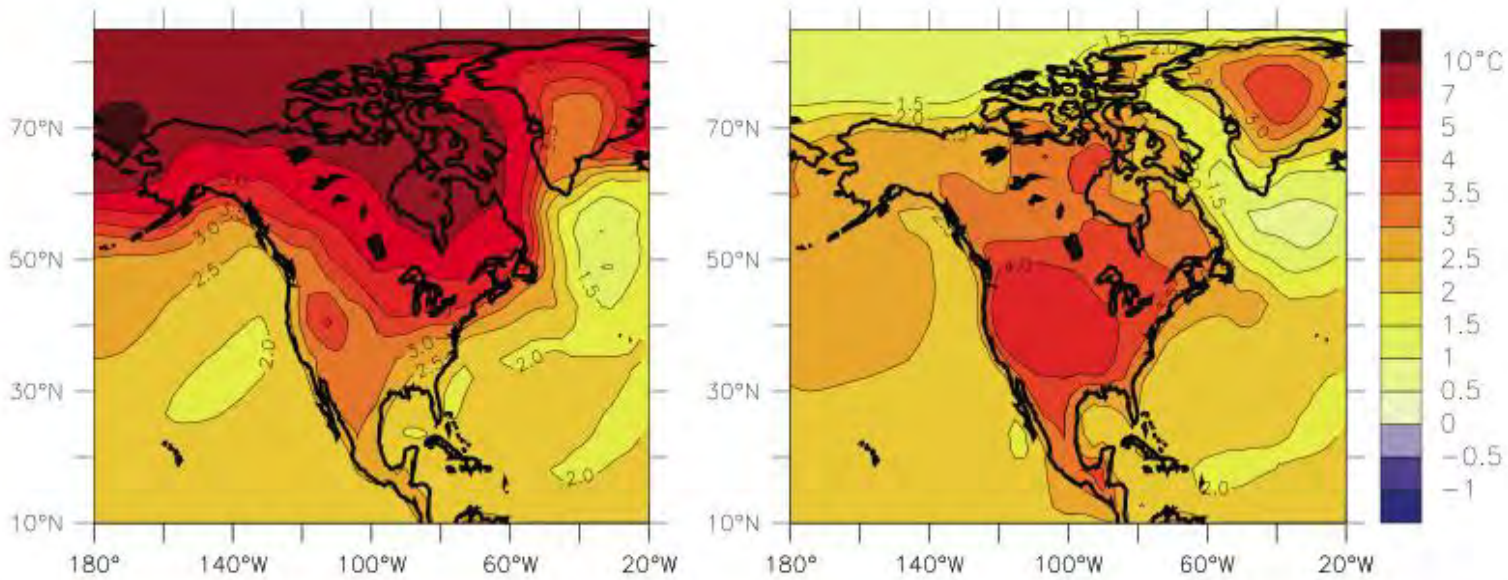
March 5

Regional Climate Change: North America

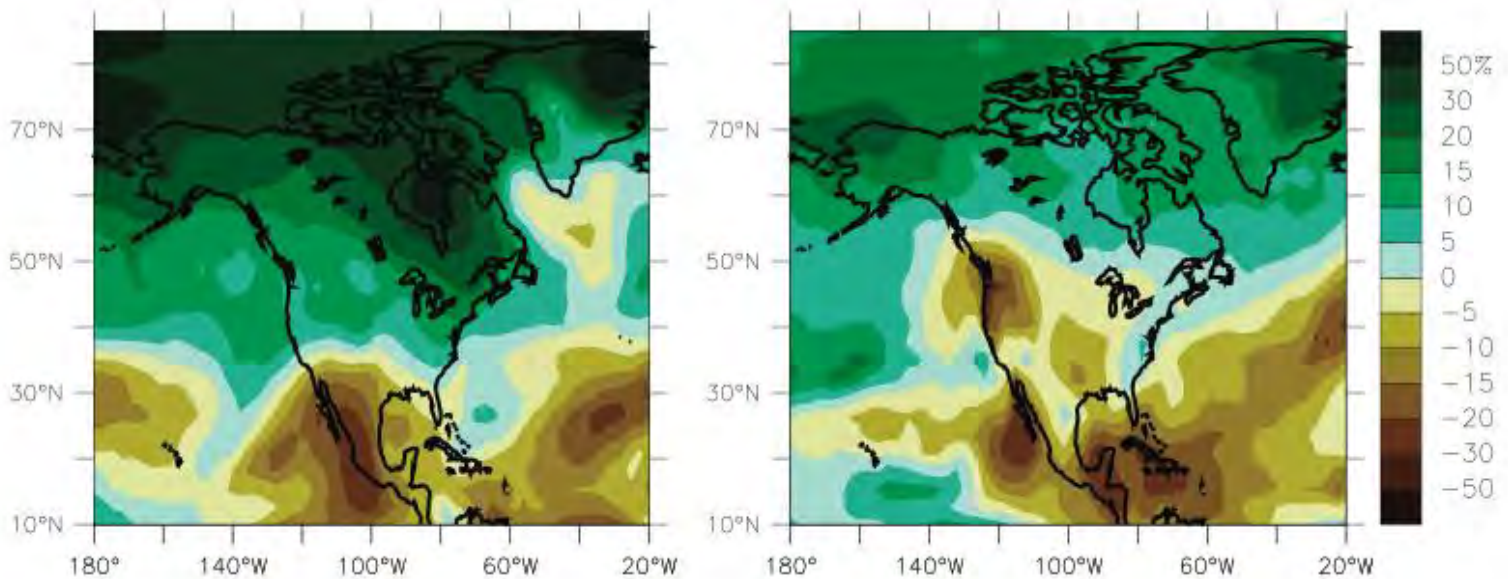
Winter

Summer

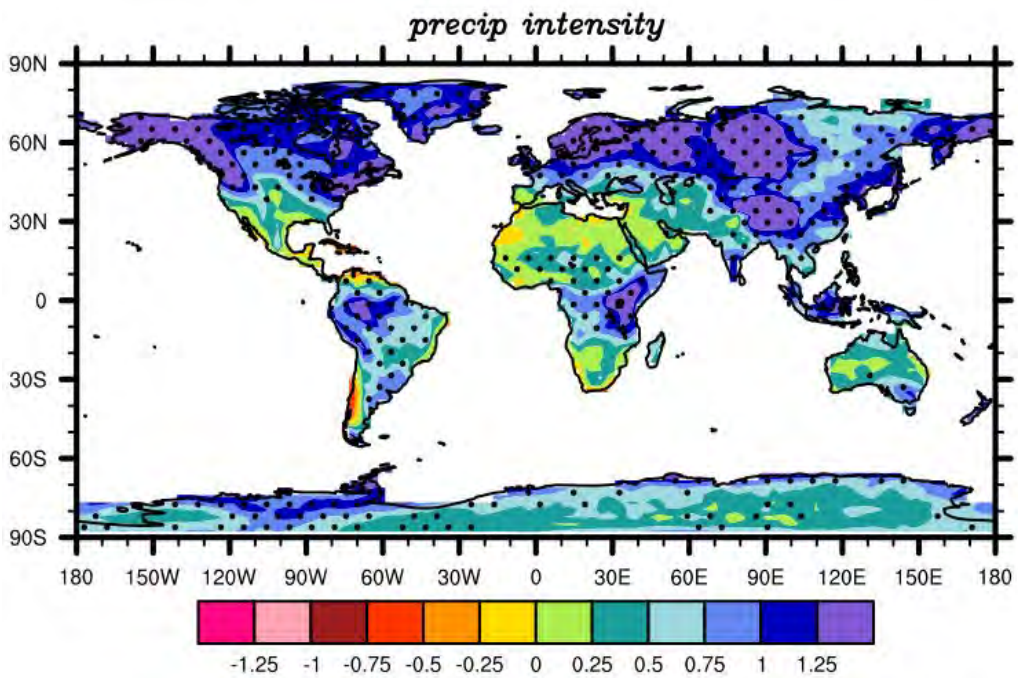
Temperature



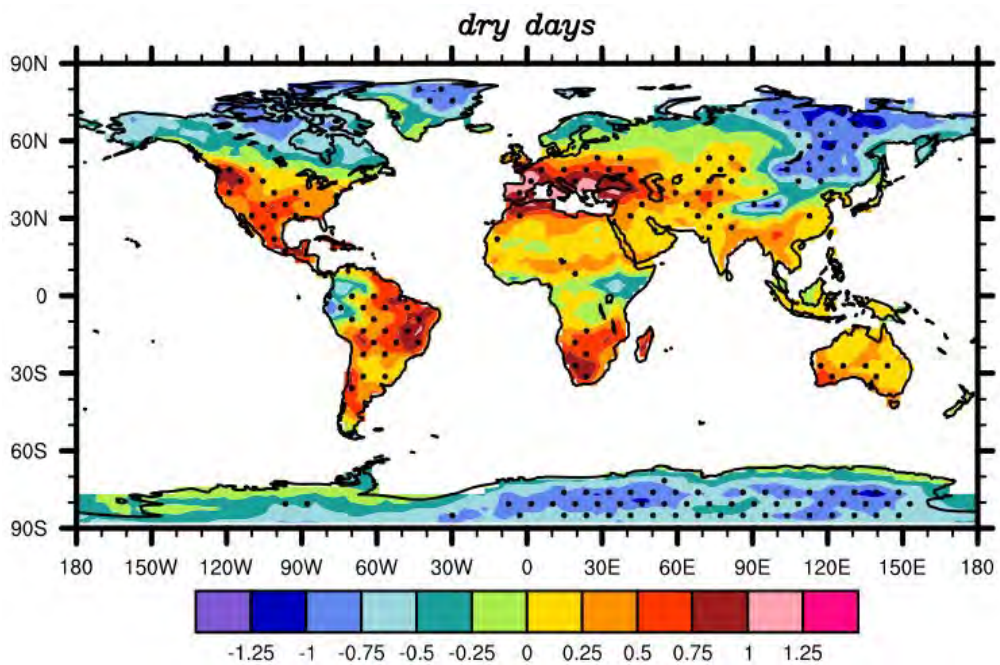
Rain and Snow



Going to Extremes



➢**Precipitation Intensity**: total rainfall divided by the number of wet days

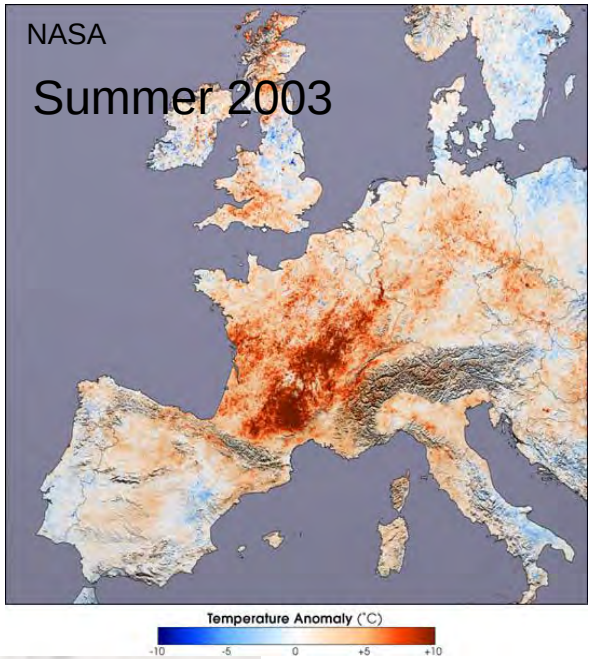


➢**Dry ☐Days**: Maximum number of consecutive dry days

Extreme Events

Extreme events are

- Localized in time
- Localized in space
- Infrequent



Chehalis River, Dec 2007

International Panel on Climate Change (IPCC) Consensus

- Warming of the climate system is unequivocal, as is now evident from increases in global average air and ocean temperatures, melting of snow and ice, and rising sea levels.
- It is very likely that anthropogenic greenhouse gas increases caused most of the observed increase in globally averaged temperatures since the mid 20th century.
- Global mean surface temperature will probably increase by **1.5-6.0°C** by the year 2100.
- Other climate changes are likely to accompany warming (precipitation, storm tracks).
- These changes will have both positive and negative consequences.

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Responding to Climate Change: Mitigation and Adaptation

Mitigation activities

Focus on reducing emissions of greenhouse gases

Adaptation activities

Focus on developing the capacity to manage the change that occurs as mitigation strategies are debated and enacted.

Climate Impacts Group.

Planning for Uncertainty

Look to implement

- **"No regrets" strategies**

  Provides benefits now with or without climate change (e.g., water conservation program)

- **"Low regrets" strategies**

  Provide climate change benefits for little additional cost or risk (e.g., adding 10% capacity rather than 5%)

- **"Win-win" strategies**

  Reduce climate change impacts while providing other environmental, social, or economic benefits (e.g., wetlands protection)

Climate Change Impacts

- **Human Health**
- **Air Quality**
- **Water Resources**
- **Energy supply and demand**
- **Agriculture**
- **Forest Ecology and Resources**
- **Coasts**
- **Infrastructure**
- **Fish Ecosystems**

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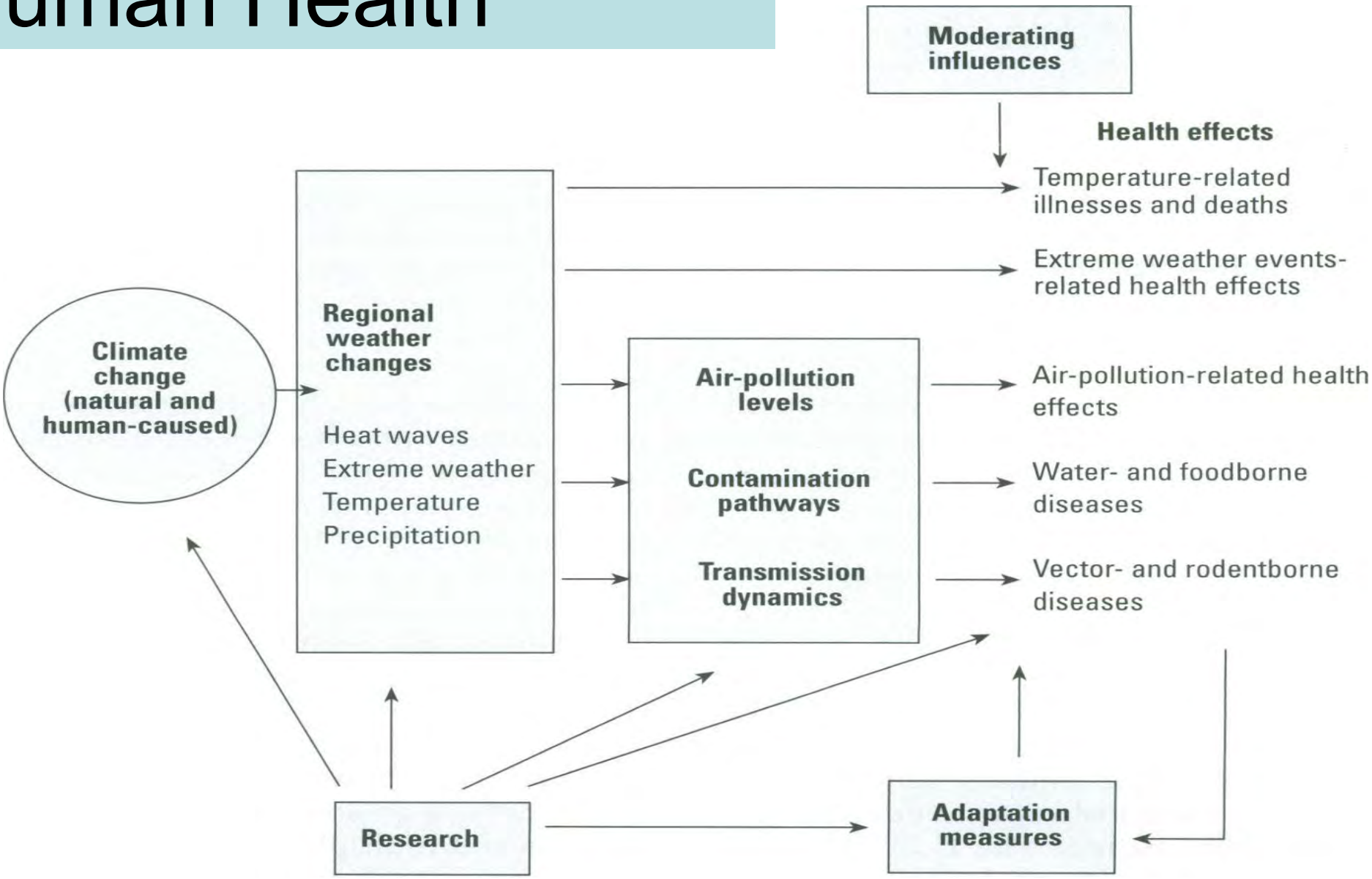
Human Health



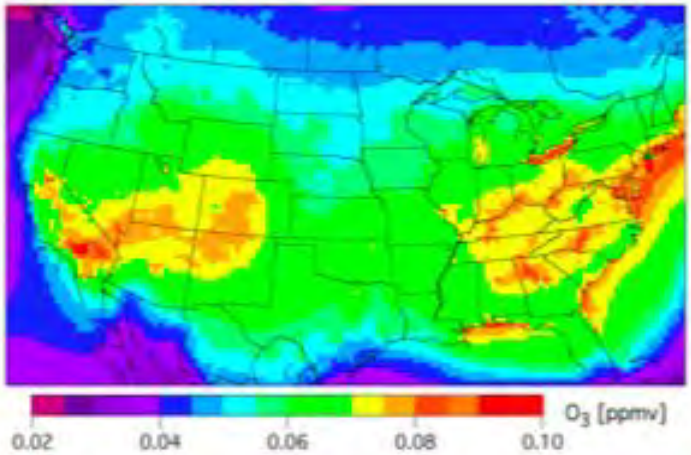
Source: *Executive summary of the report of the health sector of the U.S. National Assessment* (Patz et al. 2000)

Future U.S. Air Quality

- Changes in “upstream” (Asian) emissions
- Changes in local emissions
- Changes in Weather and Climate
  - Temperature
  - Air Mixing
  - Rain

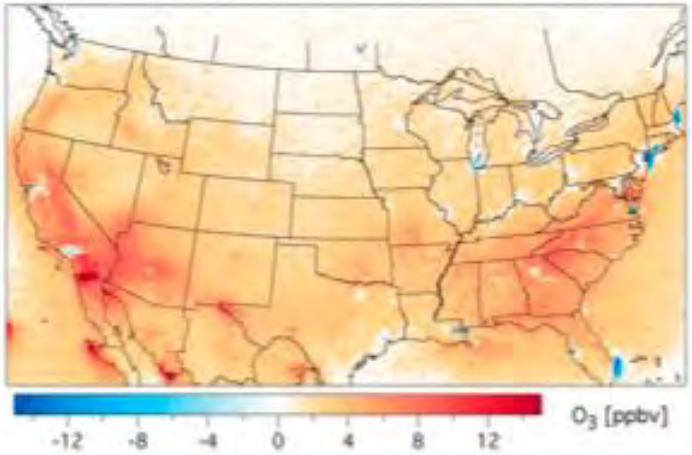
Model Results: 2050s July Maximum Daily Ozone

Current



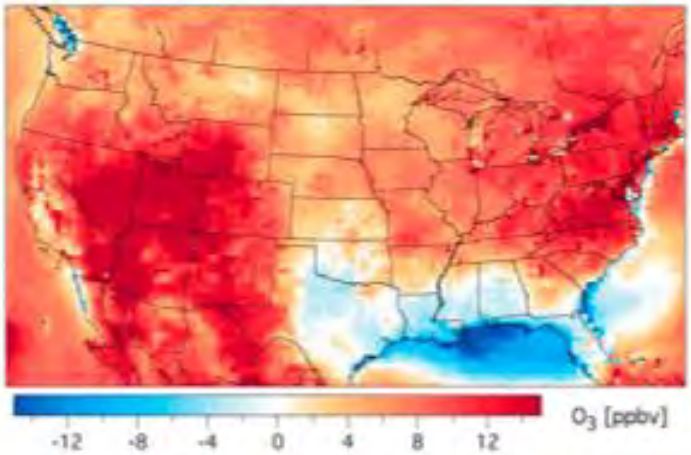
Difference

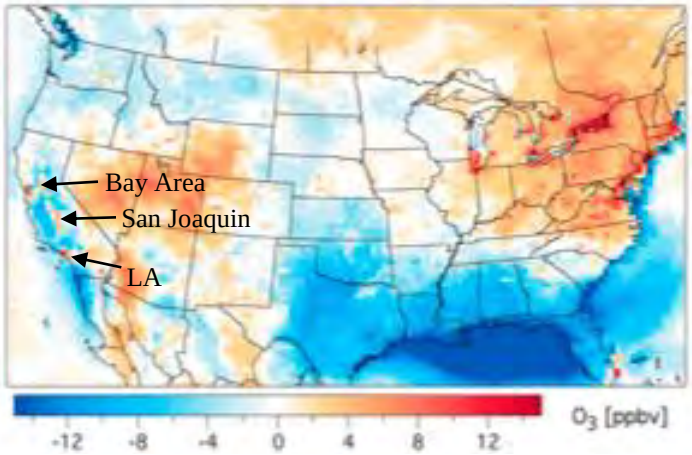
Local Emissions



Difference

All Effects

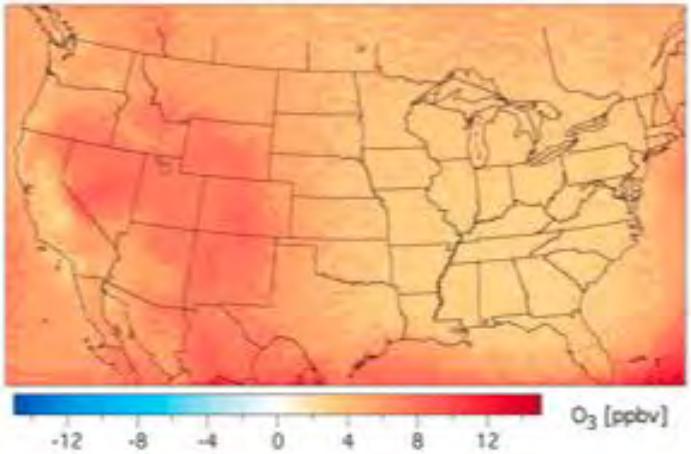




Climate Change

- ❖Temperature
- ❖ Air Mixing
- ❖ Rain

Upstream Emissions



The direction and size of the change is very regionally specific

Infrastructure

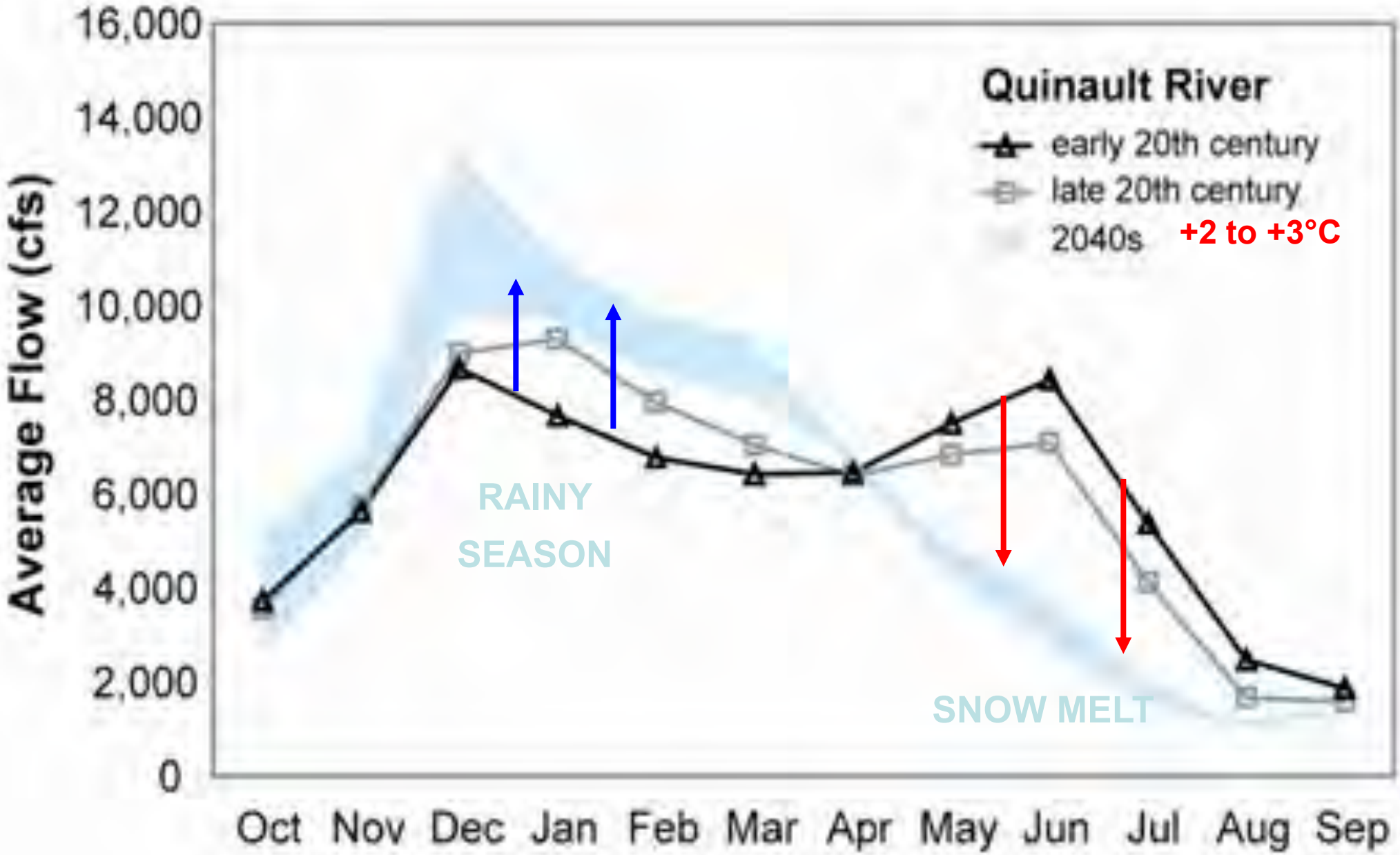
80% of the 20 greatest daily rain events
Since 1948 occurred after 1985

Chehalis River Flood

Source : THE OREGONIAN/Bruce Ely

Water Resources

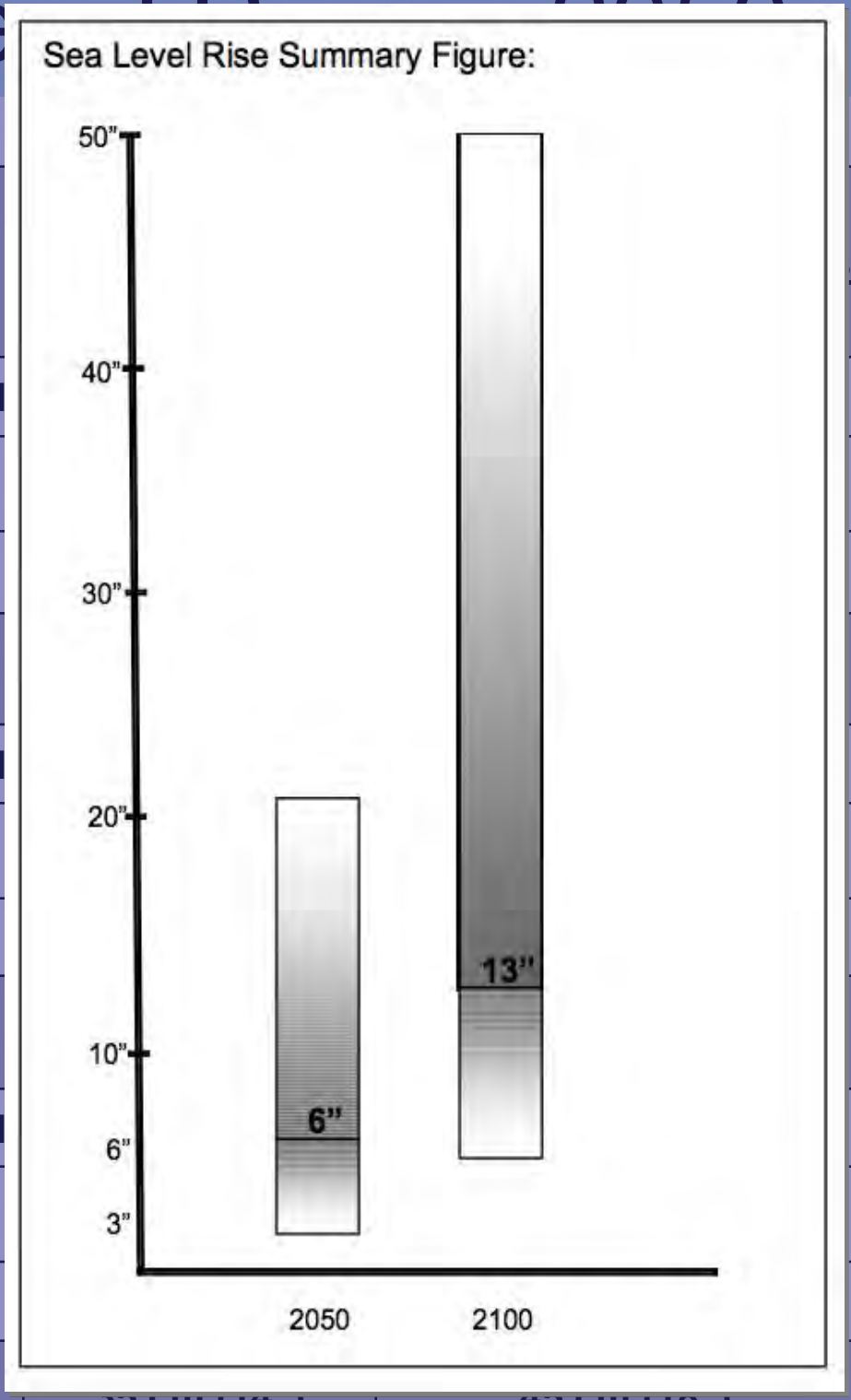
Climate Impacts on Streamflow



Agriculture

Sea Level Rise

WA Sea Le



					Puget Sound
Very Low	Global Sea Level				
	Currents				
	Tectonic				0 cm
	Total				8 cm (3")
Medium	Global Sea Level				
	Currents				
	Tectonic				0 cm
	Total				15 cm (6")
Very High	Global Sea Level				
	Currents				
	Tectonic				10 cm
	Total				55 cm (22")

Summary

- Global and regional climate is already changing
- These changes are expected to accelerate in the coming decades
- Understanding regional climate change and impacts is a multidisciplinary task
- The information and the tools to begin planning for climate change exist now