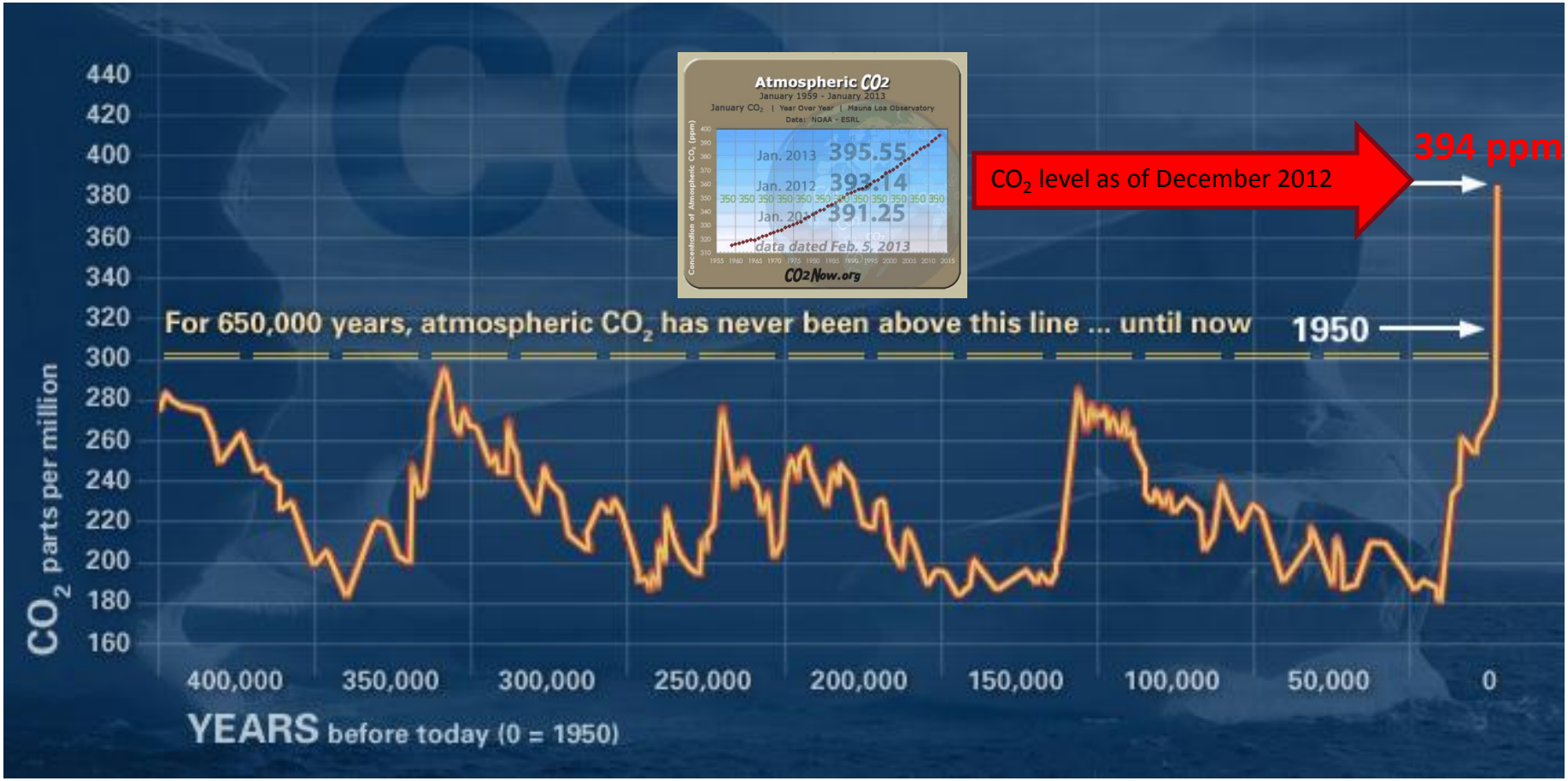
Turn Down a 4° the Heat

Why a 4°C Warmer World Must be Avoided

Presentation to the Parliamentary Workshop
Joint Program of the Parliamentary Network, IMF and World Bank
World Bank, Washington DC.
April 17-18, 2013

Atmospheric CO_2 is now higher than it's been for 650, 000 years and increasing rapidly

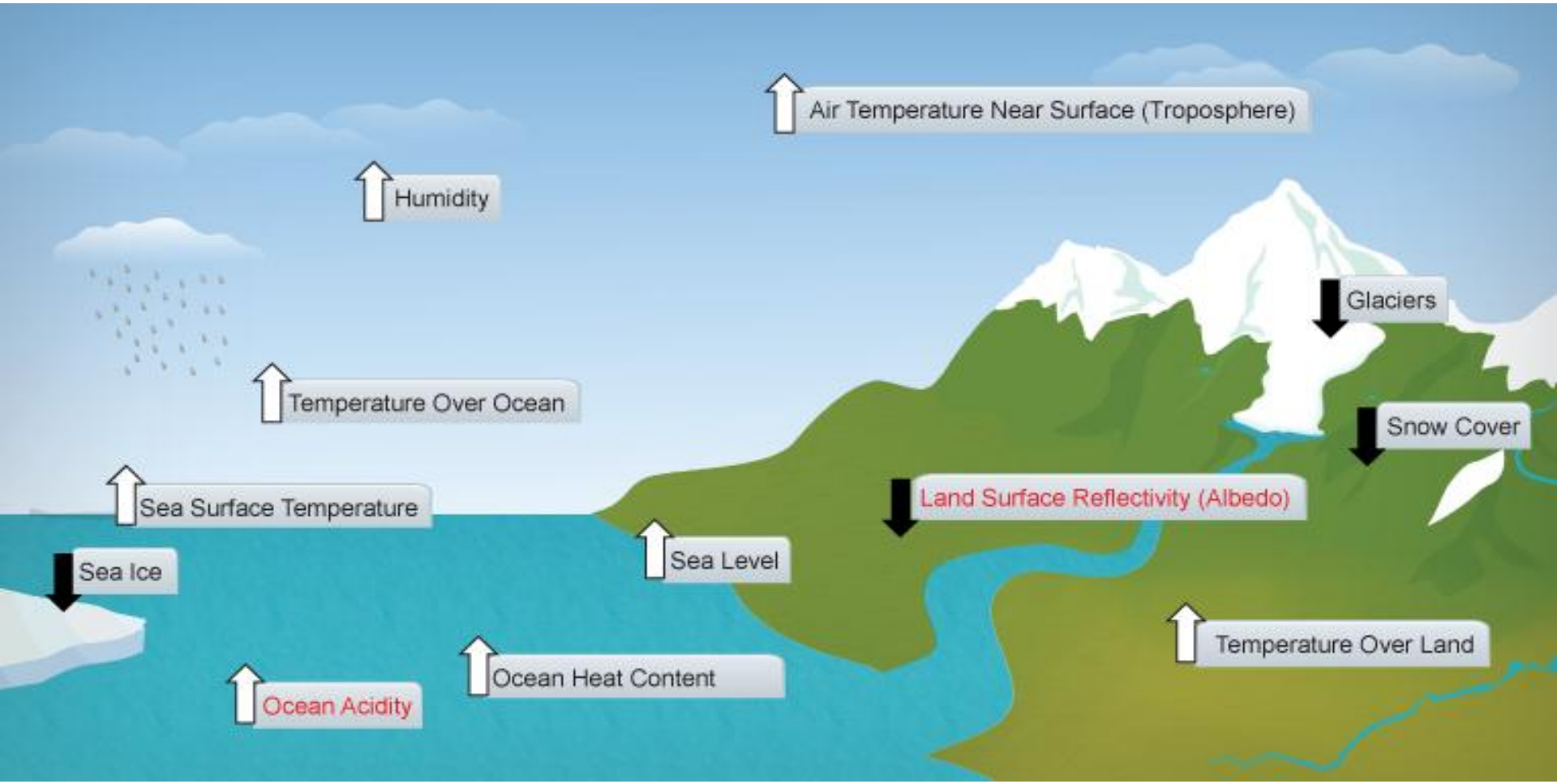


This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, provides evidence that atmospheric CO_2 has increased since the Industrial Revolution. (Source: NOAA)

Observed Impacts at +0.8ºC:

Writing on the Wall ??

11 Key indicators of a changing Climate System



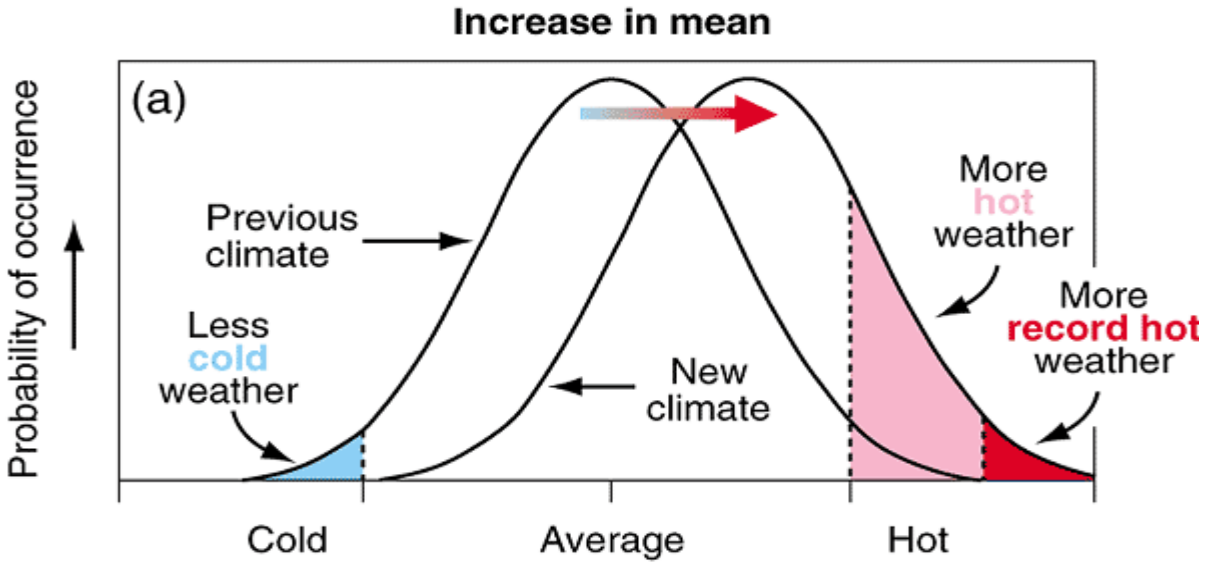
The evidence for rapid climate change is compelling

- **Temperature:** Global mean temperature is 0.8°C above pre-industrial levels
- **Ocean warming:** Have warmed 0.09°C since the 1950s
- **Sea level rise:** Have risen 15-20 cms since pre-industrial times
- **Ice melt:** Greenland and Arctic glaciers are melting at a never-before rate

Global Temperature Rise

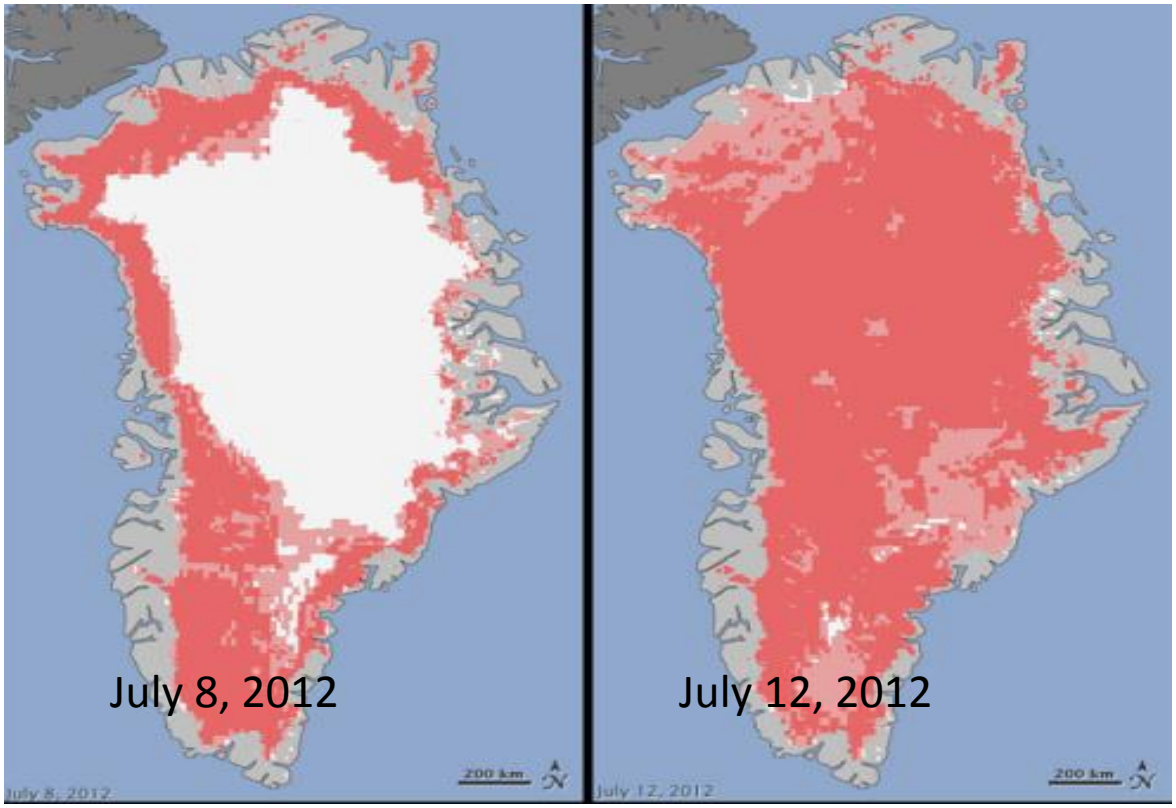
- All three major global surface temperature reconstructions show that Earth has warmed since 1880
- Most of this warming has occurred since the 1970s
- 20 warmest years having occurred since 1981
- All 10 of the warmest years occurring in the past 12 years

Small increases in average temperature produce many more record highs – especially in Urban Areas



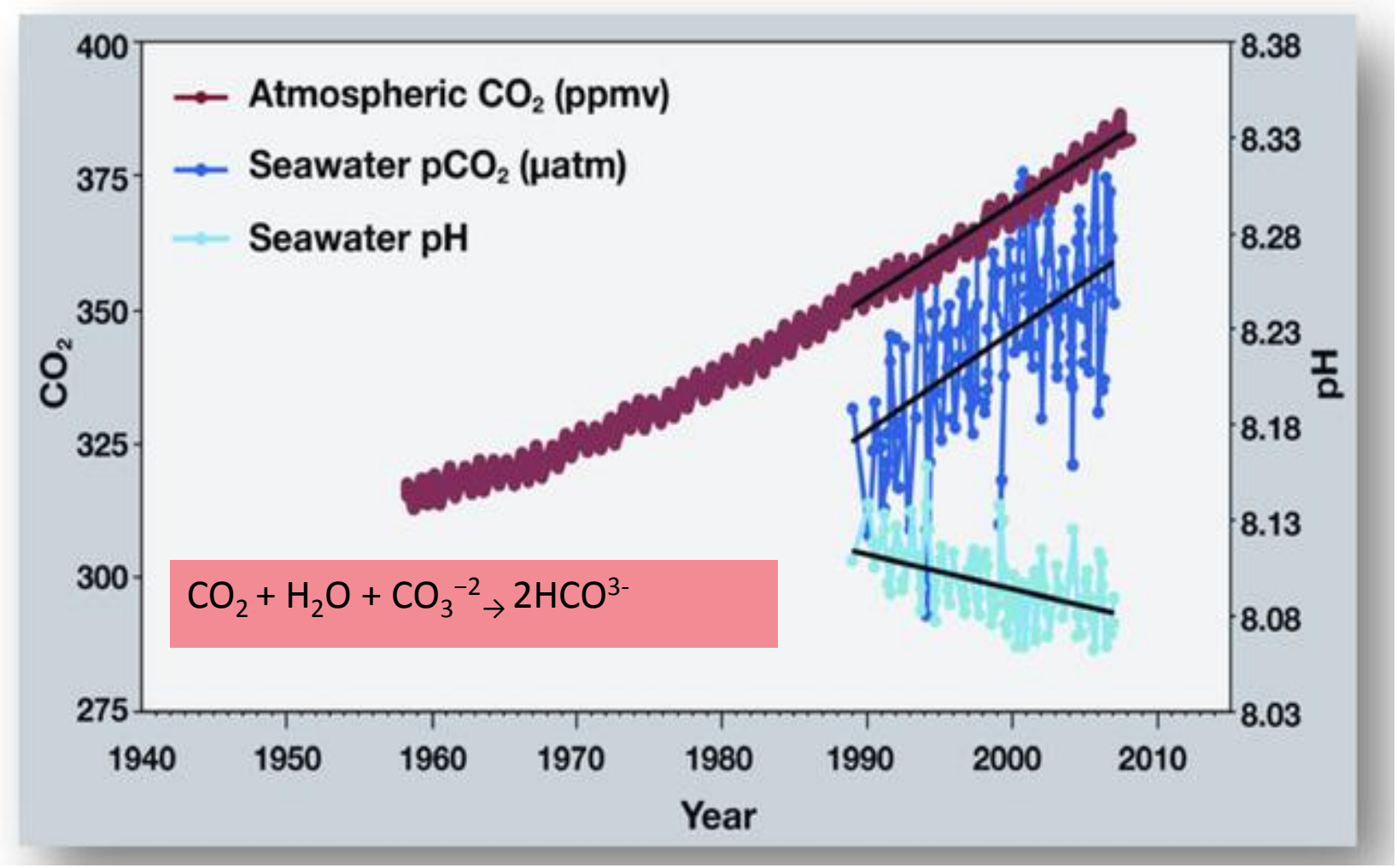
Source: Duffy, P. (2009)

Shrinking ice sheets and mountain glaciers



In Greenland, in just a few days, the melting had dramatically accelerated and an estimated 97 percent of the ice sheet surface had thawed for a short period by July 12.

The Other CO_2 Problem - Ocean Acidification



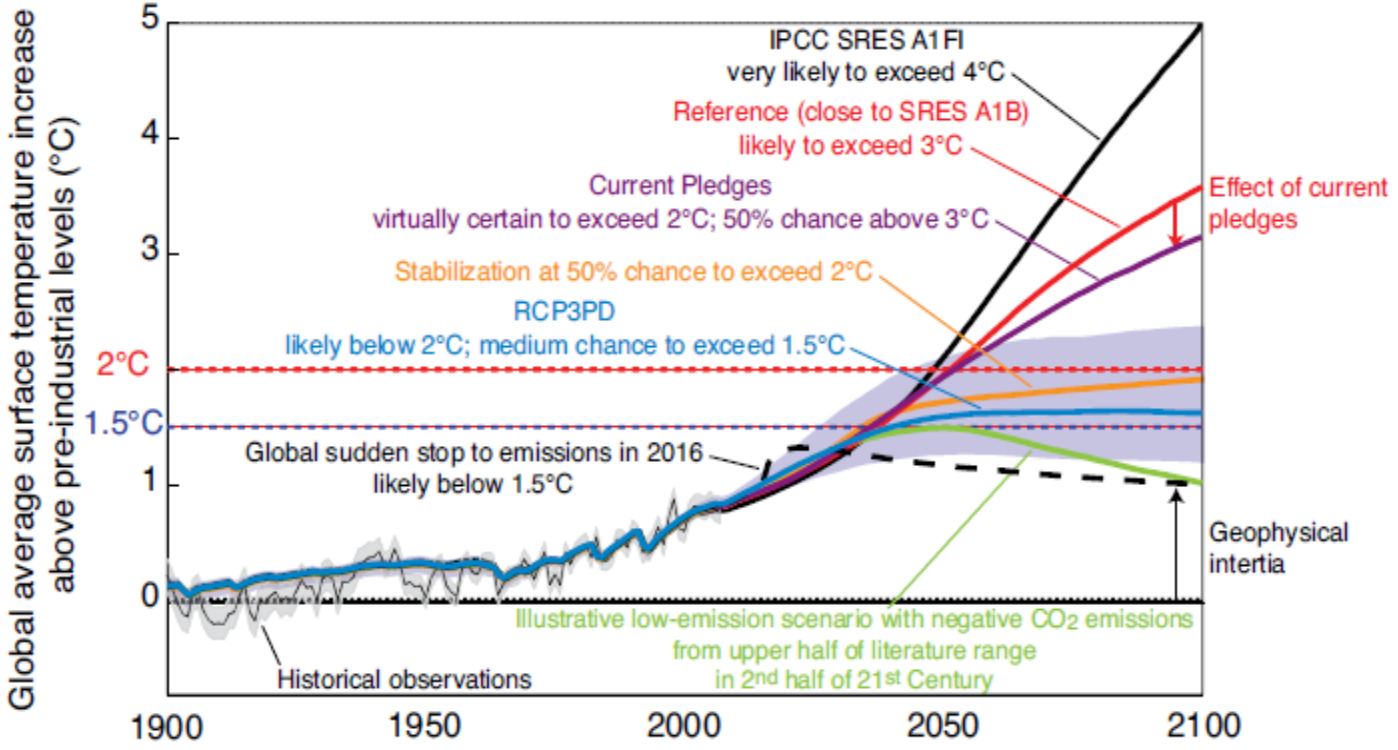
Hawaiian Carbon Dioxide Time Series *Source:* NOAA, PMEL Carbon Program

What Future??

Climate-Change Projections

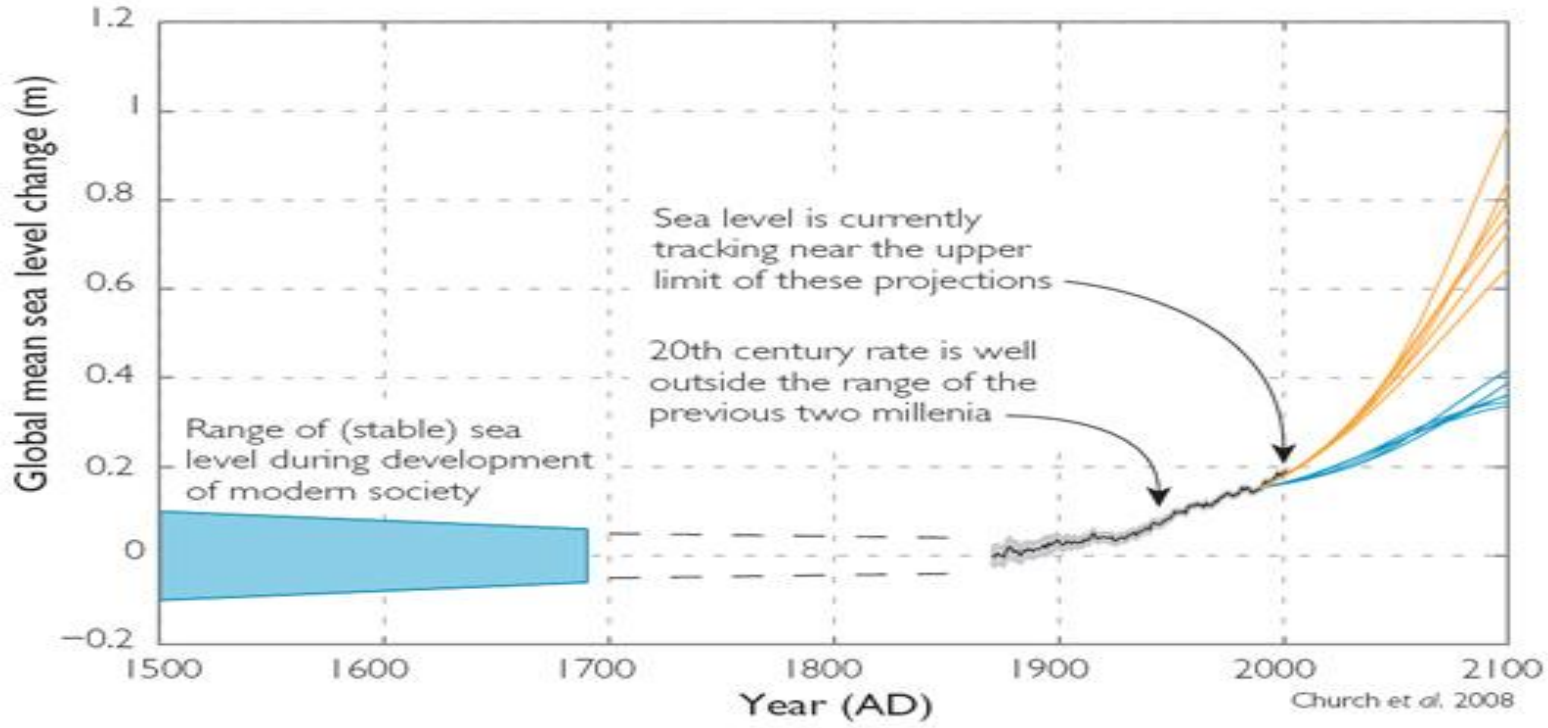
0.8 → 2.0 → 4 °C

Temperature projections under different emission scenarios



Warming of 4°C can still be avoided: numerous studies show that there are technically and economically feasible emissions pathways to hold warming likely below 2°C

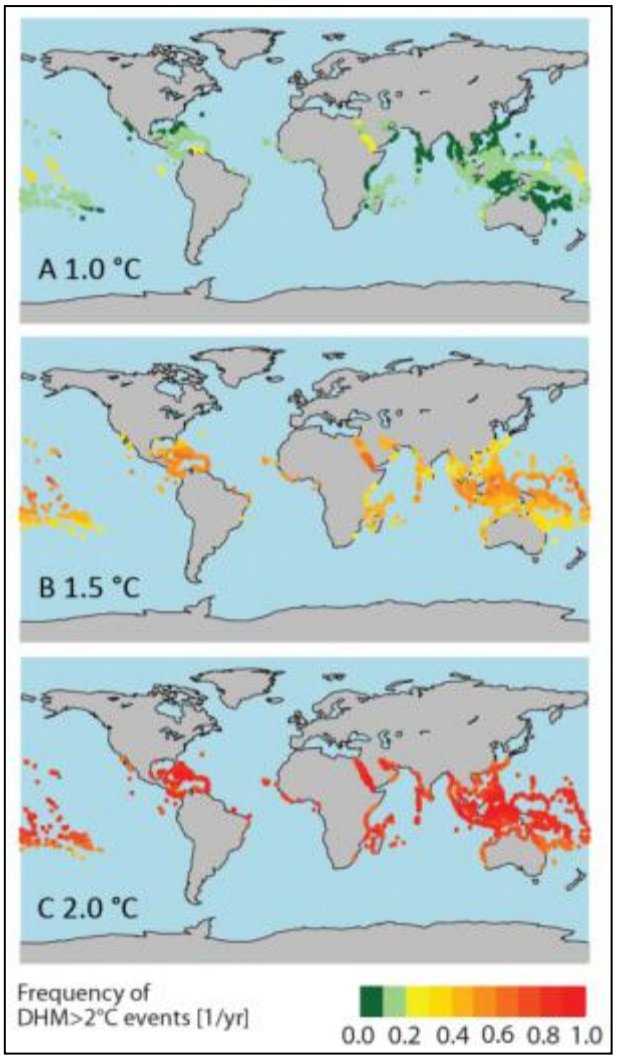
Sea Level Rise Tracking at the Upper Limit of Projections



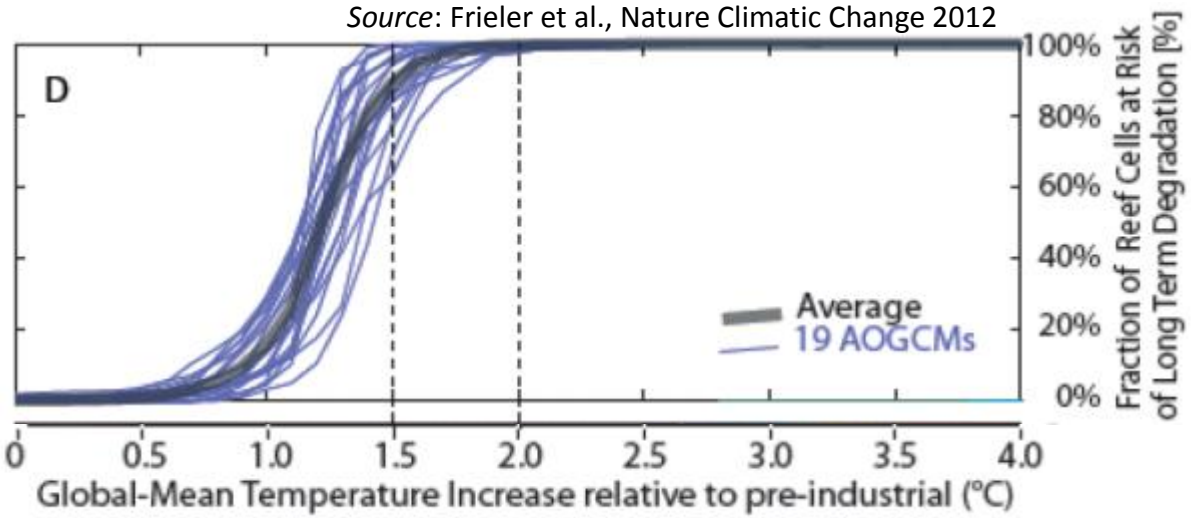
Global sea level rose about 17 centimeters (6.7 inches) in the last century. The rate in the last decade, however, is nearly double that of the last century. Regional variations are wide.

Source: Church et al, 2008; Kemp et al., 2011

Loss of Majority of Coral Reefs at 1.5°C Temperature Rise

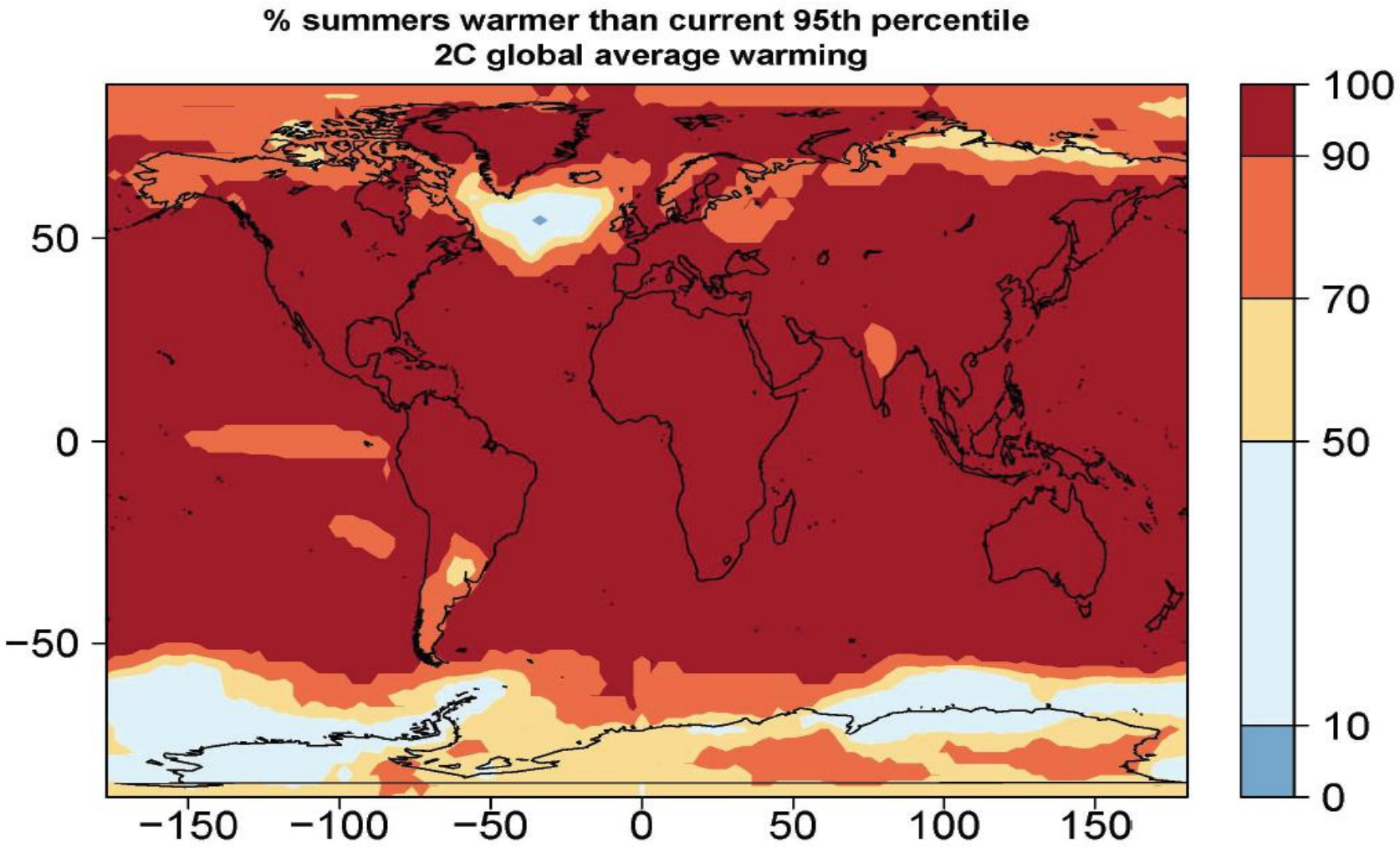


Source: Frieler et al., Nature Climatic Change 2012



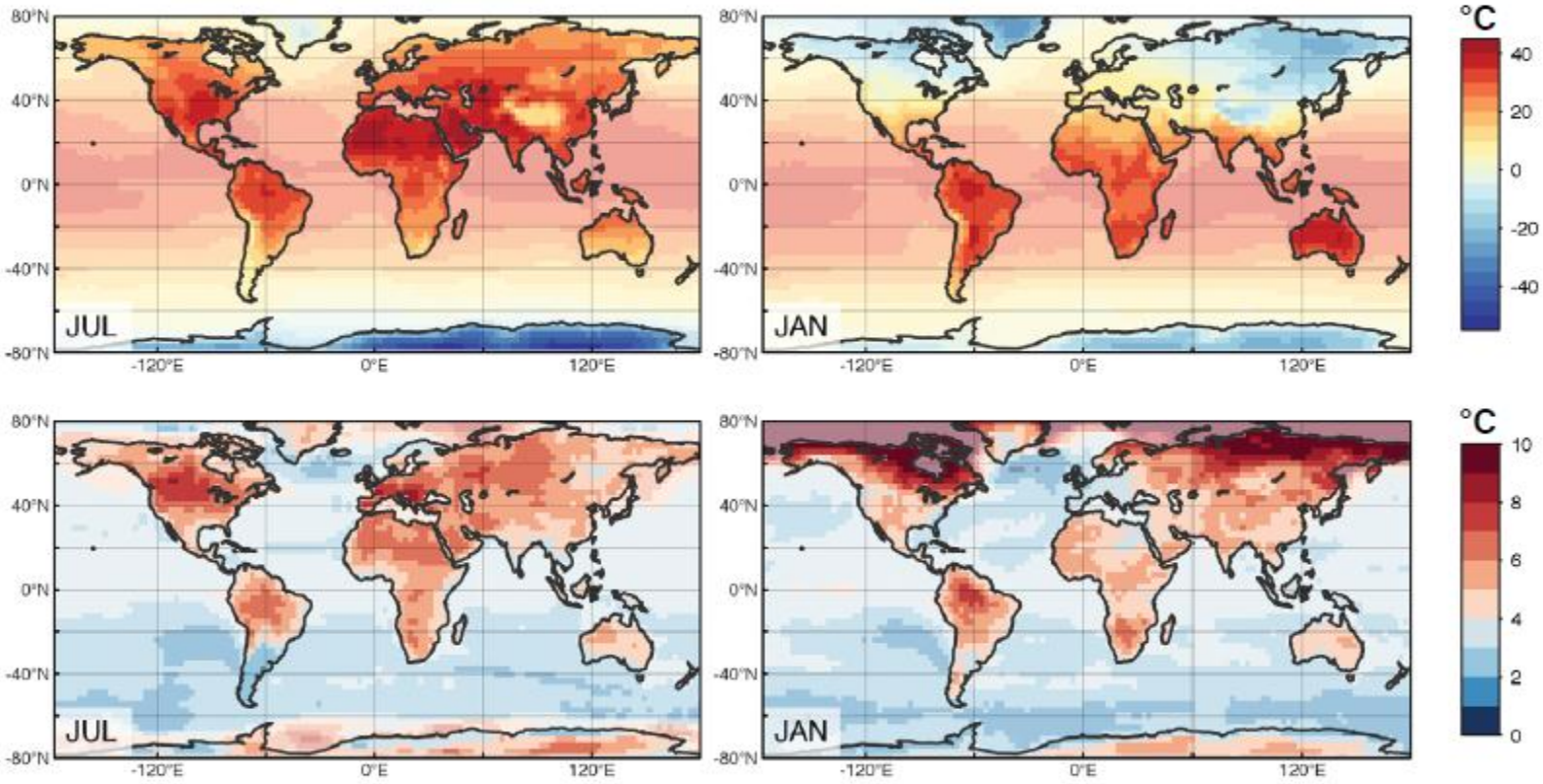
In order to save 10% of coral reefs, global warming needs to be limited to 1.5°C above pre-industrial levels.

What's expected: Hotter summers…



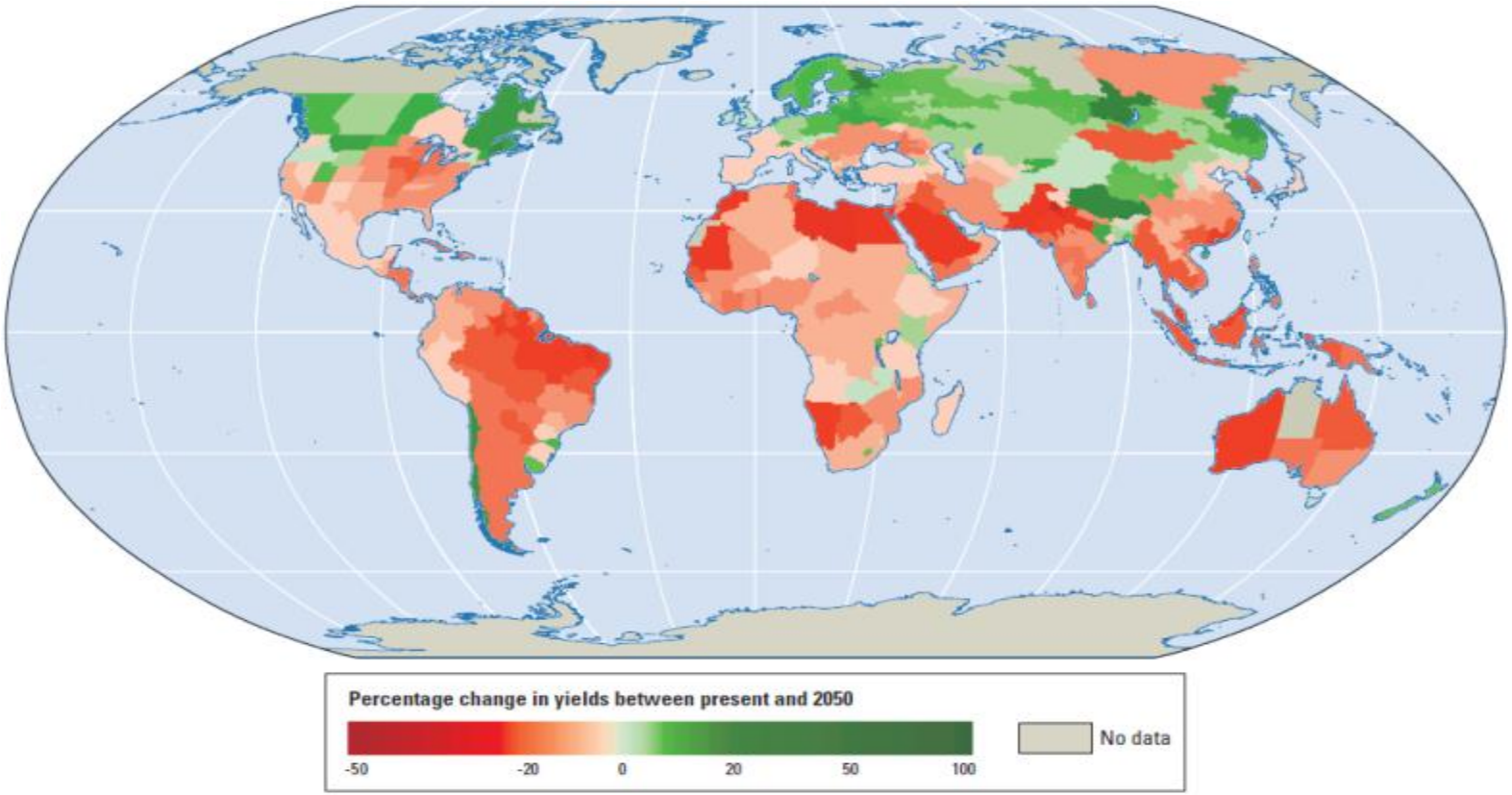
National Academies, Stabilization Targets, 2010

More effects of warming around the tropics



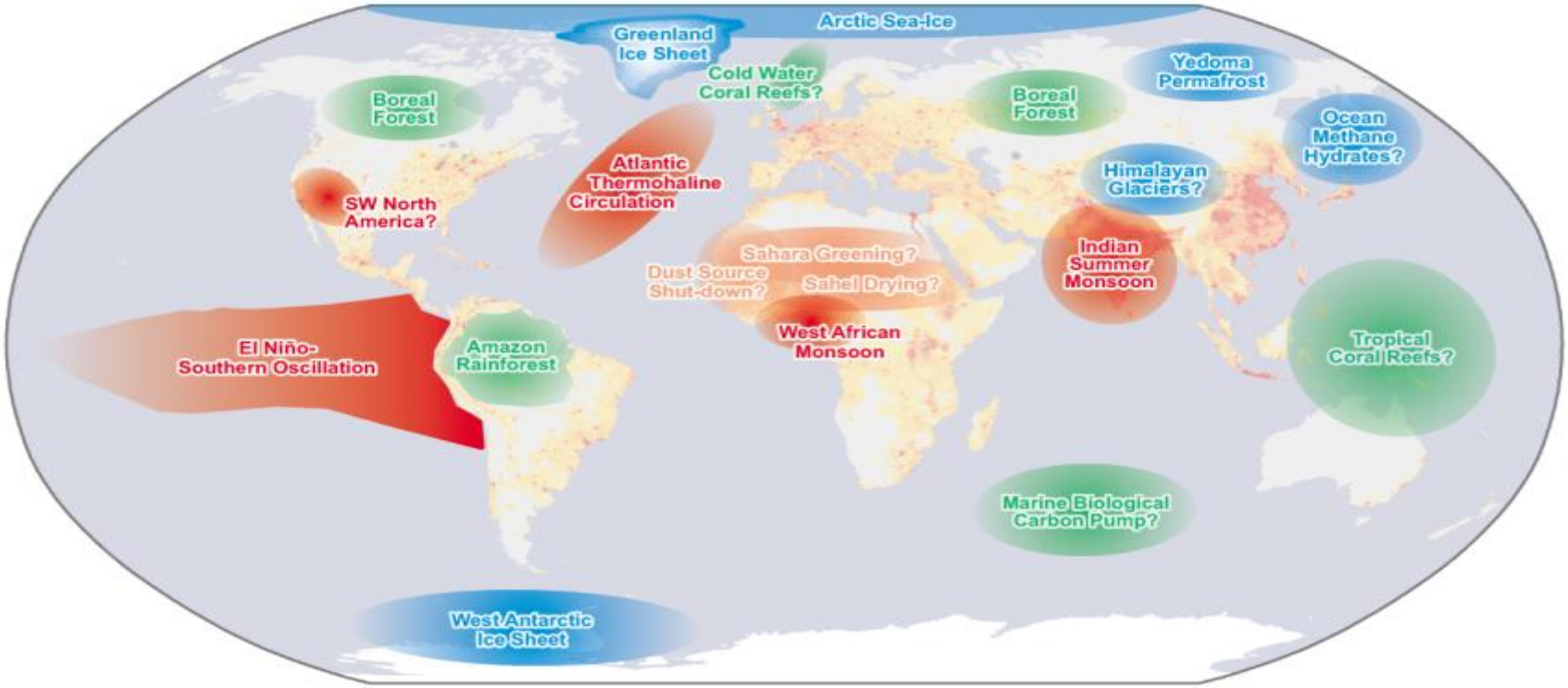
The effects of 4°C warming will not be evenly distributed around the world. Increases of 6°C or more in average monthly summer temperatures would be expected in large regions of the world, including the Mediterranean, North Africa, the Middle East, and the contiguous United States.

..Agricultural productivity will decrease in many regions and the poor will suffer most..



Source: WDR, 2010

Tipping Elements in the Earth System



Source: PIK, after Lenton et al., 2008

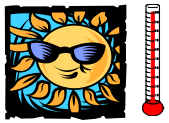
Ways Forward

Mitigation & Adaptation

Targeted & Early Adaptation

Societal Impacts

Dramatically different situation for future generations especially developing nations & communities
Exacerbated impacts on the poor



Temperature

Precipitation

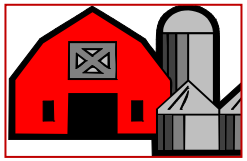
Sea Level Rise

Ecosystems Impacts

Shifts in ecological zones
Loss of habitat and species
Coral reefs threatened

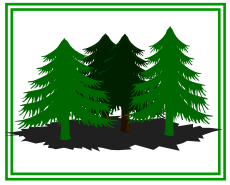
Health Impacts

Weather-related mortality/heat stress
Infectious diseases
Air quality-induced respiratory effects



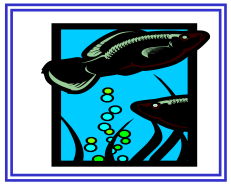
Agriculture Impacts

Crop yields and commodity prices
Irrigation demands
Pests and weed



Forest Impacts

Change in forest composition
Shift geographic range of forests
Forest health and productivity



Water Resource Impacts

Changes in water supply and timing
Water quality
Increased competition for water

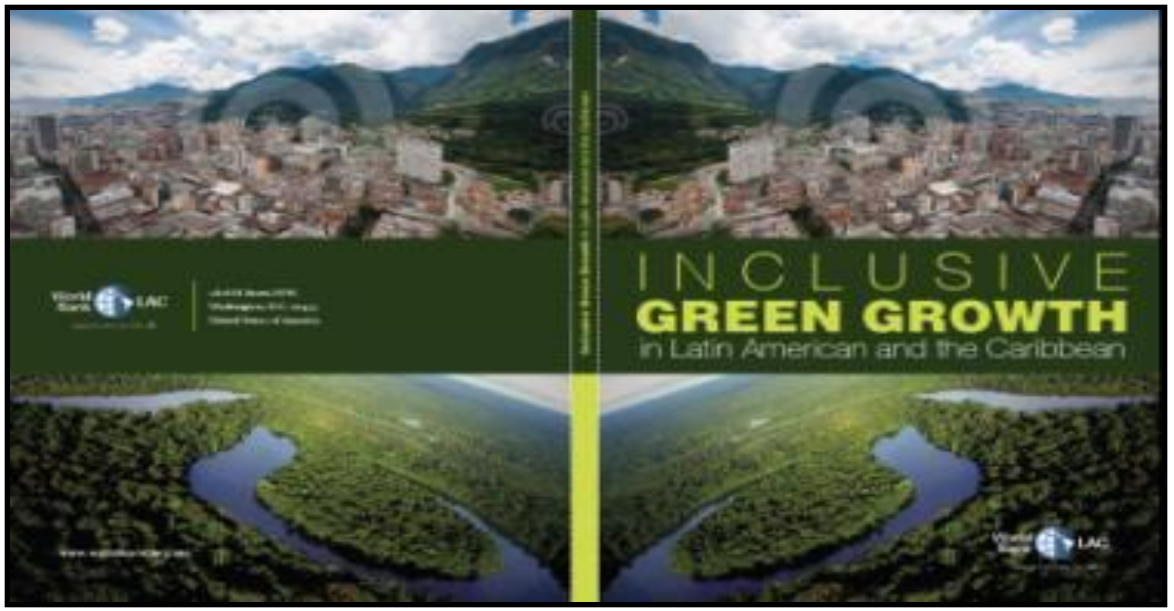
Coastal Area Impacts

Inundation of deltas & coastal wetlands
Inundation of mega urban areas
Displacement of coastal communities
Erosion of beaches

Green and Inclusive Growth

Green and Inclusive Growth is a pattern of growth that is more sustainable by being:

- **Clean**
- **Efficient**
- **Resilient**
- **Inclusive**



Quick recaps:

1. **80% chance of 4C by 2100, and 20% by 2060**

2. **Effects of 4C not evenly distributed - lower latitudes most impacted:**
   - relative warming that will occur in the tropics is larger
   - Sea-level rise likely to be 15 -20 % higher than global mean.
   - Disproportionate increases in tropical cyclone intensity
   - Increasing aridity and drought likely to increase

3. **Consequences of 4C not an extension of 2C**

4. **Need to remain focused on adaptation**

5. **But adaptation not a substitute for aggressive mitigation efforts that are essential, and solutions exist**

Turn Down the Heat – Program of work

- Phase 1: *(completed)*
  - science-base evidence – global snap-shot
- Phase 2: *(underway – to be completed May/June 2013)*
  - Regional studies focus on agriculture and livelihood security in Sub-Saharan Africa; water scarcity in South Asia, and sea-level rise and coastal impacts in South east Asia.
- Phase 3: *(forthcoming – by COP 19)*
  - Poverty and social impact/vulnerability –developing-developed country focus
  - Regional studies for Latin America & the Caribbean, Europe and Central Asia, and Middle East North Africa