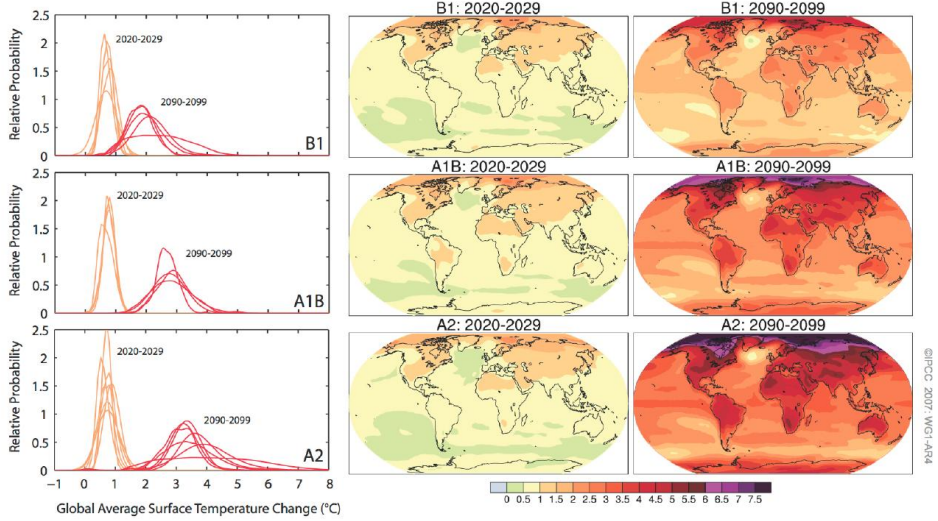
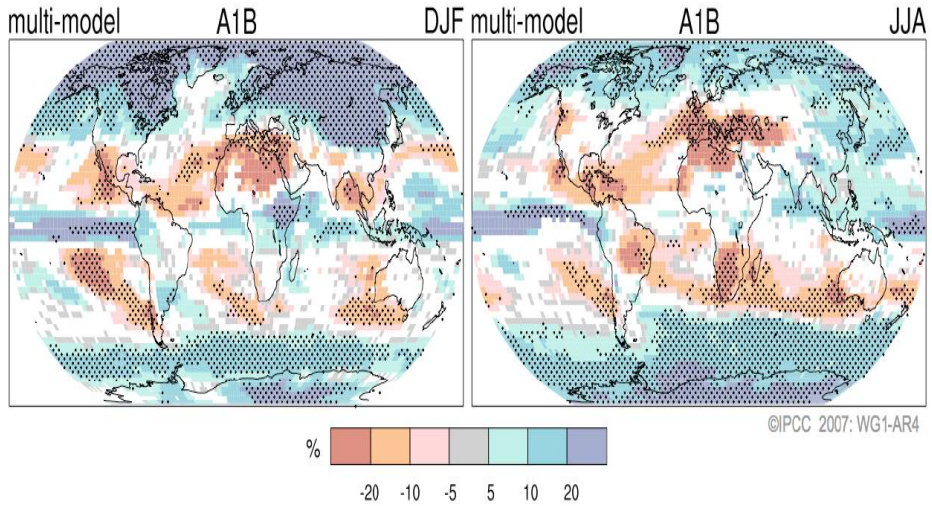


AOGCM Projections of Surface Temperatures



Projected Patterns of Precipitation Changes



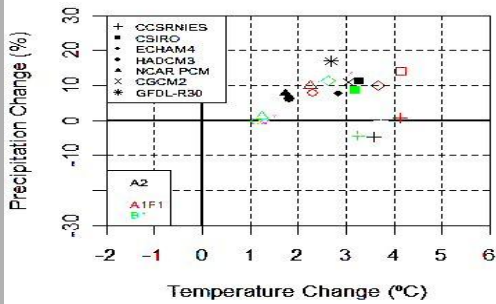
**IPCC 4th
Assessment GCMs**

**All Year
3°C (5.4°F) warmer**

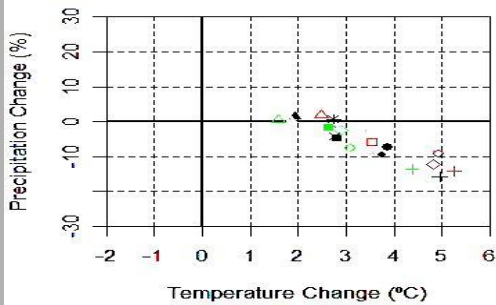
***BUT*
Winter – wetter**

Summer – drier

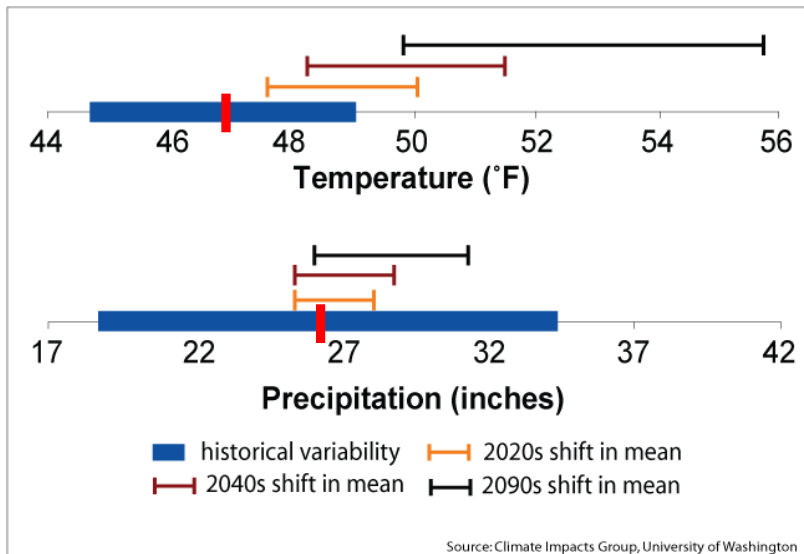
Western North America DEC-FEB (2040-2069)



Western North America JUN-AUG (2040-2069)



**Comparing Projected Change in Mean with
20th Century Variability**



Rising Temperatures



- Full range of projected temperature increase is 1.1-6.4°C (2-11.5°F)
- Best estimate range is 1.8-4.0 °C (1.8-4.0°F)
- Warming is expected to be greatest over land and at most high northern latitudes
 - Least over Southern Ocean and parts of North Atlantic Ocean

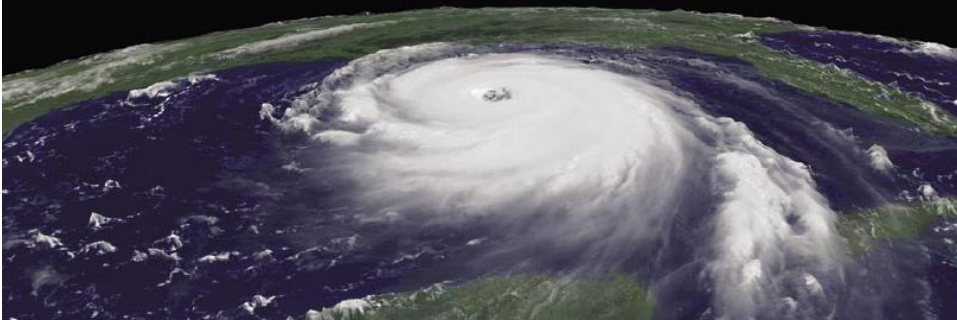
Source: IPCC *Climate Change 2007: The Physical Science Basis*—Summary for Policymakers.

Increasingly Severe Weather

Tropical cyclones (hurricanes and typhoons) are likely to become more intense, with higher peak wind speeds and heavier precipitation associated with warmer tropical seas.

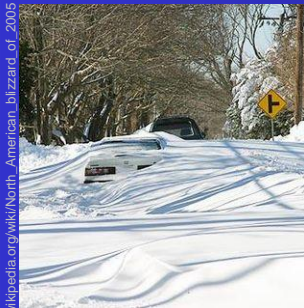
Source: IPCC *Climate Change 2007: The Physical Science Basis*—Summary for Policymakers.

NOAA



Increasingly Severe Weather

Increases in the amount of high latitude precipitation are very likely.



Associated Press
en.wikipedia.org/wiki/North_American_blizzard_of_2005

Source: IPCC *Climate Change 2007: The Physical Science Basis—Summary for Policymakers.*

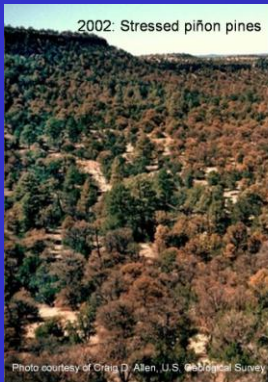
Drought

Decreases in precipitation are likely in most subtropical land regions



©INDEX-OPEN

National Park Service



2002: Stressed piñon pines



2004: Massive die-off of piñon pines

Photo courtesy of Craig D. Allen, U.S. Geological Survey

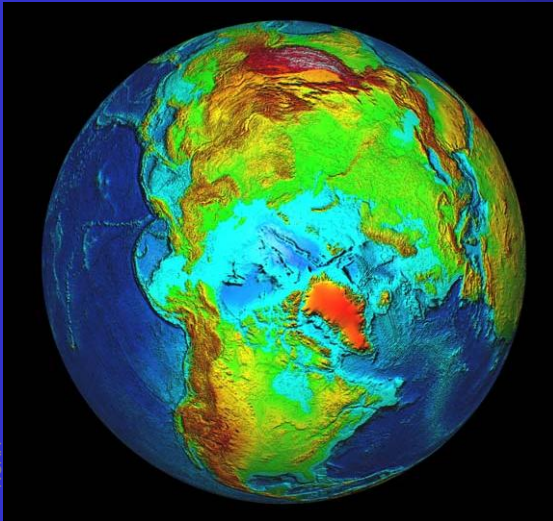
Jemez Mountains near Los Alamos



AP / Mustafa Quraishi

Source: IPCC *Climate Change 2007: The Physical Science Basis—Summary for Policymakers.*

Melting Ice



- Sea ice is projected to shrink in both the Arctic and Antarctic under all model simulations.

- Some projections show that by the latter part of the century, late-summer Arctic sea ice will disappear almost entirely.

Source: IPCC *Climate Change 2007: The Physical Science Basis*—Summary for Policymakers.

Sea-level Rise Projections Include:



- ocean expansion resulting from increased water temperatures;



- meltwater runoff from mountain glaciers around the world; and



- a contribution due to increased ice flow from Greenland and Antarctica **at the rates observed for 1993-2003.**

Source: IPCC *Climate Change 2007: The Physical Science Basis*—Summary for Policymakers.

Sea-level Rise Projections DO NOT Include:



Photo Roger Braithwaite



iStockphoto.com

- Ice sheet instability
- Carbon dioxide uptake changes

IPCC: “Larger values cannot be excluded, but understanding of these effects is too limited to assess their likelihood or provide a best estimate or an upper bound for sea-level rise.”

Source: IPCC *Climate Change 2007: The Physical Science Basis—Summary for Policymakers.*



Weiss and Overpeck U. Arizona



Threshold risks:

Some models do suggest that sustained warming between 2-7°F above today’s global average temperature would initiate irreversible melting of the Greenland ice sheet—which could ultimately contribute about **23 feet** to sea-level rise.

Source: IPCC *Climate Change 2007: The Physical Science Basis—Summary for Policymakers.*