

GLOBAL CLIMATE CHANGE: THE NATURE OF THE BEAST

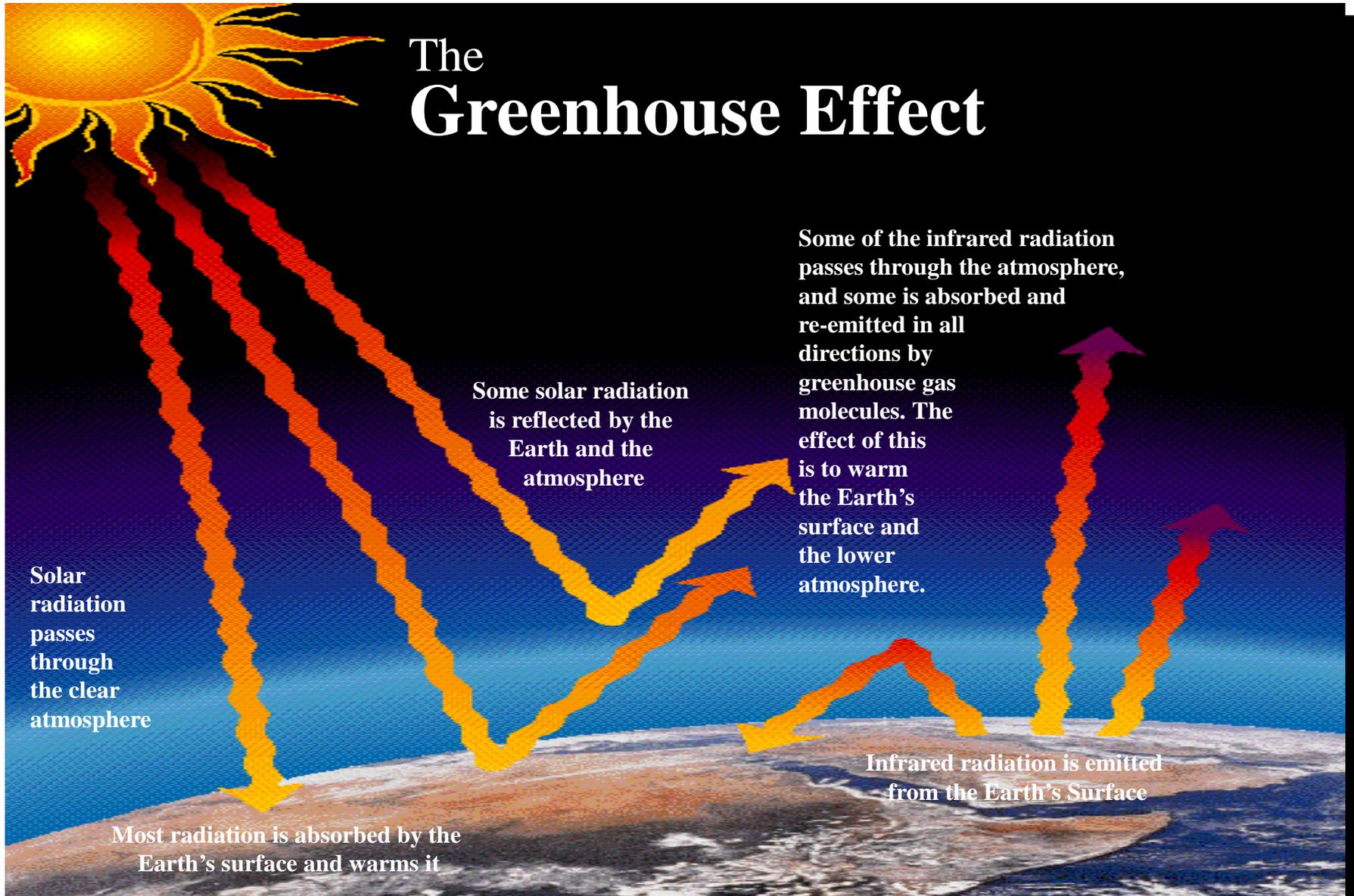
Rob Wolcott

Bret O. Bergst

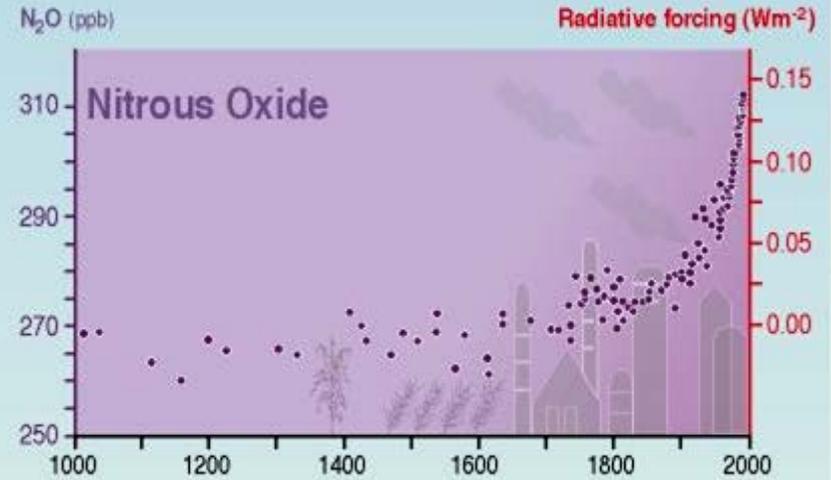
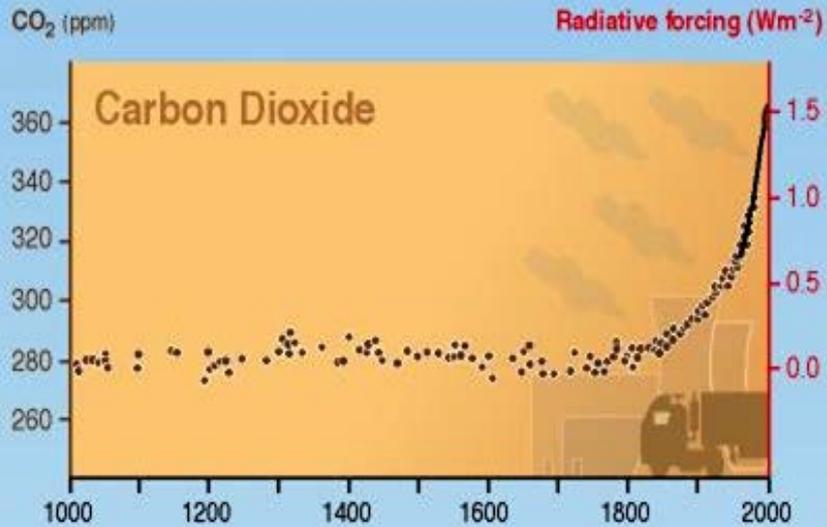
World Resources Institute

CLIMATE CHANGE AND THE GREENHOUSE EFFECT

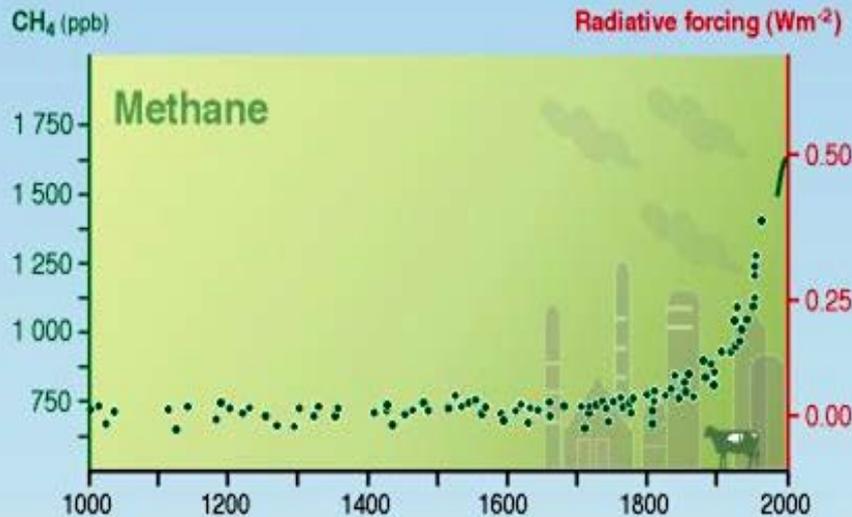
The Greenhouse Effect



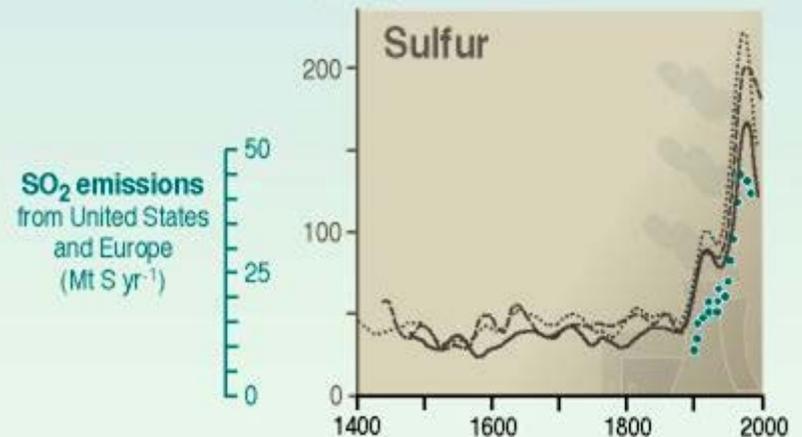
HUMAN ACTIVITIES HAVE CHANGED THE COMPOSITION OF THE ATMOSPHERE SINCE THE PRE-INDUSTRIAL ERA



Sulfate aerosols deposited in Greenland ice



Sulfate concentration
mg SO₄²⁻ per tonne of ice

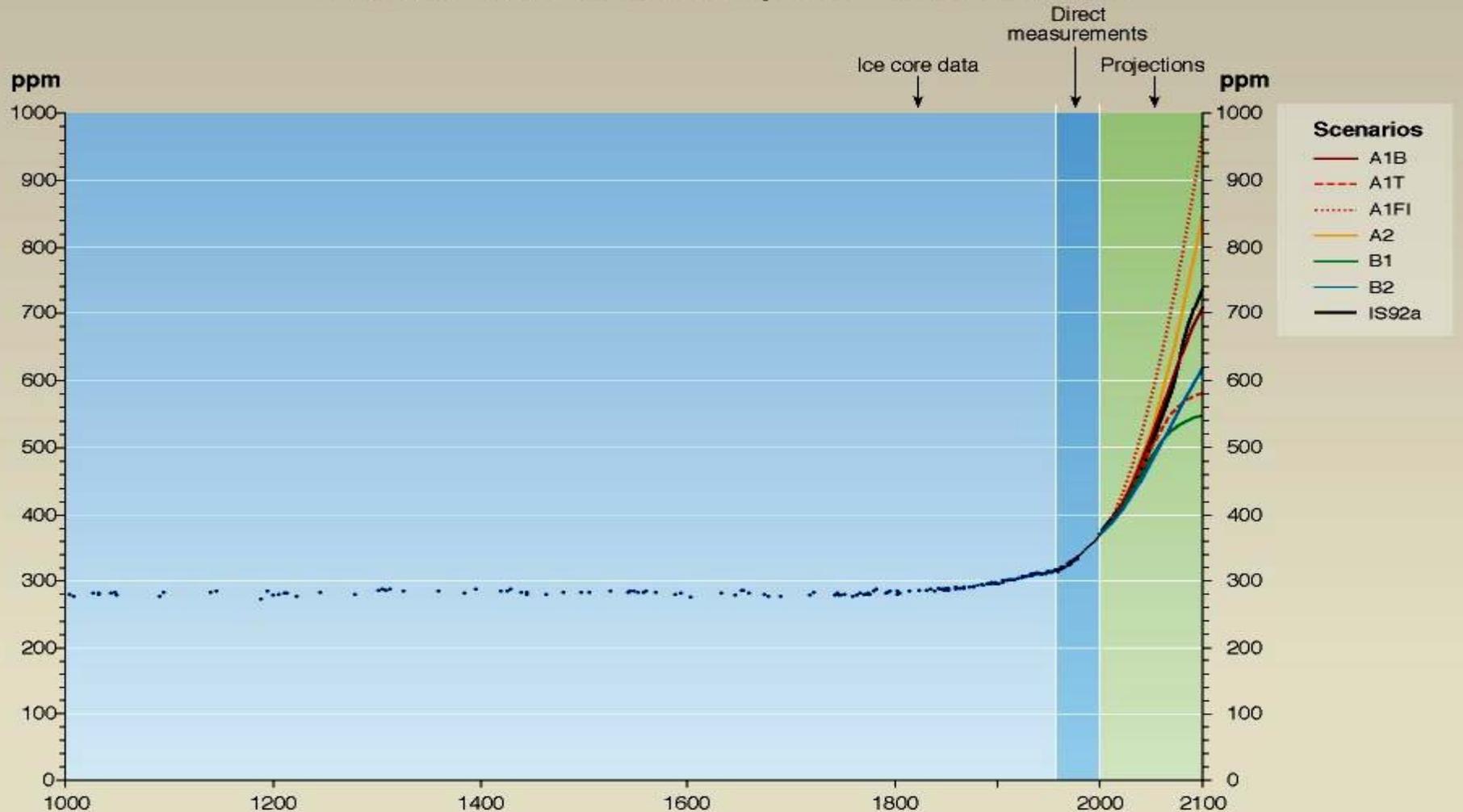


CARBON DIOXIDE HAS TWO MAIN SOURCES

- 80 – 85% produced by recent fossil fuel use
- 15 – 20% results from changes in land use

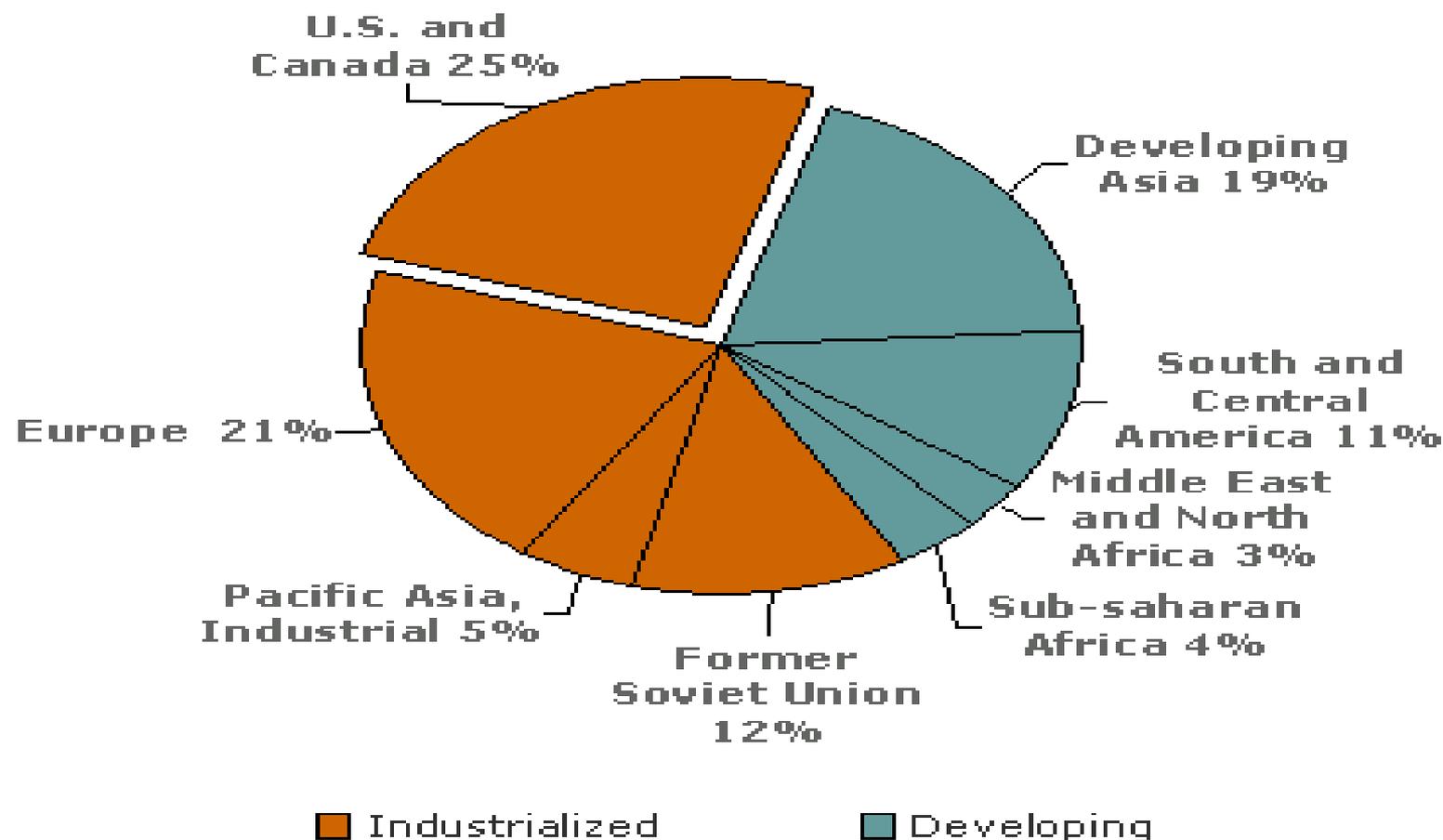
PROJECTED CONCENTRATIONS OF CO₂ DURING THE 21ST CENTURY ARE TWO TO FOUR TIMES THE PRE-INDUSTRIAL LEVEL

Past and future CO₂ atmospheric concentrations



The Contributors to Climate Change

Figure 1: Percent of Cumulative Global Carbon Emissions From Industrial Sources and Land-Use Changes, 1900-1999

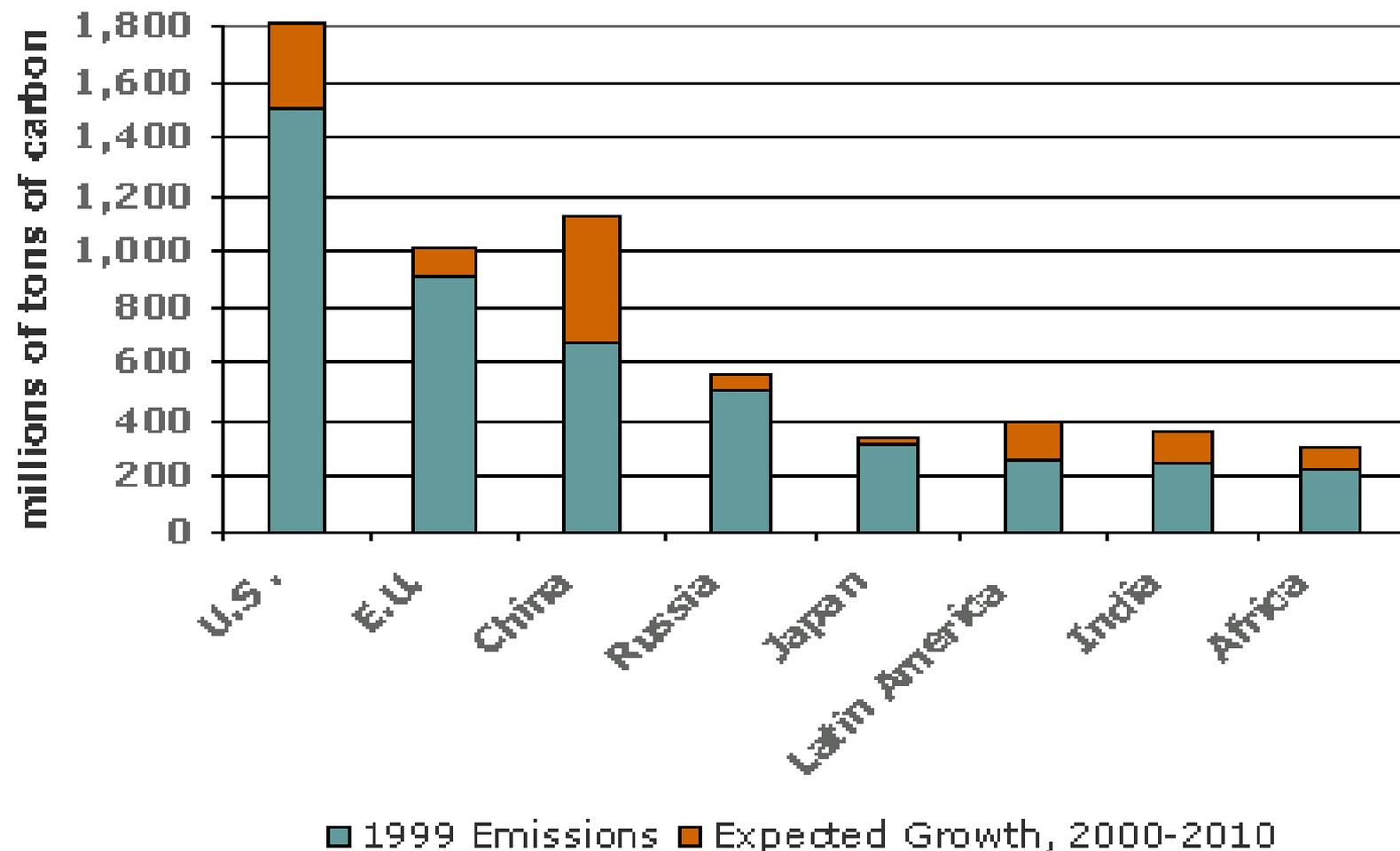


Notes: Data includes net CO₂ emissions from fossil fuel combustion (1900-1999) and from changes in land-use (1900-1990), such as harvesting of forest products, clearing for agriculture, and vegetation regrowth.

Source: WRI; Marland et al. 2000; Houghton and Hackler 2000.

Future Carbon Emissions Will Grow Unevenly

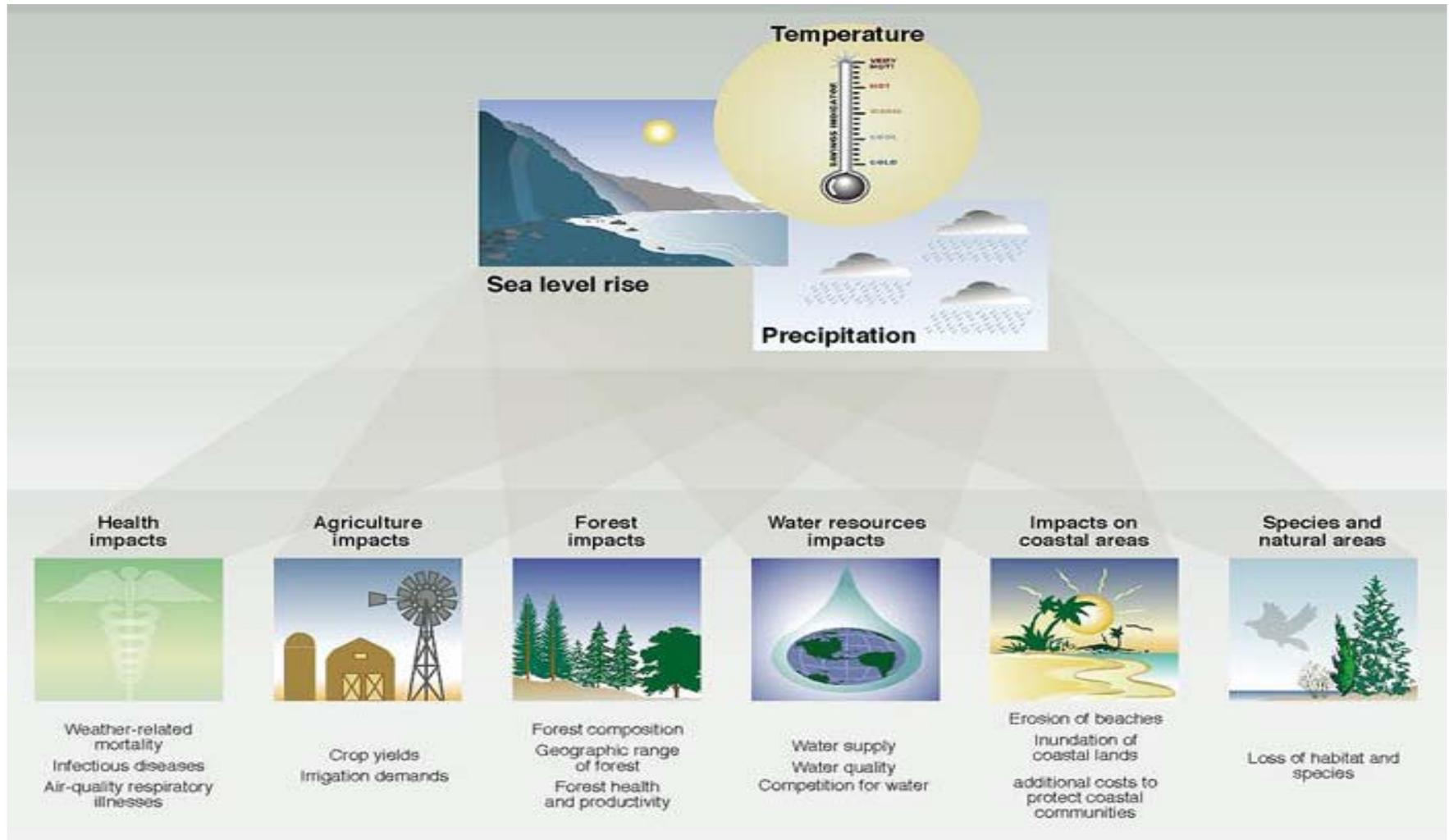
Figure 3: 1999 Carbon Emissions and Expected Growth by 2010



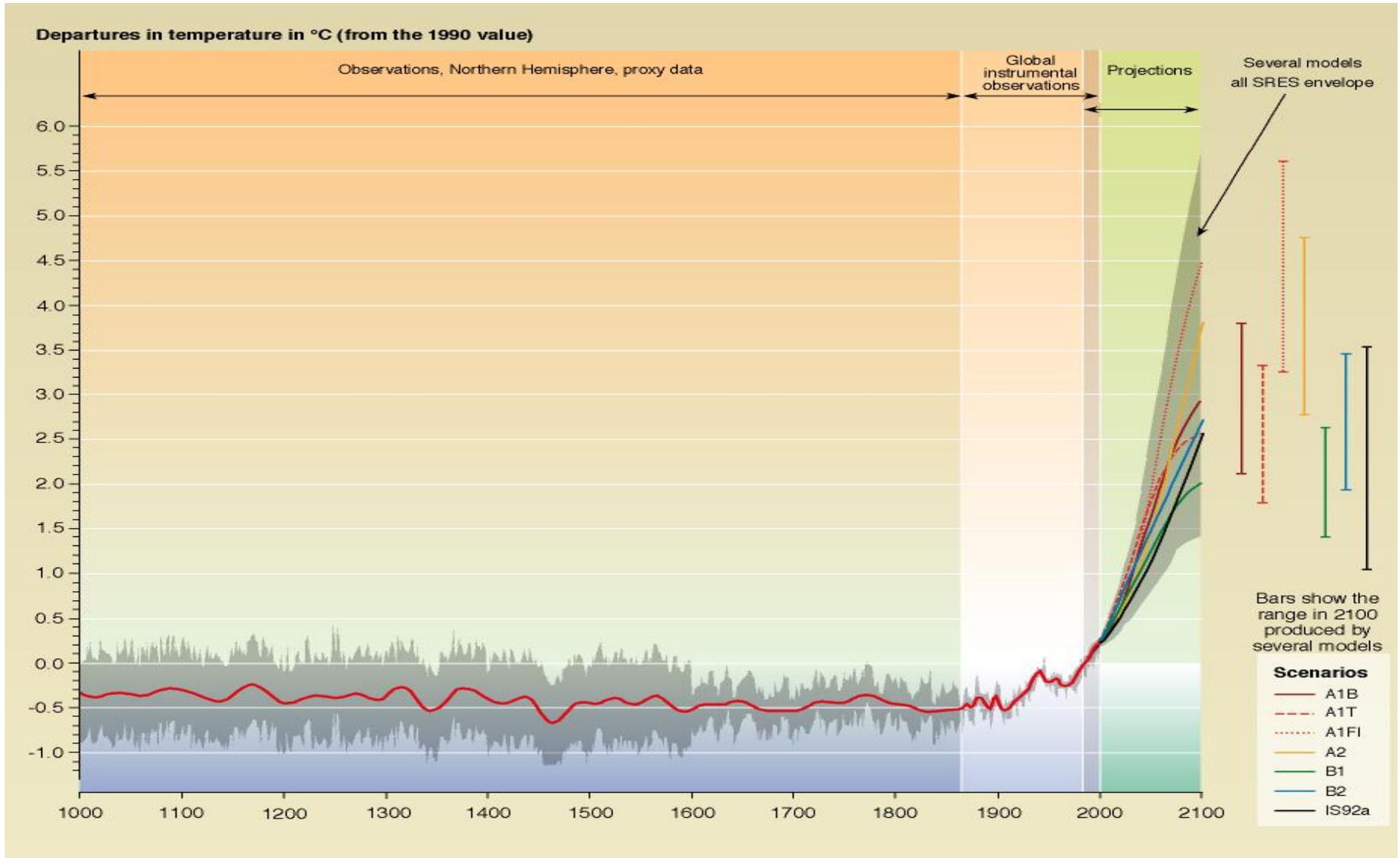
Notes: Shows carbon emissions associated with fossil fuel combustion; projections are EIA reference case scenarios.

Sources: WRI and EIA 2001.

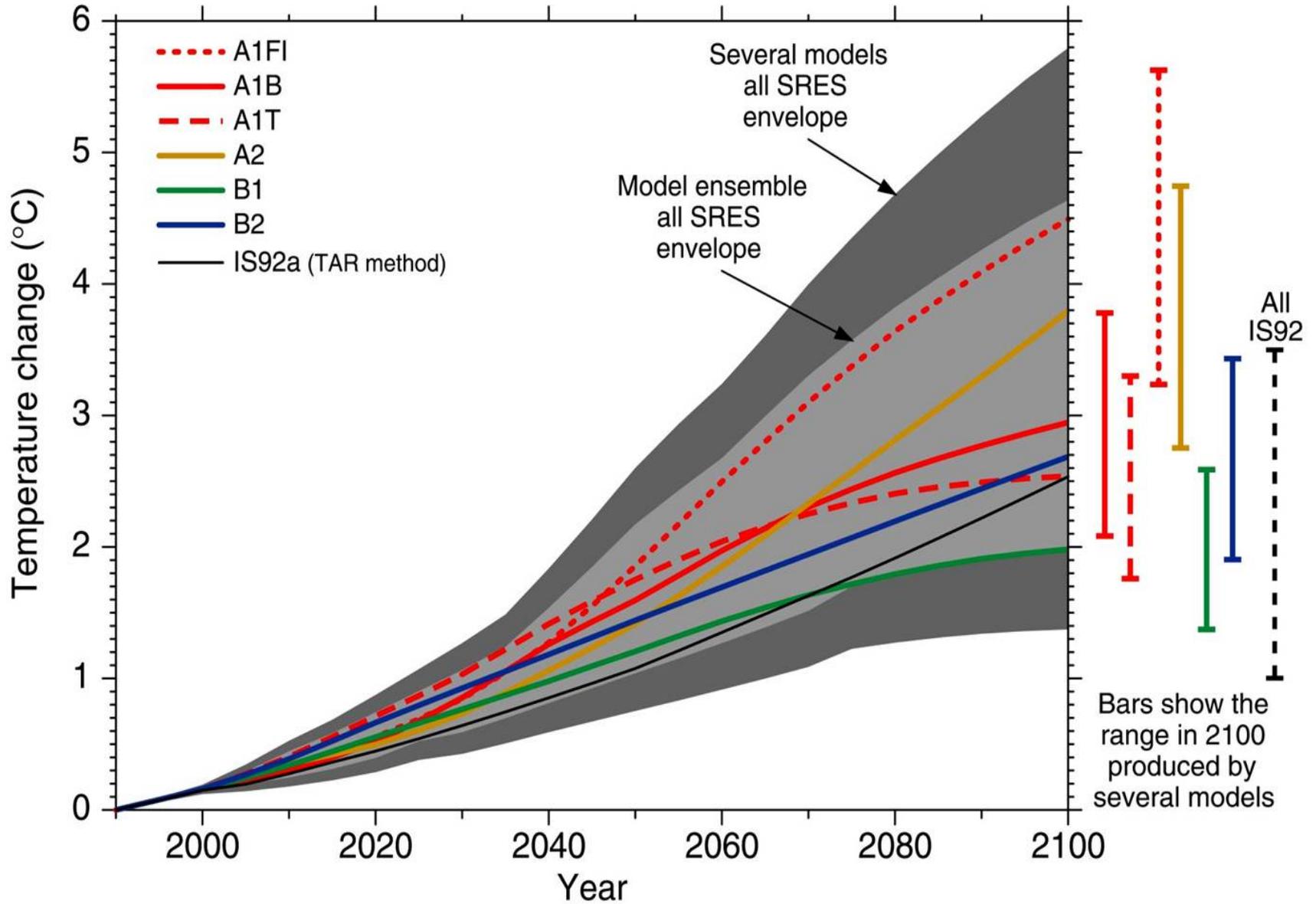
CHANGES IN TEMPERATURE, SEA LEVEL AND PRECIPITATION WILL HAVE VARYING IMPACTS



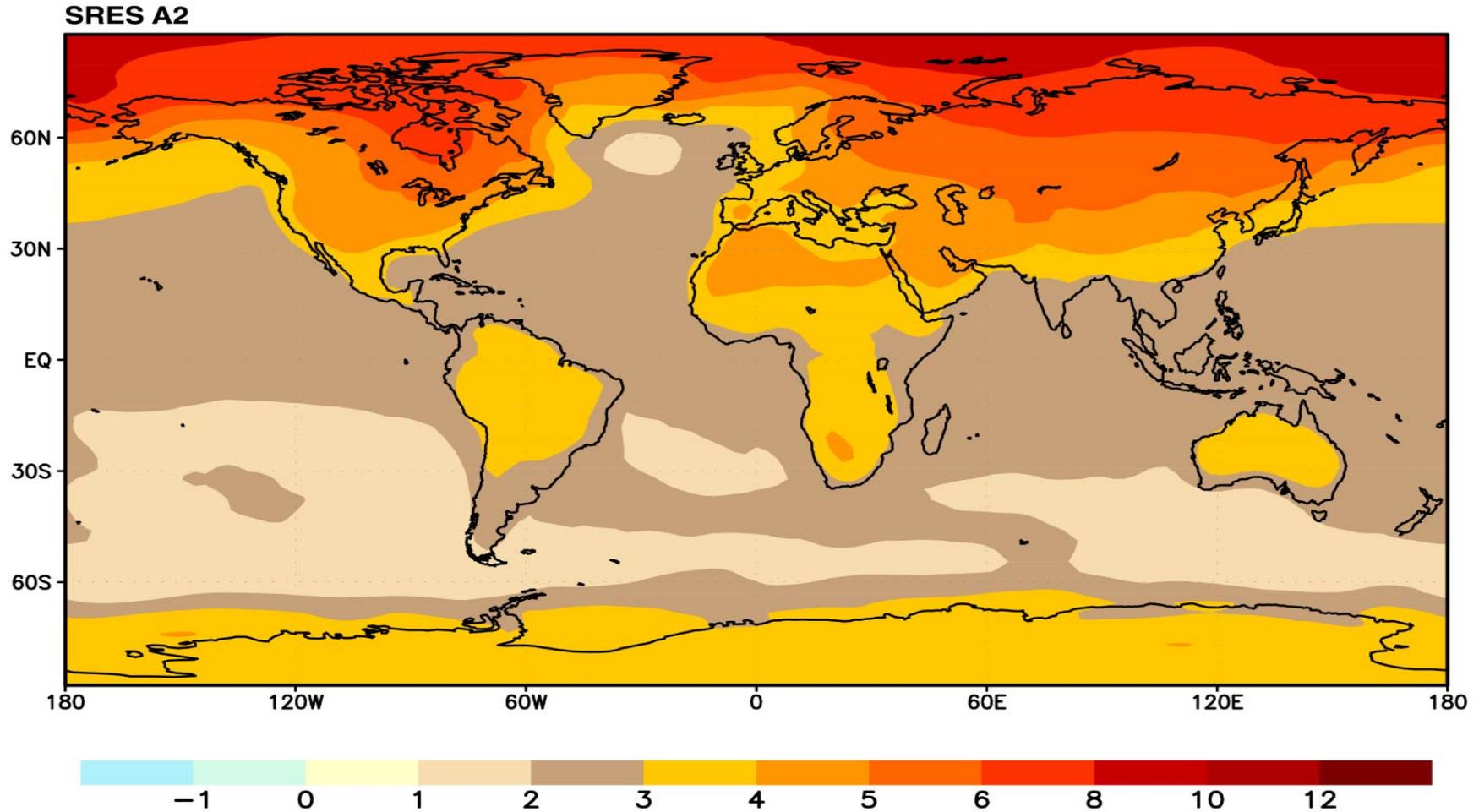
PROJECTED TEMPERATURES DURING THE 21ST CENTURY ARE SIGNIFICANTLY HIGHER THAN AT ANY TIME DURING THE LAST 1000 YEARS



Temperature change

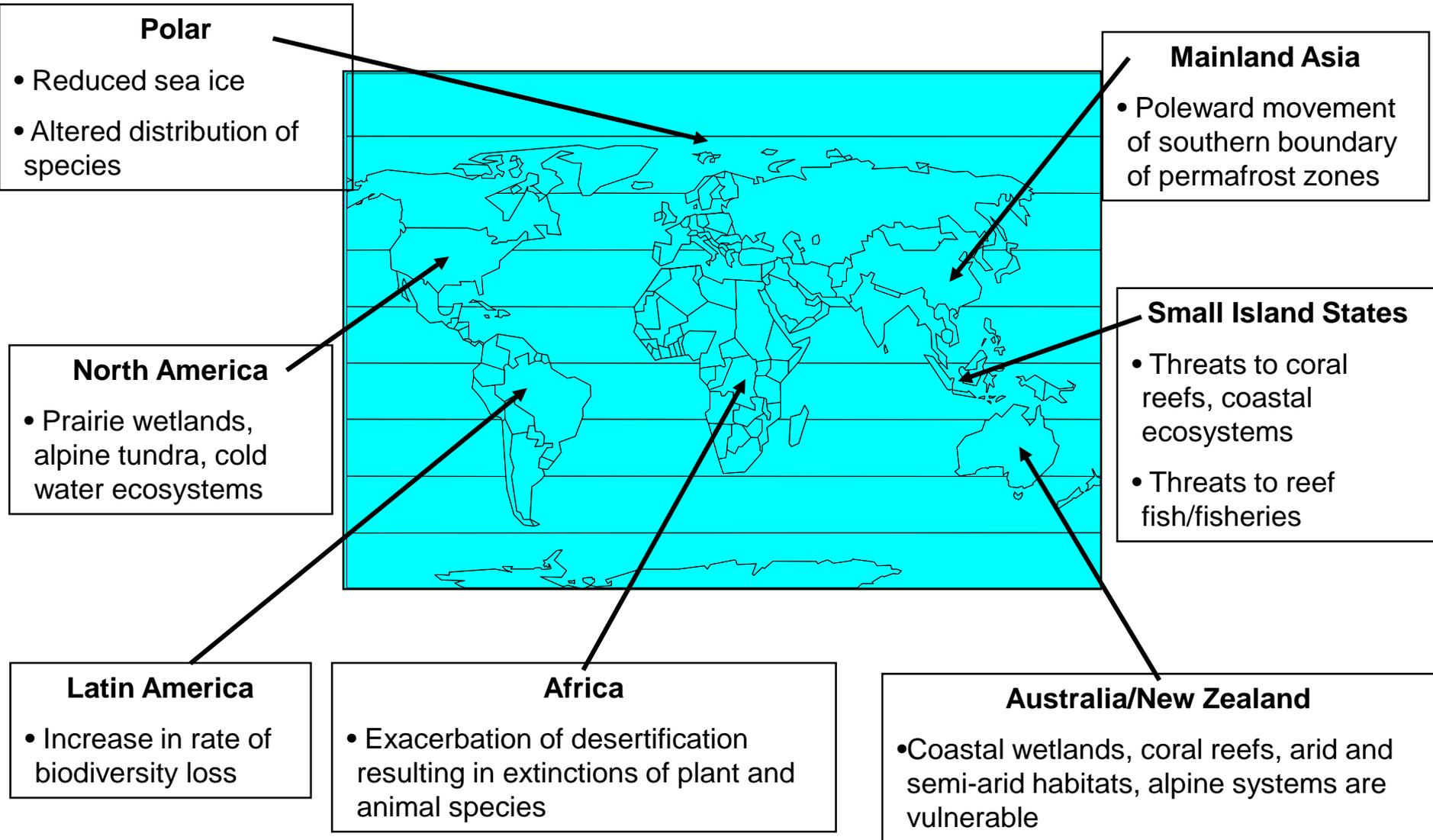


LAND AREAS ARE PROJECTED TO WARM MORE THAN THE OCEANS WITH THE GREATEST WARMING AT HIGH LATITUDES

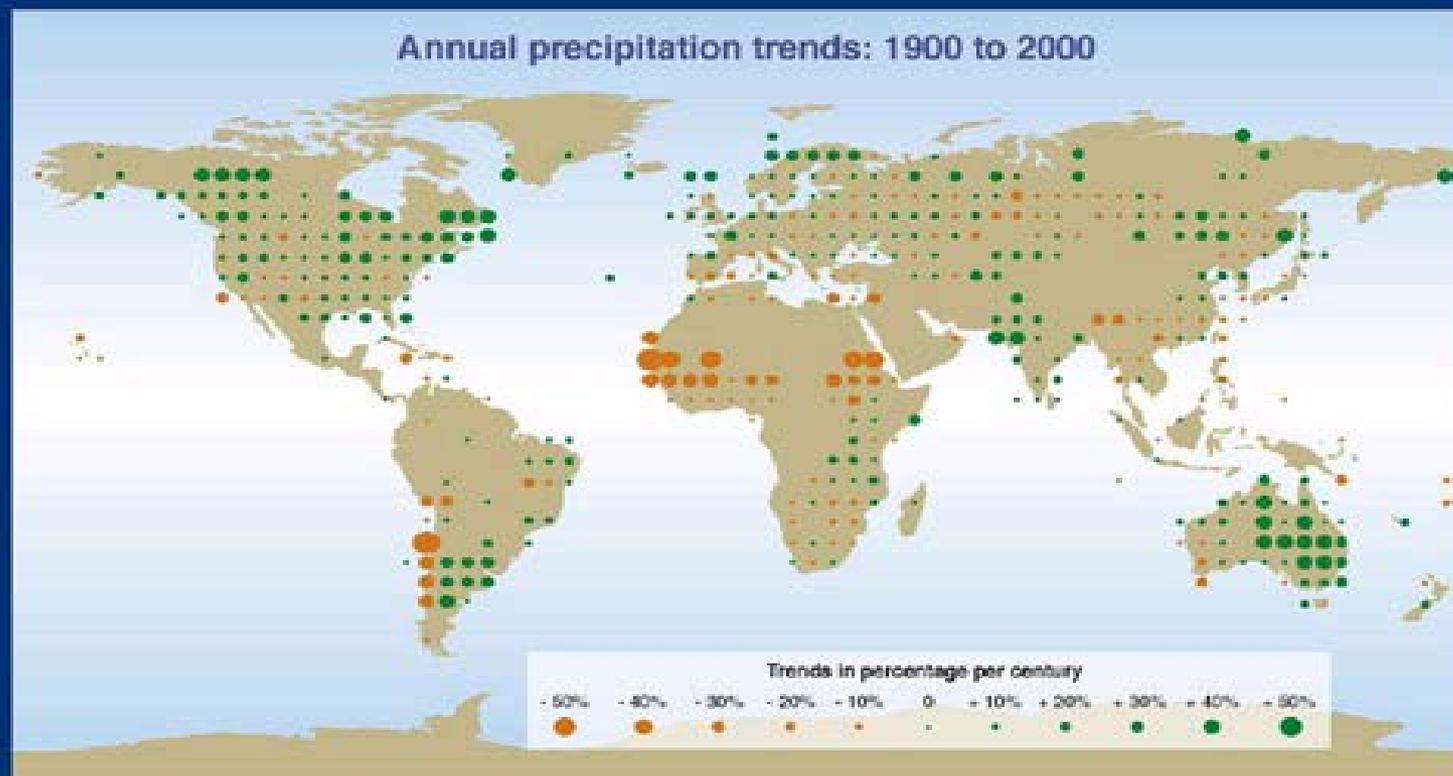


Annual mean temperature change, 2071 to 2100 relative to 1990: Global Average in 2085 = 3.1°C

EXAMPLES OF VULNERABLE ECOSYSTEMS

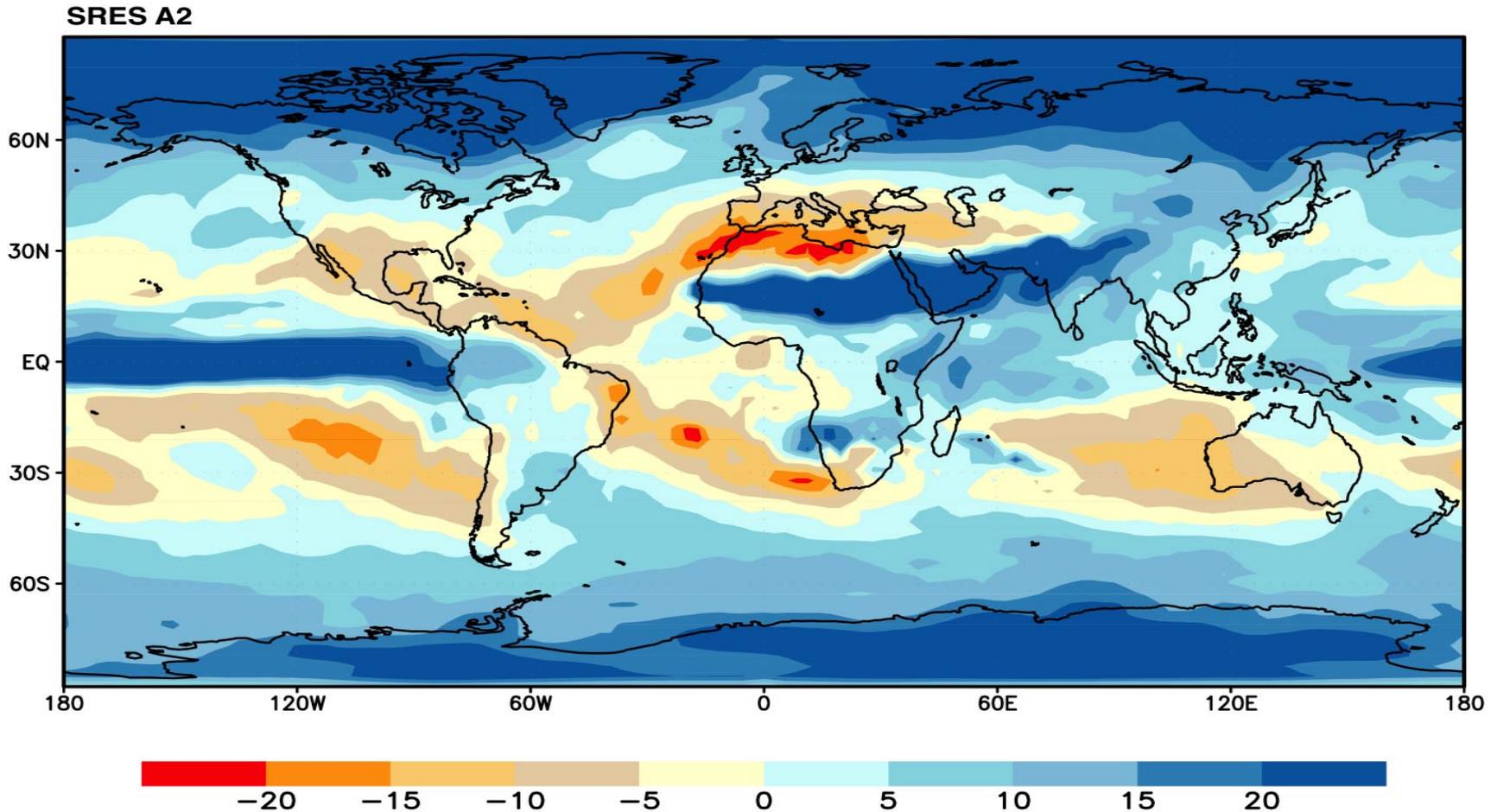


PRECIPITATION RATES ARE CHANGING



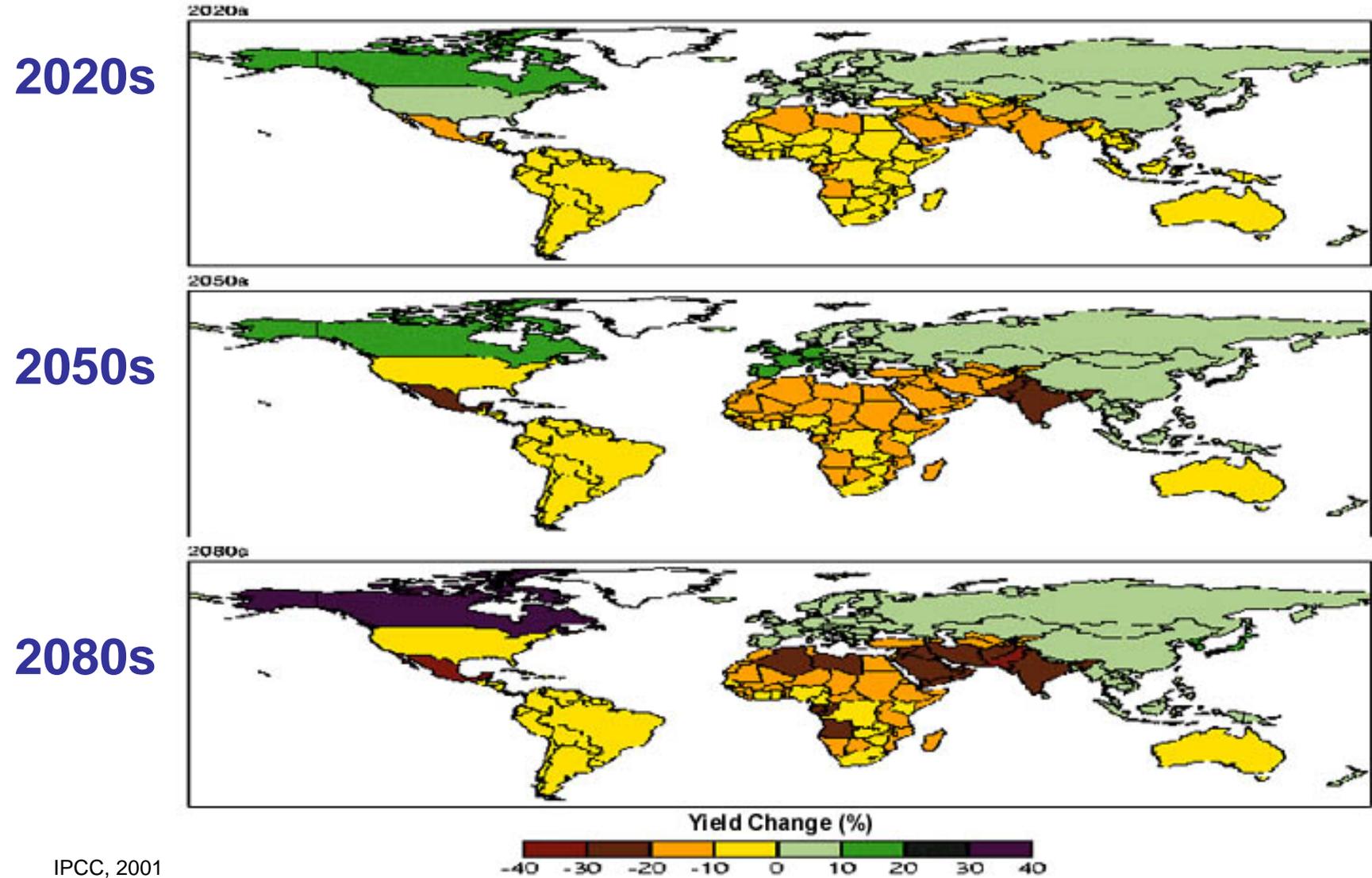
SYR - FIGURE 2-6a

SOME AREAS ARE PROJECTED TO BECOME WETTER, OTHERS DRIER WITH AN OVERALL INCREASE PROJECTED

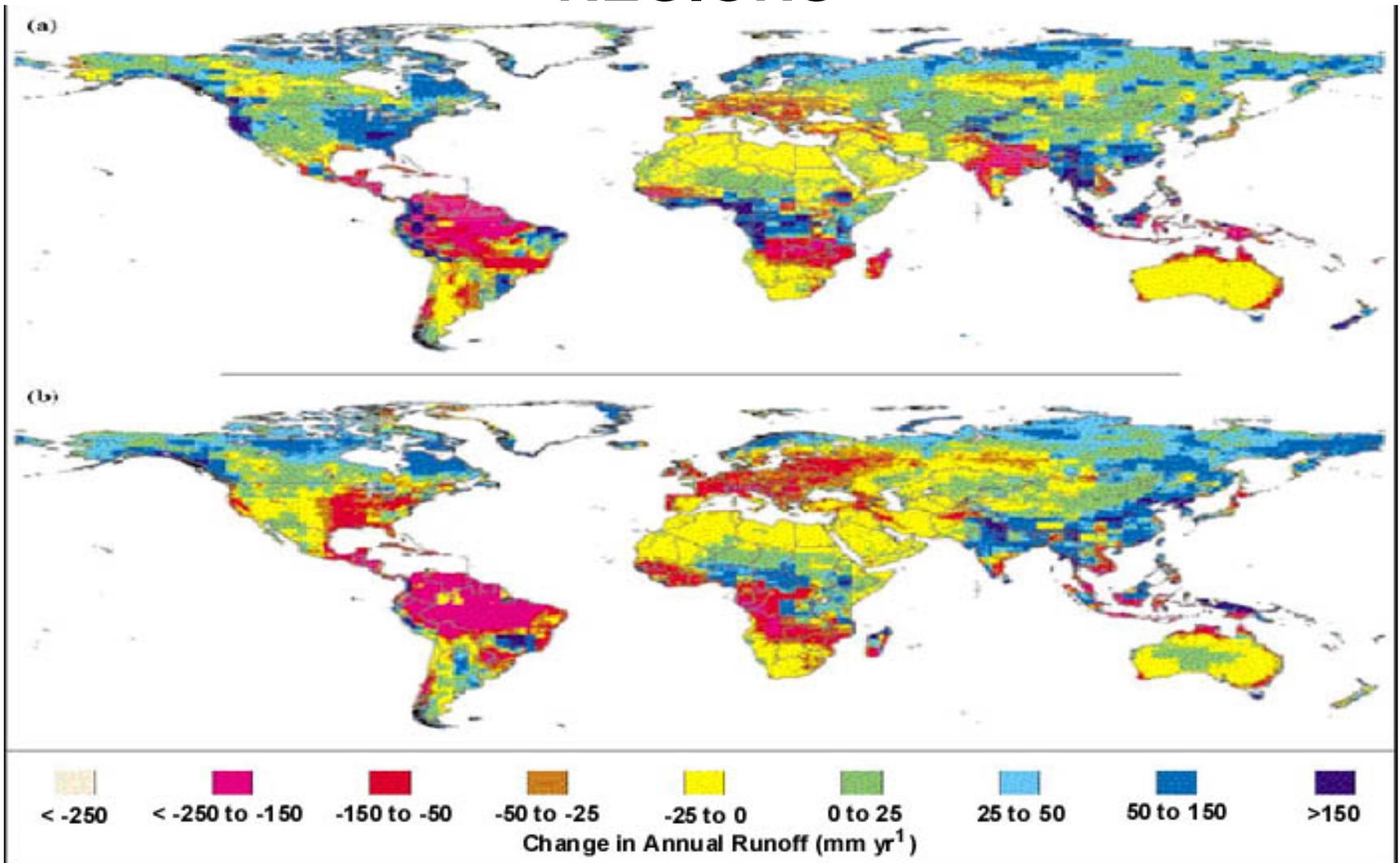


Annual mean precipitation change: 2071 to 2100 Relative to 1990

INITIALLY INCREASED AGRICULTURAL PRODUCTIVITY IN SOME MID-LATITUDE REGIONS & REDUCTION IN THE TROPICS AND SUB-TROPICS EVEN WITH WARMING OF A FEW DEGREES

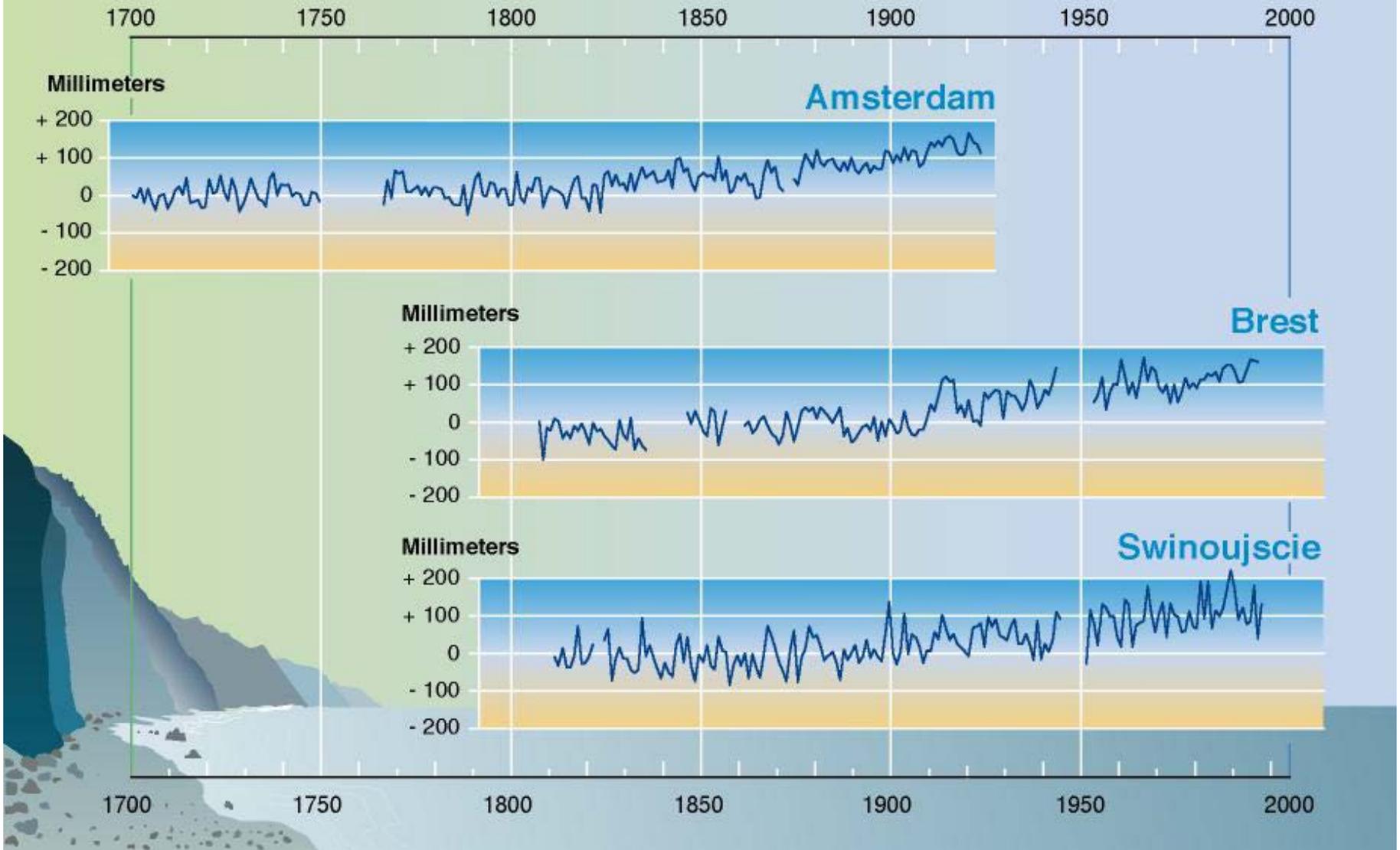


INCREASED WATER AVAILABILITY IN SOME WATER-SCARCE REGIONS, AND DECREASED WATER AVAILABILITY IN MANY WATER SCARCE REGIONS



SEA LEVELS HAVE RISEN

Relative sea level over the last 300 years



What causes the sea level to change ?

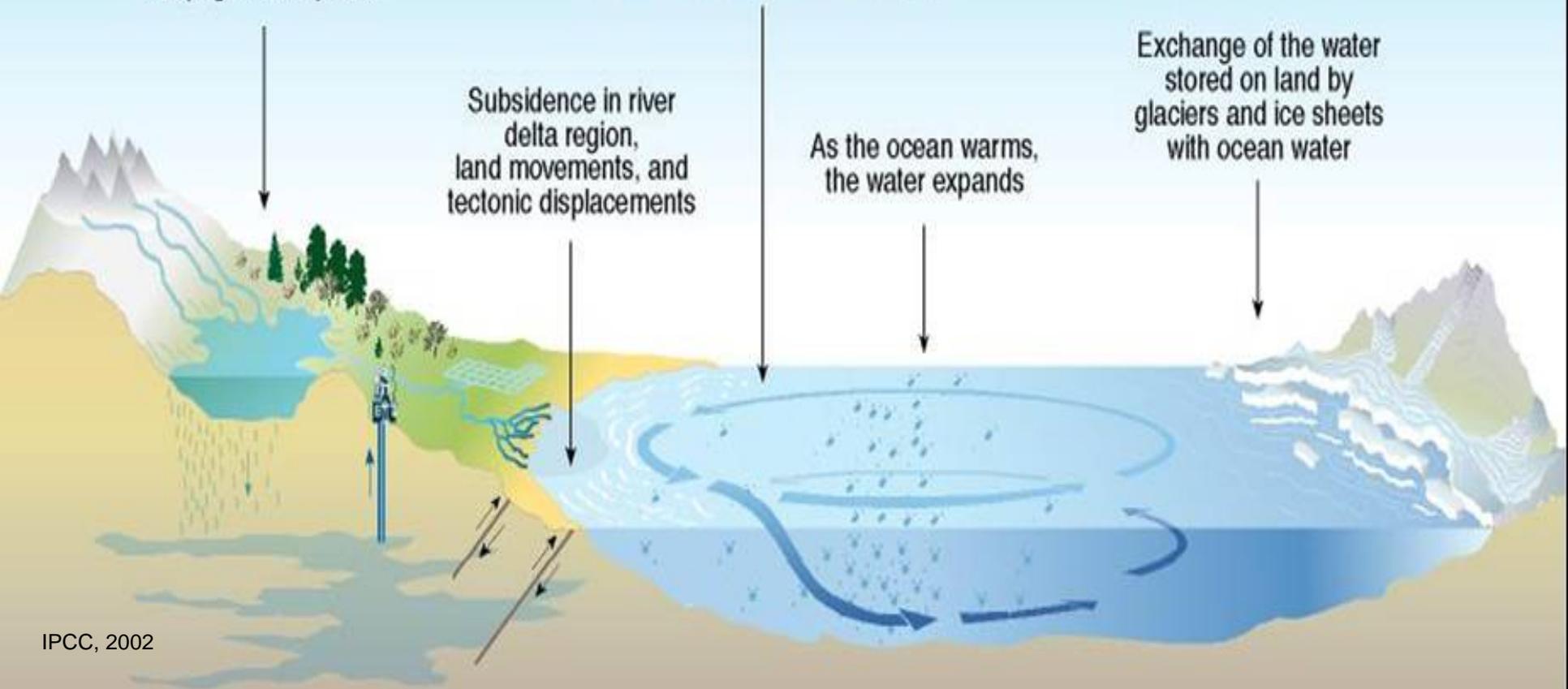
Terrestrial water storage, extraction of groundwater, building of reservoirs, changes in runoff, and seepage into aquifers

Surface and deep ocean circulation changes, storm surges

Subsidence in river delta region, land movements, and tectonic displacements

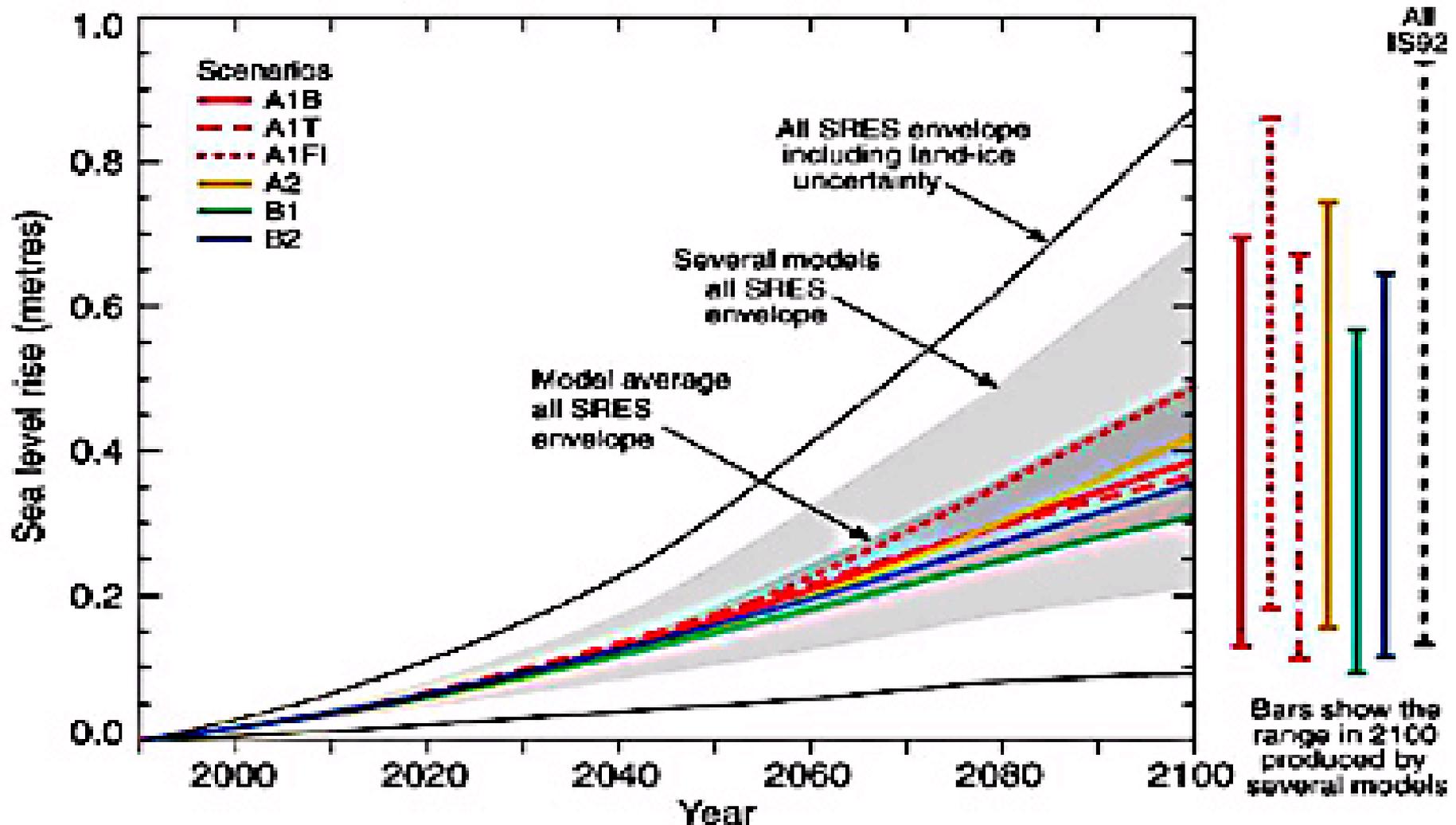
As the ocean warms, the water expands

Exchange of the water stored on land by glaciers and ice sheets with ocean water



MEAN SEA LEVEL IS PROJECTED TO RISE .09 TO .88M BY 2100 WITH SIGNIFICANT VARIATIONS

(e) Sea level rise



SEA LEVEL RISE AND HEAVY RAINFALL EVENTS WILL DRAMATICALLY IMPACT LOW-LYING DELTAIC AREAS

Potential impact of sea-level rise on Bangladesh



Today

Total population: 112 Million

Total land area: 134,000 km²



1.5 m - Impact

Total population affected: 17 Million (15%)

Total land area affected: 22,000 km² (16%)

CLIMATE CHANGE AND OTHER ENVIRONMENTAL ISSUES ARE ALSO INTER-LINKED

