

Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report

Summary for Policymakers



June 21, 2007



California Air Resources Board

California Environmental Protection Agency



Overview



Feb 2007

The Physical Science Basis

Apr 2007

**Impacts, Adaptation
and Vulnerability**

May 2007

Mitigation of Climate Change

Nov 2007

Final Synthesis Report

IPCC 4th Assessment (2007)

Climate Change 2007
The Physical Science Basis



1,250 authors
2,500 reviewers
130 countries
6 years work
1 consensus report

**Policy-relevant but not policy-prescriptive reviews
of the state of scientific understanding**

Constraints on IPCC 4th Assessment

- End of 2005 cut-off for research
- Important findings in 2006 not included
 - Rapid Greenland and Antarctic ice melt
 - Sea surface temperatures
 - Hurricane intensity
 - Sea level rise
- Computer climate models to be improved for short-term projections (1-2 decades)
- Policy makers need more frequent, comprehensive, but succinct summaries

Physical Science Basis

Key Findings

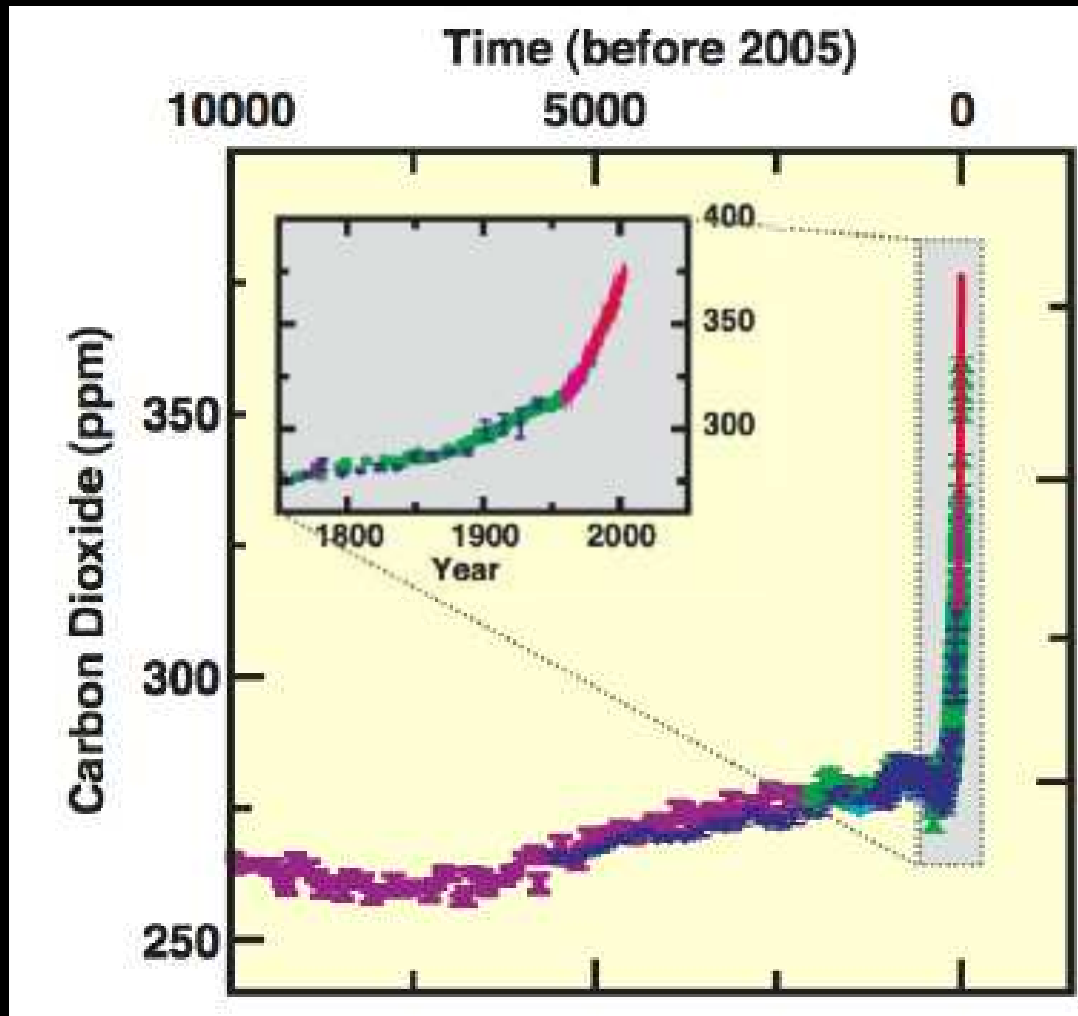
*“**Warming** of the climate system is **unequivocal**...”*

“Most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations.”

*“**Very high confidence** that the globally averaged net effect of human activities since 1750 has been one of warming...”*

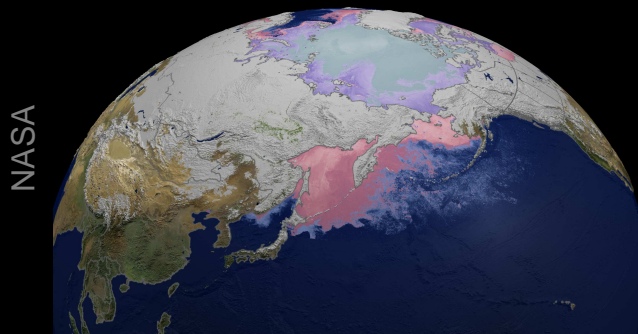
Changes in Heat-trapping Gases from Ice-Core and Modern Data

*“Since the dawn of the industrial era, CO₂ and other key heat-trapping gases have increased at a rate that is **very likely to have been unprecedented in more than 10,000 years.**”*

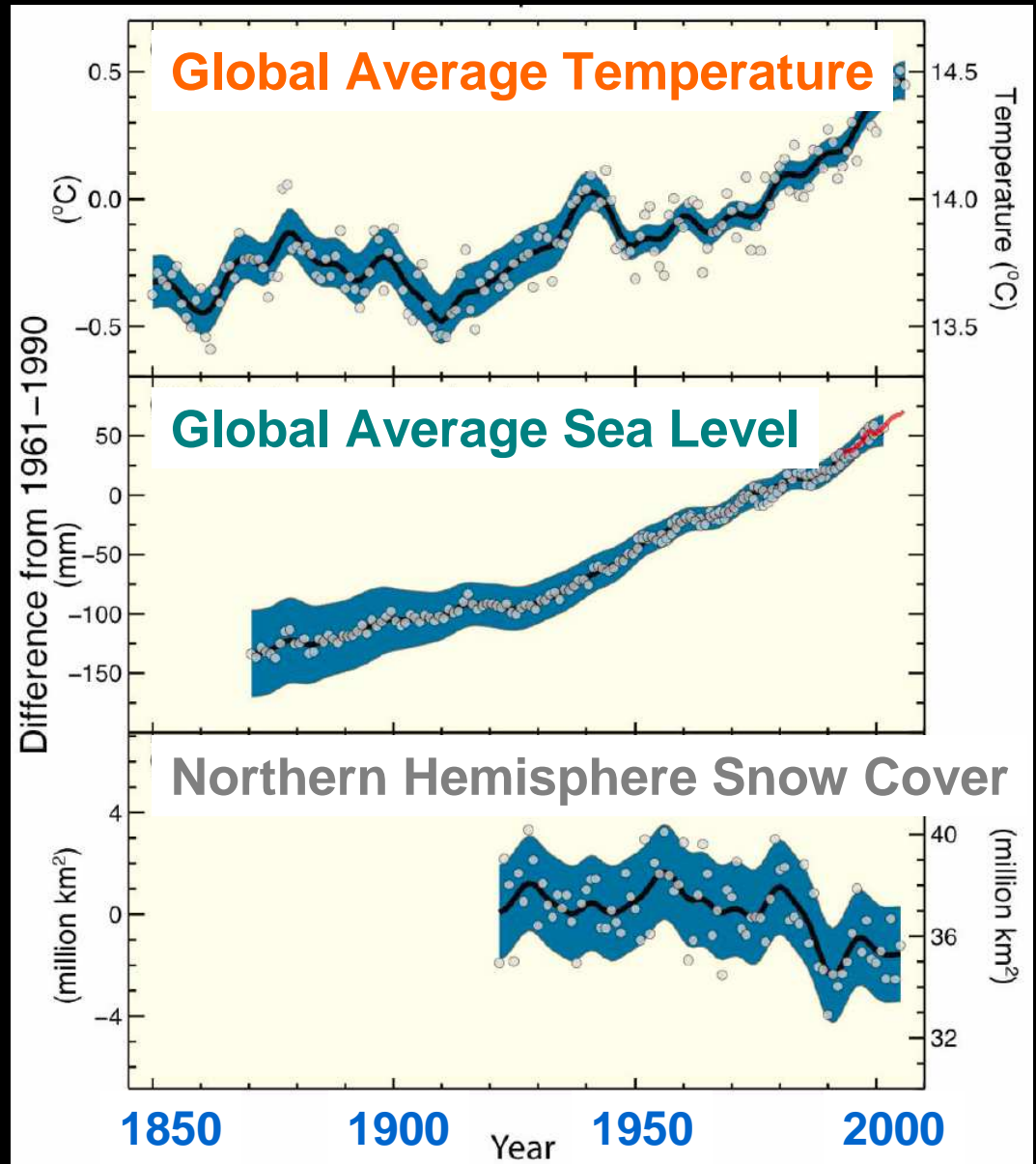


Source: IPCC *Climate Change 2007: The Physical Science Basis*—Summary for Policymakers.

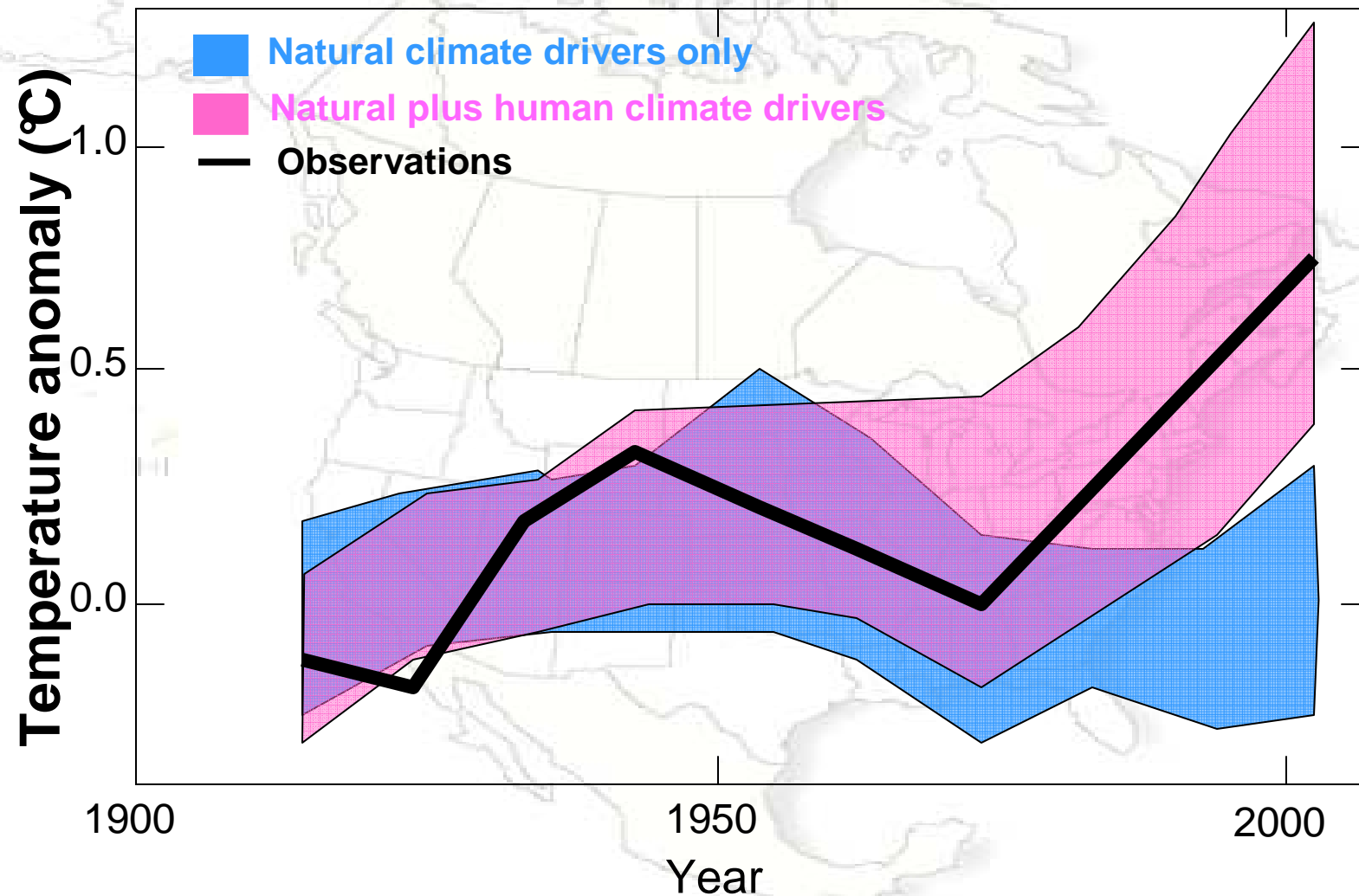
Direct Observations of Recent Climate Change



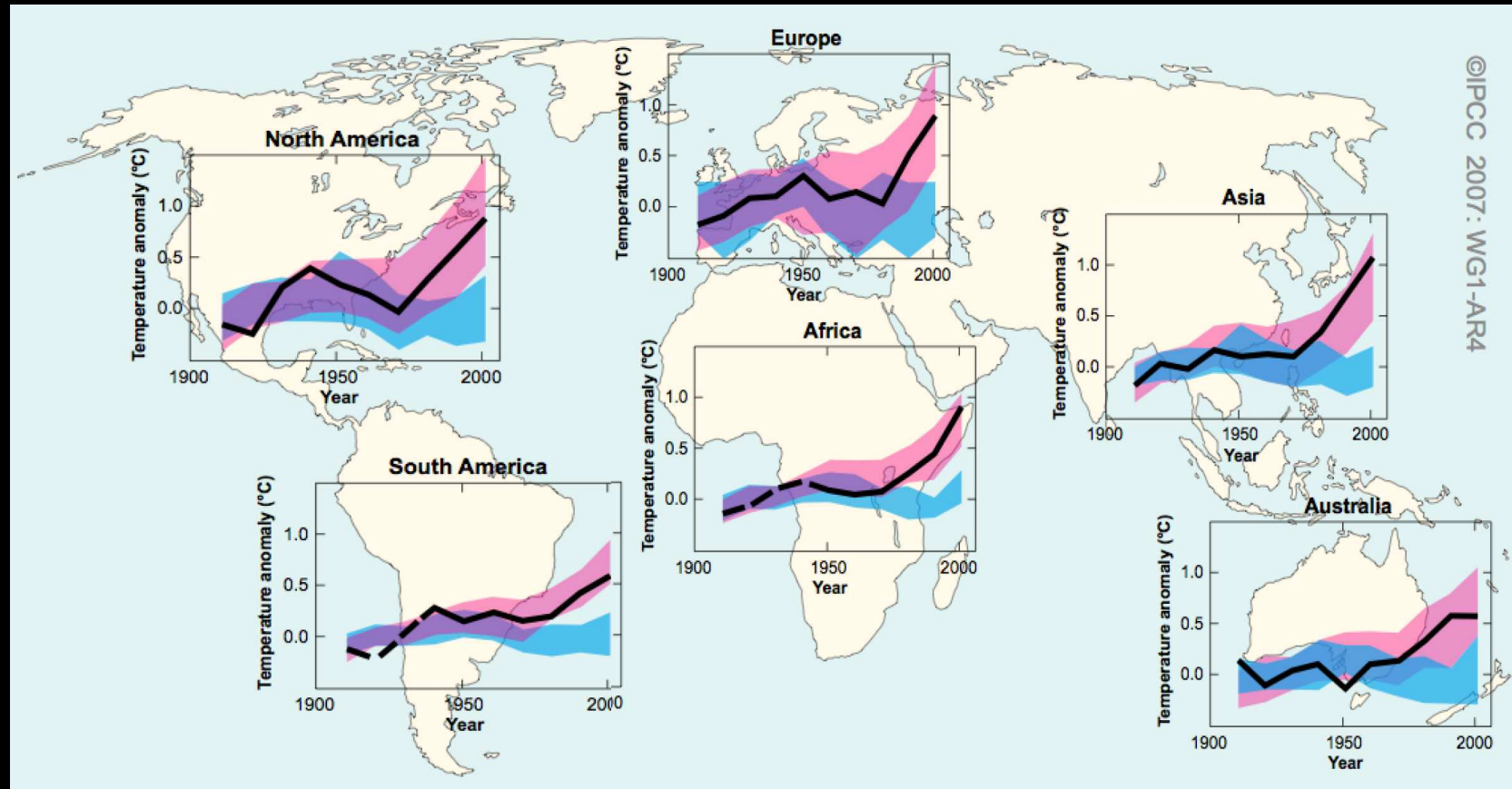
Source: IPCC *Climate Change 2007: The Physical Science Basis*—SPM



Predicted and Observed Temperature Change North America



Predicted and Observed Temperature Change



There has been significant human-induced warming over past 50 years in each continent

Impacts, Adaptation and Vulnerability

Key Findings

“It is likely that since 1970, human-induced warming has had a discernible influence on many physical and biological systems.”

89% of the 29,000 datasets that IPCC examined exhibited changes in the direction expected from warming.



Effects of human-induced climate change are now apparent on every continent



Future Risks:

Rise Above 1980-1999 of 1-2°C (1.8-3.6°F)

Up to 30% of species at increasing risk of extinction



Dado Galdieri - AP



Disappearance of Glaciers

www.southamerican
experience.co.uk



Decrease cereal productivity low latitudes



Increase cereal productivity mid-high latitudes



Decrease freshwater availability for billion people

Most corals bleached



Replacement of tropical forest by savanna in eastern Amazon

Future Risks:

Rise Above 1980-1999 of 2-3°C (3.6-5.4°F)

Ashley Cooper
Picimpact/Corbis

~15% of
terrestrial
biosphere
becomes net
carbon source



Large increase
area burned



Widespread
coral mortality

© Shehzad Noor
Still Pictures



Millions more
people could
experience
coastal
flooding each
year

Future Risks:

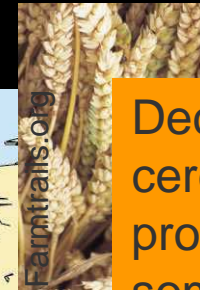
Rise Above 1980-1999 of 3-4°C (5.4-7.2°F)

Ashley Cooper
Picimpact/Corbis

~40% of
terrestrial
biosphere
becomes net
carbon source



High latitudes
flood



Decrease
cereal
productivity
some regions



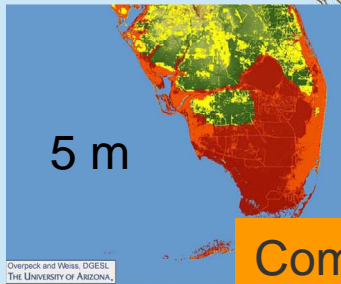
Decrease all
cereal
productivity
low latitudes



Increases in
coastal water
temperature
worsens
cholera
abundance



~30% of global
coastal
wetlands lost



Commit to
long-term ice
sheet melt
contribution of
4-6 meters sea
level rise

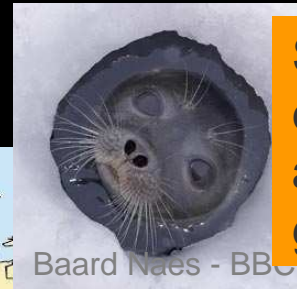
Future Risks:

Rise Above 1980-1999 of 4-5°C (7.2-9.0°F)

Sea ice reduction
in Canadian
Arctic



Significant
extinctions
around the
globe



Increased
deaths,
disease, and
injury due to
floods



Increased
frequency of
cardio-
respiratory
diseases due
to climate-
induced smog



Increased
mortality from
droughts



Altered
distribution of
disease
vectors



“Although many early impacts of climate change can be effectively addressed through adaptation, the options for successful adaptation diminish and the associated costs increase with increasing climate change.”



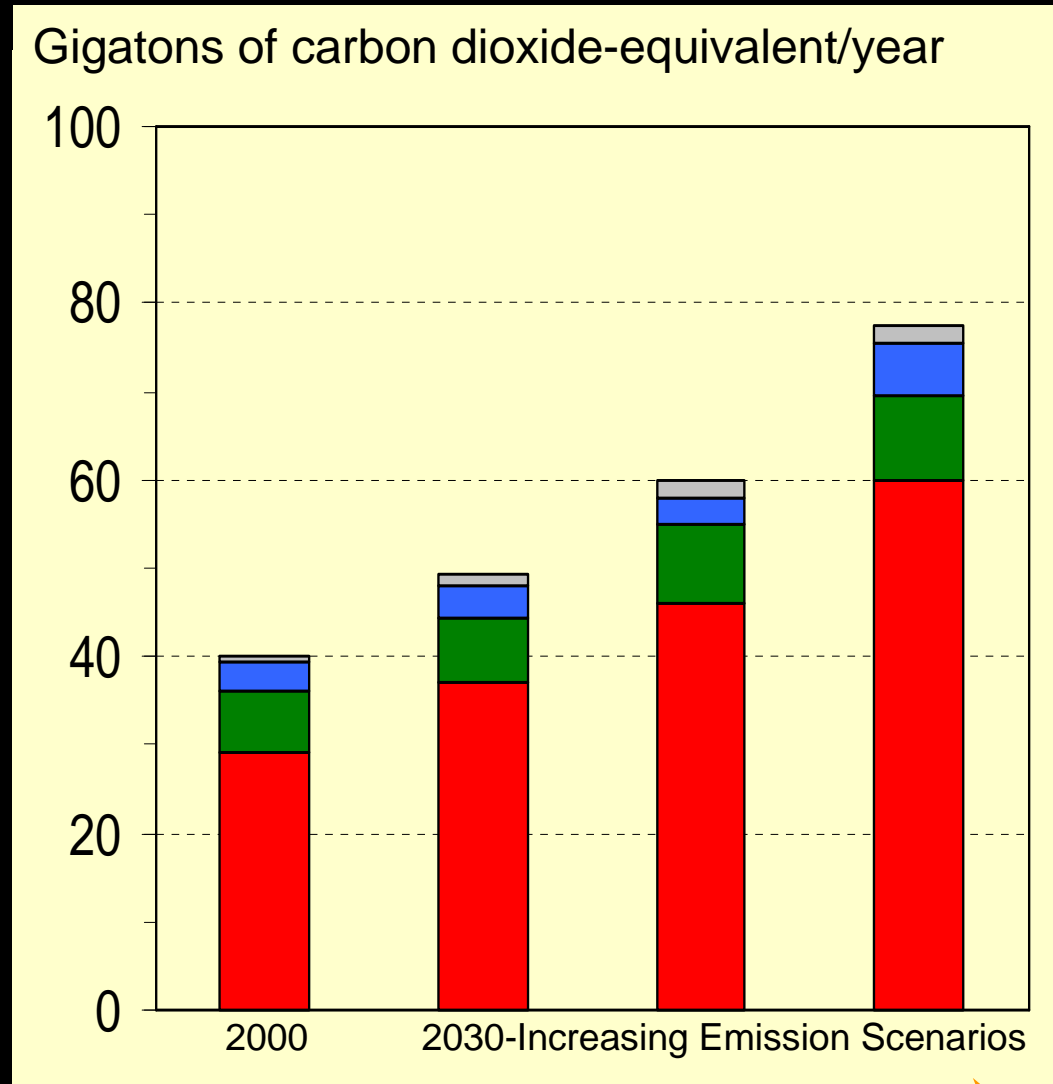
Mitigation of Climate Change

Key Findings

“There is substantial economic potential for the mitigation of global greenhouse gas emissions over the coming decades, that could offset the projected growth of global emissions or reduce emissions below current levels.”

Global Emissions for 2000 and Projected Emissions for 2030

Global emissions will increase 25-90% by 2030 (compared to 2000 levels), unless we take immediate actions.



Cost of Mitigation to Limit Temperature Rise in 2030

Stabilization levels (ppm CO ₂ -eq)	Global mean temperature increase (°C)	Range of GDP reduction Present-2030 (%)	Reduction of average annual GDP growth rates (%)
590 – 710	3.2 – 4.0	-0.6 – 1.2	< 0.06
535 – 590	2.8 – 3.2	0.2 – 2.5	< 0.1
445 – 535	2.0 – 2.8	< 3	< 0.12

Source: IPCC Climate Change 2007: *Mitigation of Climate Change*—SPM

Roles of Developed and Developing Countries

- Emissions from some developing countries are growing rapidly, and curtailing them will need to be part of the solution.
- However, the U.S. and other developed countries bear a historical responsibility for most of the emissions in the atmosphere.



Our Changing Climate

Assessing the Risks to California



A Summary Report from
the California Climate Change Center

California Climate Change Scenarios Assessment

Gov Schwarzenegger's
June 2005 Executive Order
commissioned this
Climate Assessment, which
investigated potential
climate change impacts and
formed key scientific
background for California's
GHG emissions legislation,
Assembly Bill 32

Key Conclusions

Numerous observations of long-term changes in climate

Very high confidence that human activities have contributed to recent warming effects

Further warming unavoidable due to past emissions, so climate adaptation investments are needed

Developing countries face a disproportionate burden of the damage and costs of climate change

Substantial technologies and policy instruments available for greenhouse gas mitigation

The degree of climate change our children and grandchildren experience in the second half of this century depends on the actions we take in this and the coming decade.



Thank you