Emerging Climate Change Science and Policy

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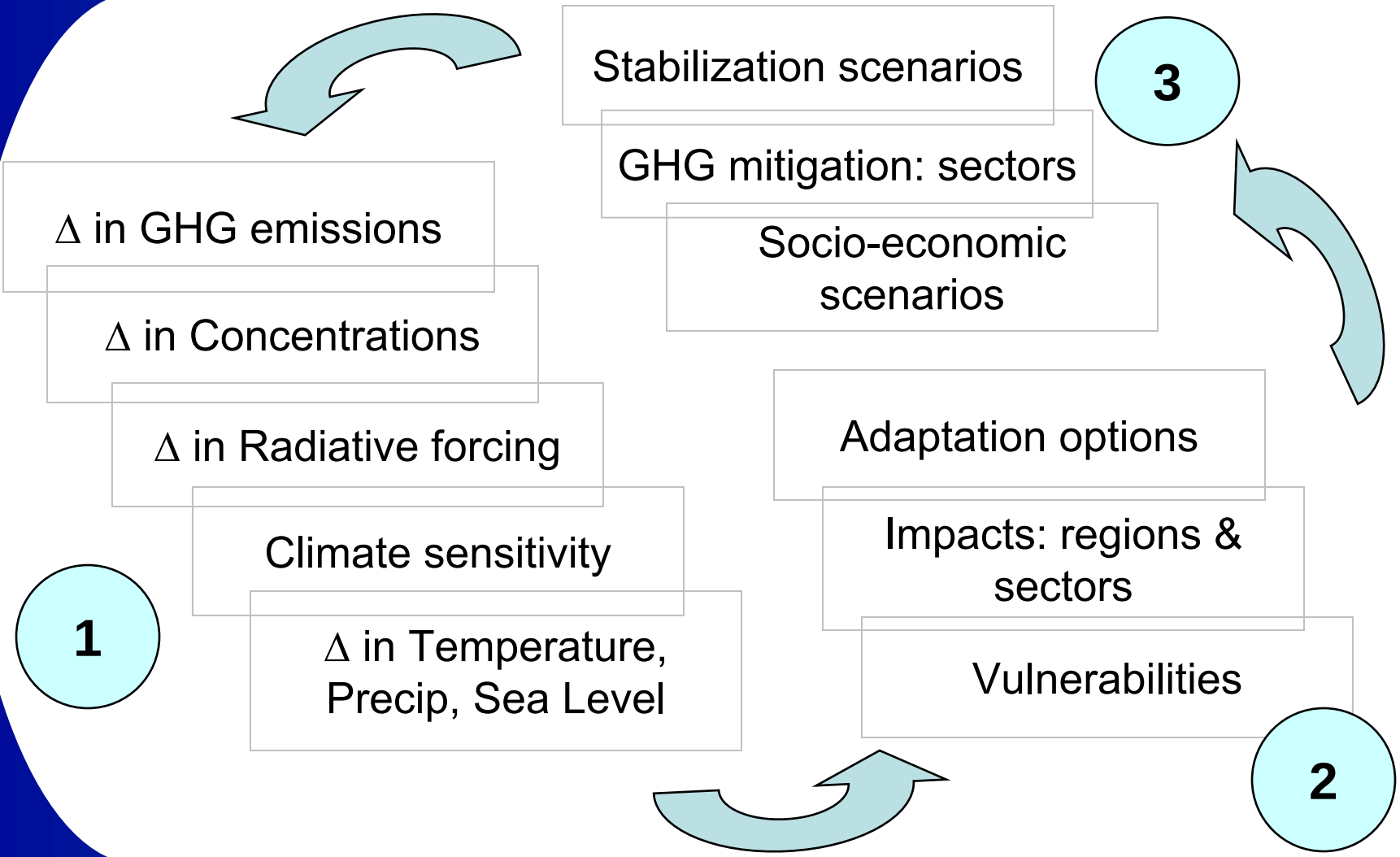
Presentation Outline

Latest findings from IPCC

Working Group I *Physical Science*	Working Group II *Impacts, Adaptation, and Vulnerability*	Working Group III *Mitigation*
Summary for Policymakers (SPM) approved Feb. 1	SPM approved April 6	SPM approved May 4

U.S. Climate Policy and EPA's Role

Scope of IPCC Working Groups I, II and III



Some Key IPCC Conclusions

Warming of the climate system is unequivocal - global average warming in the past century is 0.74°C (1.3°F). [WG1]

Most of the observed increase in globally averaged temperatures since the mid 20th century is very likely due to the observed increase in anthropogenic GHG concentrations. [WG1]

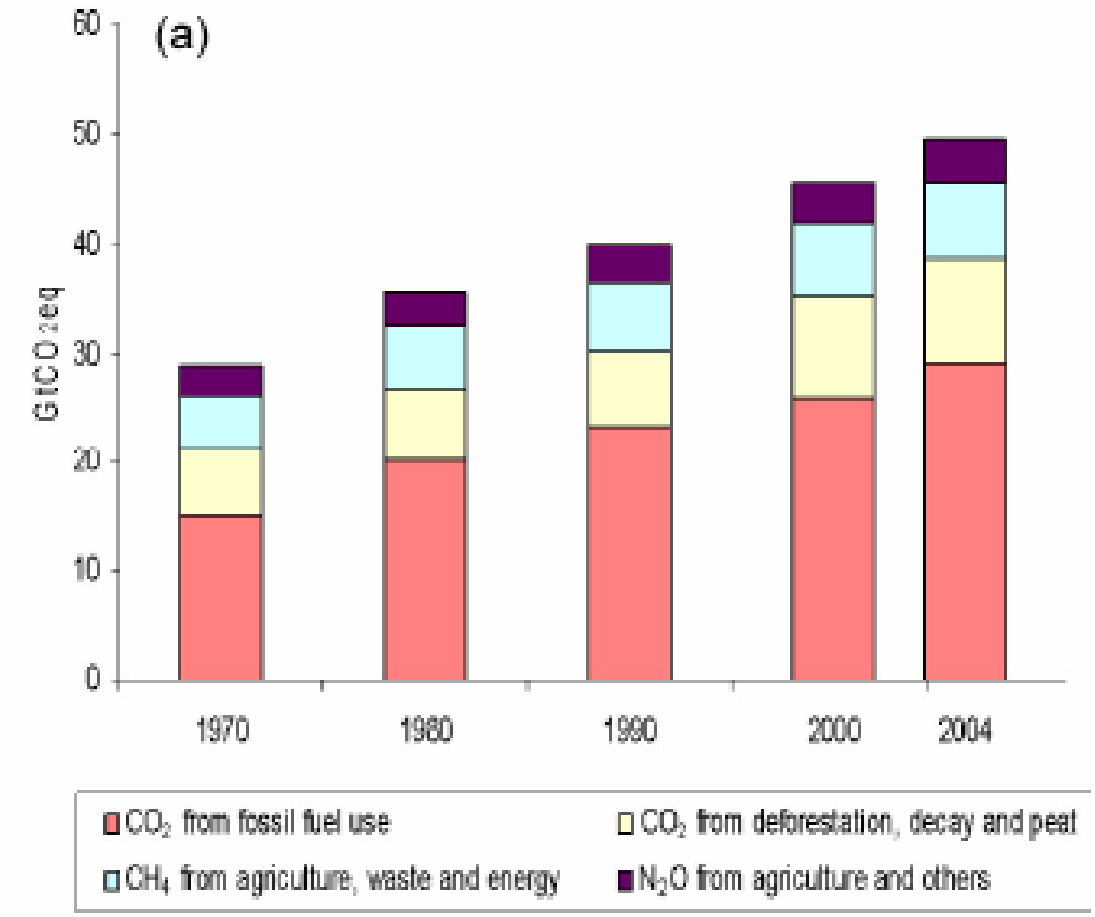
Continued GHG emissions at or above current rates would cause further warming and induce many changes…that would very likely be larger than those observed during the 20th century. [WG1]

Impacts of climate change will vary regionally but, aggregated and discounted to the present, they are very likely to impose net annual costs which will increase over time as global temperatures increase. [WG2]

Adaptation will be necessary to address impacts resulting from the warming which is already unavoidable due to past emissions. [WG2]

A range of stabilization levels can be achieved by deploying a portfolio of current and future technologies [WG3]

Global Anthropogenic Emissions of GHGs

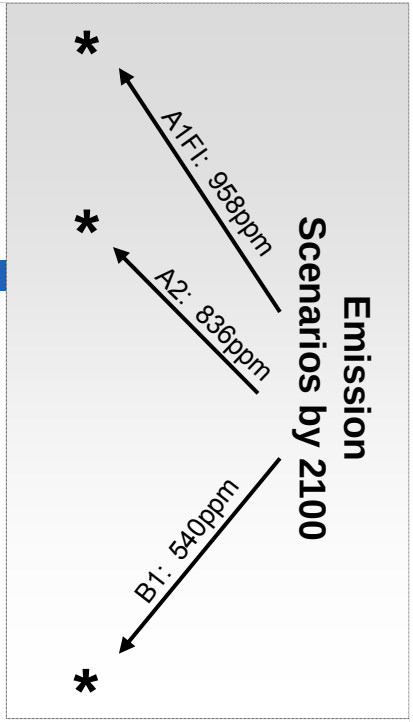


Global GHG emissions have grown 70% between 1970 and 2004

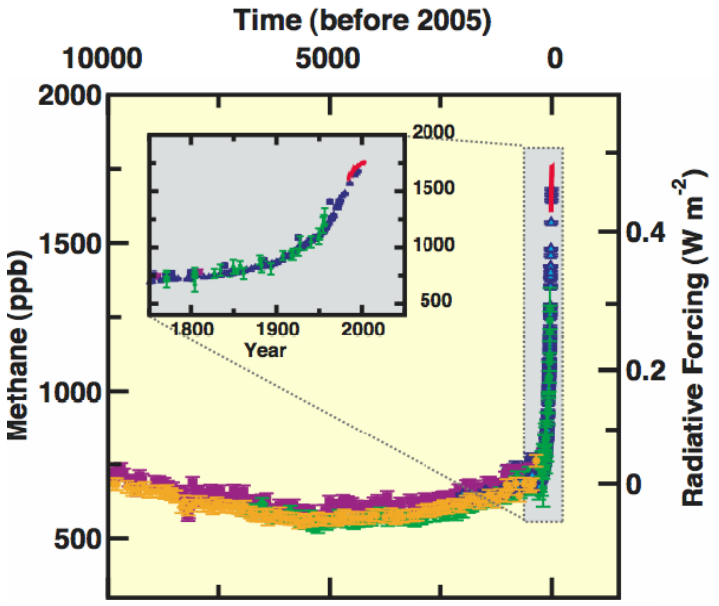
CO_2 accounts for 77% of total in 2004

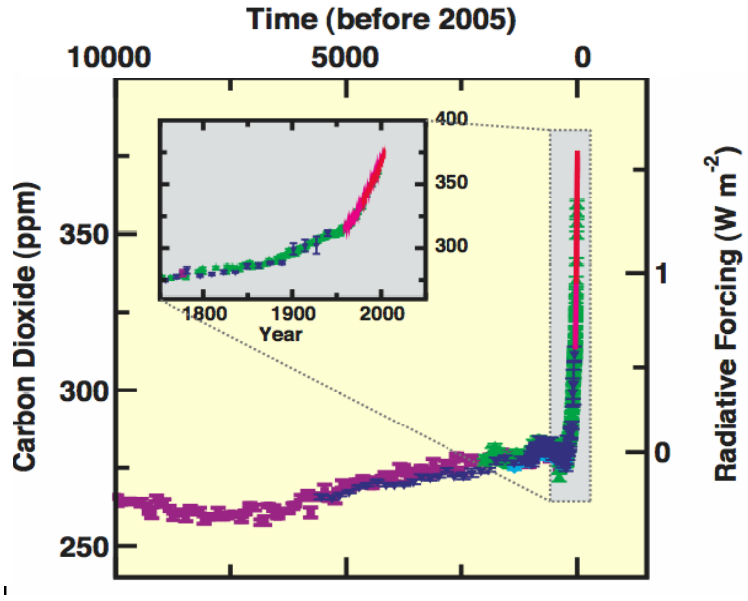
Source: IPCC WG3

CO_2 & CH_4 Concentrations:
Historic, Present and Projected



Atmospheric concentrations of CO_2 and CH_4 in 2005 far exceeded the natural range over the last 650,000 years.

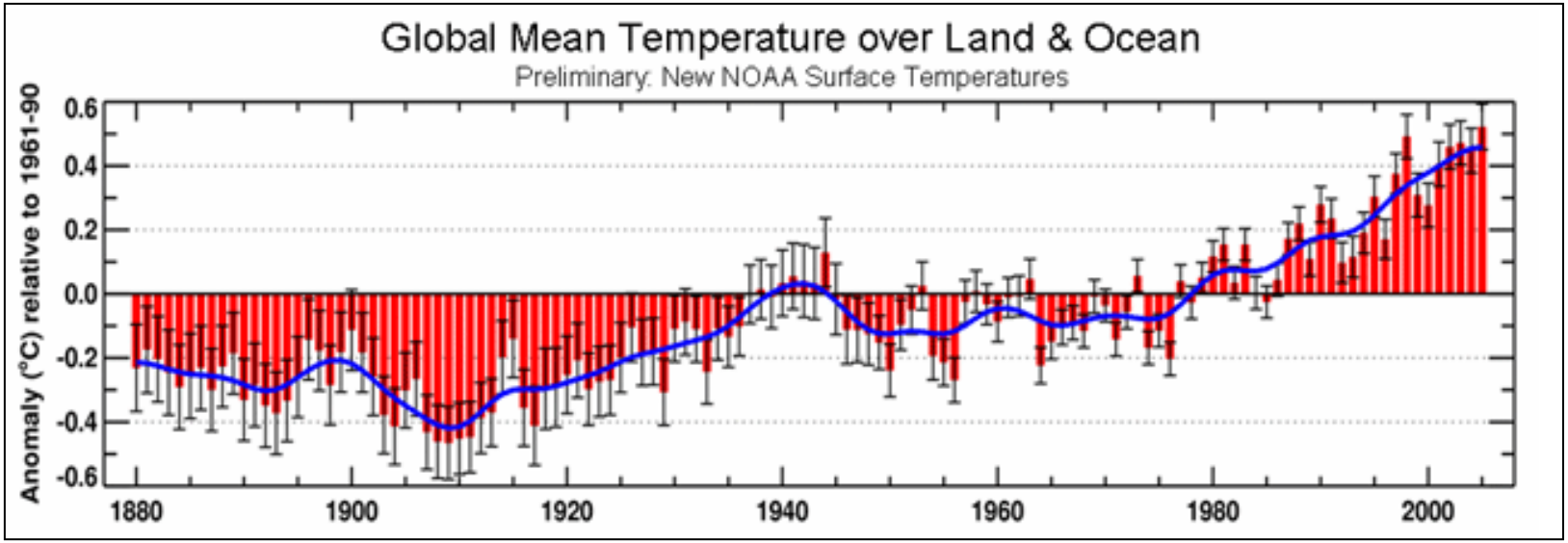




Source: IPCC WGI AR4, 2007.

Observed Global Warming

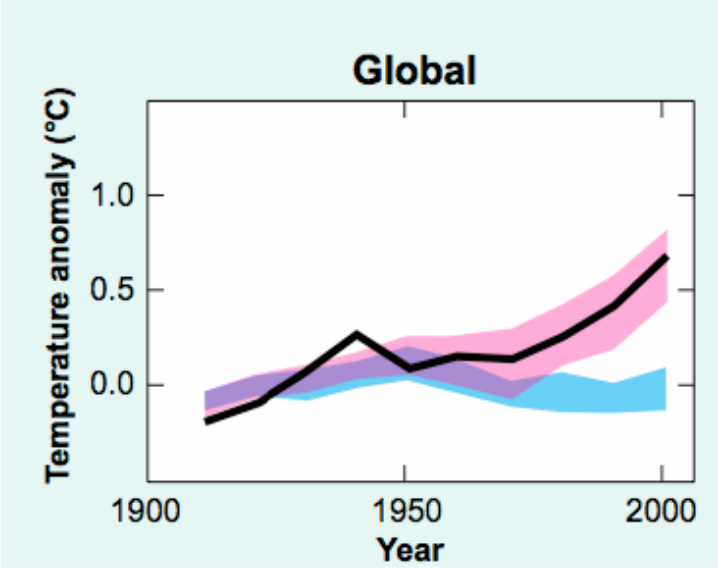
Warming of the climate system is <u>unequivocal</u>, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level

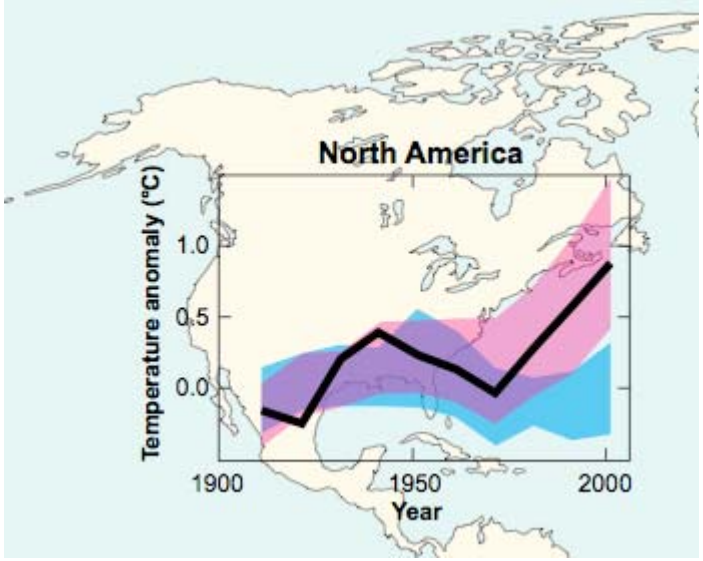


Global average warming in the past century is 0.74°C (1.3°F)

Attribution of Observed Global Warming to Emissions

Most of the observed increase in globally averaged temperatures since the mid 20th century is very likely due to the observed increase in anthropogenic GHG concentrations





Black line is observed warming

Blue area is 5-95% range from 5 climate models using only natural forcings

Red area is 5-95% range from 14 climate models using both natural and anthropogenic forcings

Future Global Temperature Projections

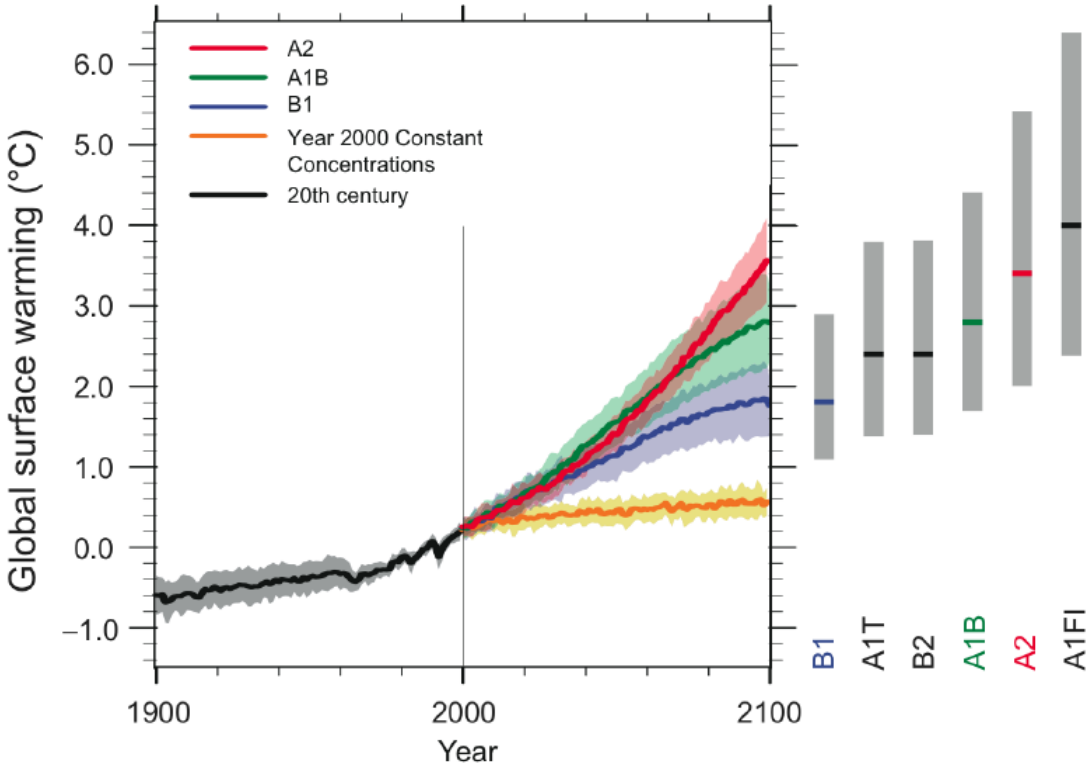
Continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century.

IPCC global temperature projections by 2100 relative to 1990:

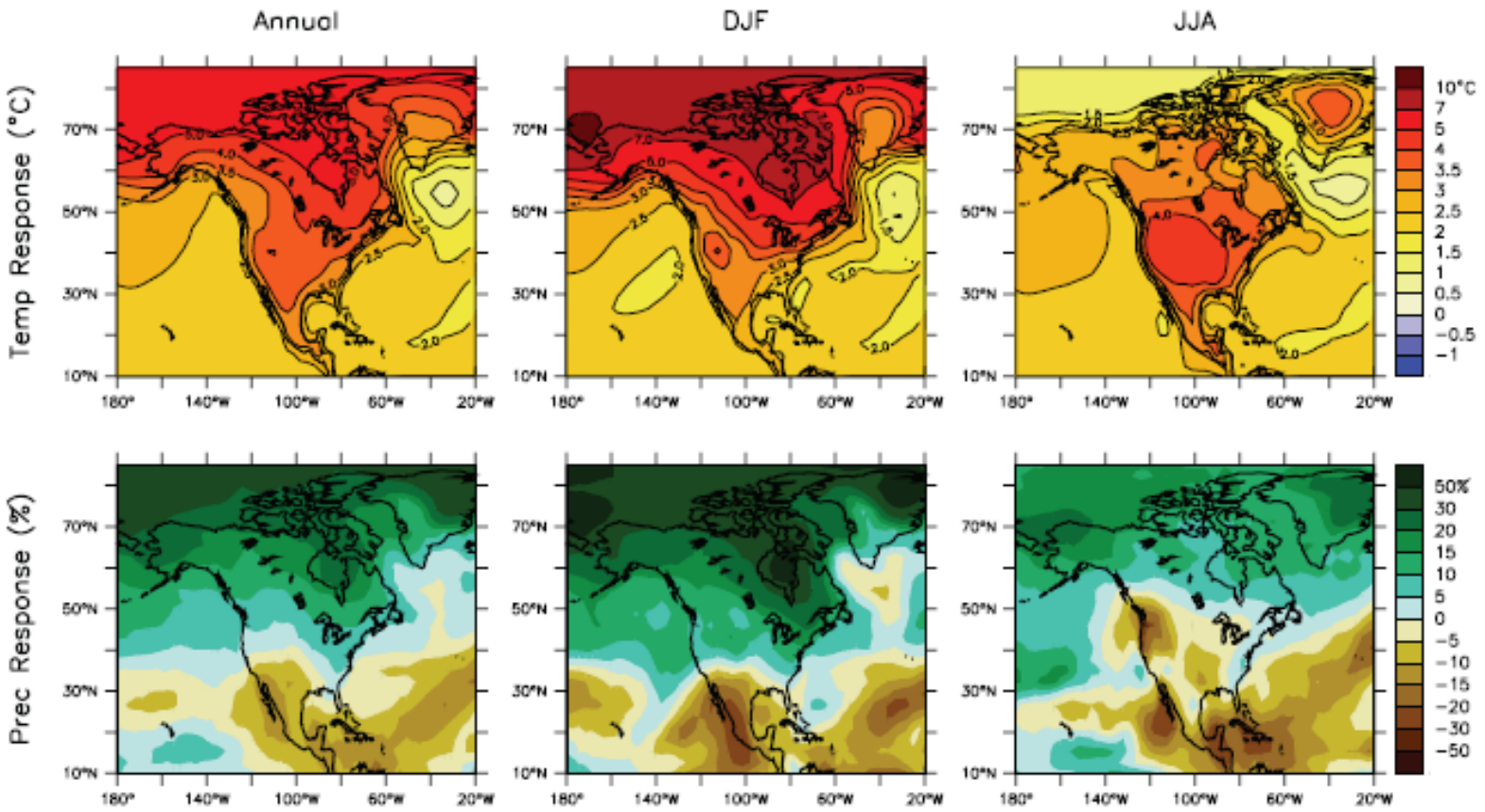
Best estimate = 1.8 to 4.0°C (3.2 – 7.2°F)

Likely range = 1.1 to 6.4°C (2.0 – 11.5°F)

Under the IPCC 'business-as-usual' emission scenarios, warming and sea level rise would continue for centuries beyond 2100

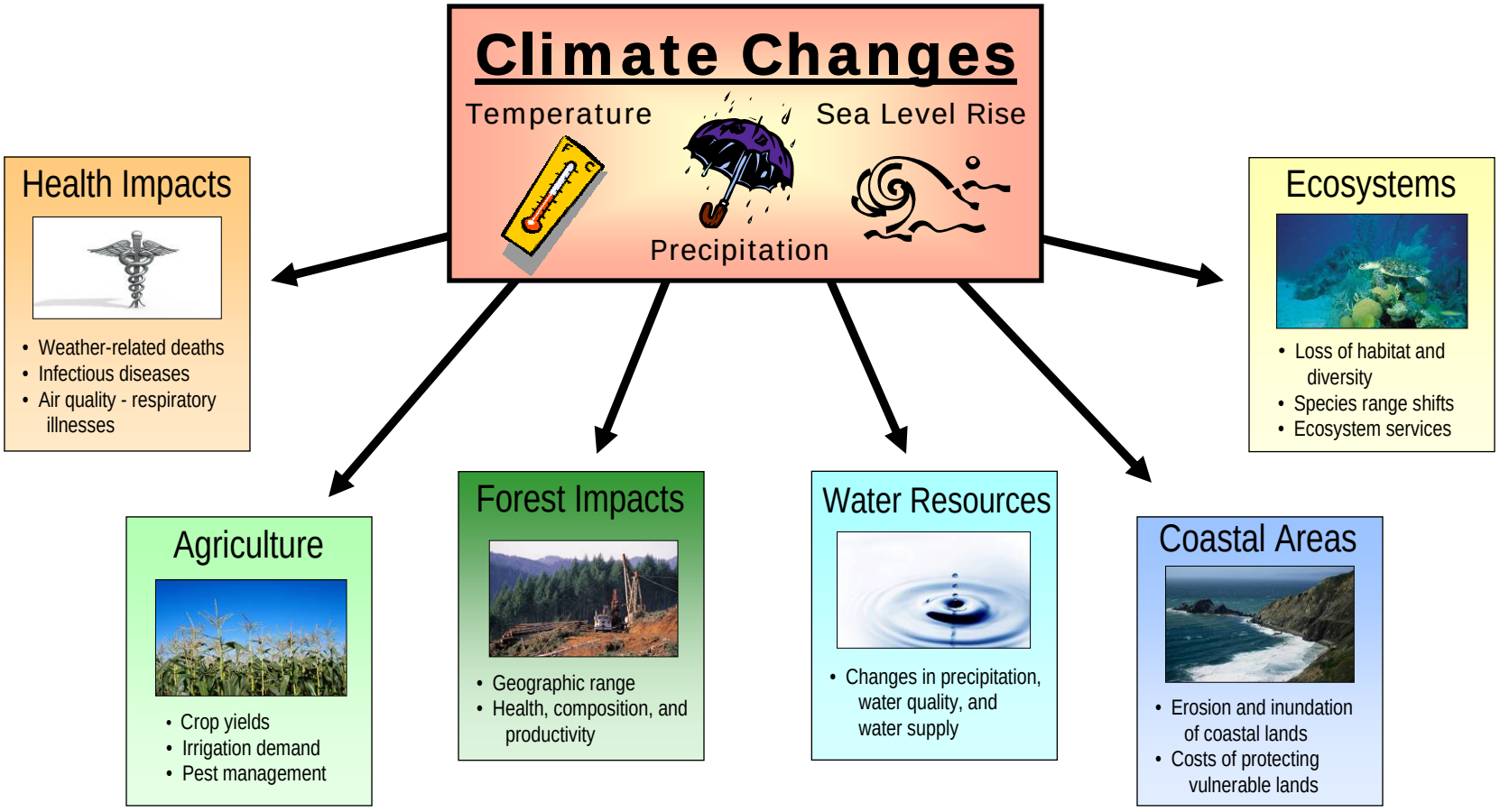


U.S. Temperature and Precipitation Projections



Under A1B emissions scenario (~medium growth)
Timeframe: comparing change between 1980-1999 and 2080-2099
All results are averaged over 21 models.

Expected Impacts



IPCC Projected Impacts on North America

- Moderate climate change in the early decades is projected to increase aggregate yields of rain fed agriculture by 5-20%, but with important variability among regions. Major challenges are projected for crops near the warm end of their suitable range or depend on highly utilized water resources. [high confidence]

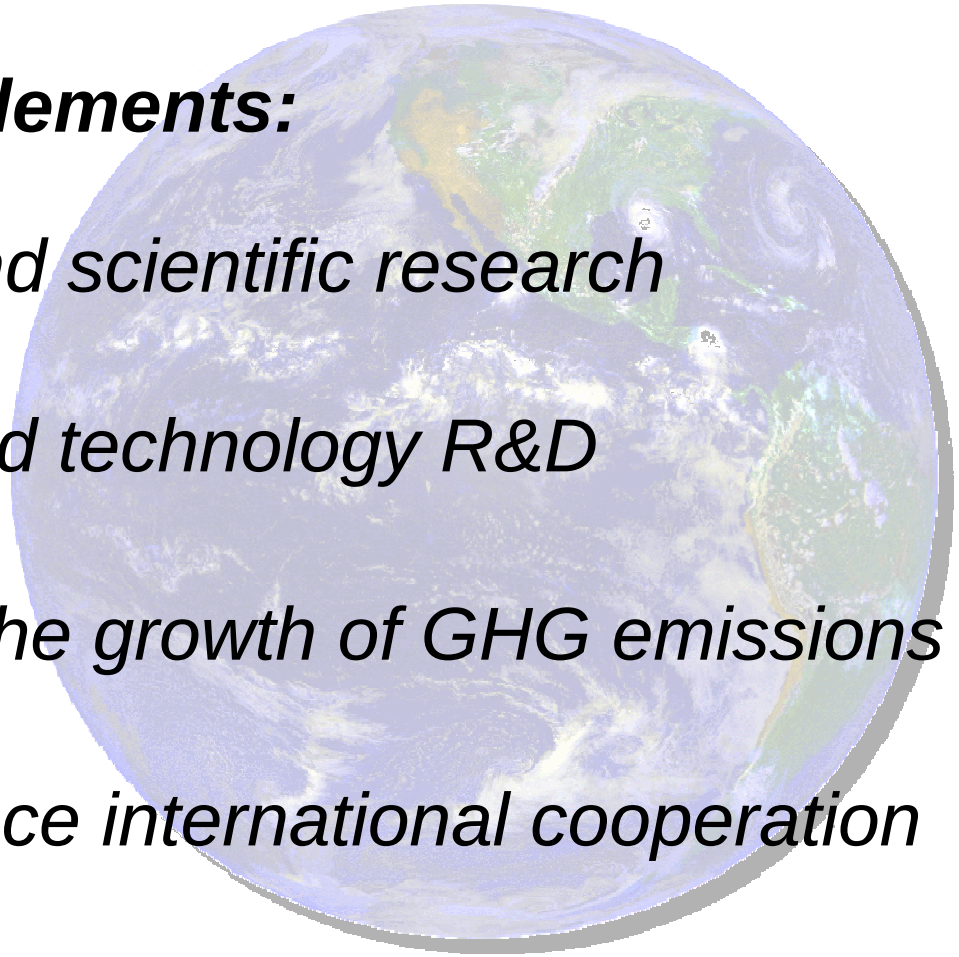
- Warming in western mountains is projected to cause decreased snow pack, more winter flooding, and reduced summer flows, exacerbating competition for over-allocated water resources. [very high confidence]

- Disturbances from pests, diseases, and fire are projected to have increasing impacts on forests, with an extended period of high fire risk and large increases in area burned. [very high confidence]

- Cities that currently experience heat waves are expected to be further challenged by an increased number, intensity and duration of heat waves, with potential for adverse health impacts. The growing number of the elderly population is most at risk. [very high confidence]

- Coastal communities and habitats will be increasingly stressed by climate change interacting with development and pollution. Population growth and the rising value of infrastructure in coastal areas increase vulnerability to climate variability and future climate change, with losses projected to increase if the intensity of tropical storms increases. Current adaptation is uneven and readiness for increased exposure is low. [very high confidence]

U.S. Climate Policy Overview



Key Elements:

Expand scientific research

Expand technology R&D

Slow the growth of GHG emissions

Enhance international cooperation

Strategic Role of EPA Partnerships to Reduce GHGs

- Contributing approximately 70% of avoided emissions needed to attain the Administration's goal of 18% reduction in GHG intensity by 2012
- Partnering with companies, governments, communities, and organizations to achieve cost-effective emissions reductions
- Helping partners implement GHG-reducing technologies, processes, and best-management practices – yielding economic and environmental benefits
- Delivering near-term action while long-term work on transformational technologies is underway

Supreme Court

- *Massachusetts v. EPA* (April 2007): Court ruled that EPA had the authority to regulate GHGs under the CAA
- EPA currently analyzing the implications of that decision
- Executive Order 13432 (May 2007): Pres. Bush ordered the start of the rulemaking process to reduce GHGs from vehicles

New Fuel and Vehicle Rulemaking

- EPA (along with DOE and DOT) to design a program for reducing GHGs under the Clean Air Act to address President's "Twenty in Ten" announcement
  - Fuels: 35 billion gallons of renewable or alternative fuel by 2017
  - Vehicles: Improve efficiency of cars & light-trucks by 4 percent per year
- Use existing Clean Air Act authorities
- Proposal by the end of 2007, with a final rule completed by October 2008

Congressional Overview

- ***Activities include:***
  - Cap-and-trade mandates
  - Renewable fuels, energy security, and transportation legislation
  - Renewables and/or efficiency mandates
  - Tax incentives
  - Climate science
  - Foreign policy

- ***11 Cap-and-trade bills introduced***
  - *EPA conducted economic analysis of Lieberman-McCain bill S.280*

Bridging the Science-Policy Gap

- Synthesis of Science to Support Policy Analysis
  - Tracking/understanding findings from IPCC & CCSP products, National Research Council and Scientific Literature
- Evaluating Benefits of Adaptation and Mitigation
  - What impacts can be avoided through mitigation strategies?
  - How to characterize the benefits of GHG mitigation strategies?
  - What are appropriate adaptation responses given some degree of committed climate change, and likely regional & sectoral impacts?
  - What is the appropriate mix of adaptation and mitigation (given costs and potential for avoiding impacts)?
- Tracking and Analysis of Environmental Indicators

Final Observations

- Substantial activity at many levels on climate science and policy
- Lack national or international consensus on how to proceed with solutions
- Key priorities:
  - Enhance actions to reduce greenhouse gas intensity now
  - Enhance R&D into long-term technologies
  - Engage key developing countries and explore how to move forward given developmental needs
  - Obtain better understanding of benefits/costs of different response strategies (adaptation and mitigation)
  - Evaluate and learn from science and policy developments at all levels

For more information…

- Visit EPA's Climate Change Web site at http://www.epa.gov/climatechange
- The Climate Change Division Web site is http://www.epa.gov/air/ccd.html

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Thank you!