HOW THE GOVERNMENT USES *SCIENCE* TO KEEP PEOPLE FROM BUYING YOUR STUFF

Patrick J. Michaels
Center for the Study of Science
Cato Institute

…AND HOW TO STOP IT

HOW TO USE *SCIENCE* TO TAKE AWAY STUFF

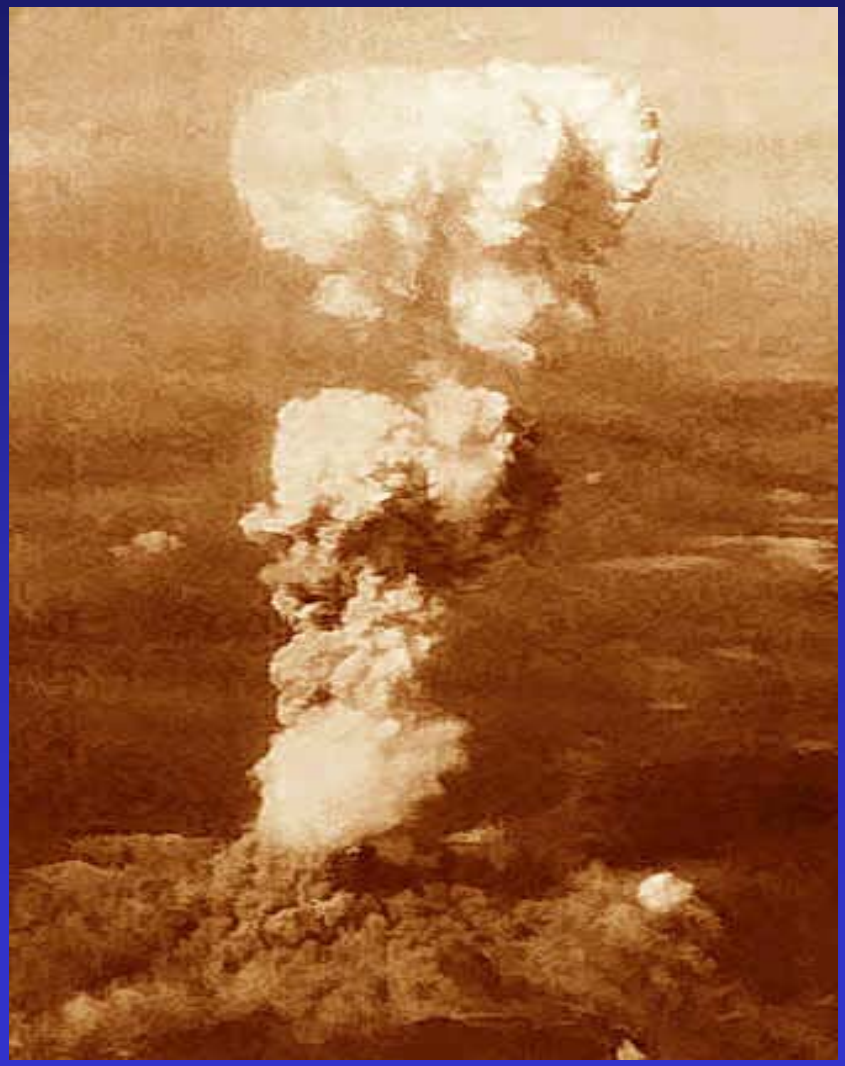
1. The government asks [climate, toxicology, whatever] scientists it pays if *what they study is a real problem.*

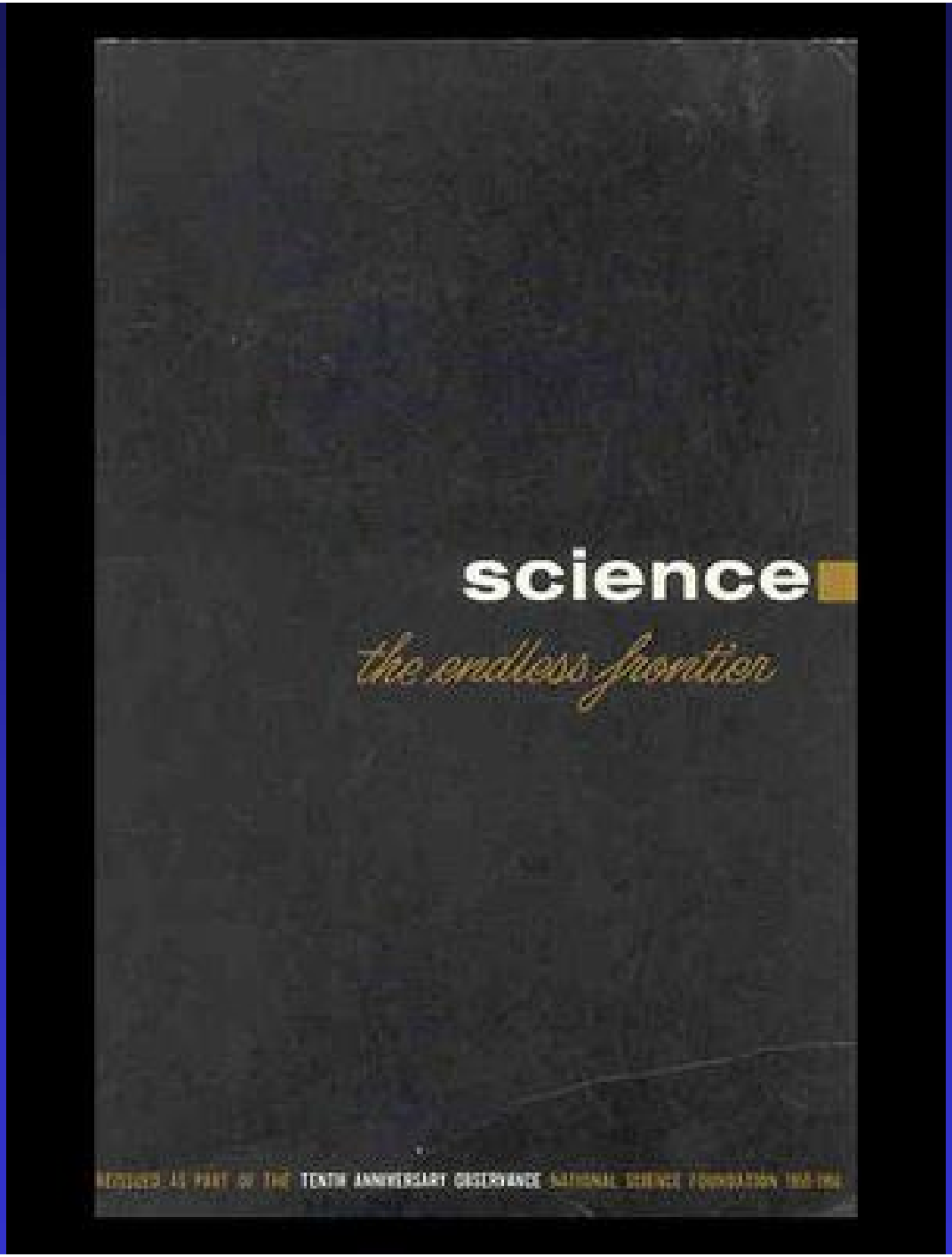
2. The scientists produce a “comprehensive” report

3. It’s the most important problem on earth!

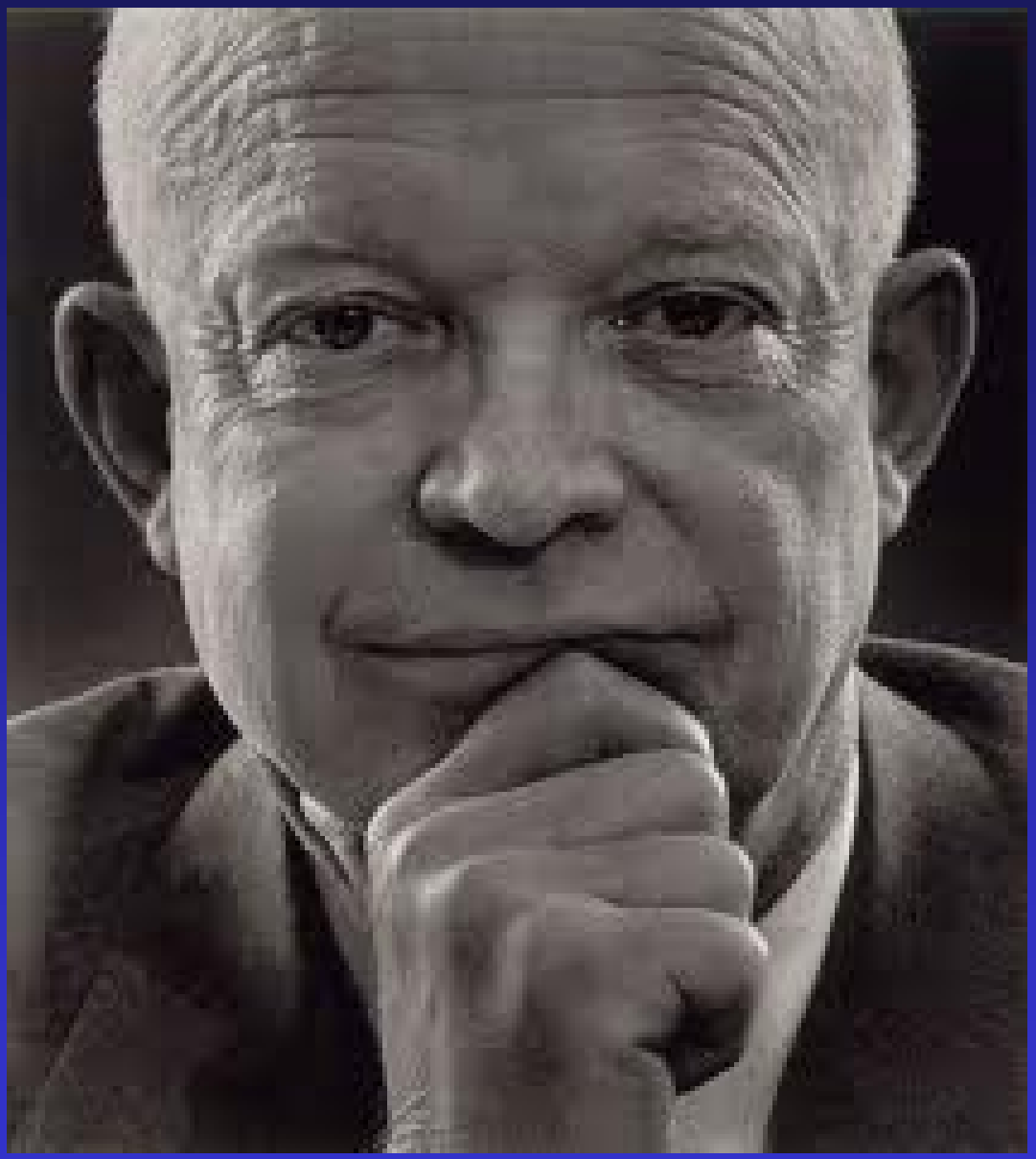

WPA
P.W.A.
AAA

THE MANHATTAN PROJECT: AN EPLOSIVE SUCCESS!




science
the endless frontier
TENTH ANNIVERSARY OBSERVANCE

State Science Institute



Dwight D. Eisenhower, Farewell Adress

The free university, historically the fountainhead of free ideas and scientific discovery, has experienced a revolution in the conduct of research. Partly because of the huge costs involved, a government contract becomes virtually a substitute for intellectual curiosity…

Yet, in holding scientific research and discovery in respect, as we should, we must also be alert to the equal and opposite danger that public policy could itself become the captive of a scientific-technological elite. The prospect of domination of the nation's scholars by Federal employment, project allocations, and the power of money is ever present – and is gravely to be regarded.

2001

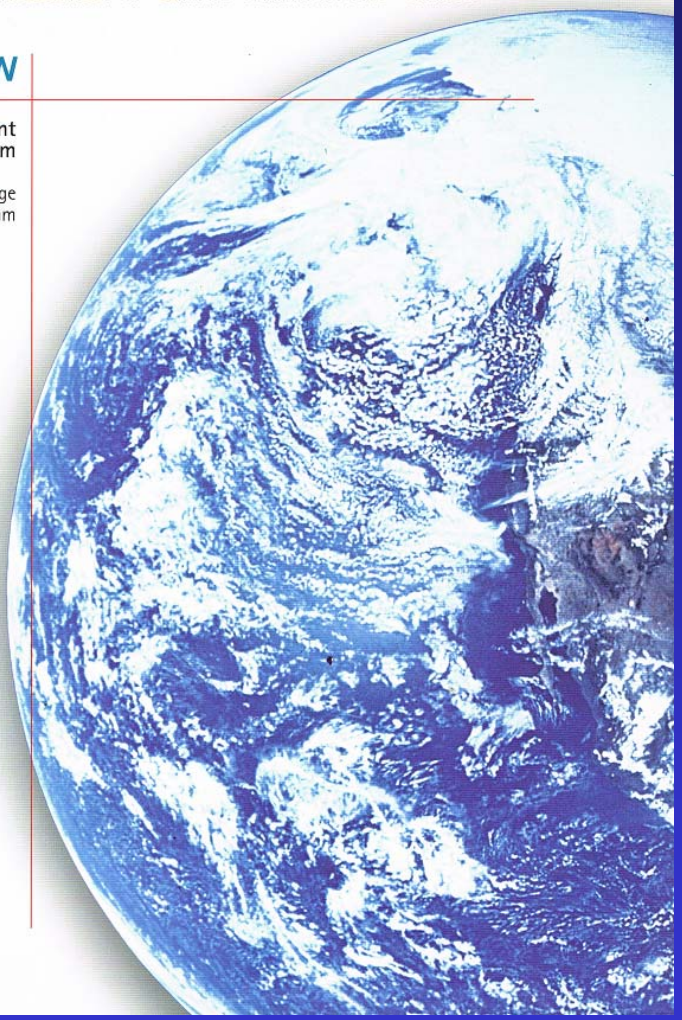
CLIMATE CHANGE IMPACTS ON THE UNITED STATES

THE POTENTIAL CONSEQUENCES OF CLIMATE VARIABILITY AND CHANGE

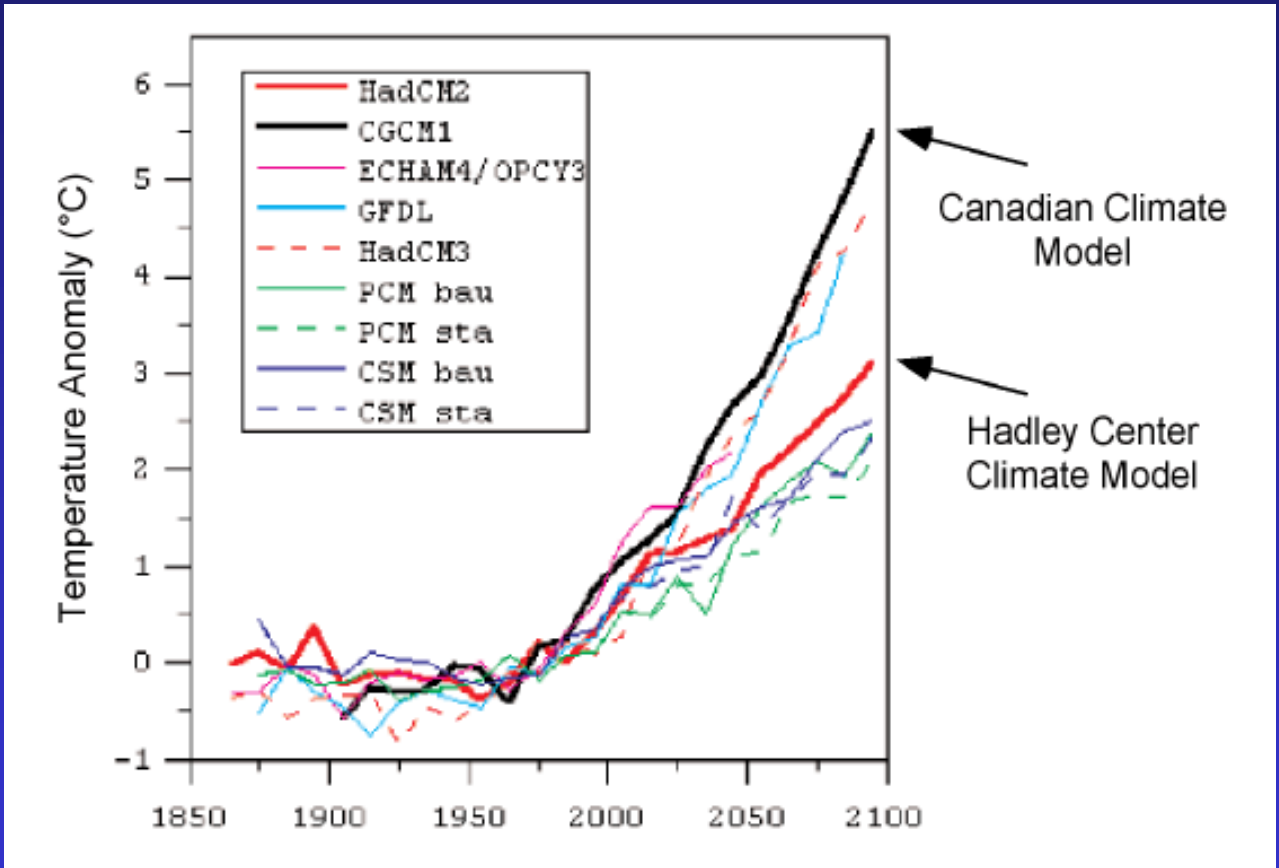
Overview

National Assessment
Synthesis Team

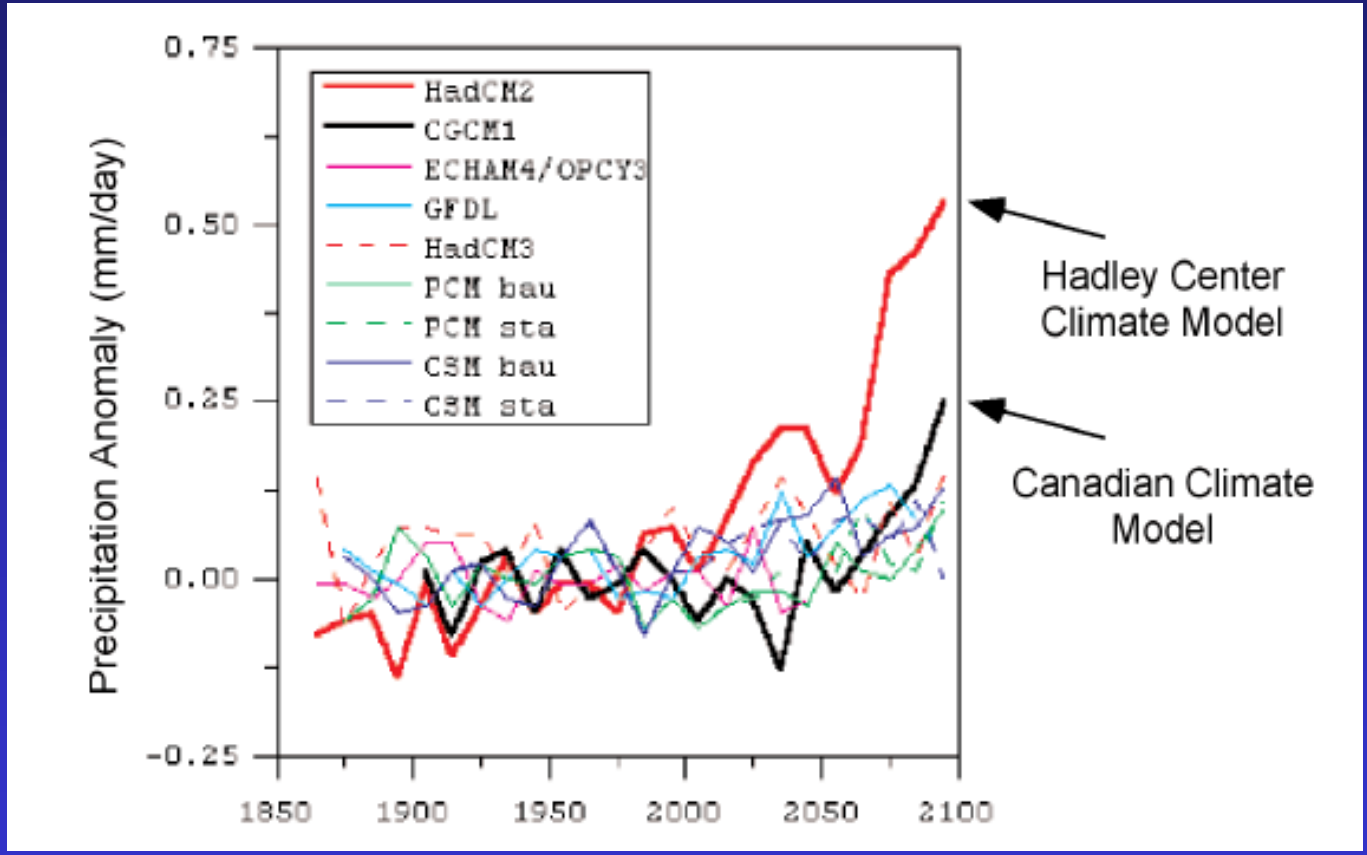
US Global Change
Research Program



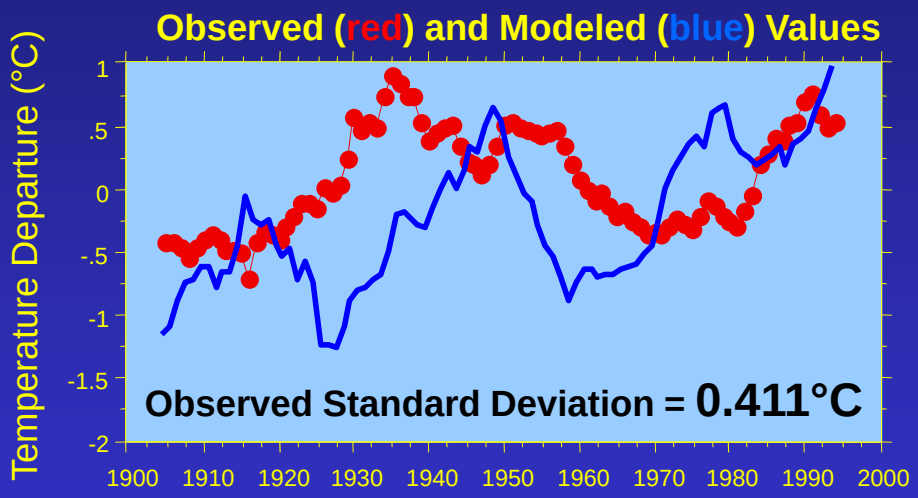
Temperature

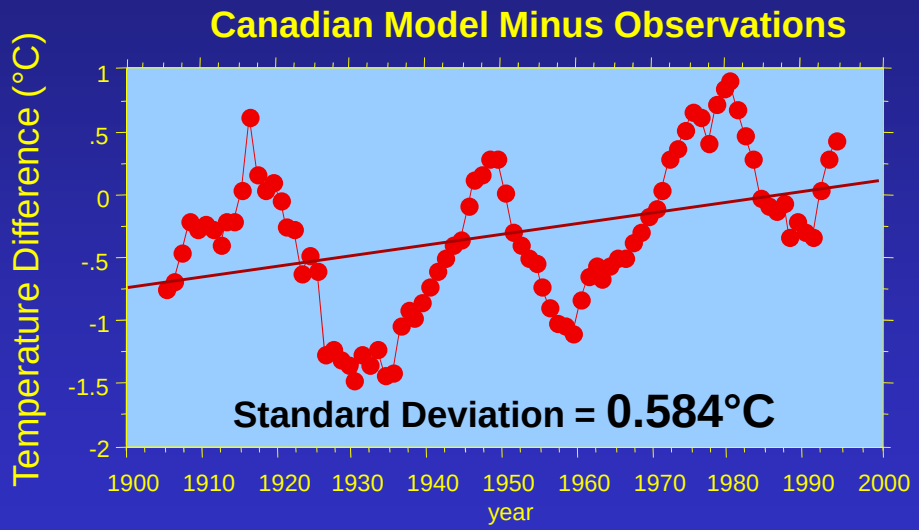


Precipitation



2001:
USNA DISCOVERS “NEGATIVE KNOWLEDGE”





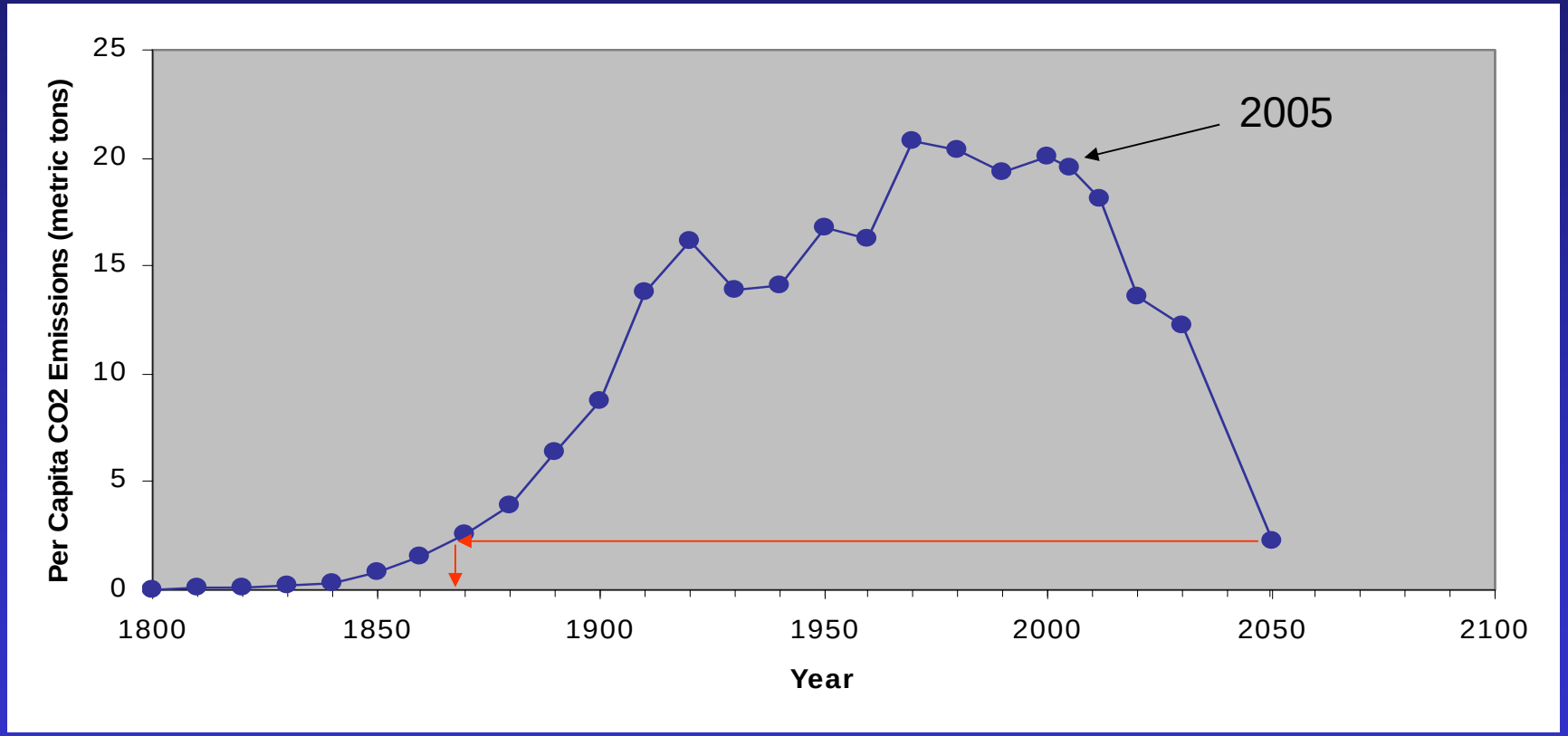
2009

WAXMAN-MARKEY

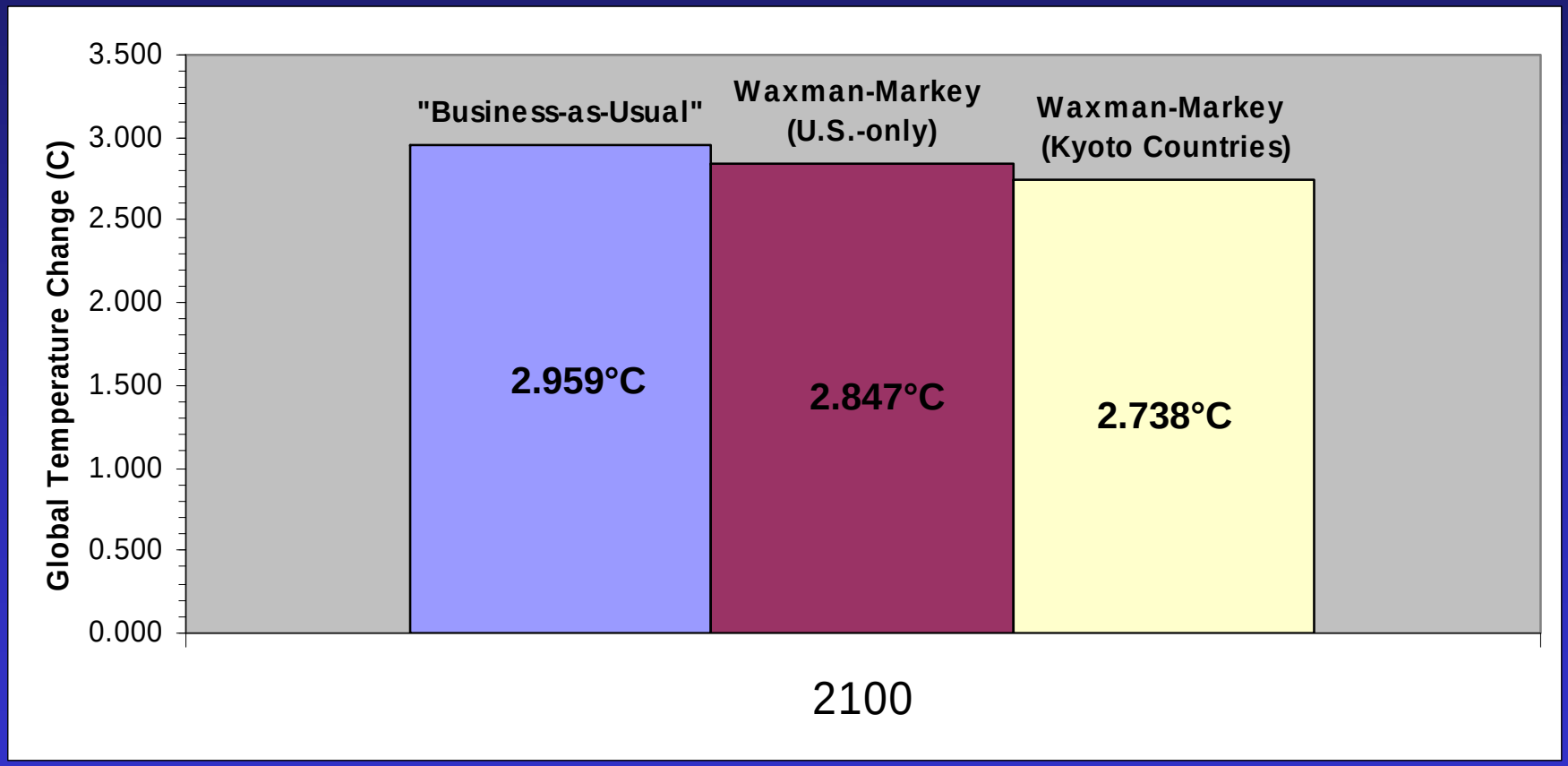
- 3% below 2005 emissions in 2012
- 16% below 2005 by 2020
- 42% below 2005 by 2030
- 83% below 2005 by 2050

US per capita CO2 emissions

POST-2005 VALUES BASED UPON WAXMAN-MARKEY
and U.S. Census Bureau projections



Impacts of Waxman-Markey on Projected Global Temperatures Year 2100



Presidential Approval Index

1,500 Likely Voters
+/- 3%

www.RasmussenReports.com

NOVEMBER 3, 2010

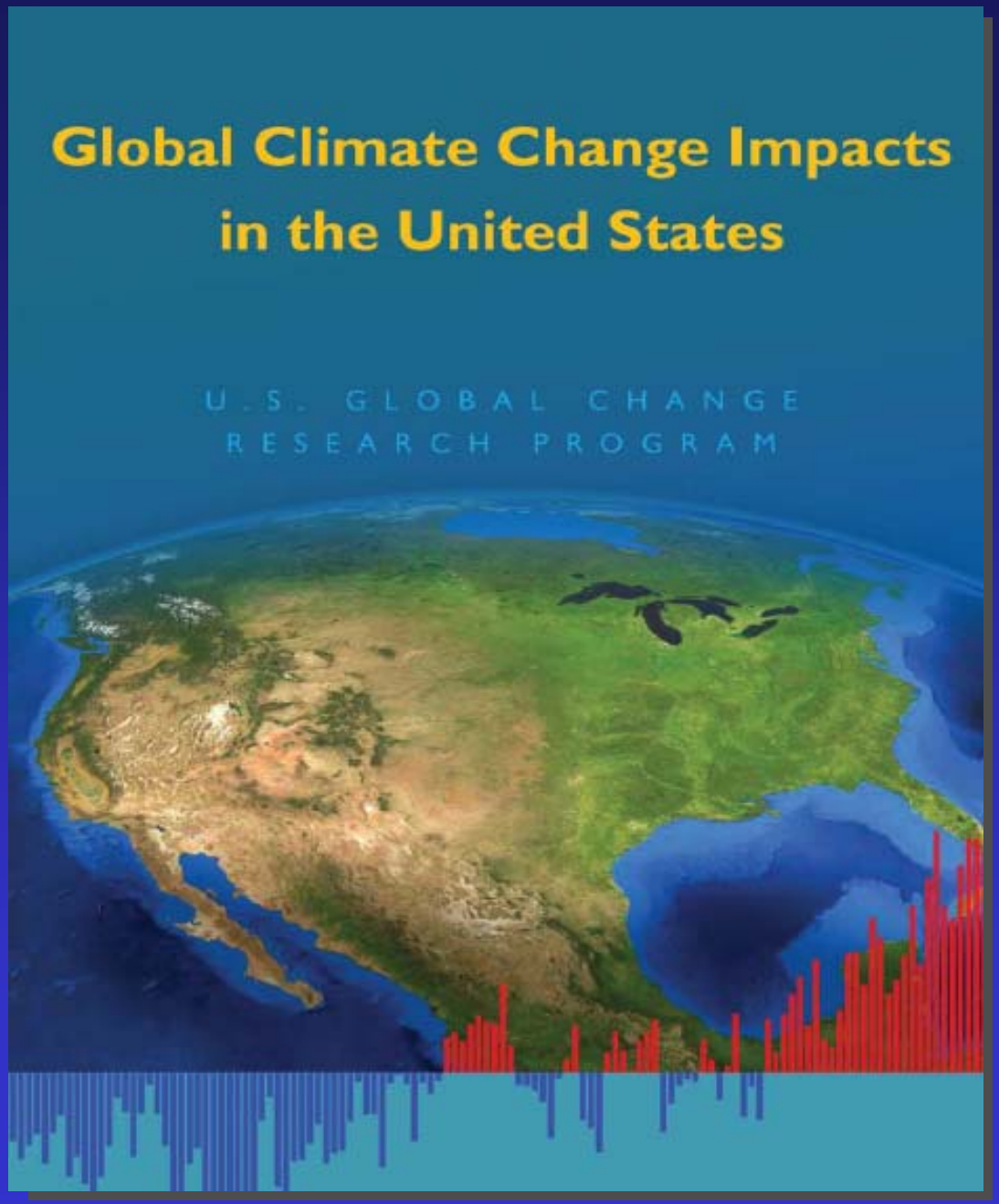
In response to question on cap-and-trade:

"There's more than one way to skin a cat"

--Barack Obama

FROM CONGRESS TO THE EPA

- Massachusetts v. EPA, 2007
- “Proposed Finding of Endangerment”, April 2009
- Failure of Cap-and-Trade in the Senate, 2009-10
- “Endangerment Finding”, December 7, 2009
  (First day of UN Climate Meeting in Copenhagen)

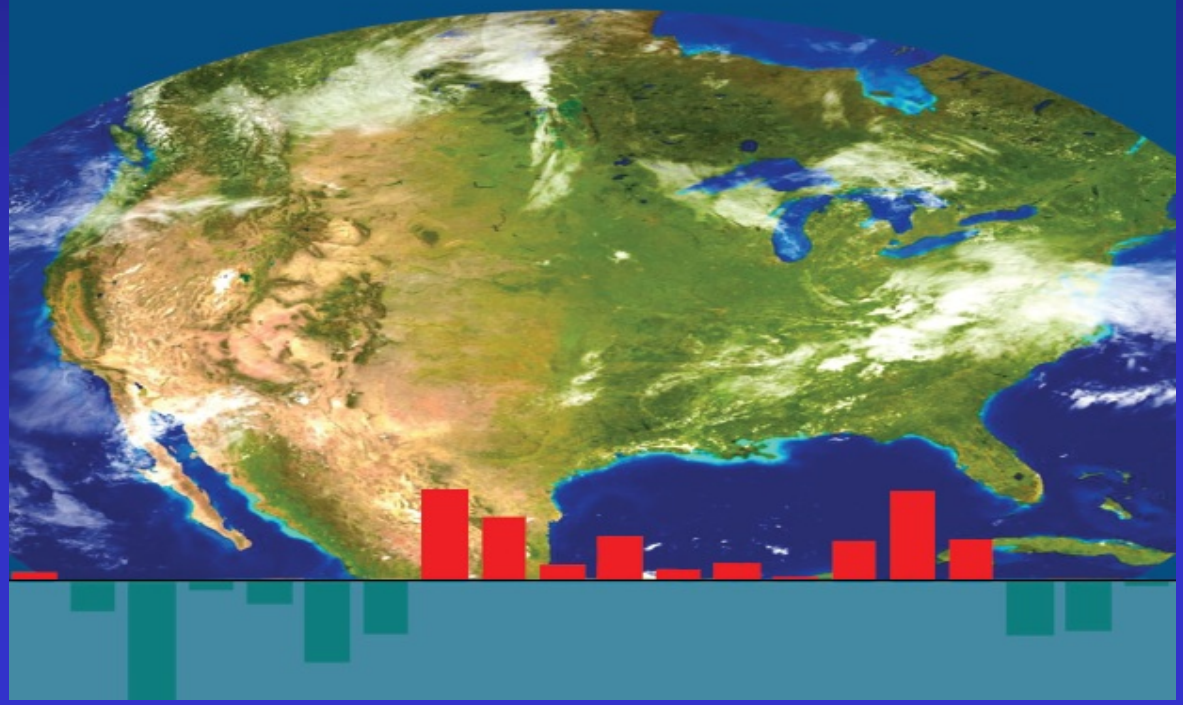

Global Climate Change Impacts
in the United States
U.S. GLOBAL CHANGE
RESEARCH PROGRAM

IT STARTS WITH THE COVER…

- USGCRP cover shows the U.S., but contains a plot of *global* surface temperature.
- USGCRP cover neglects one of the most important climate parameters: *clouds.*
- Cato version includes clouds and shows U.S. annual temperatures as greenhouse gases increased the most.

ADDENDUM:
Global Climate Change Impacts in the United States

CENTER FOR THE STUDY OF SCIENCE
CATO INSTITUTE



“KEY POINTS” in both reports are analogous, and provide reference pages in text.

USGCRP Report

Key Findings

1. Global warming is unequivocal and primarily human-induced.
Global temperature has increased over the past 50 years. This observed increase is due primarily to human-induced emissions of heat-trapping gases. (p. 13)

2. Climate changes are underway in the United States and are projected to grow.
Climate-related changes are already observed in the United States and its coastal waters. These include increases in heavy downpours, rising temperature and sea level, rapidly retreating glaciers, thawing permafrost, lengthening growing seasons, lengthening ice-free seasons in the ocean and on lakes and rivers, earlier snowmelt, and alterations in river flows. These changes are projected to grow. (p. 27)

3. Widespread climate-related impacts are occurring now and are expected to increase.
Climate changes are already affecting water, energy, transportation, agriculture, ecosystems, and health. These impacts are different from region to region and will grow under projected climate change. (p. 41-106, 107-152)

4. Climate change will stress water resources.
Water is an issue in every region, but the nature of the potential impacts varies. Drought, related to reduced precipitation, increased evaporation, and increased water loss from plants, is an important issue in many regions, especially in the West. Floods and water quality problems are likely to be amplified by climate change in most regions. Declines in mountain snowpack are important in the West and Alaska where snowpack provides vital natural water storage. (p. 41, 129, 135, 139)

5. Crop and livestock production will be increasingly challenged.
Many crops show positive responses to elevated carbon dioxide and low levels of warming, but higher levels of warming often negatively affect growth and yields. Increased pests, water stress, diseases, and weather extremes will pose adaptation challenges for crop and livestock production. (p. 71)

6. Coastal areas are at increasing risk from sea-level rise and storm surge.
Sea-level rise and storm surge place many U.S. coastal areas at increasing risk of erosion and flooding, especially along the Atlantic and Gulf Coasts, Pacific Islands, and parts of Alaska. Energy and transportation infrastructure and other property in coastal areas are very likely to be adversely affected. (p. 111, 139, 145, 149)

7. Risks to human health will increase.
Harmful health impacts of climate change are related to increasing heat stress, waterborne diseases, poor air quality, extreme weather events, and diseases transmitted by insects and rodents. Reduced cold stress provides some benefits. Robust public health infrastructure can reduce the potential for negative impacts. (p. 89)

8. Climate change will interact with many social and environmental stresses.
Climate change will combine with pollution, population growth, overuse of resources, urbanization, and other social, economic, and environmental stresses to create larger impacts than from any of these factors alone. (p. 99)

9. Thresholds will be crossed, leading to large changes in climate and ecosystems.
There are a variety of thresholds in the climate system and ecosystems. These thresholds determine, for example, the presence of sea ice and permafrost, and the survival of species, from fish to insect pests, with implications for society. With further climate change, the crossing of additional thresholds is expected. (p. 76, 82, 115, 137, 142)

10. Future climate change and its impacts depend on choices made today.
The amount and rate of future climate change depend primarily on current and future human-caused emissions of heat-trapping gases and airborne particles. Responses involve reducing emissions to limit future warming, and adapting to the changes that are unavoidable. (p. 25, 29)

Cato Report

Key Findings

1. Climate change is unequivocal and human activity plays some part in it.
There are two periods of warming in the 20th century that are statistically indistinguishable in magnitude. The first had little if any relation to changes in atmospheric carbon dioxide, while the second has characteristics that are consistent in part with a changed greenhouse effect. (p. 16)

2. Climate change has occurred and will occur in the United States.
US temperature and precipitation have changed significantly over some states since the modern record began in 1895. Some changes, such as the amelioration of severe winter cold in the northern Great Plains, are highly consistent with a changed greenhouse effect (pp. 34-55, 189-194)

3. Impacts of observed climate change have little national significance.
There is no significant long-term change in US economic output that can be attributed to climate change. The slow nature of climate progression results in *de facto* adaptation as, as can be seen with sea level changes on the East Coast. (pp. 44-45, 79-81, 157-160, 175-176)

4. Climate change will affect water resources.
Long-term paleoclimatic studies show that severe and extensive droughts have occurred repeatedly throughout the Great Plains and the West. These will occur in the future, with or without human-induced climate change. Infrastructure planners would be well-advised to take them into account. (pp. 56-71)

5. Crop and livestock production will adapt to climate change.
There is a large body of evidence that demonstrates substantial untapped adaptability of US agriculture to climate change, including crop-switching that can change the species used for livestock feed. In addition, carbon dioxide itself is likely increasing crop yields and will continue to do so in increasing increments in the future. (pp. 102-118)

6. Sea level rises caused by global warming are easily adapted to.
Much of the densely populated East Coast has experienced sea level rises in the 20th century that are more than twice those caused by global warming, with obvious adaptation. The mean projections from the United Nations will likely be associated with similar adaptation. (pp. 175-176)

7. Life expectancy and wealth are likely to continue to increase.
There is little relationship between life expectancy, wealth and climate. Even under the most dire scenarios, people will be much wealthier and healthier than they are today in the year 2100.(pp. 141-147, 160-162)

8. Climate change is a minor overlay on US society.
People voluntarily expose themselves to climate changes throughout their lives that are much larger and more sudden than those expected from greenhouse gases. The migration of US population from the cold North and East to the much warmer South and West is an example. Global markets exist to allocate resources that fluctuate with the weather and climate. (pp. 156-171)

9. Species and ecosystems will change with or without climate change.
There is little doubt that some ecosystems, such as the desert west, have been changing with climate, while others, such as cold marine fisheries, move with little obvious relationship to climate. (pp. 119-140)

10. Policies enacted by the developed world will have little effect on global temperature.
Even if every nation that has obligations under the Kyoto Protocol agreed to reduce emissions over 80 percent, there would be little or no detectable effect on climate on the policy-relevant timeframe, because emissions from these countries will be dwarfed in coming decades by the total emissions from China, India, and the developing world. (pp. 27, 212)

USGCRP Report

Water Resources

Key Messages:

- Climate change has already altered, and will continue to alter, the water cycle, affecting where, when, and how much water is available for all uses.
- Floods and droughts are likely to become more common and more intense as regional and seasonal precipitation patterns change, and rainfall becomes more concentrated into heavy events (with longer, hotter dry periods in between).
- Precipitation and runoff are likely to increase in the Northeast and Midwest in winter and spring, and decrease in the West, especially the Southwest, in spring and summer.
- In areas where snowpack dominates, the timing of runoff will continue to shift to earlier in the spring and flows will be lower in late summer.
- Surface water quality and groundwater quantity will be affected by a changing climate.
- Climate change will place additional burdens on already stressed water systems.
- The past century is no longer a reasonable guide to the future for water management.

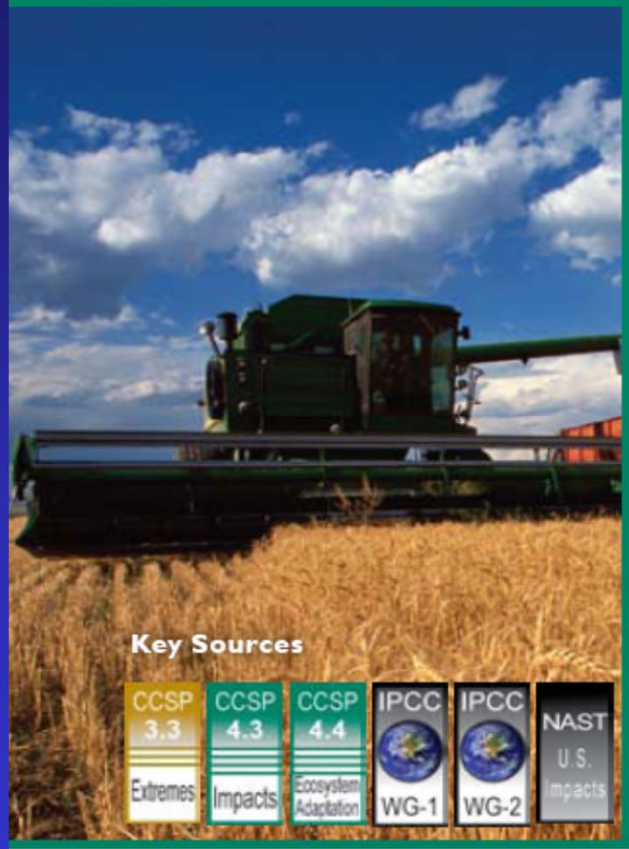
Cato Report

Water Resources

Key Messages:

- Changing composition of the atmosphere will impact the water cycle by generally increasing atmospheric moisture at the global scale.
- Climate models generally predict that hydrological extremes (droughts and floods) may increase in the future, but at present, little empirical evidence supports the prediction.
- The greatest concern is for the Southwest where demand for water may outstrip supplies, with or without climate change.
- The western United States is dependent upon snowpack for water supplies, but trends in snowpack are well within the limits of natural variation.
- Surface and groundwater quality may be influenced by climate change, but they will likely be far more influenced by non-climatic considerations.
- Predictions for major changes in water resources should be taken seriously by policymakers, but scientists should continue to seek empirical evidence to support such predictions.

USGCRP Report



Agriculture

Key Messages:

- Many crops show positive responses to elevated carbon dioxide and low levels of warming, but higher levels of warming often negatively affect growth and yields.
- Extreme events such as heavy downpours and droughts are likely to reduce crop yields because excesses or deficits of water have negative impacts on plant growth.
- Weeds, diseases, and insect pests benefit from warming, and weeds also benefit from a higher carbon dioxide concentration, increasing stress on crop plants and requiring more attention to pest and weed control.
- Forage quality in pastures and rangelands generally declines with increasing carbon dioxide concentration because of the effects on plant nitrogen and protein content, reducing the land's ability to supply adequate livestock feed.
- Increased heat, disease, and weather extremes are likely to reduce livestock productivity.

Cato Report

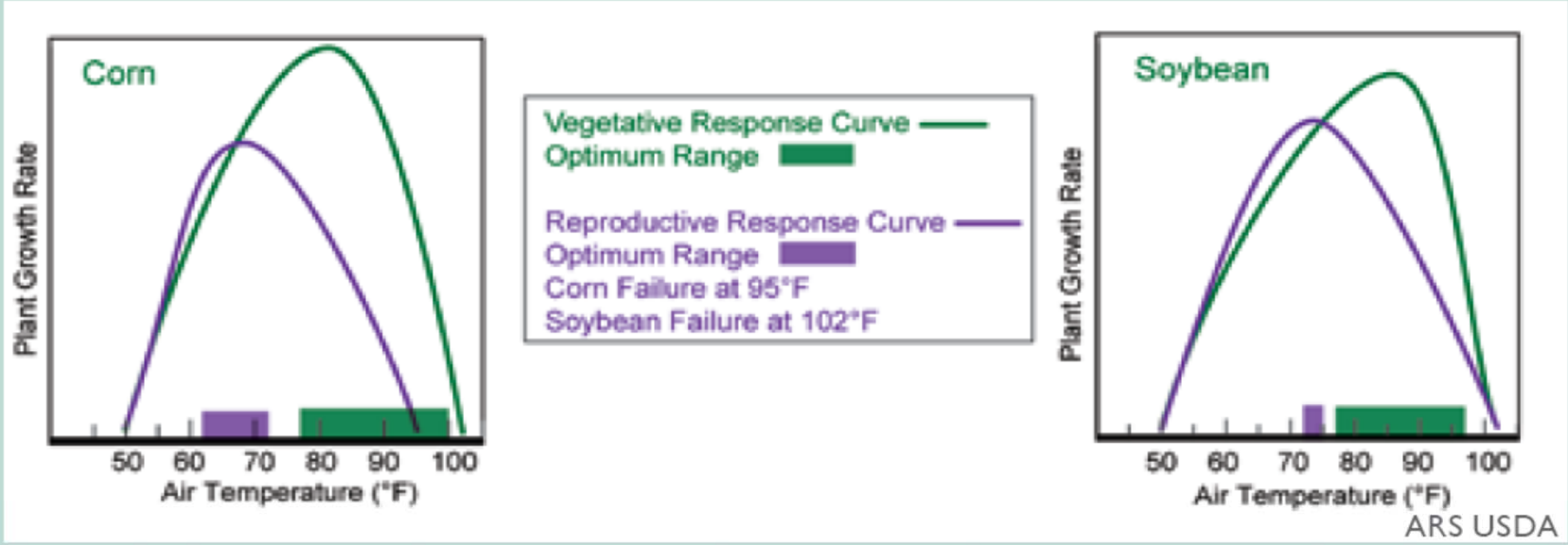
Agriculture

Key Messages:

- Elevated carbon dioxide increases the productivity and water use efficiency of nearly all plants.
- Higher levels of atmospheric CO_2 ameliorate, and sometimes fully compensate for, the negative influences of various environmental stresses on plant growth, including the stress of high temperature.
- Health promoting substances found in various food crops and medicinal plants have been shown to benefit from rising atmospheric CO_2.
- Elevated CO_2 reduces, and frequently completely overrides, the negative effects of ozone pollution on plant photosynthesis, growth and yield.
- Extreme weather events such as heavy downpours and droughts are not likely to impact future crop yields any more than they do now.
- On the whole, CO_2-enrichment does not increase the competitiveness of weeds over crops; higher atmospheric CO_2 will likely reduce crop damage from insects and pathogenic diseases.
- In addition to enhancing forage productivity, atmospheric CO_2-enrichment will likely not alter its digestibility by animals.

USGCRP Report

Corn and Soybean Temperature Response



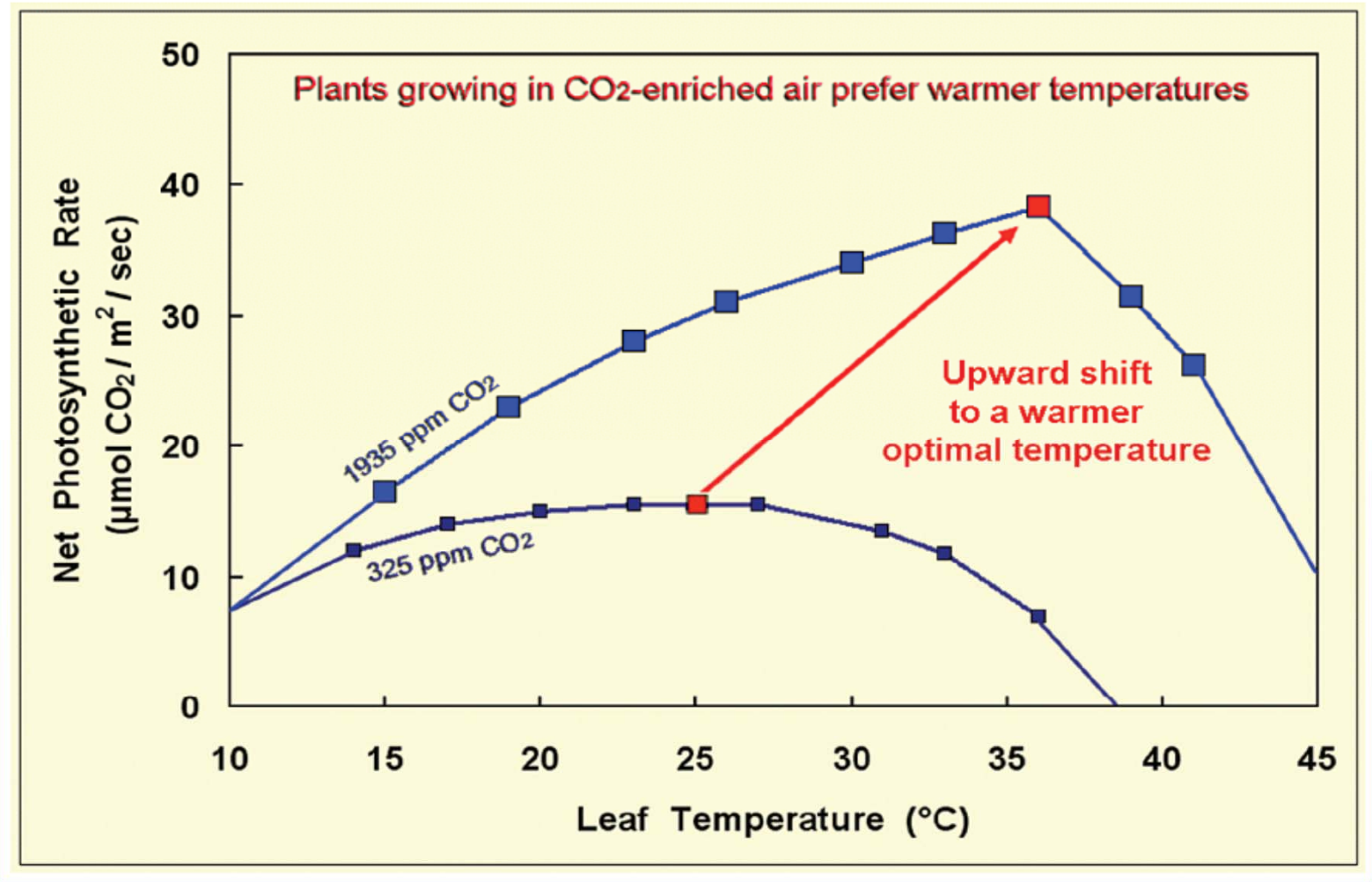
ARS USDA

For each plant variety, there is an optimal temperature for vegetative growth, with growth dropping off as temperatures increase or decrease. Similarly, there is a range of temperatures at which a plant will produce seed. Outside of this range, the plant will not reproduce. As the graphs show, corn will fail to reproduce at temperatures above 95°F and soybean above 102°F.

- USGCRP neglects fundamental crop physiology by portraying growth response as static when atmospheric carbon dioxide increases.

- In reality, the temperature optimum for photosynthesis increases with the carbon dioxide concentration.

Cato Report


Plants growing in CO2-enriched air prefer warmer temperatures
Net Photosynthetic Rate
(µmol CO2 / m2 / sec)
50
40
30
20
10
0
1935 ppm CO2
325 ppm CO2
Upward shift
to a warmer
optimal temperature
10
15
20
25
30
35
40
45
Leaf Temperature (°C)

USGCRP Report

Herbicide Loses Effectiveness at Higher CO_2

Current CO_2 (380 ppm) Potential Future CO_2 (680 ppm)

The left photo shows weeds in a plot grown at a carbon dioxide (CO_2) concentration of about 380 parts per million (ppm), which approximates the current level. The right photo shows a plot in which the CO_2 level has been raised to about 680 ppm. Both plots were equally treated with herbicide.[233]

Cato Report

Plants Grow Better with Higher CO2 Levels

Cato Report

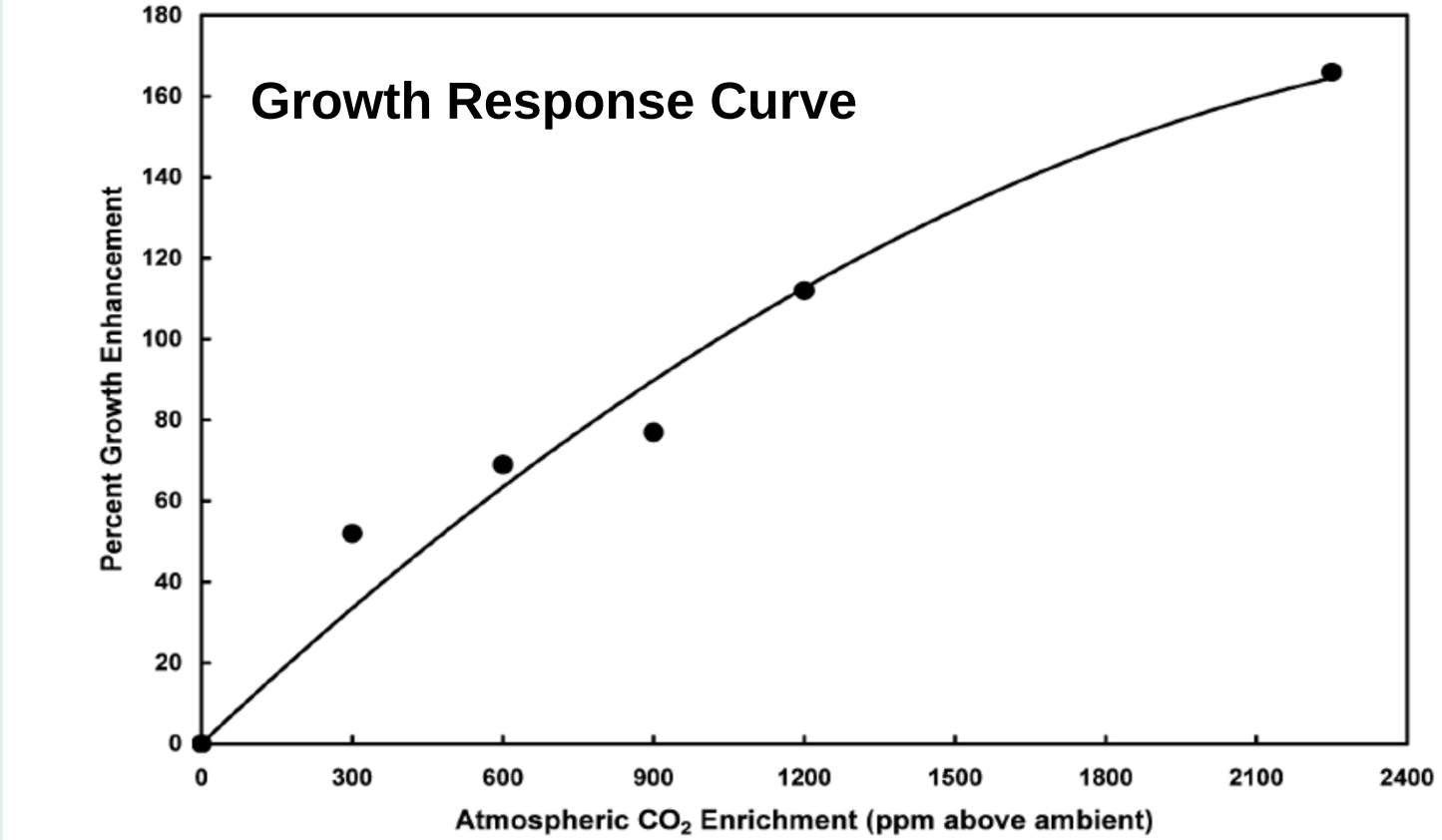


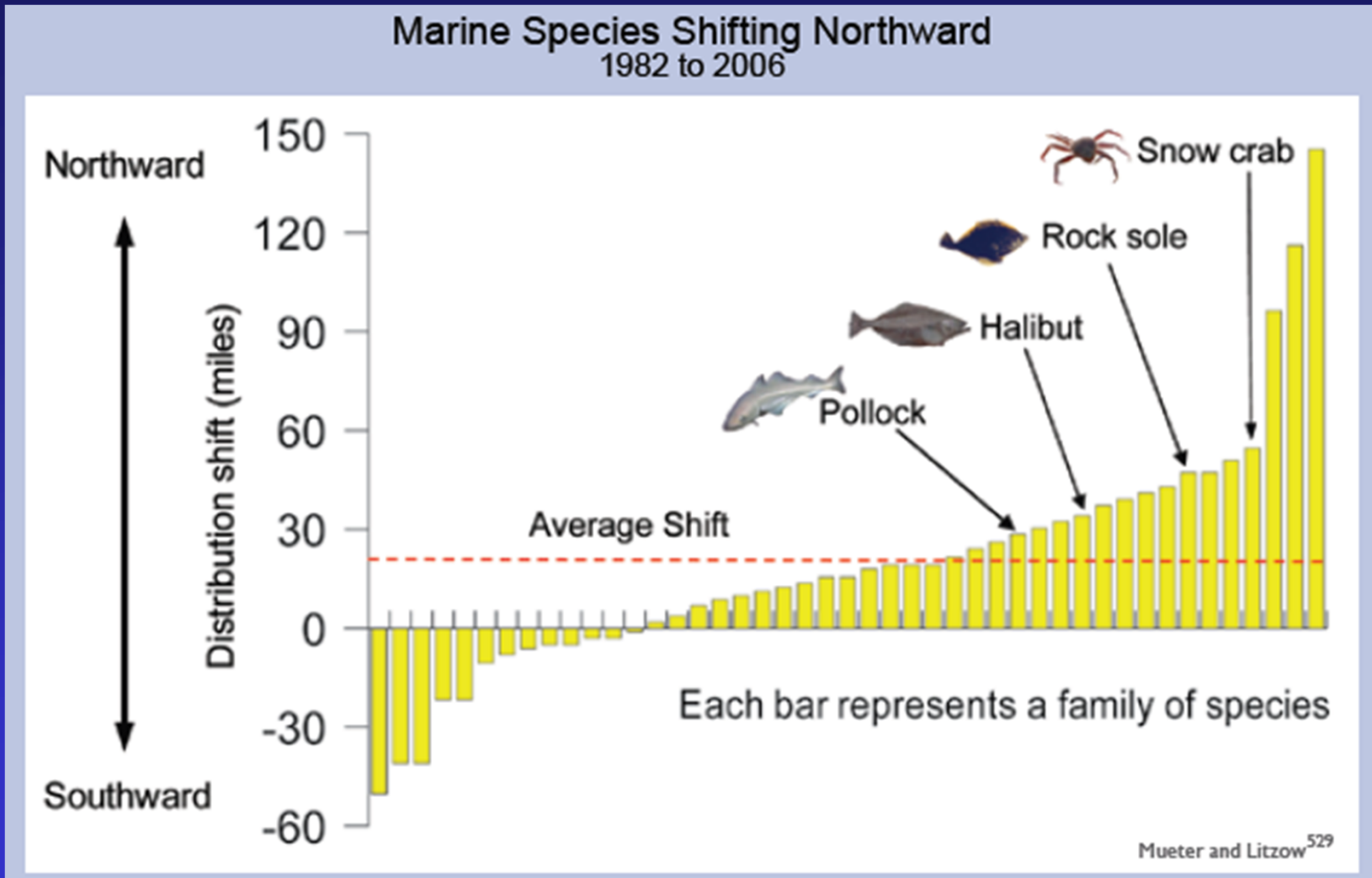
Figure 1. Percent growth enhancement as a function of atmospheric CO_2 enrichment in parts per million (ppm) above the normal or ambient atmospheric CO_2 concentration, showing that the growth benefits continue to accrue well beyond an atmospheric CO_2 concentration of 2000 ppm. These data, representing a wide mix of plant species, were derived from 1,087 individual experiments described in 342 peer-reviewed scientific journal articles written by 484 scientists residing in 28 countries and representing 142 different research institutions.[7]

REGIONAL ANALYSIS: ALASKAN EXAMPLE

I CHOOSE MY WORDS CAREFULLY:

THE FEDERAL GOVERNMENT LIES ABOUT CLIMATE CHANGE AND ITS EFFECTS

USGCRP REPORT



As air and water temperatures rise, marine species are moving northward, affecting fisheries, ecosystems, and coastal communities that depend on the food source. On average, by 2006, the center of the range for the examined species moved 19 miles north of their 1982 locations.

MEUTER AND LITZOW, 2007

From their 2007 paper:

"A nonlinear, accelerating time trend in northward displacement (Fig. 5D), unrelated to temperature or any other climate parameter we tested (at any lag), suggests that mechanisms besides climate must be contributing to distribution shifts in the Bering Sea…The failure of our exploratory attempts to explain variability among species underlines the difficulties of this research problem."

Download the USGCRP Report:

http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf

Download the Cato Addendum Report:

http://www.cato.org/pubs/Global-Climate-Change-Impacts.pdf

2013

globalchange.gov
U.S. Global Change Research Program

Thirteen Agencies, One Vision: Empower the Nation with Global Change Science

National Climate Assessment Development Advisory Committee

Home

Federal Advisory Committee Draft Climate Assessment Report Released for Public Review

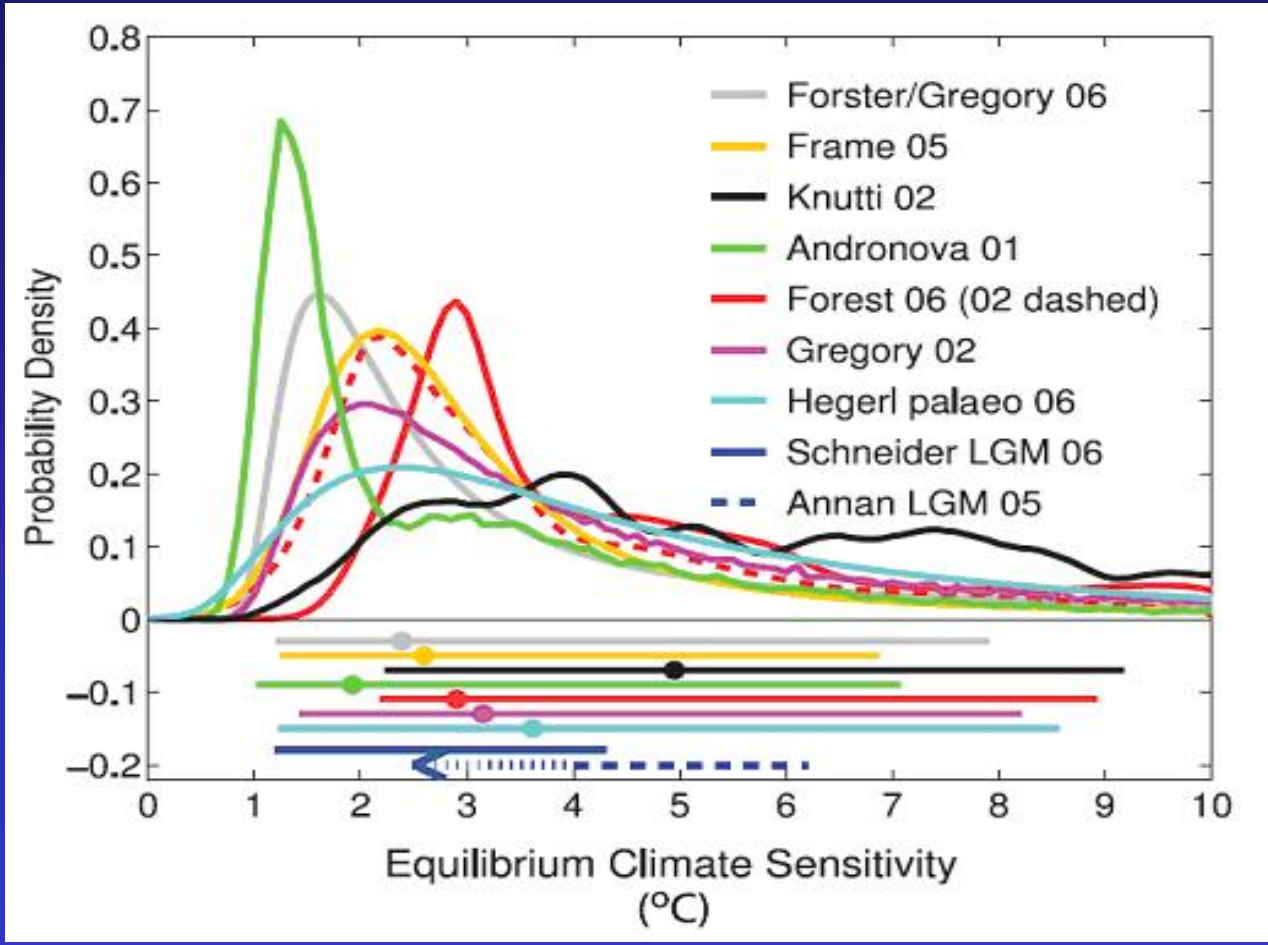
A 60-person Federal Advisory Committee (The "National Climate Assessment and Development Advisory Committee" or NCADAC) has overseen the development of this draft climate report.

The NCADAC, whose members are available here (and in the report), was established under the Department of Commerce in December 2010 and is supported through the National Oceanic and Atmospheric Administration (NOAA). It is a federal advisory committee established as per the Federal Advisory Committee Act of 1972. The Committee serves to oversee the activities of the National Climate Assessment. Its members are diverse in background, expertise, geography and sector of employment. A formal record of the committee can be found at the NOAA NCADAC website.

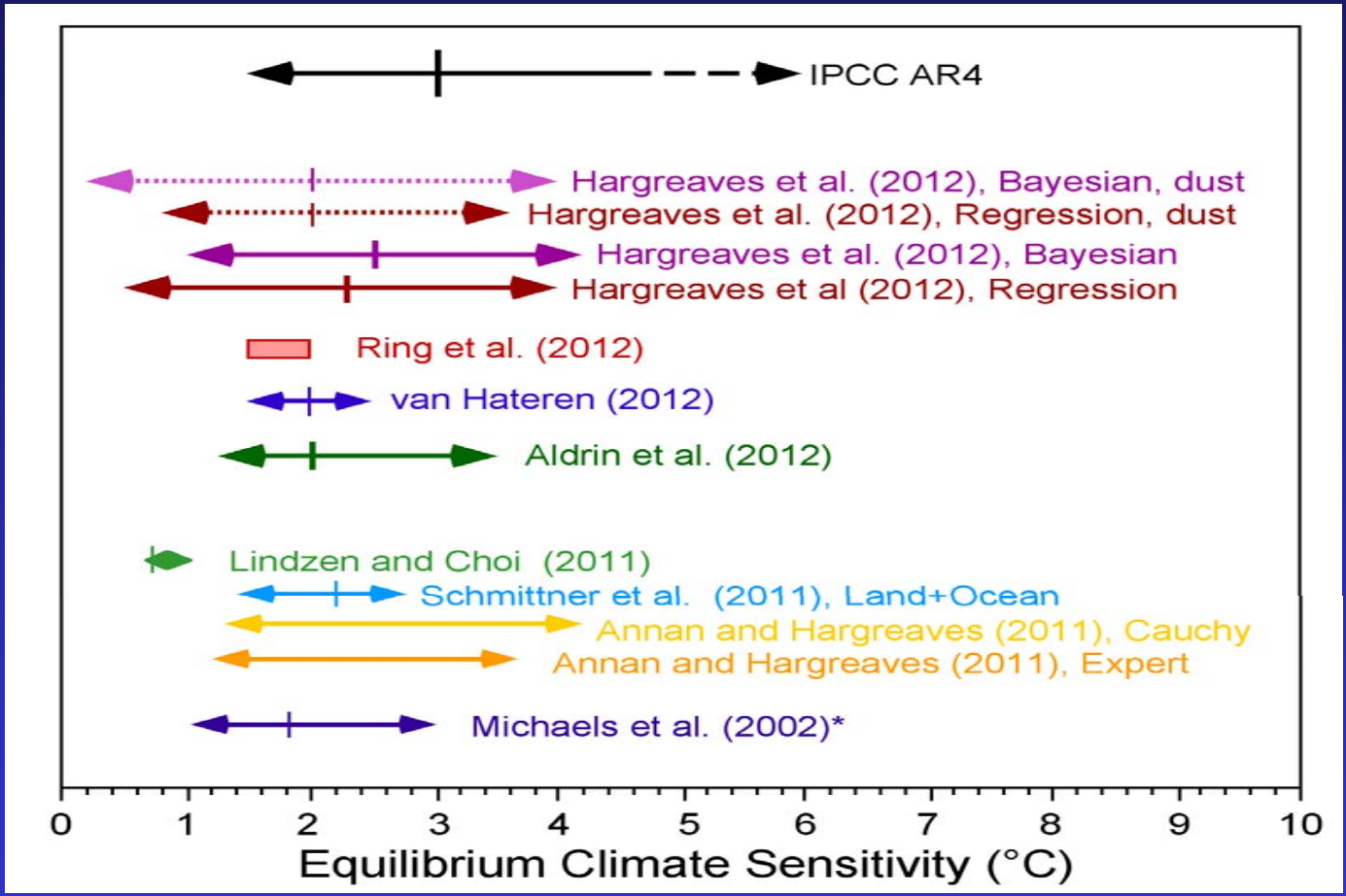
The NCADAC has engaged more than 240 authors in the creation of the report. The authors are acknowledged at the beginning of the chapters they co-authored.

Following extensive review by the National Academies of Sciences and by the public, this report will be revised by the NCADAC and, after additional review, will then be submitted to the Federal Government for consideration in the Third National Climate Assessment (NCA) Report. For more information on the NCA process and background, previous assessments and other NCA information, please explore the NCA web-pages. The NCA is being conducted under the auspices of the Global Change Research Act of 1990 and is being organized and administered by the Global Change Research Program.

THE EPA HAS A FAT TAIL



NO FACT CHECKS, PLEASE



RECENT RESEARCH* HAS NO FAT TAIL

Vol. 23: 1–9, 2002 | CLIMATE RESEARCH Clim Res | Published December 20

Revised 21st century temperature projections

Patrick J. Michaels[1, 2, *], Paul C. Knappenberger[3, *], Oliver W. Frauenfeld[1], Robert E. Davis[1]

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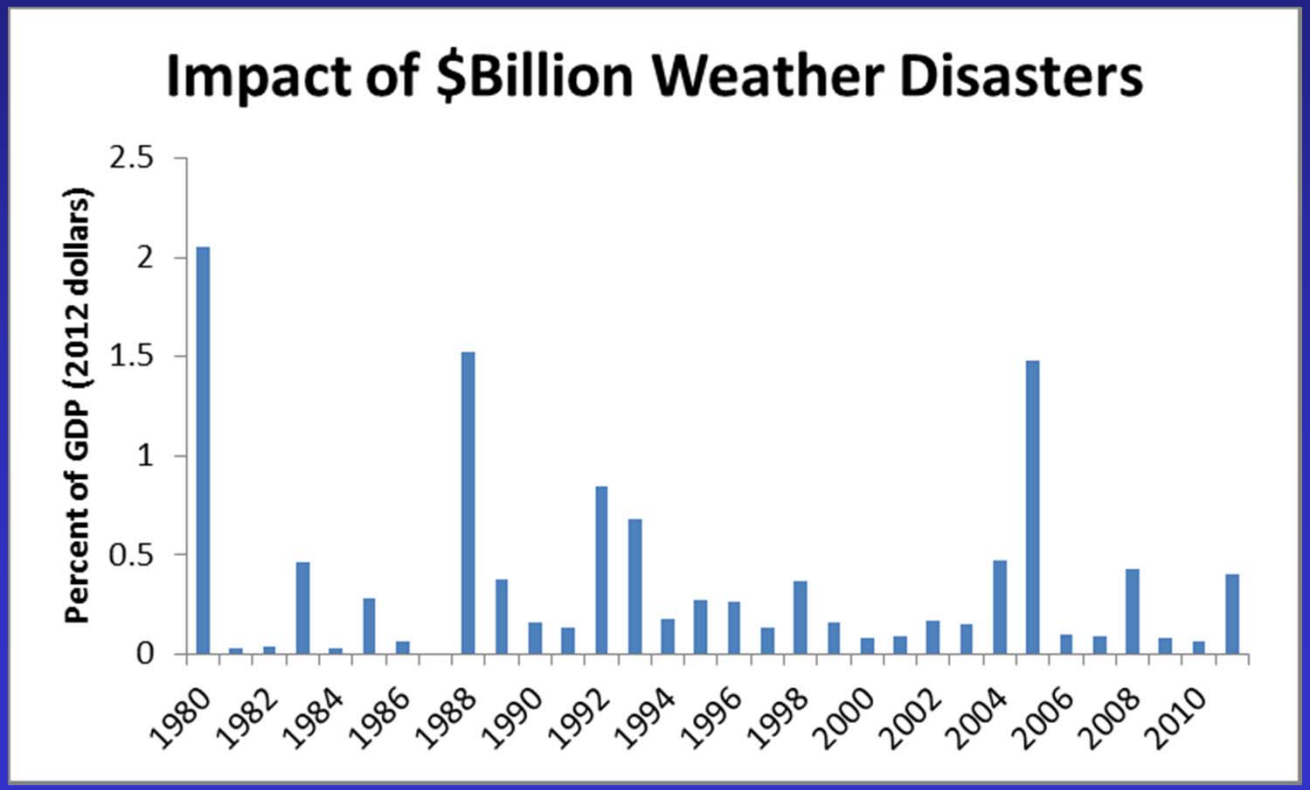
[2]Cato Institute, Washington, DC 20001-5403, USA
[3]New Hope Environmental Services, 5 Boar's Head Lane, Suite 101, Charlottesville, Virginia 22903, USA

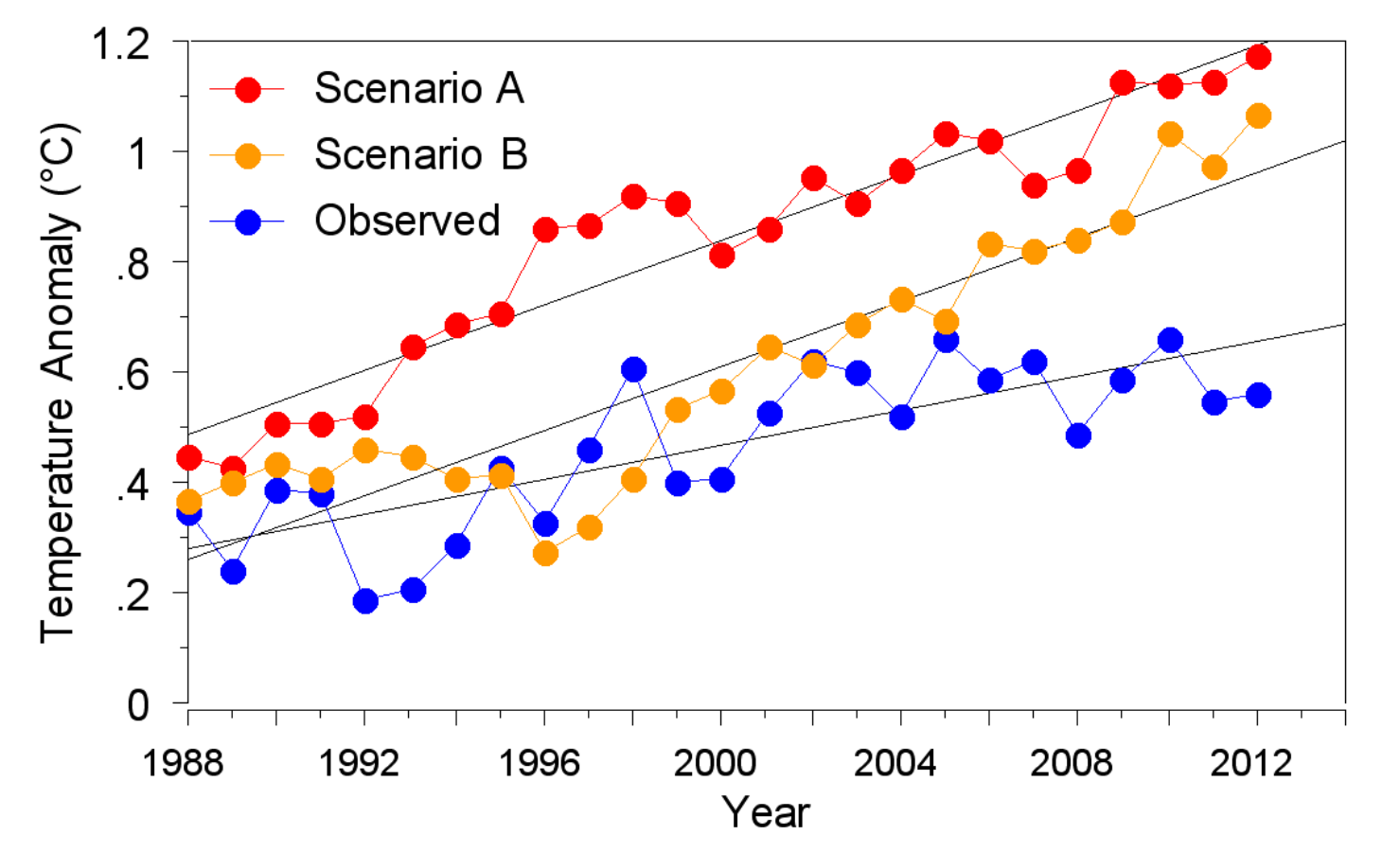
ABSTRACT: Temperature projections for the 21st century made in the Third Assessment Report (TAR) of the United Nations Intergovernmental Panel on Climate Change (IPCC) indicate a rise of 1.4 to 5.8°C for 1990–2100. However, several independent lines of evidence suggest that the projections at the upper end of this range are not well supported. Since the publication of the TAR, several findings have appeared in the scientific literature that challenge many of the assumptions that generated the TAR temperature range. Incorporating new findings on the radiative forcing of black carbon (BC) aerosols, the magnitude of the climate sensitivity, and the strength of the climate/carbon cycle feedbacks into a simple upwelling diffusion/energy balance model similar to the one that was used in the TAR, we find that the range of projected warming for the 1990–2100 period is reduced to 1.1–2.8°C. When we adjust the TAR emissions scenarios to include an atmospheric CO_2 pathway that is based upon observed CO_2 increases during the past 25 yr, we find a warming range of 1.5–2.6°C prior to the adjustments for the new findings. Factoring in these findings along with the adjusted CO_2 pathway reduces the range to 1.0–1.6°C. And thirdly, a simple empirical adjustment to the average of a large family of models, based upon observed changes in temperature, yields a warming range of 1.3–3.0°C, with a central value of 1.9°C. The constancy of these somewhat independent results encourages us to conclude that 21st century warming will be modest and near the low end of the IPCC TAR projections.

KEY WORDS: Temperature projections · Climate change · Global warming · Climate models · Impact assessment

“Economic losses arising from weather and climate events are large and have been increasing.”



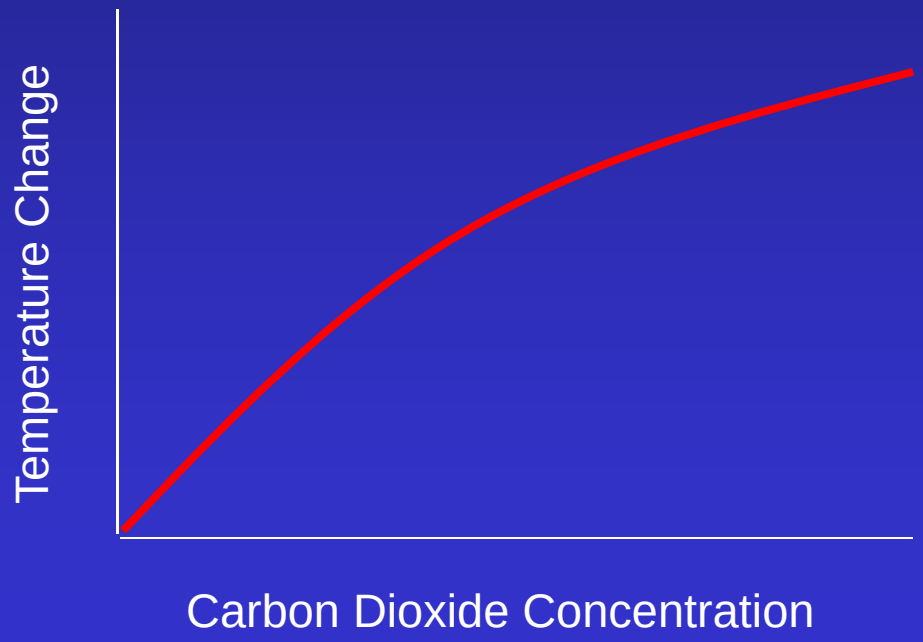
Hansen 1988 Projections



Why is Warming Rate so Low?

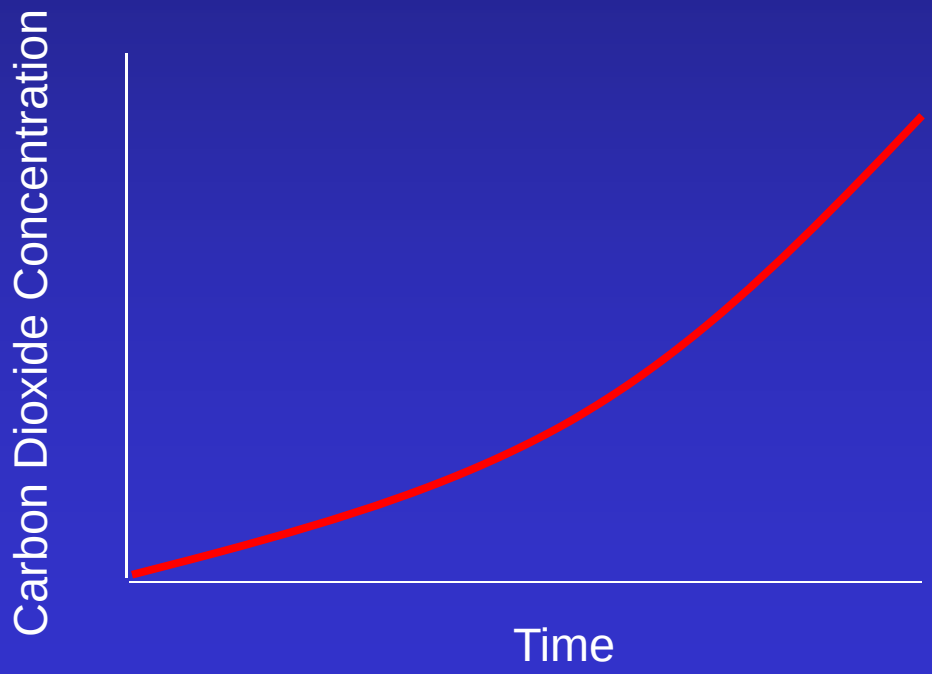
The response to greenhouse gas increases is:

LOGARITHMIC



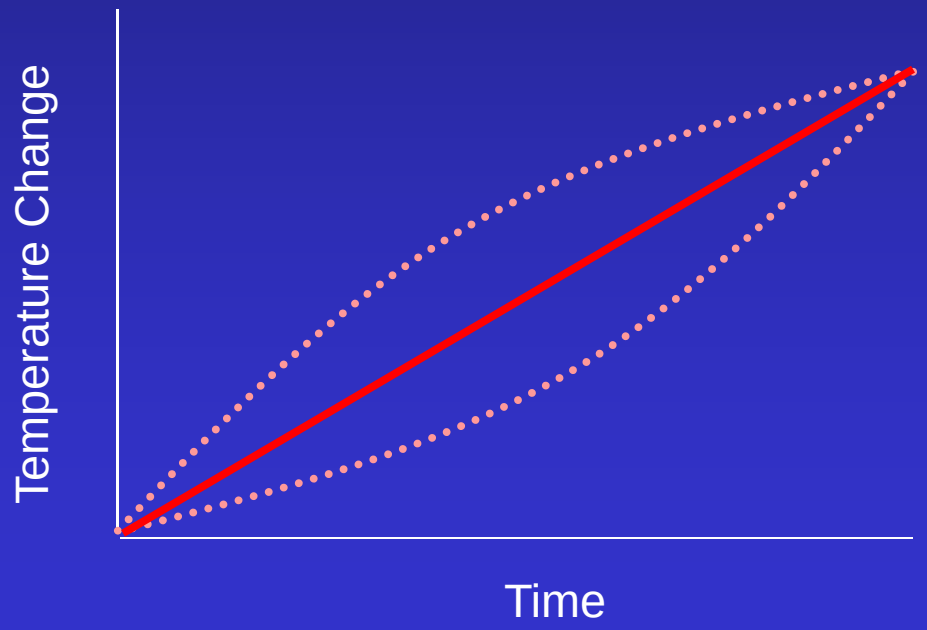
The increase in greenhouse gases is

A LOW ORDER EXPONENT

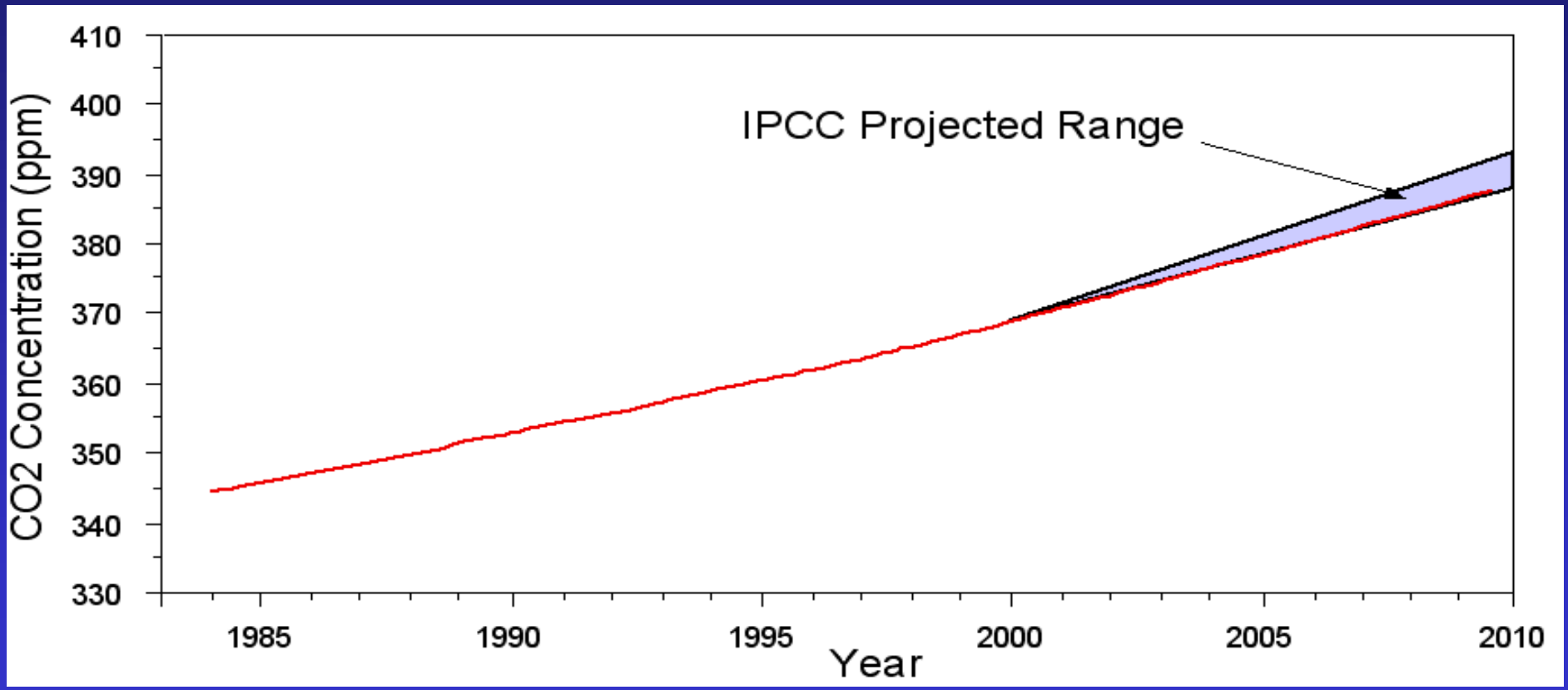


The combination of the two tends towards

A STRAIGHT LINE



Atmospheric Carbon Dioxide Concentration (Observed and Projected)



METHANE

ATMOSPHERIC METHANE

SOURCES

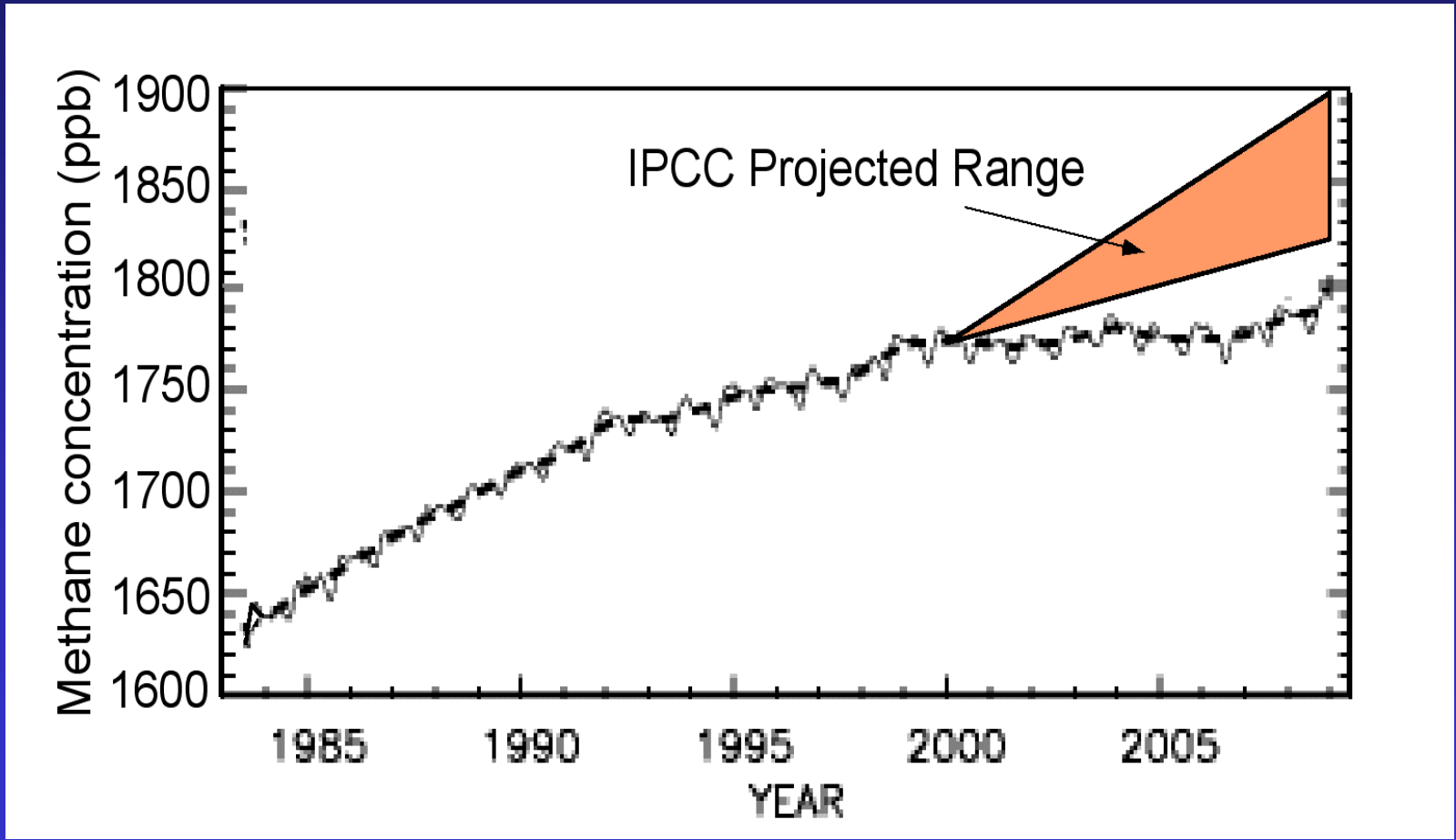
Bovine Flatulence

Rice Paddy Agriculture

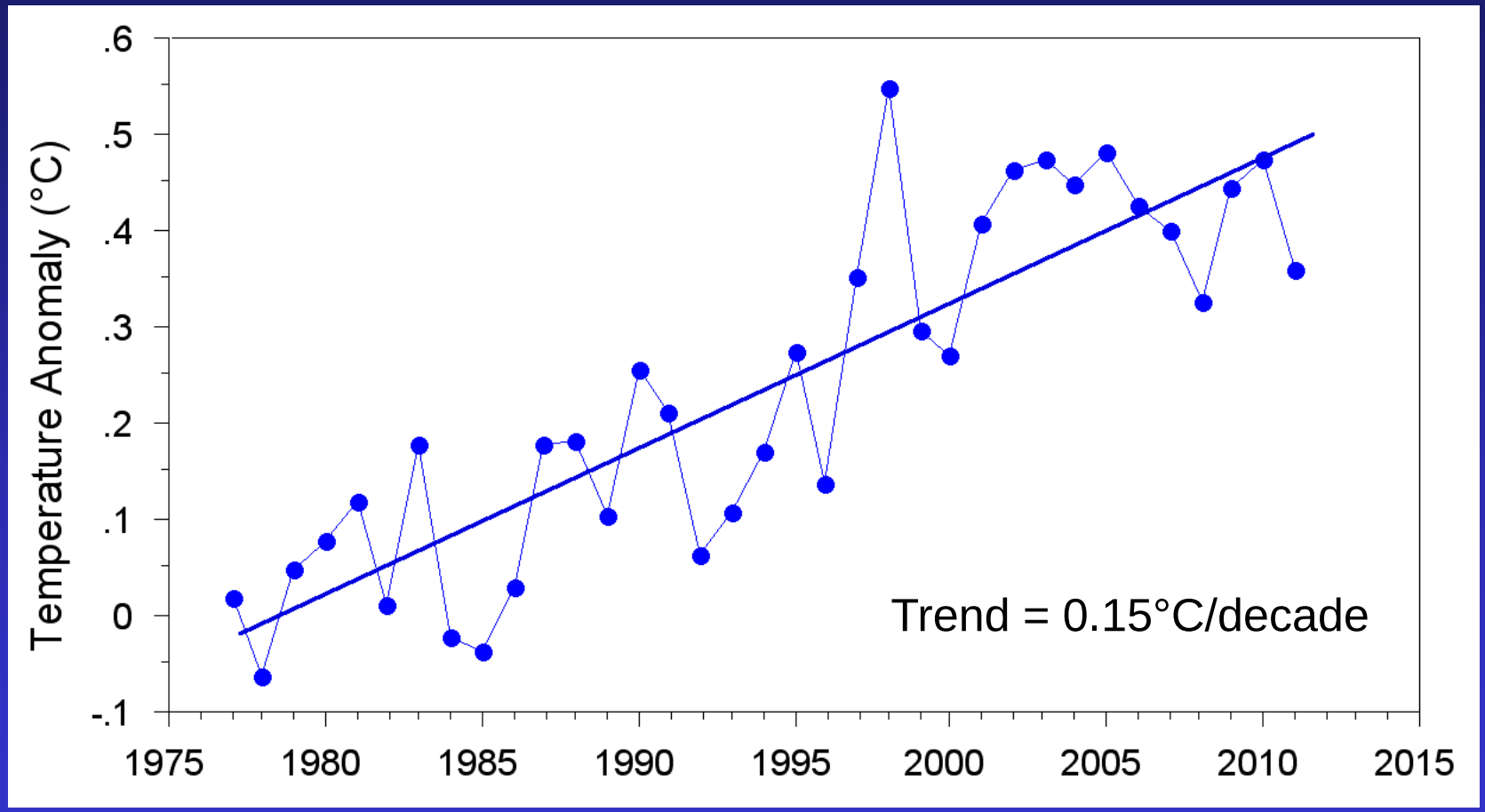
Coal Mining

Leaky Pipes?

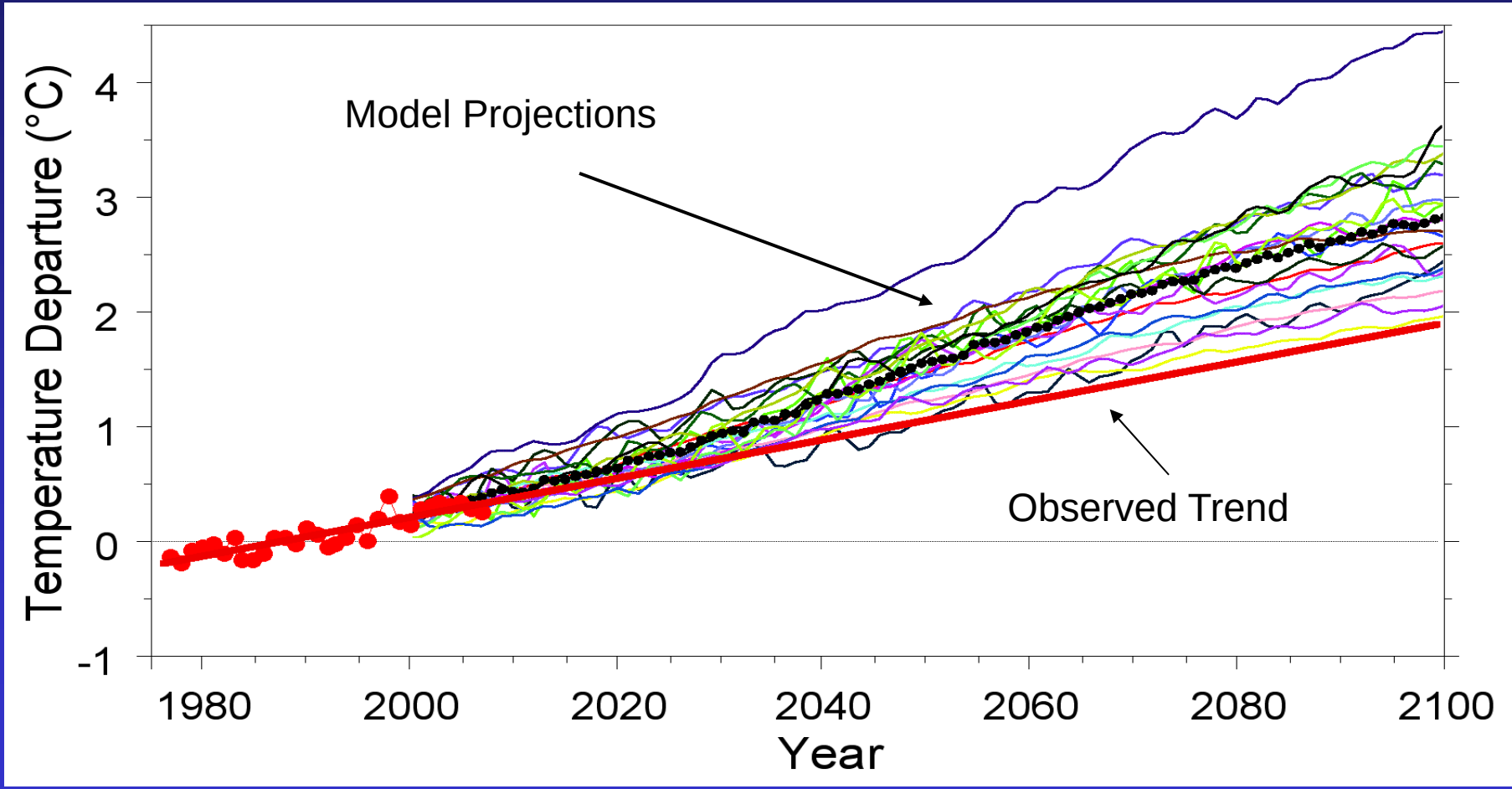
Atmospheric Methane (Duglokenky 09) IPCC 2001 (same as 2007) Overlay



Global Temperature Anomalies, 1977-2011



Projected (A1B) and Observed Temperatures



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Revised 21st century temperature projections

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ABSTRACT: Temperature projections for the 21st century made in the Third Assessment Report (TAR) of the United Nations Intergovernmental Panel on Climate Change (IPCC) indicate a rise of 1.4 to 5.8°C for 1990–2100. However, several independent lines of evidence suggest that the projections at the upper end of this range are not well supported. Since the publication of the TAR, several findings have appeared in the scientific literature that challenge many of the assumptions that generated the TAR temperature range. Incorporating new findings on the radiative forcing of black carbon (BC) aerosols, the magnitude of the climate sensitivity, and the strength of the climate/carbon cycle feedbacks into a simple upwelling diffusion/energy balance model similar to the one that was used in the TAR, we find that the range of projected warming for the 1990–2100 period is reduced to 1.1–2.8°C. When we adjust the TAR emissions scenarios to include an atmospheric CO_2 pathway that is based upon observed CO_2 increases during the past 25 yr, we find a warming range of 1.5–2.6°C prior to the adjustments for the new findings. Factoring in these findings along with the adjusted CO_2 pathway reduces the range to 1.0–1.6°C. And thirdly, a simple empirical adjustment to the average of a large family of models, based upon observed changes in temperature, yields a warming range of 1.3–3.0°C, with a central value of 1.9°C. The constancy of these somewhat independent results encourages us to conclude that 21st century warming will be modest and near the low end of the IPCC TAR projections.

KEY WORDS: Temperature projections · Climate change · Global warming · Climate models · Impact assessment