

Questioning the Science and Politics of Climate Change

John R. Christy

Alabama State Climatologist

Director, Earth System Science Center

University of Alabama in Huntsville

**“America is
addicted to oil”**

**State of The Union
Address**

Jan 31 2006

**President George W.
Bush**



Affordable Energy

**Electrification
Transportation
Industry**

Carbon 87%
(coal, natural gas, oil)

Nuclear 9%
Hydroelectric power 3%

**CO2: Non-Toxic
Invigorates Biosphere
Increases food production
Climate?????**

We are addicted to:

**Long life
Good health/Medical advances
Technological Progress
Affordable Services
Freedom of mobility
Abundant and affordable food
Natural landscapes
Clean Water/Air**

All Science is Numbers

**Paraphrase of Lord Kelvin
(Sir William Thomson)**

Carbon Dioxide

By-product of energy production

Represents progress and development

Increases food production (CO₂ is plant food)

Global atmospheric concentrations increasing at ~0.6% per year

Leads to ~1 ° C warming over time for neutral case if doubled

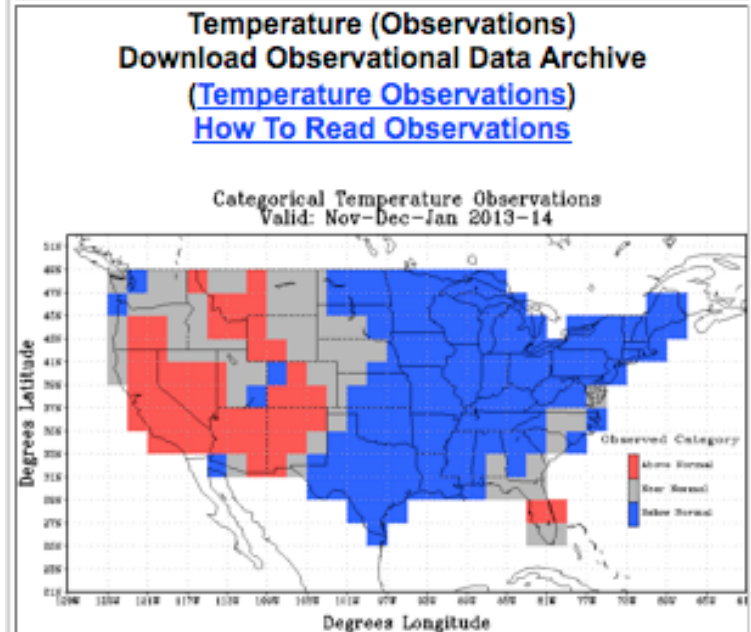
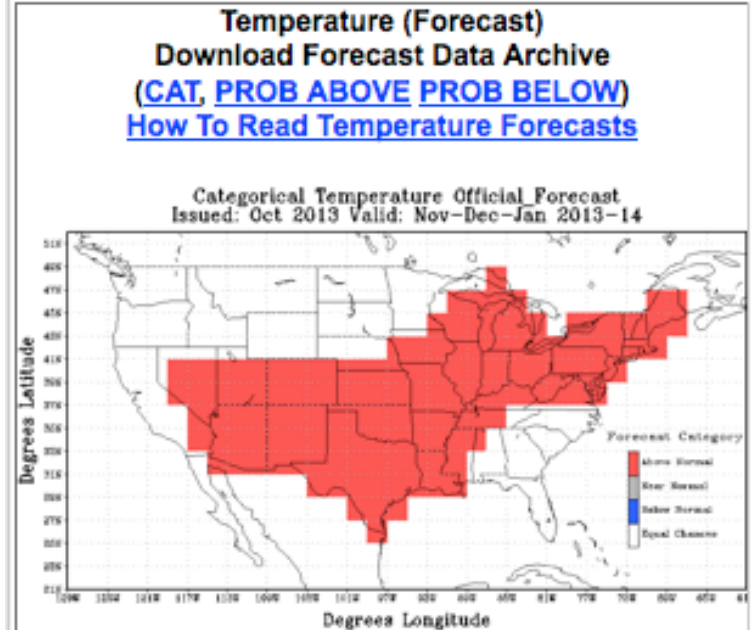
Climate model projections assert 2 – 5 ° C warming, a relatively large amount, due to positive feedbacks

In science, a fundamental principle is that when you understand a system, you can predict its behavior

Seasonal Forecast Nov-Jan 2013-14

Actual

Temperature Forecast Heidke Skill Scores :
Non-Equal Chance(non EC) forecasts: -22.01
All forecasts: -12.72
% coverage not Equal Chance forecasts : 57.76



How do you test the “Settled Science” of the Administration’s view of Climate Change?

(i.e. the science claim is that the climate system is understood so well that we can predict its behavior.)

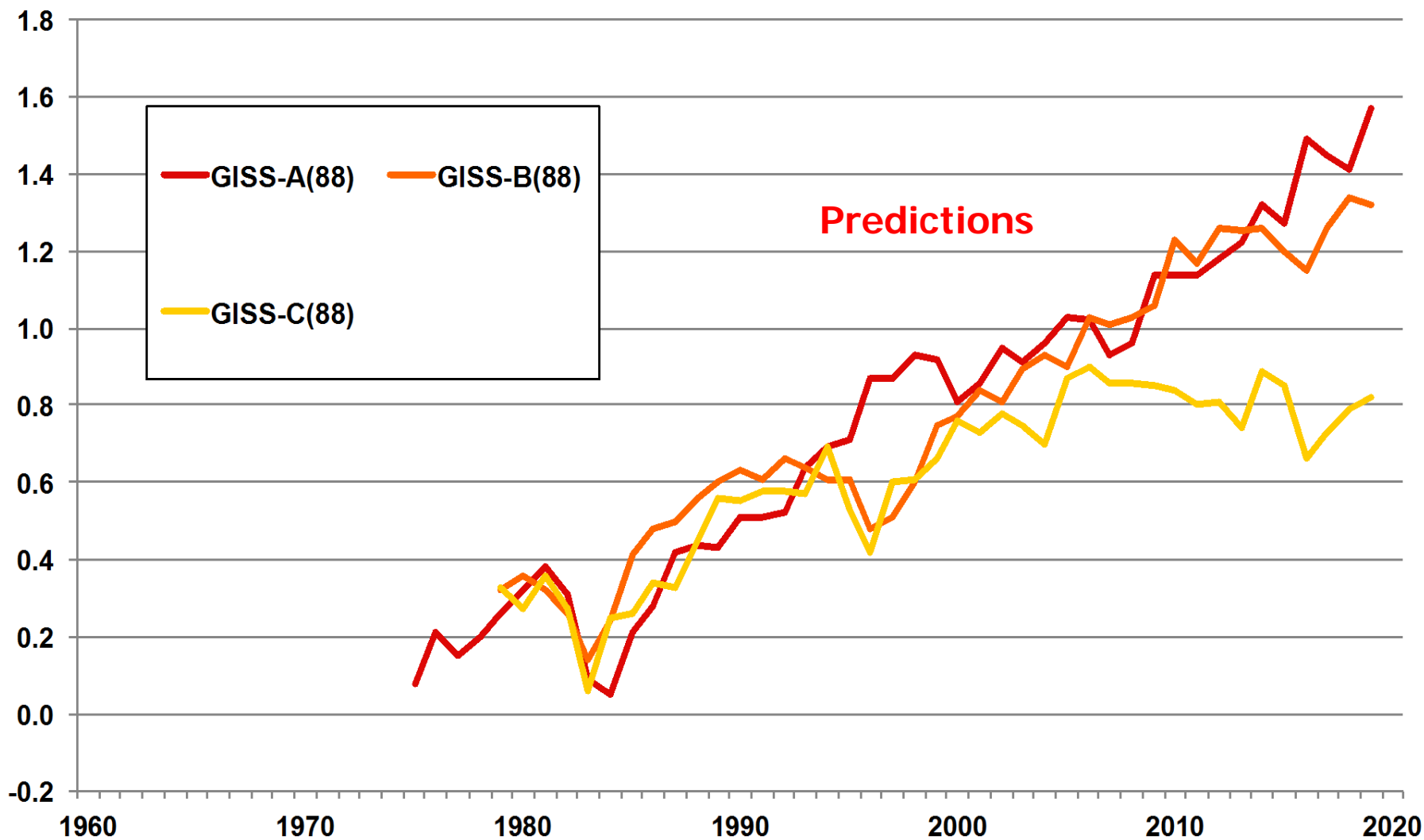
**A Climate Model
Simulation is a
Hypothesis – a “claim”**

**How does one define a
falsifiable test for a
model hypothesis?**

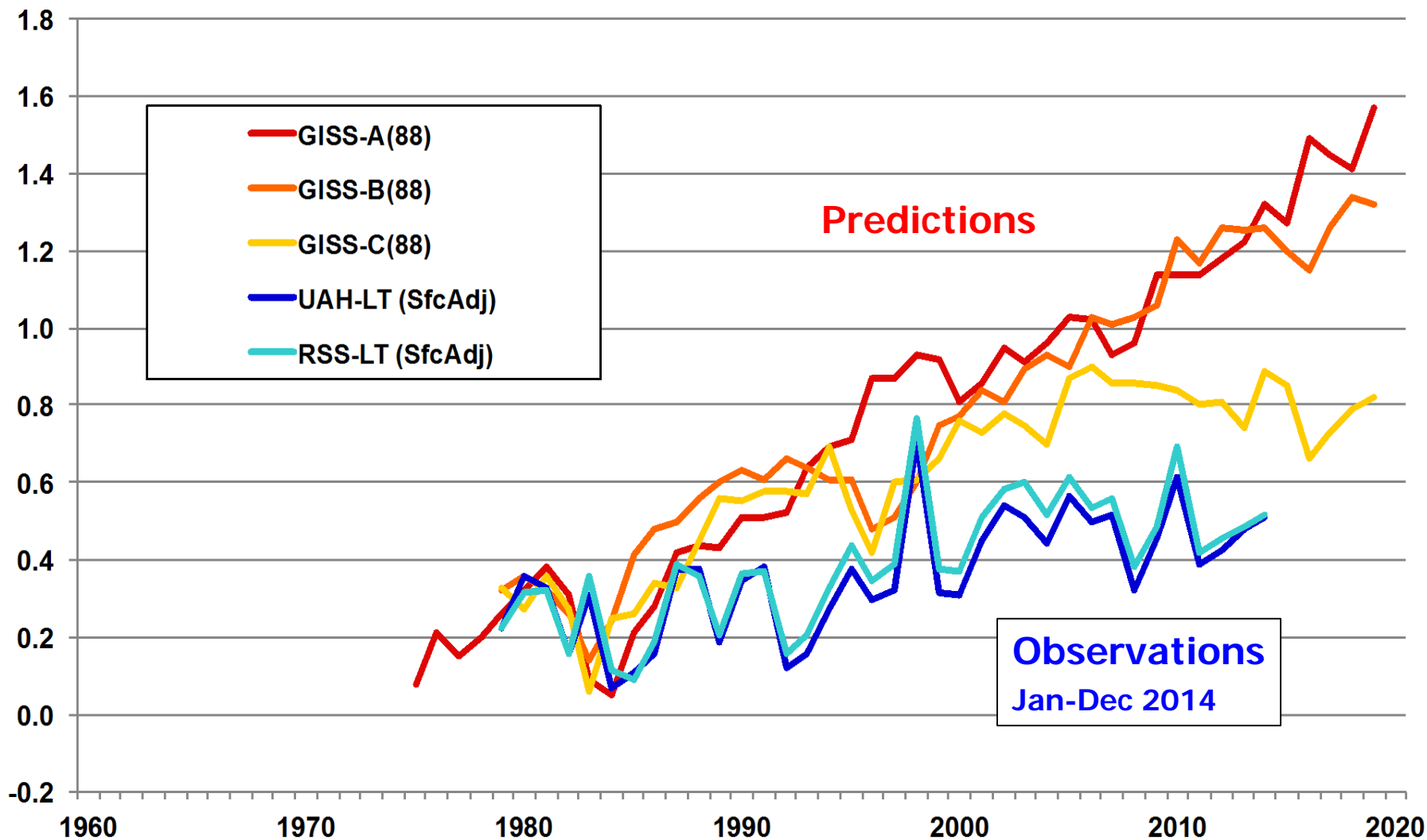
Select a prominent metric dependent on the main perturbation in forcing - a large signal - test against observations

One such test is to compare global average temperatures in models and in the real world (observations)

History Lesson 1988



History Lesson 1988

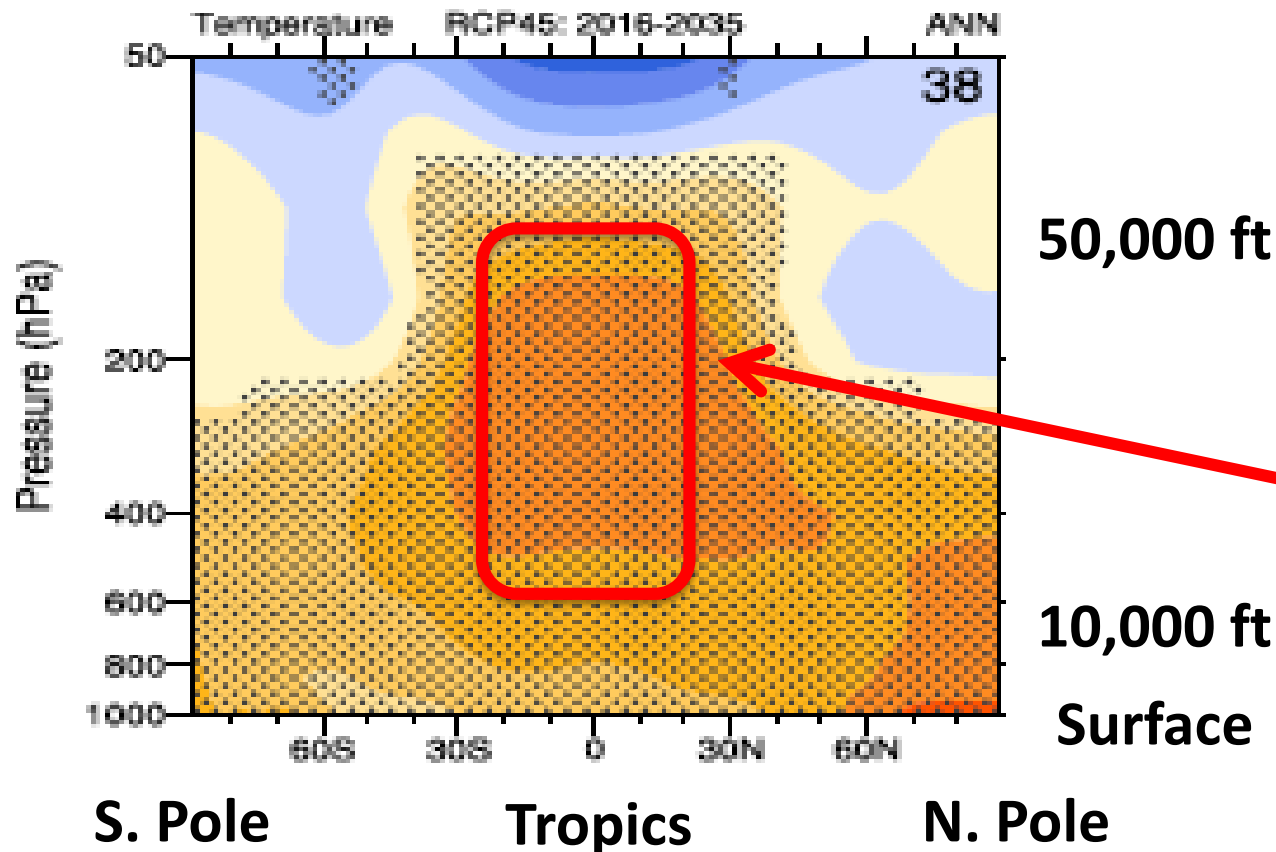


This is 2015, and science surely has advanced since 1988. Let us again do a test on the latest model projections used in the latest IPCC AR5 Report

Another such test is to compare tropical average temperatures in models and in the real world (observations)

Test the Largest Signature of Global Warming that “Settled Science” (model) says is Happening

The most obvious signature of warming due to extra greenhouse gases is the temperature of the tropical troposphere



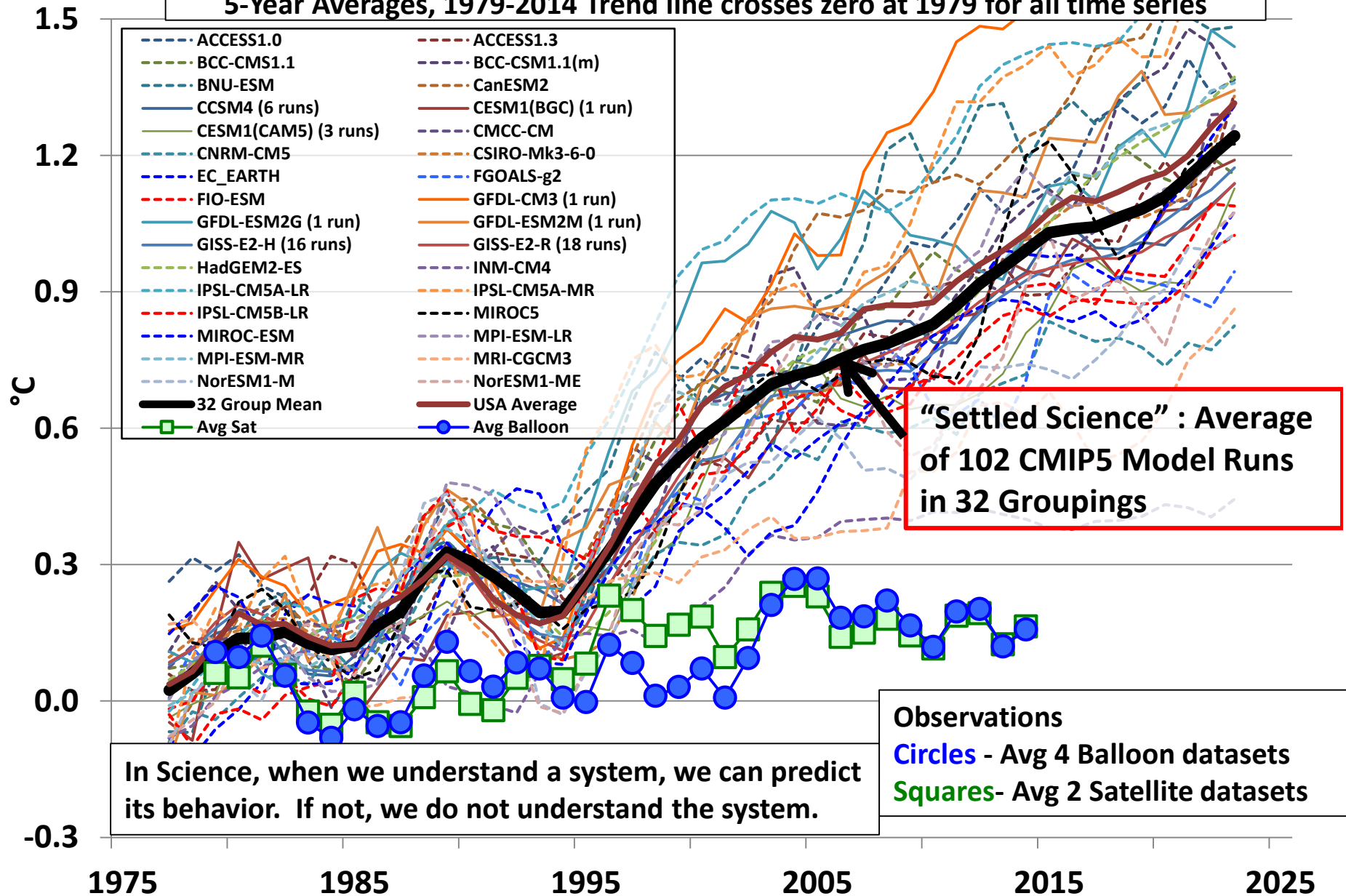
Cross section
of atmosphere

Tropical
tropospheric “**Hot
Spot**” is a major
signature of GHG
response in models

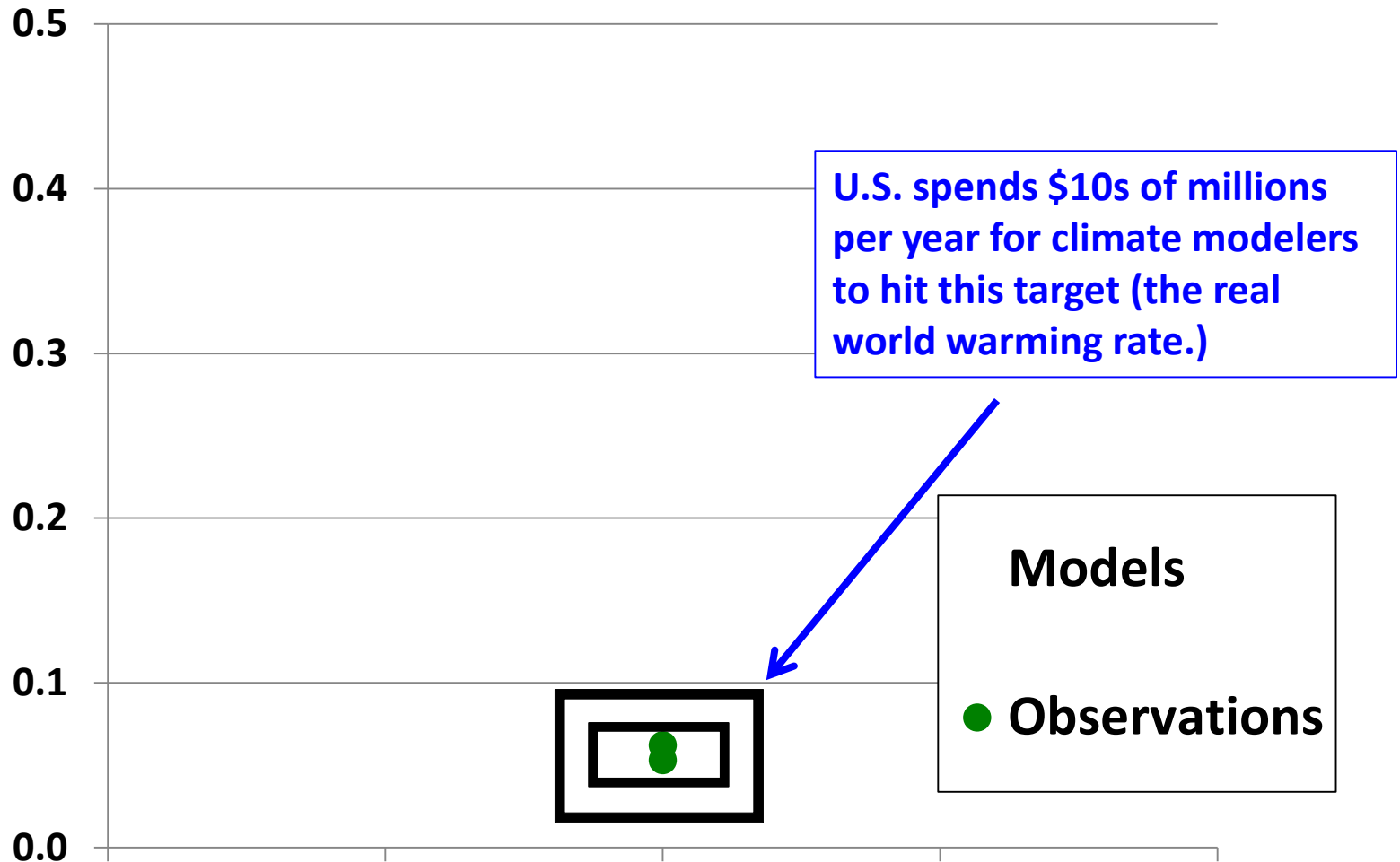
102 CMIP-5 rcp4.5 Model runs in 32 Groups

Tropical Mid-Tropospheric Temp. – The greenhouse “Hot Spot”

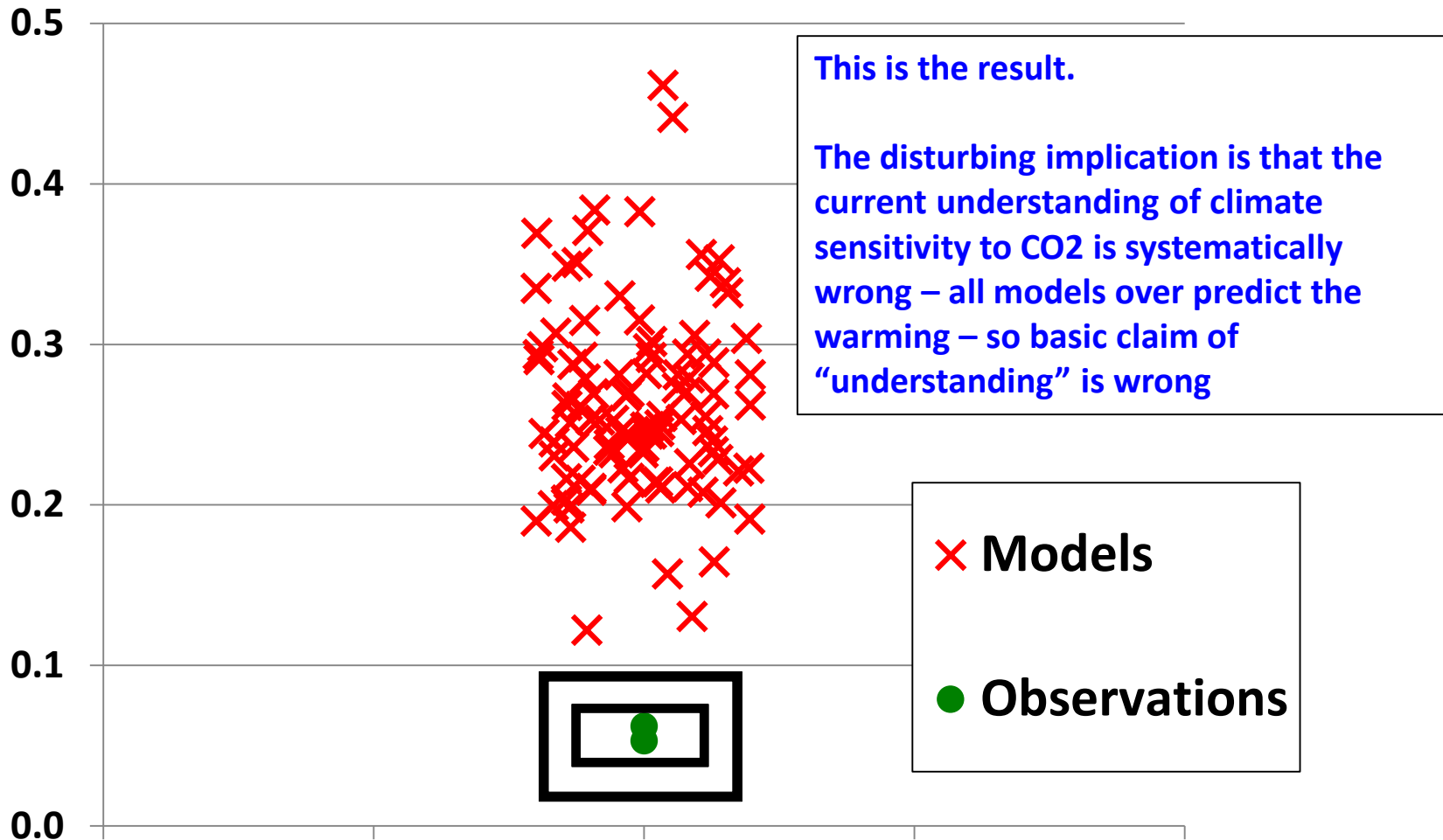
5-Year Averages, 1979-2014 Trend line crosses zero at 1979 for all time series

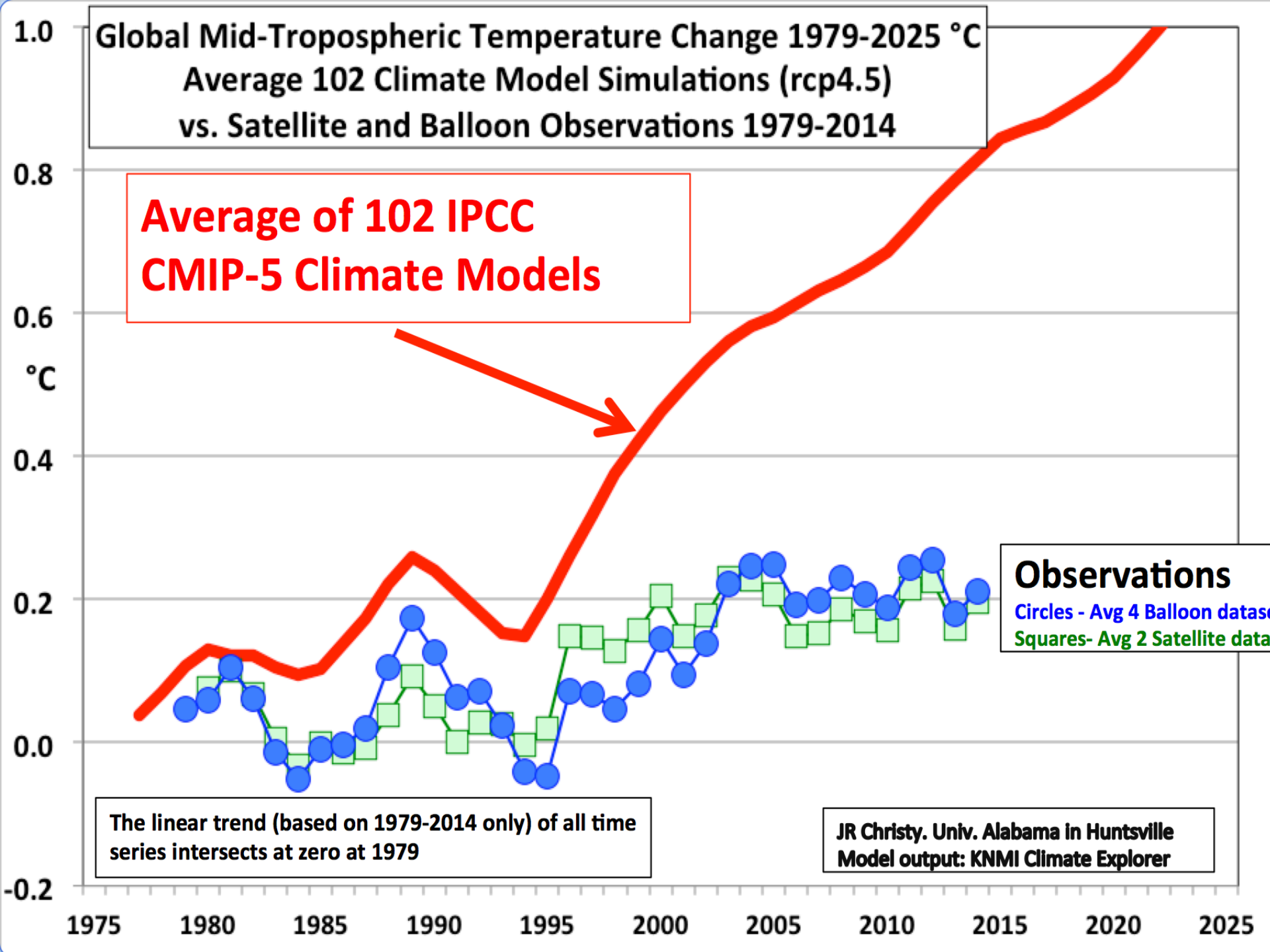


Tropical Tropospheric Temperature Trend ($^{\circ}\text{C}/\text{decade}$) 1979-2013, 102 CMIP-5 Models vs. Observations

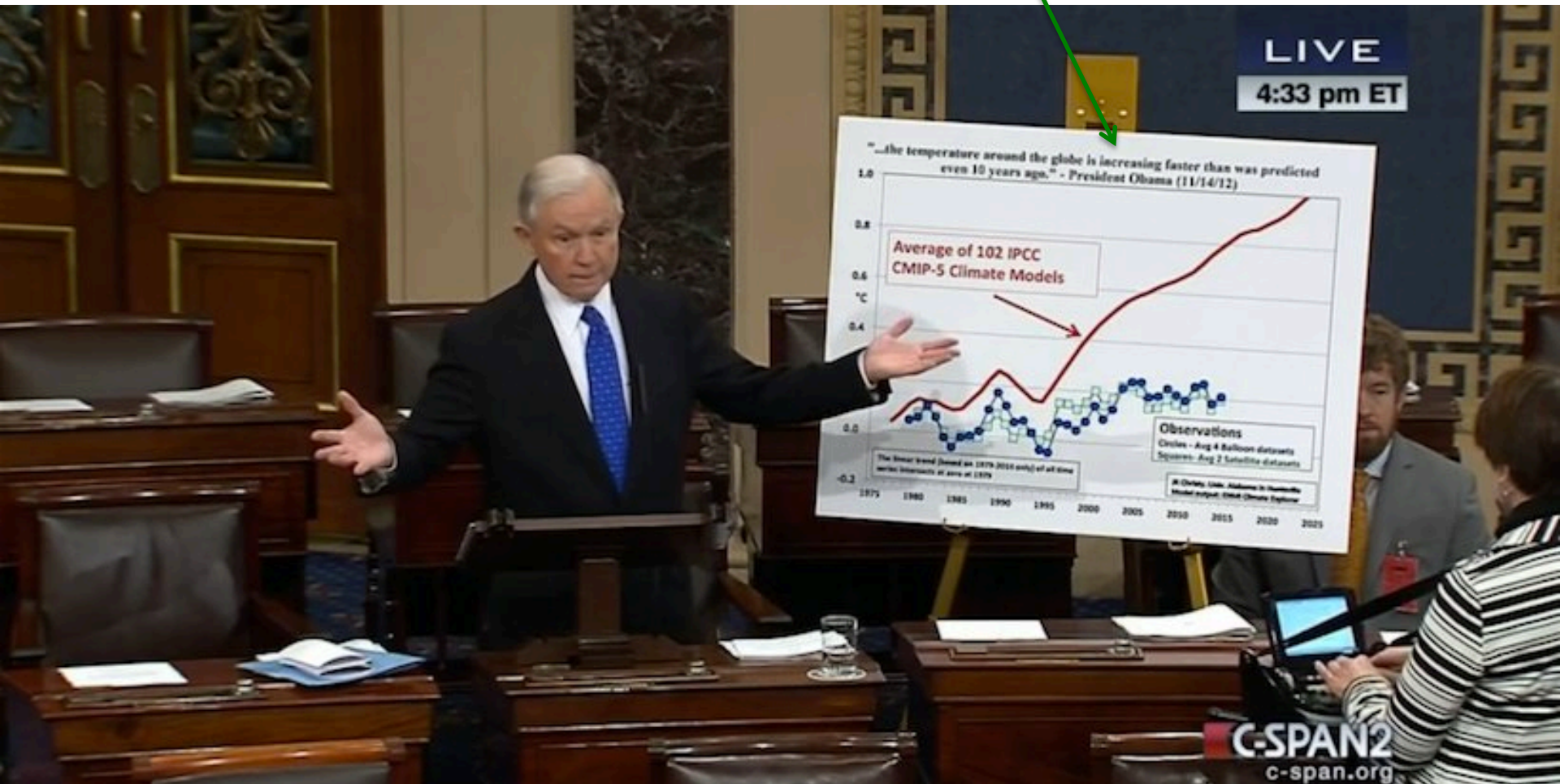


Tropical Tropospheric Temperature Trend ($^{\circ}\text{C}/\text{decade}$) 1979-2013, 102 CMIP-5 Models vs. Observations

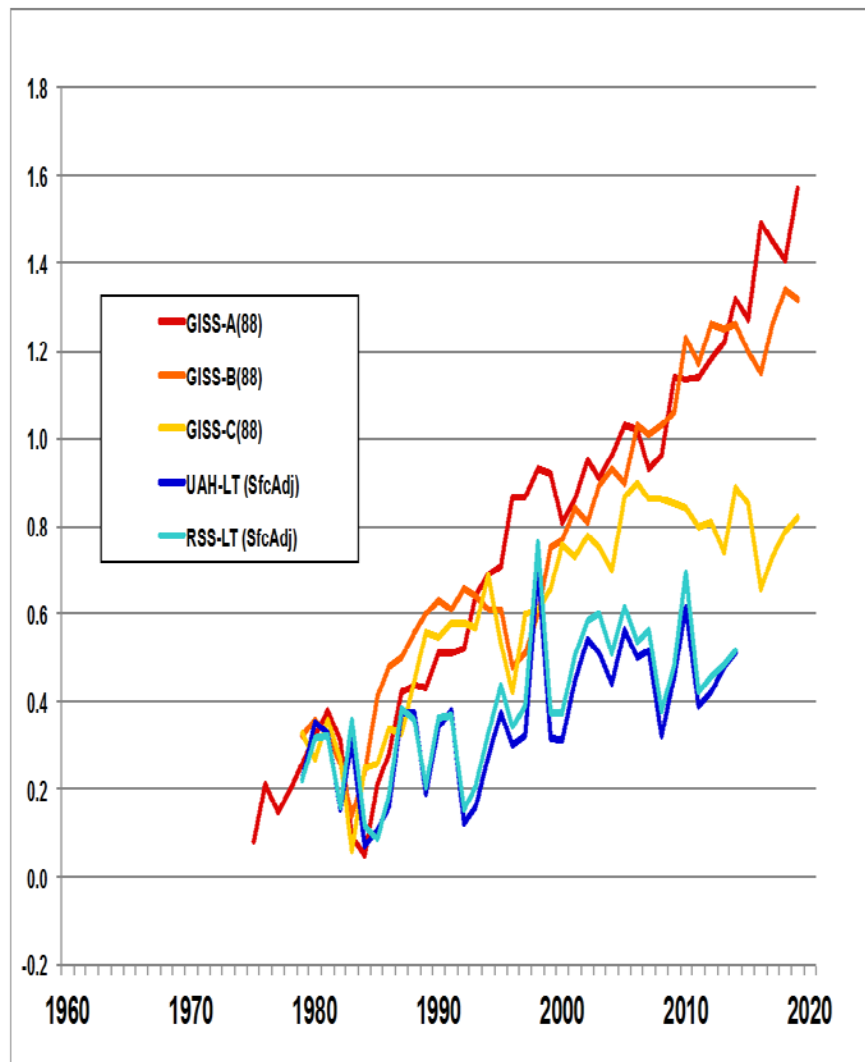




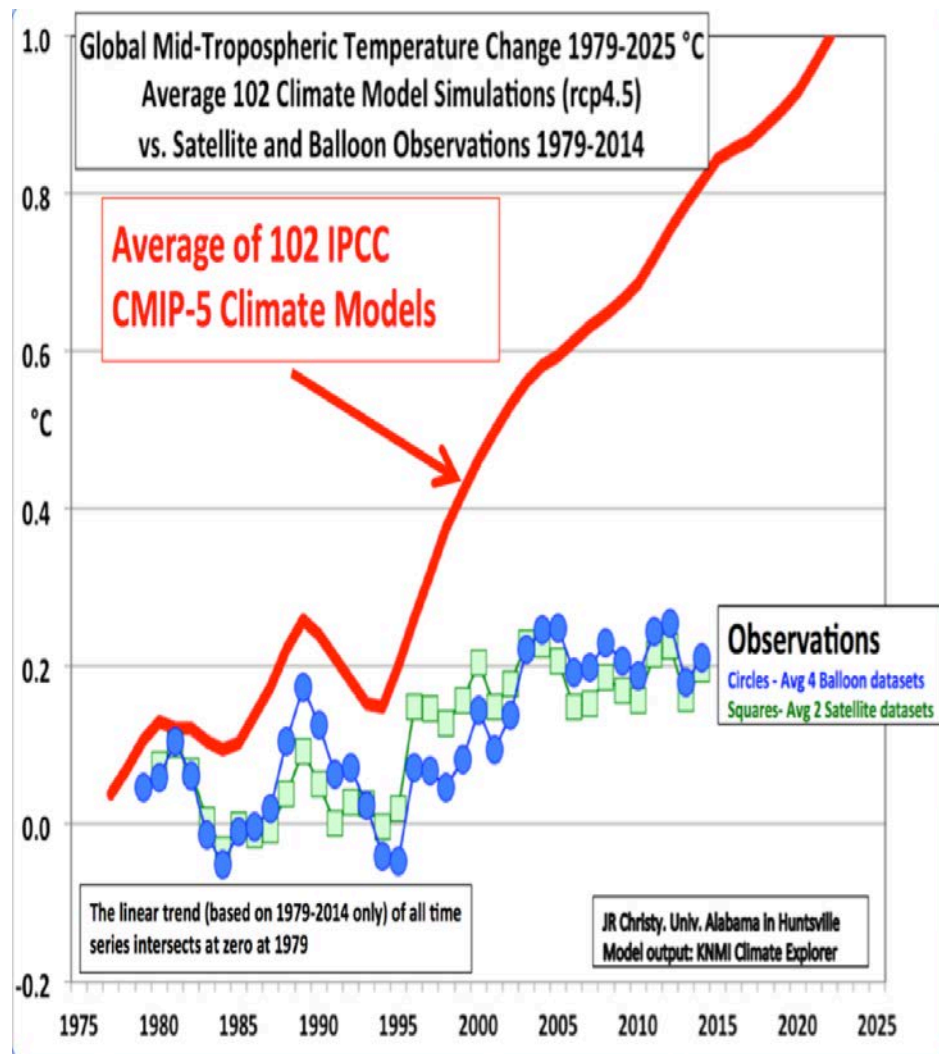
“The temperature around the globe is increasing faster than was predicted just 10 years ago”, President Obama Nov. 14 2012



Sen. Jeff Sessions Floor Speech 27 Jan 2015



1988



2013

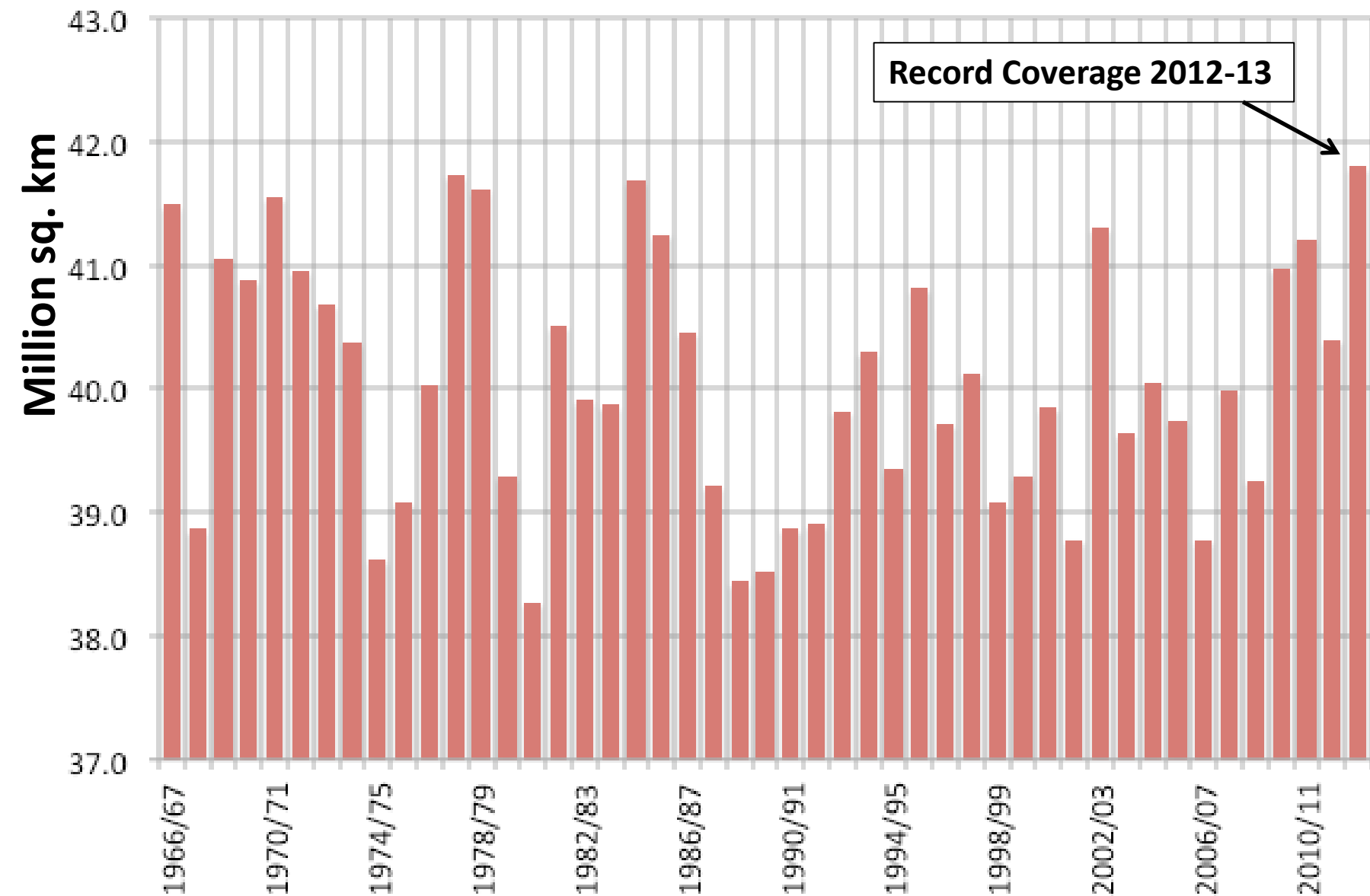
The evidence clearly demonstrates that there is a fundamental problem with the current understanding of the climate system (all models fail in the same direction). The current models fail significantly (a scientific demonstration of falsifiability) in depicting how the global climate system works.

If the models can't tell us what has happened, how can they tell us why it happened (i.e. CO2 emissions)? They should not be used for policy.

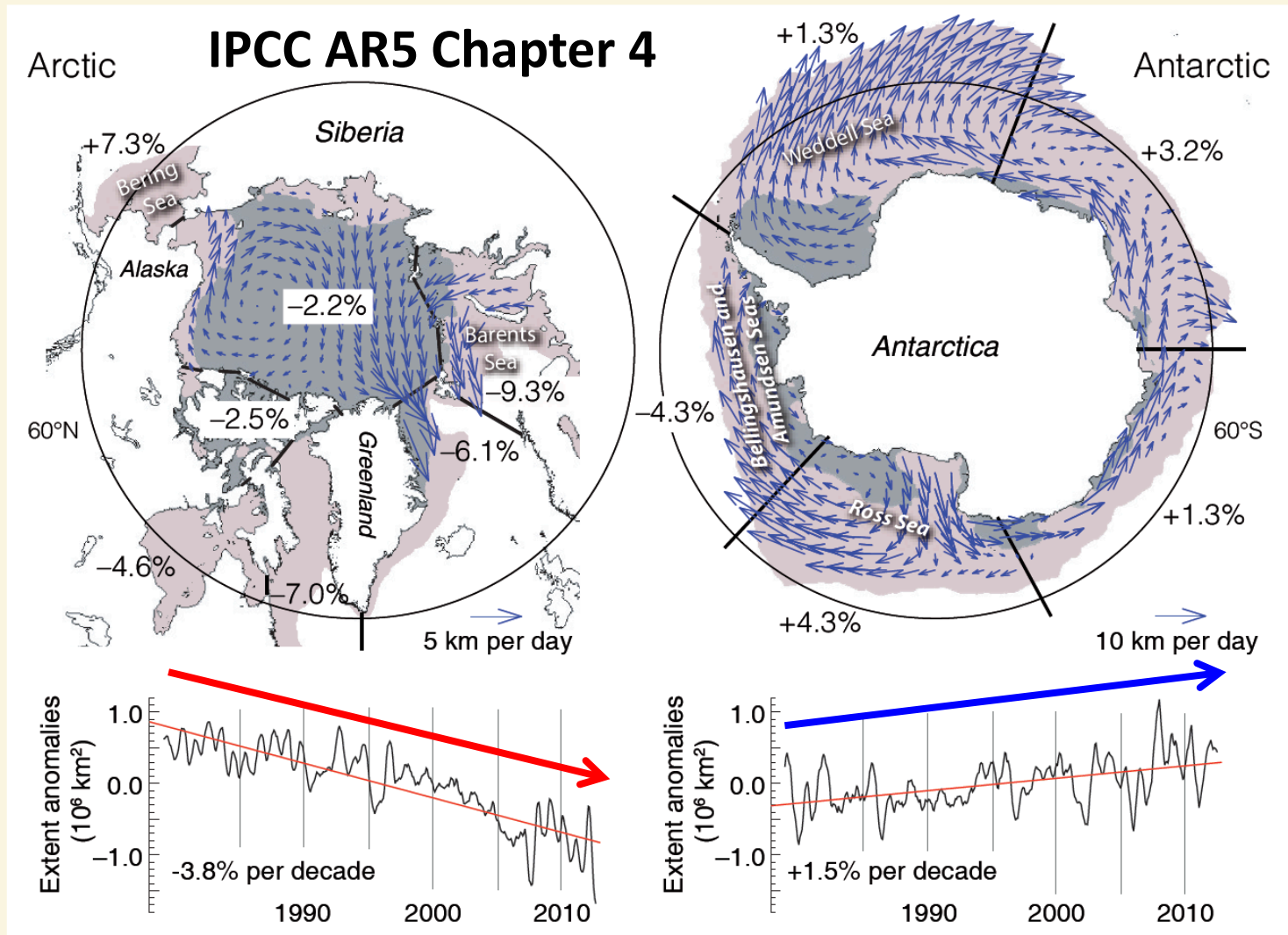
Evidence?

**Disappearing
Snow and Sea Ice**

Northern Hemisphere Snow Extent November to April



IPCC AR5 Chapter 4

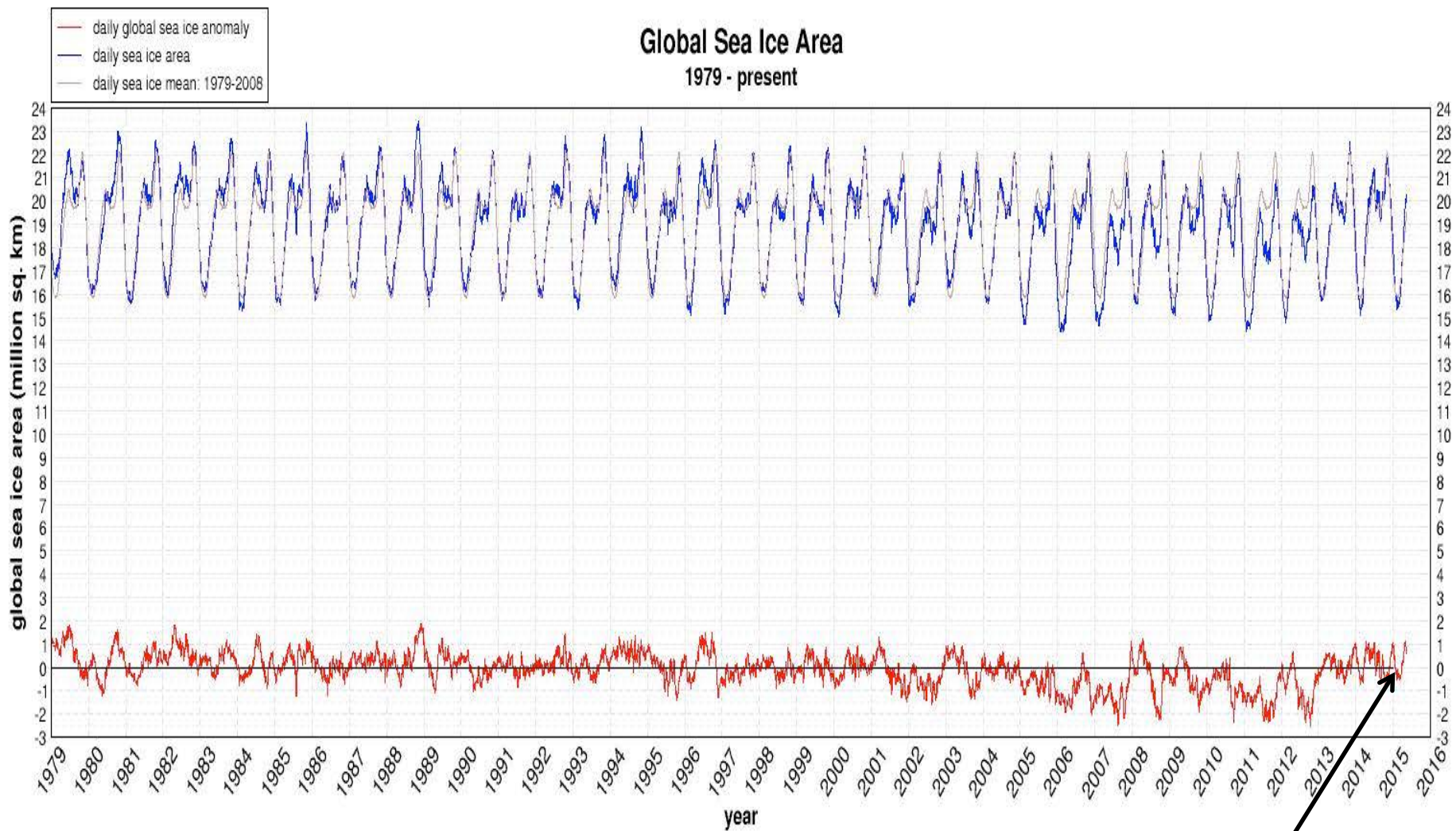


FAQ 4.1, Figure 1 | The mean circulation pattern of sea ice and the decadal trends (%) in annual anomalies in ice extent (i.e., after removal of the seasonal cycle), in different sectors of the Arctic and Antarctic. Arrows show the average direction and magnitude of ice drift. The average sea ice cover for the period 1979 through 2012, from satellite observations, at maximum (minimum) extent is shown as orange (grey) shading.

Arctic Downward

Antarctic Upward

Sea Ice Changes 1979-2012



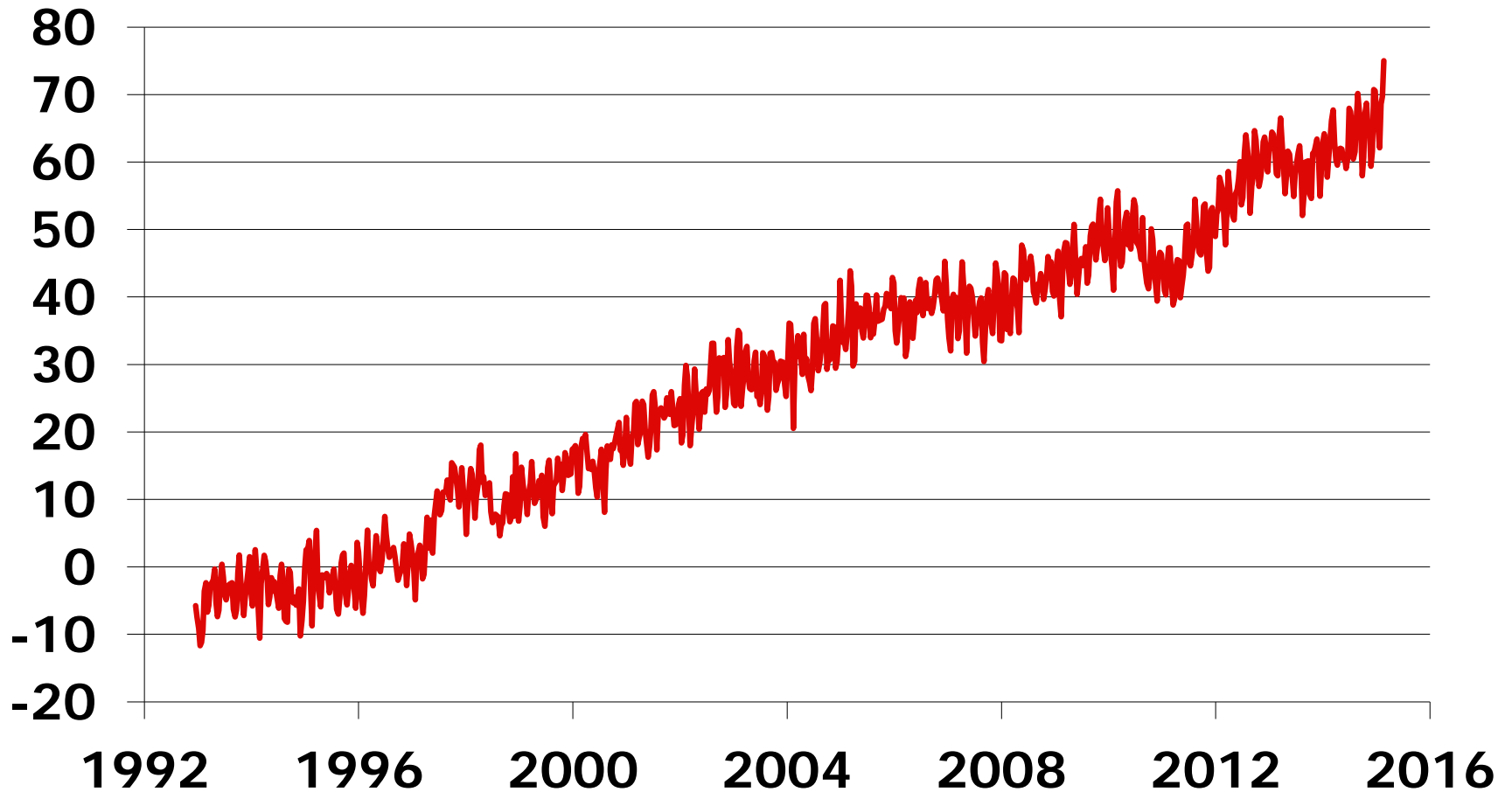
Global Sea Ice is at the long-term average as of 18 May 2015
[2014 Antarctic Sea Ice coverage has set daily records]

Cryosphere Today, Chapman, U. Illinois

Evidence?

Ice Caps and Sea Level

Sea Level 1992- Feb 2015 (mm)

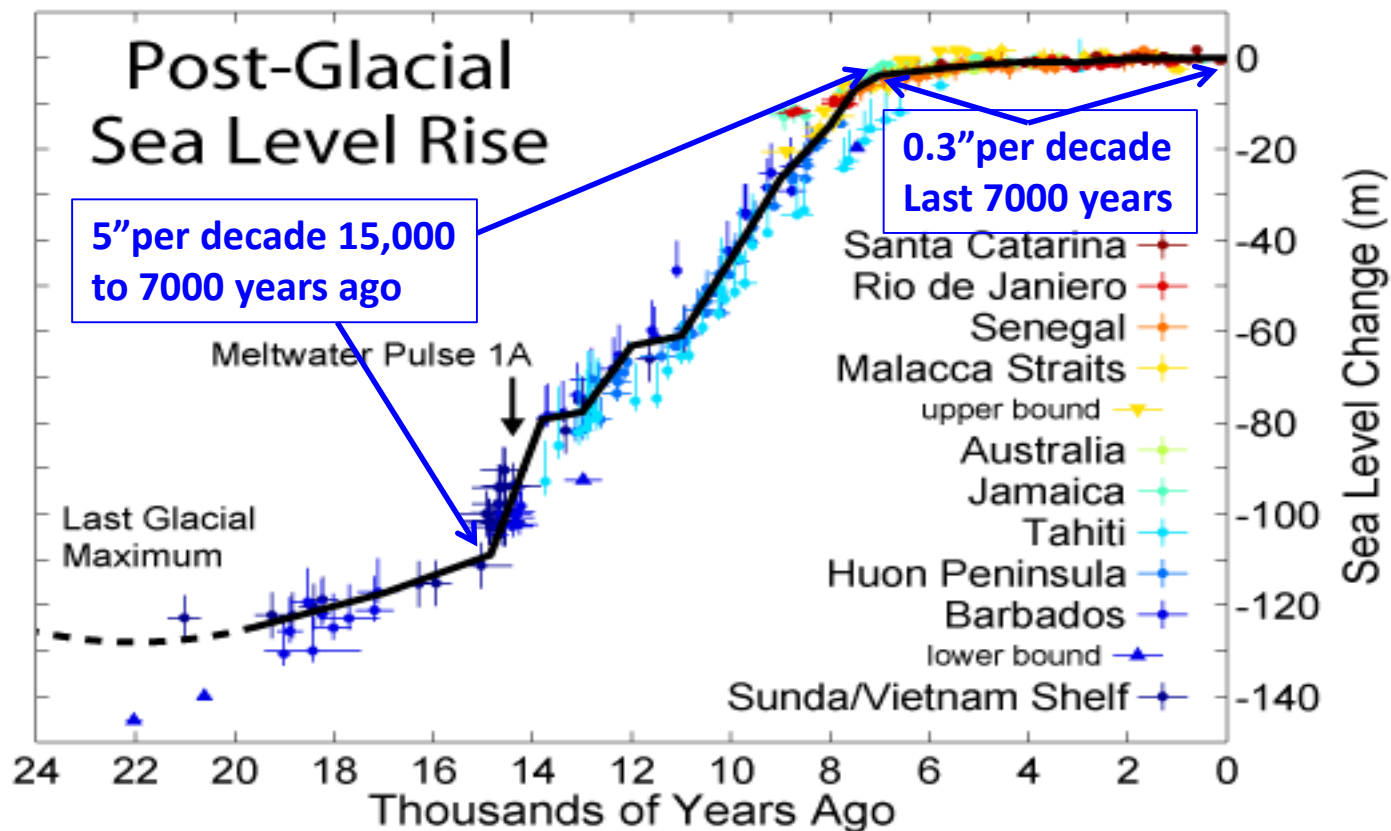


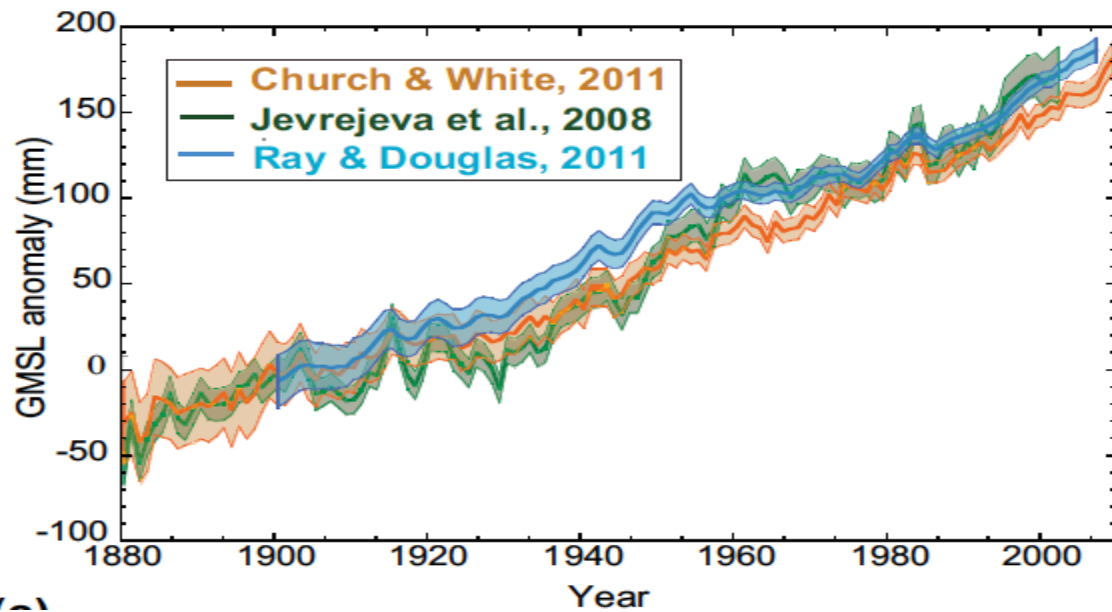
University of Colorado

Sea Level Rises as Land-ice melts.

The major low-latitude ice-age ice sheets finished melting about 8,000 years ago (i.e. Illinois, New York, etc.) and since then the remnant mountain glaciers and parts of Greenland and Antarctica are still adding some melt-water. [The warm period 130,000 years ago saw sea levels 20 ft higher than today, i.e. naturally.]

Sea level also rises for other reasons such as increases in eroded soil material flowing into the ocean and thermal expansion of the water itself.





Sea Level

Over the past 10,000 years, glaciers reached their largest extent in 1850 and are now melting back from there

Current rate of Sea Level Rise is not unusual compared with past 100 years. Sea level is not a static quantity

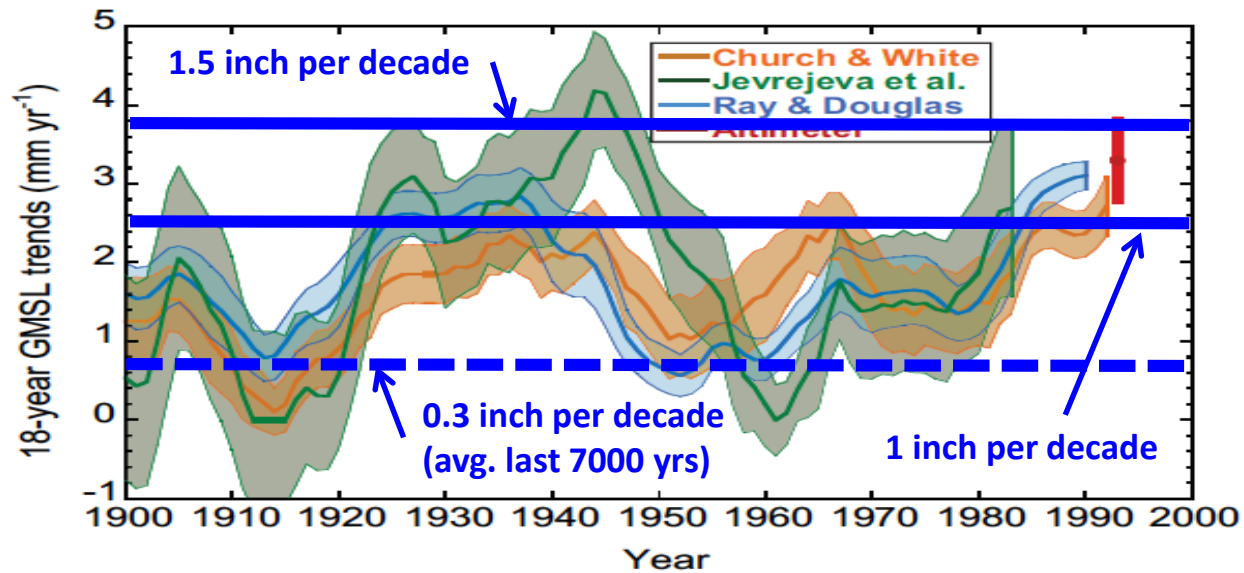
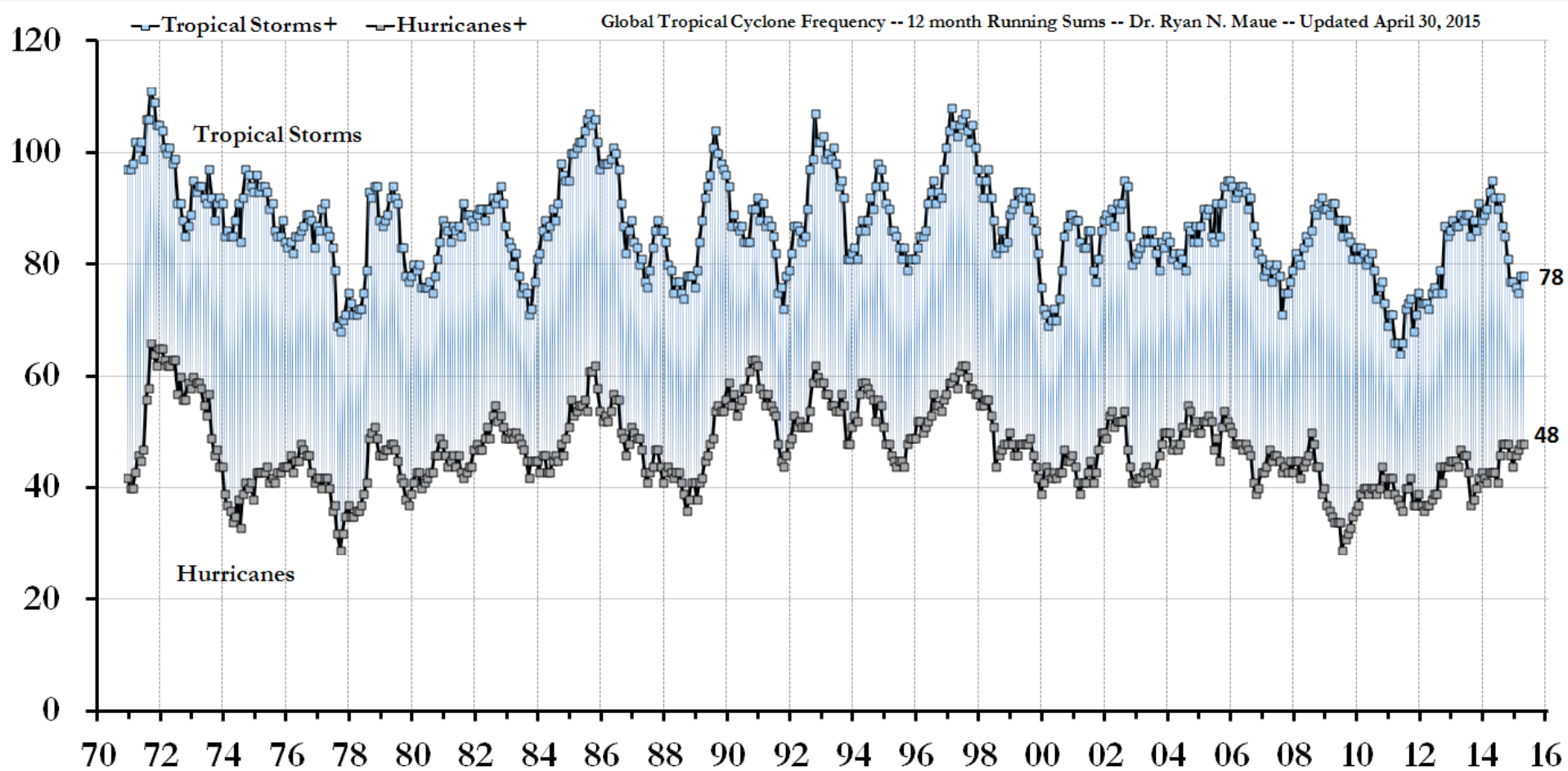


Figure 3.14 | 18-year trends of GMSL rise estimated at 1-year intervals. The time is the start date of the 18-year period, and the shading represents the 90% confidence. The estimate from satellite altimetry is also given, with the 90% confidence given as an error bar. Uncertainty is estimated by the variance of the residuals about the fit, and accounts for serial correlation in the residuals as quantified by the lag-1 autocorrelation.

Evidence?

Extreme Weather

Global Hurricanes (1971 to April 2015)



US Hurricane Landfalls 1900-2013

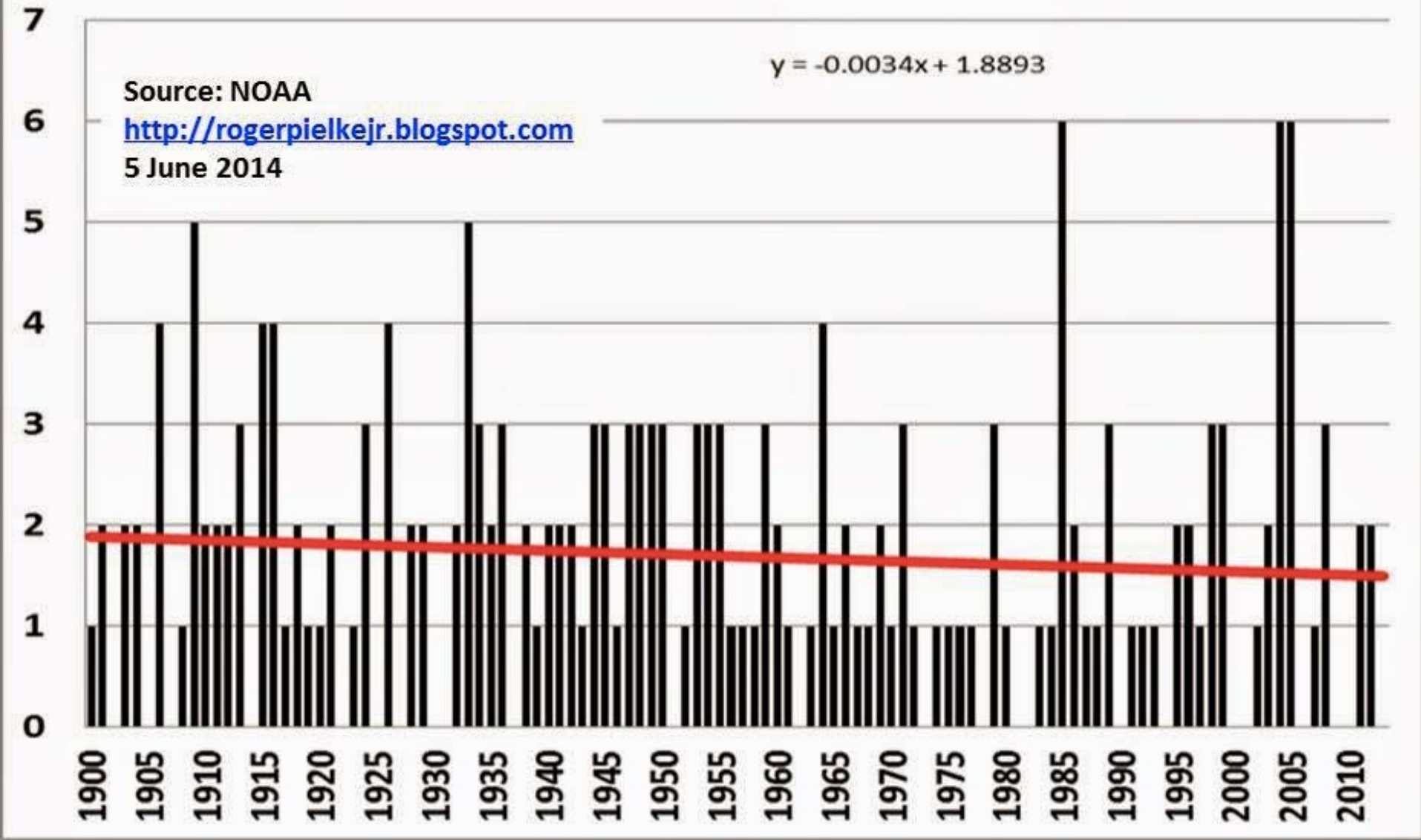
Source: NOAA

<http://rogerpielkejr.blogspot.com>

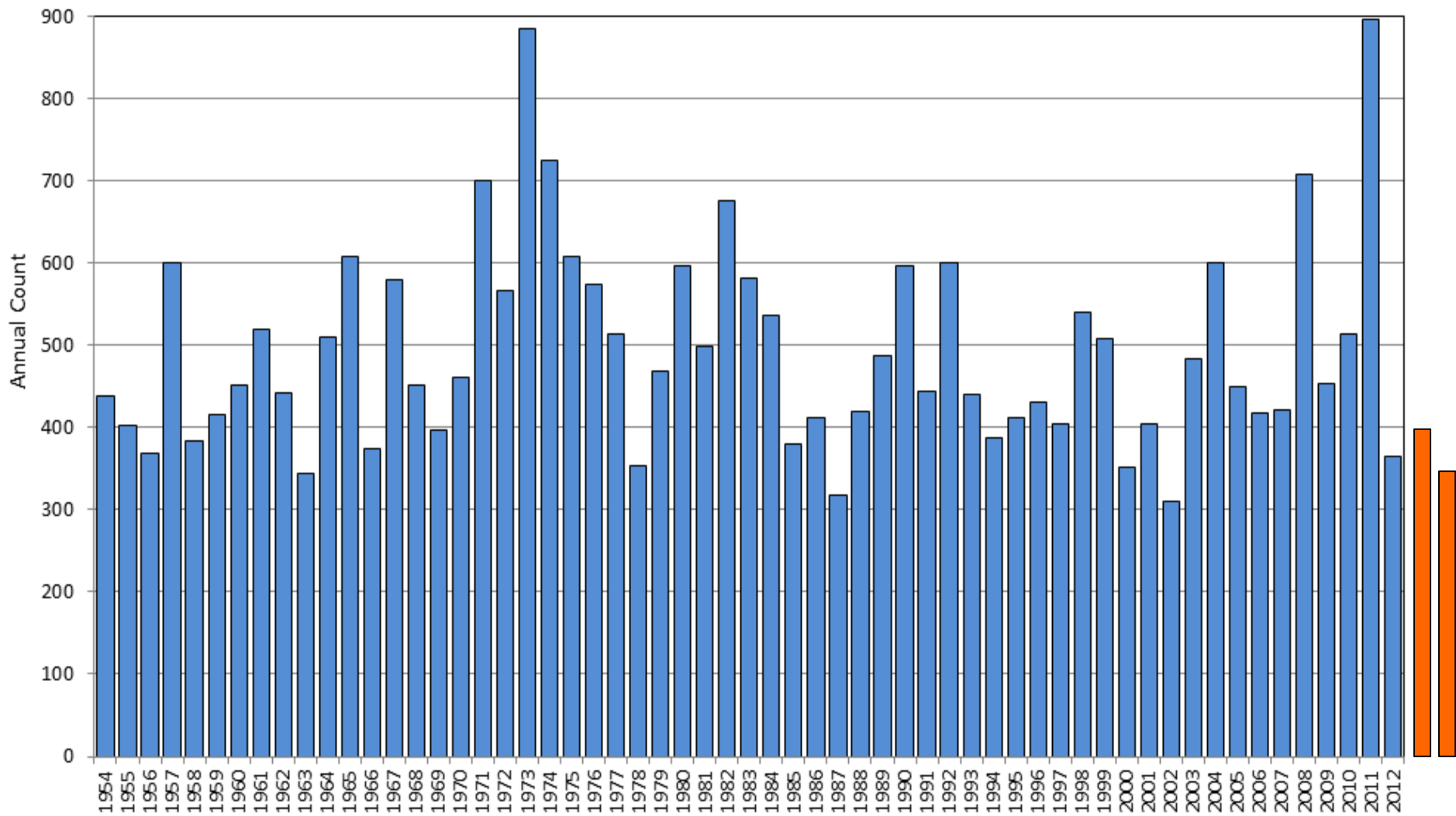
5 June 2014

$$y = -0.0034x + 1.8893$$

1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010



U.S. Annual Count of EF-1+ Tornadoes, 1954 through 2012

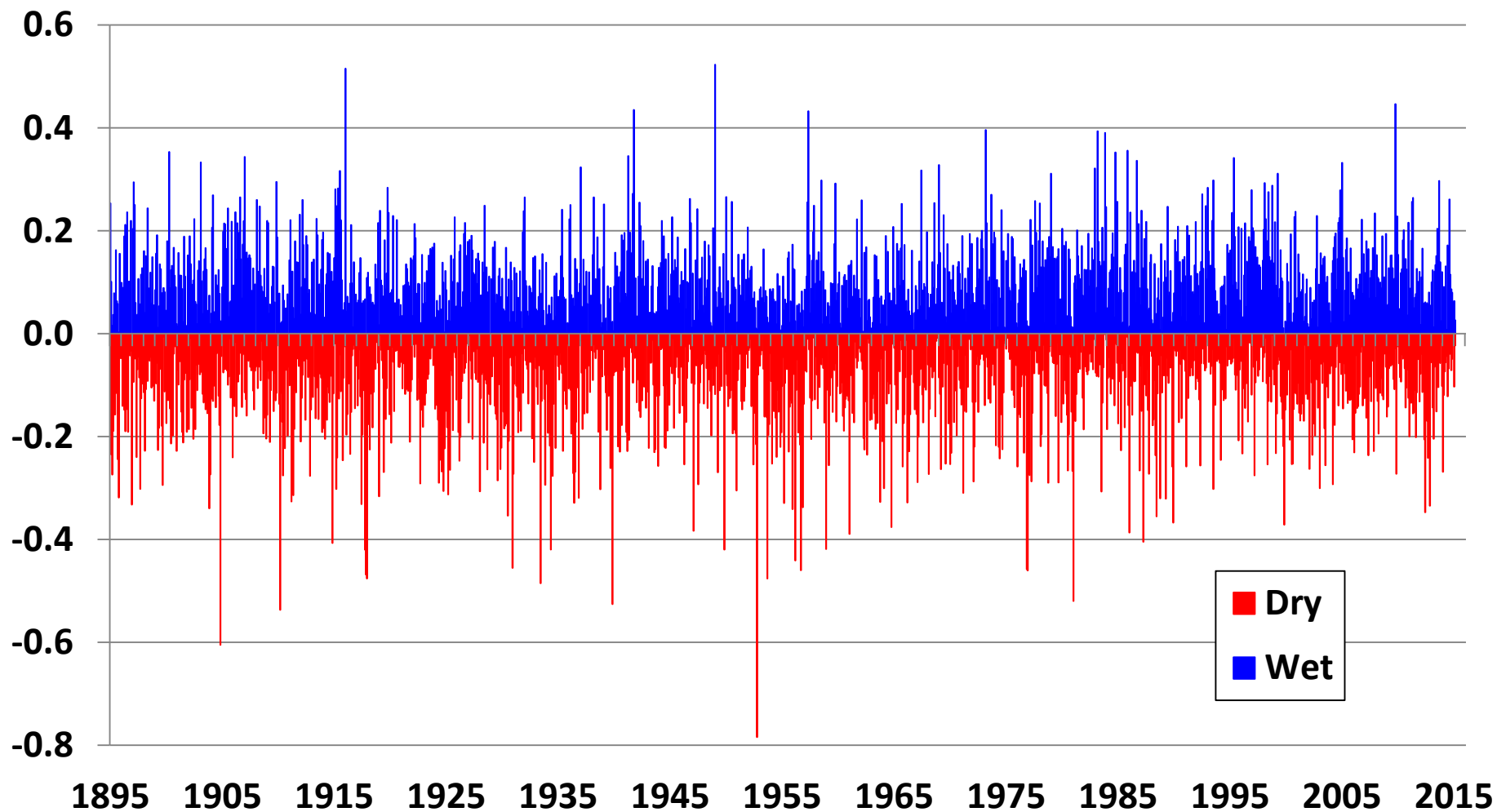


Data Source: NOAA/ NWS Storm Prediction Center

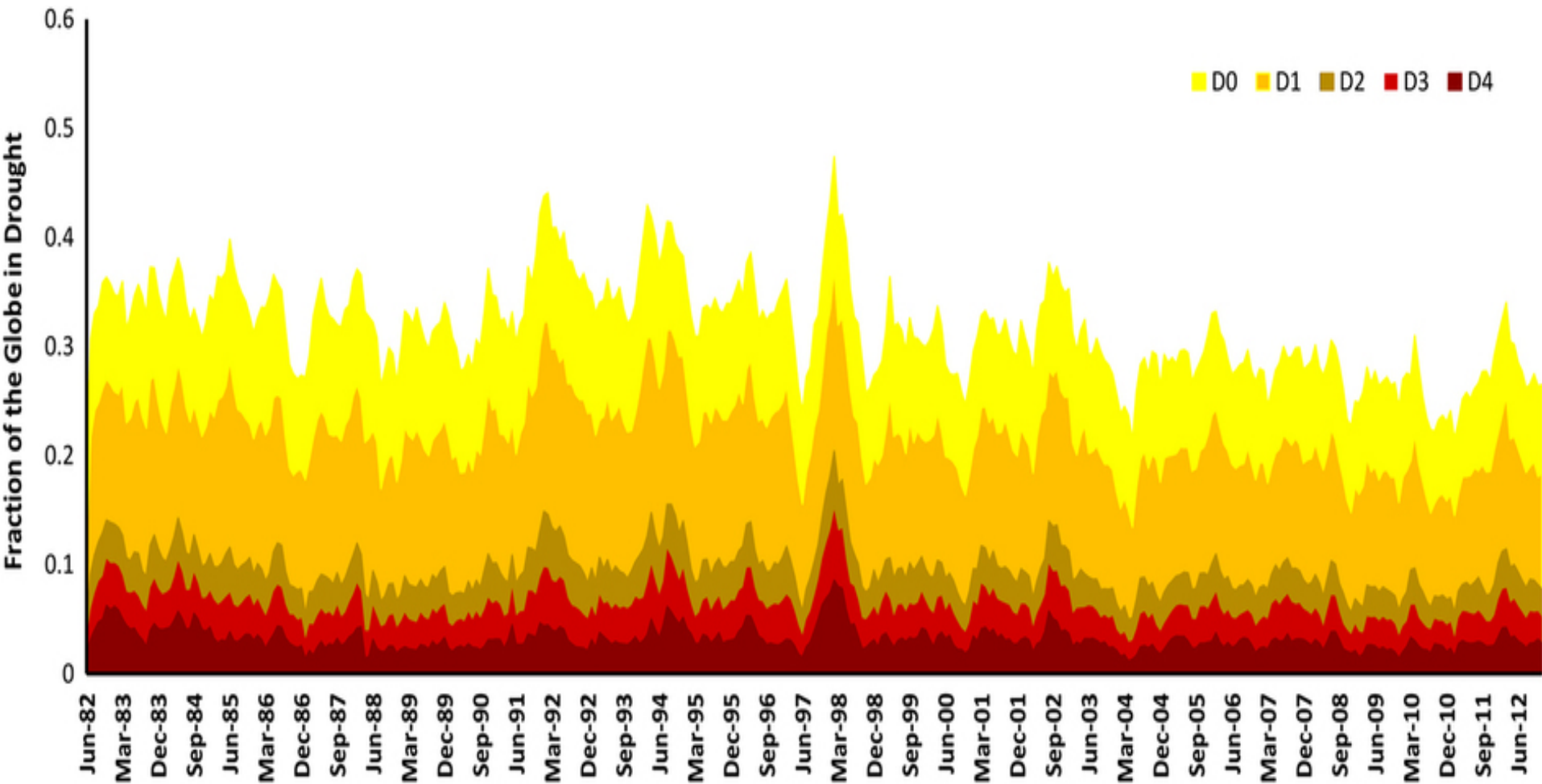
(2013 Preliminary, will decline as duplicates removed)

Monthly Fraction of US with Very Wet (floods) or Very Dry (drought) Conditions

Jan 1895 – Feb 2015 NOAA/NCDC

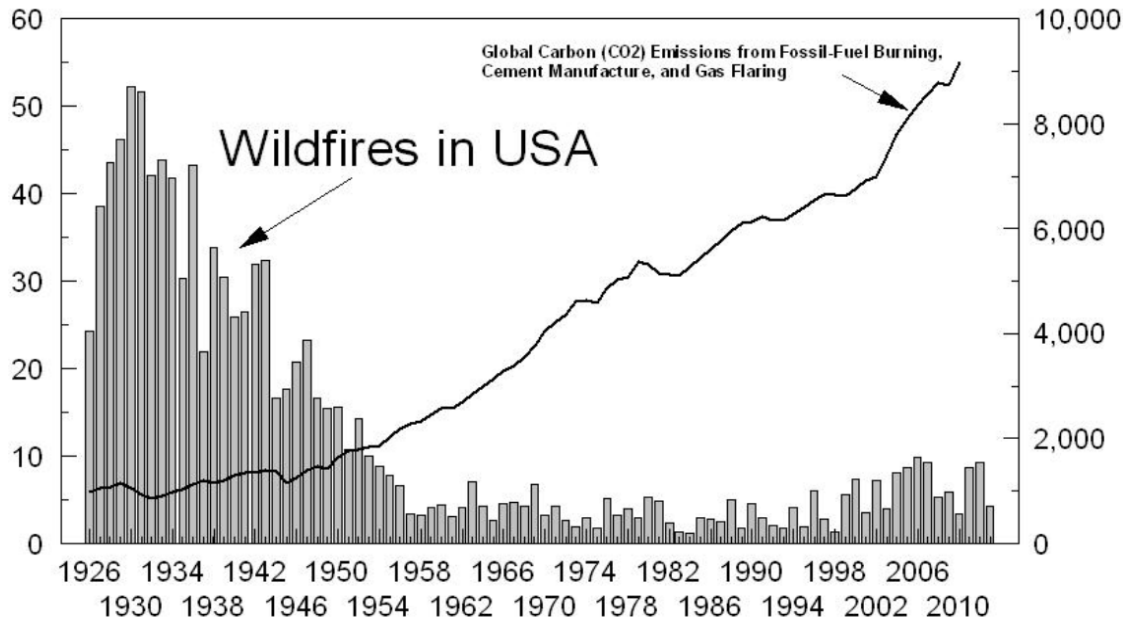


Global Drought Indices 1982-2012



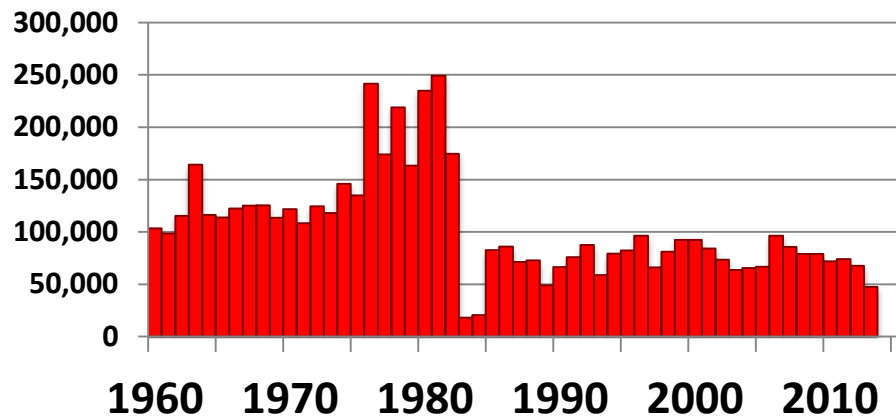
Hao et al. 2014

Million acres million metric tons of carbon

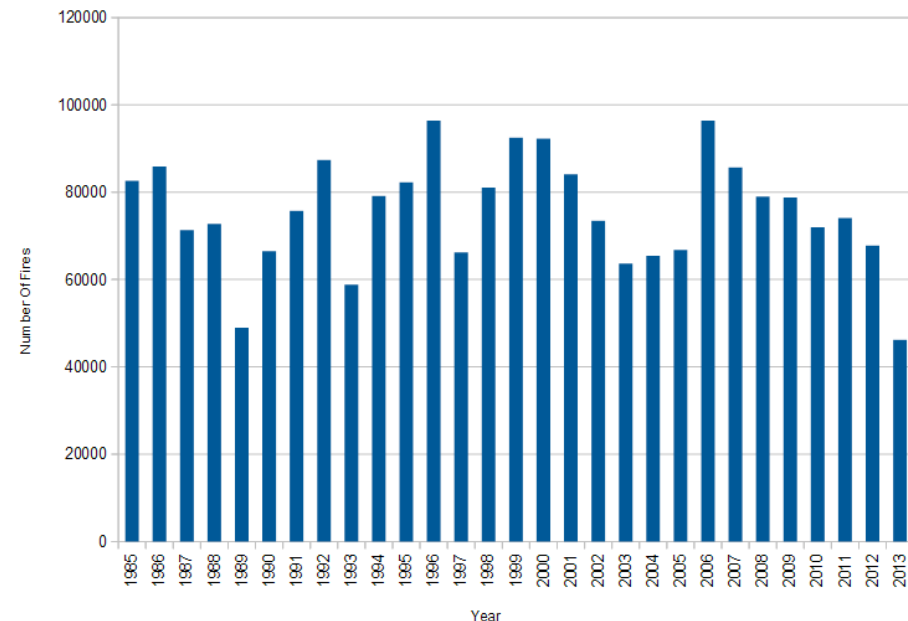


Wildfires are a function of management and suppression policies

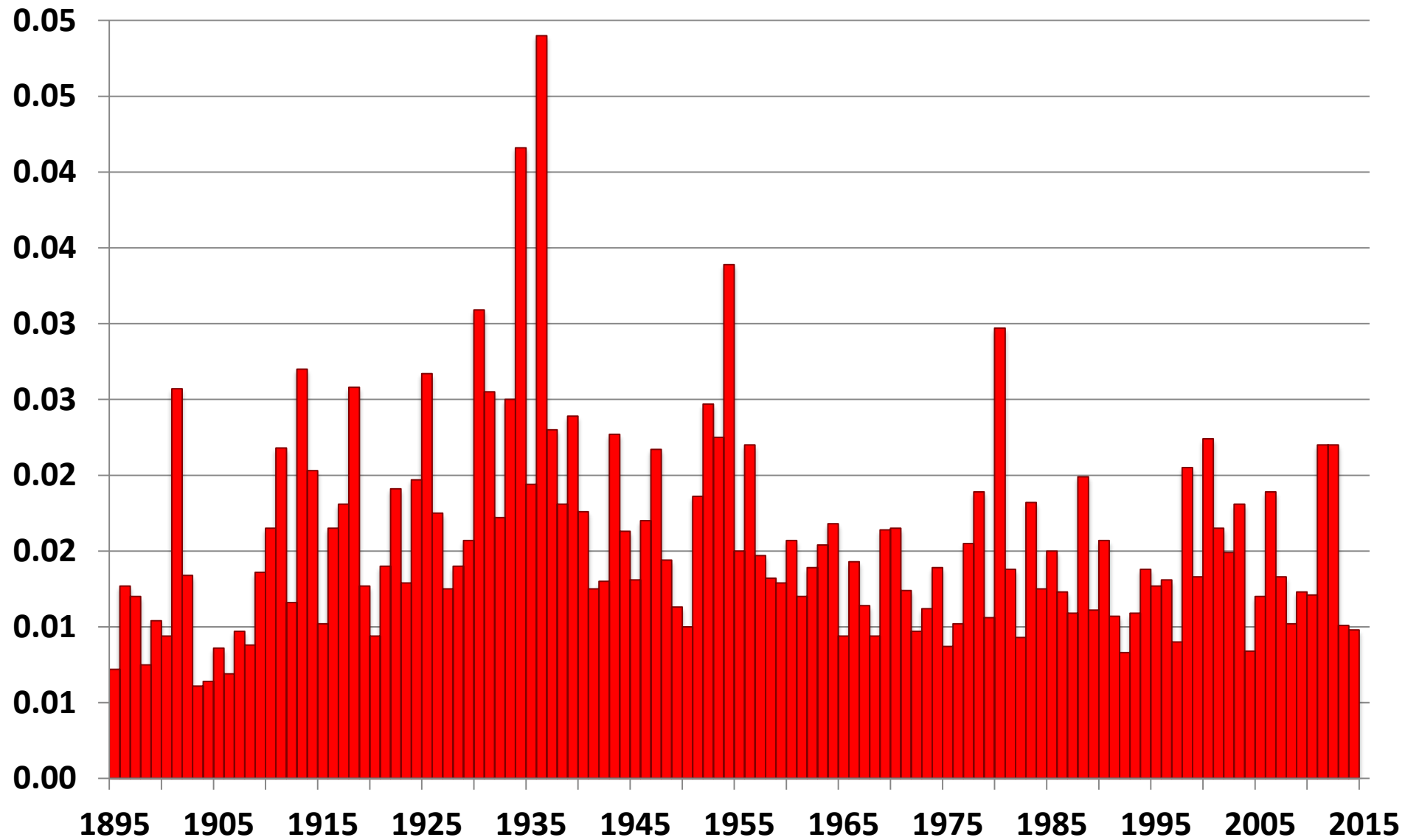
Number Wildfires



US Forest Fire Count

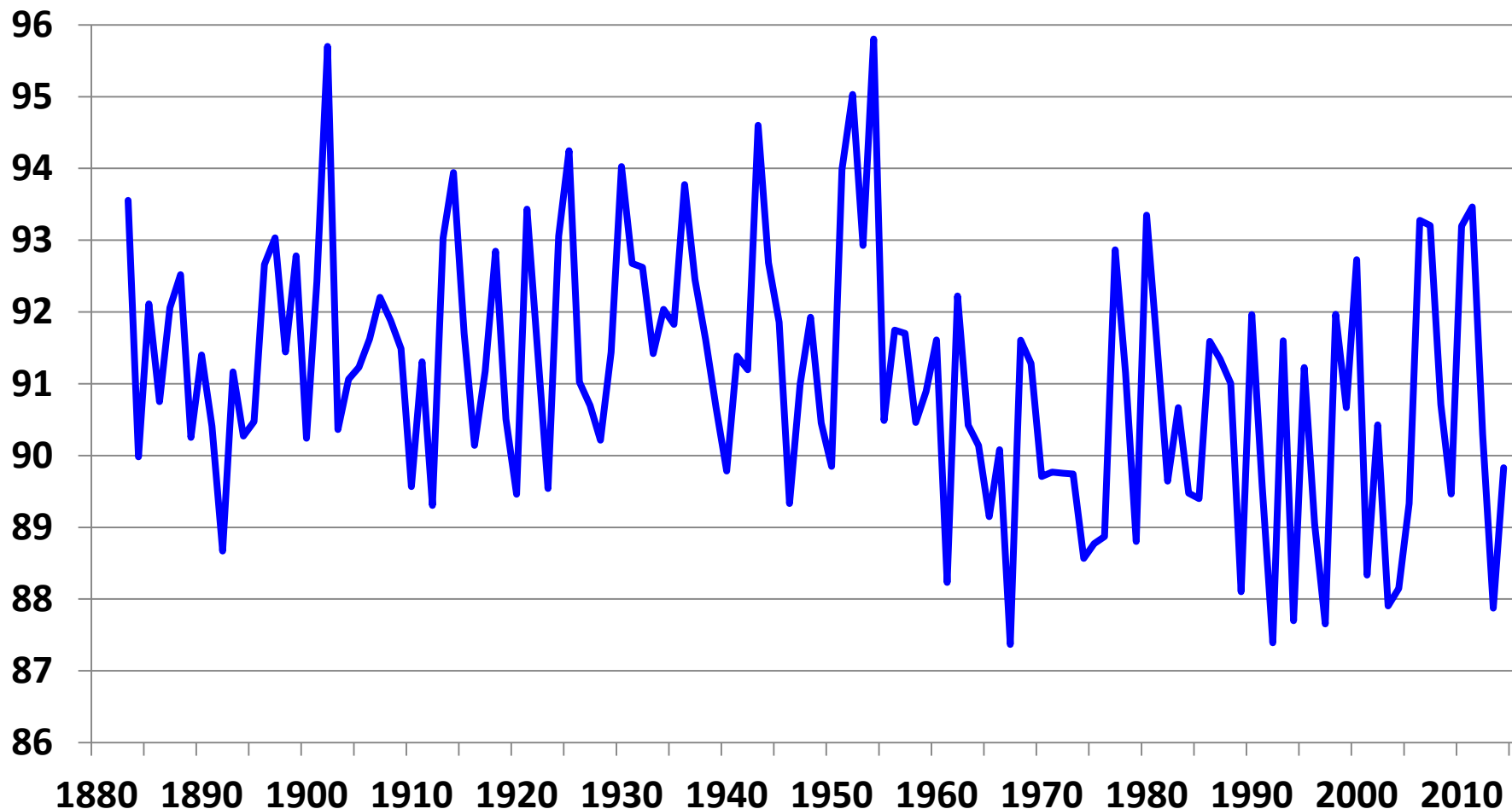


Fraction of Daily High Temperatures at 982 USHCN Stations exceeding 100°F per year 1895-2014



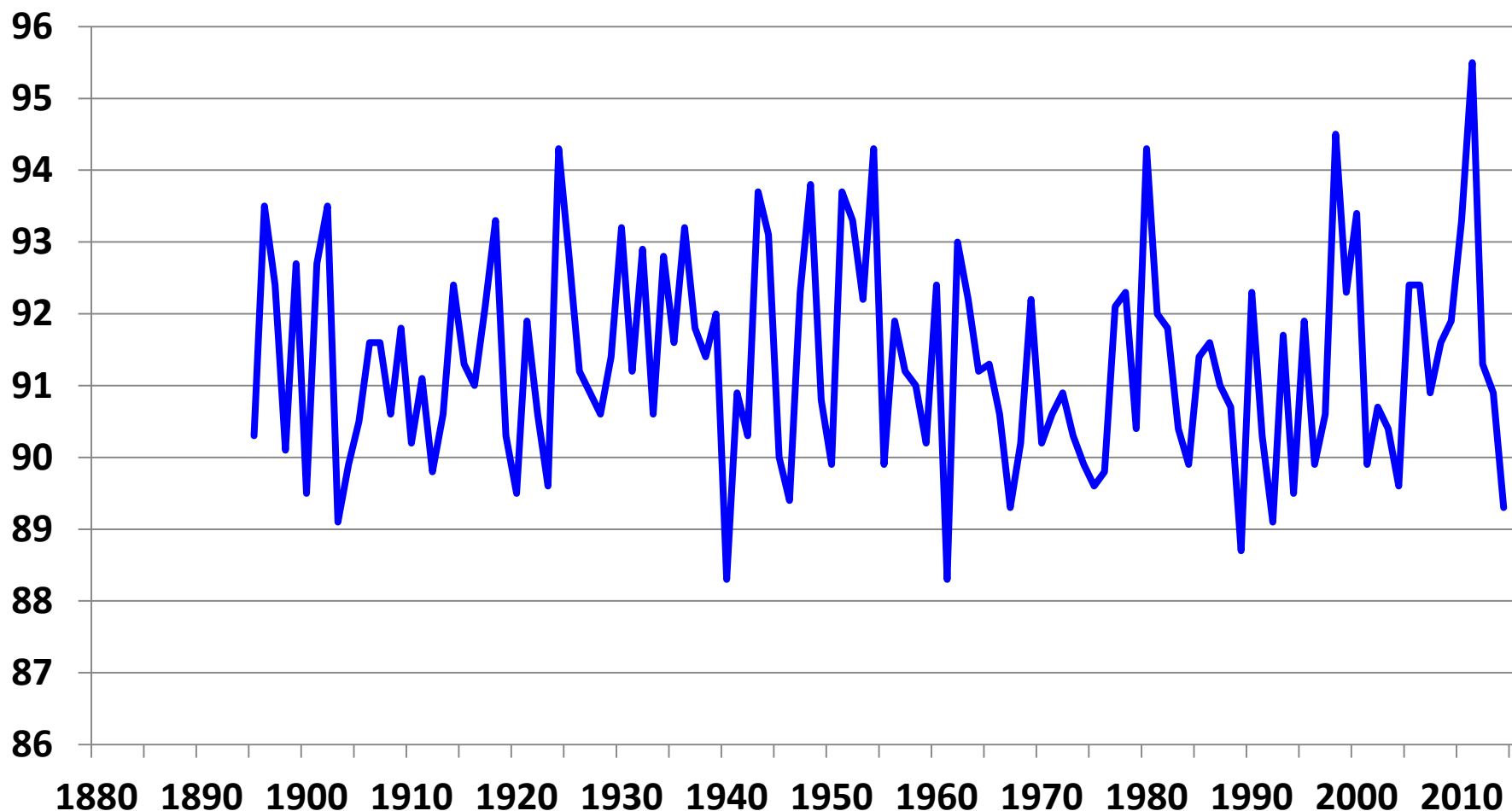
Alabama Summer Daily Maximum Temperature

Average of 4, 100-mile-diameter regions centered on MOB, MGM, BHM and HSV, 1883-2014

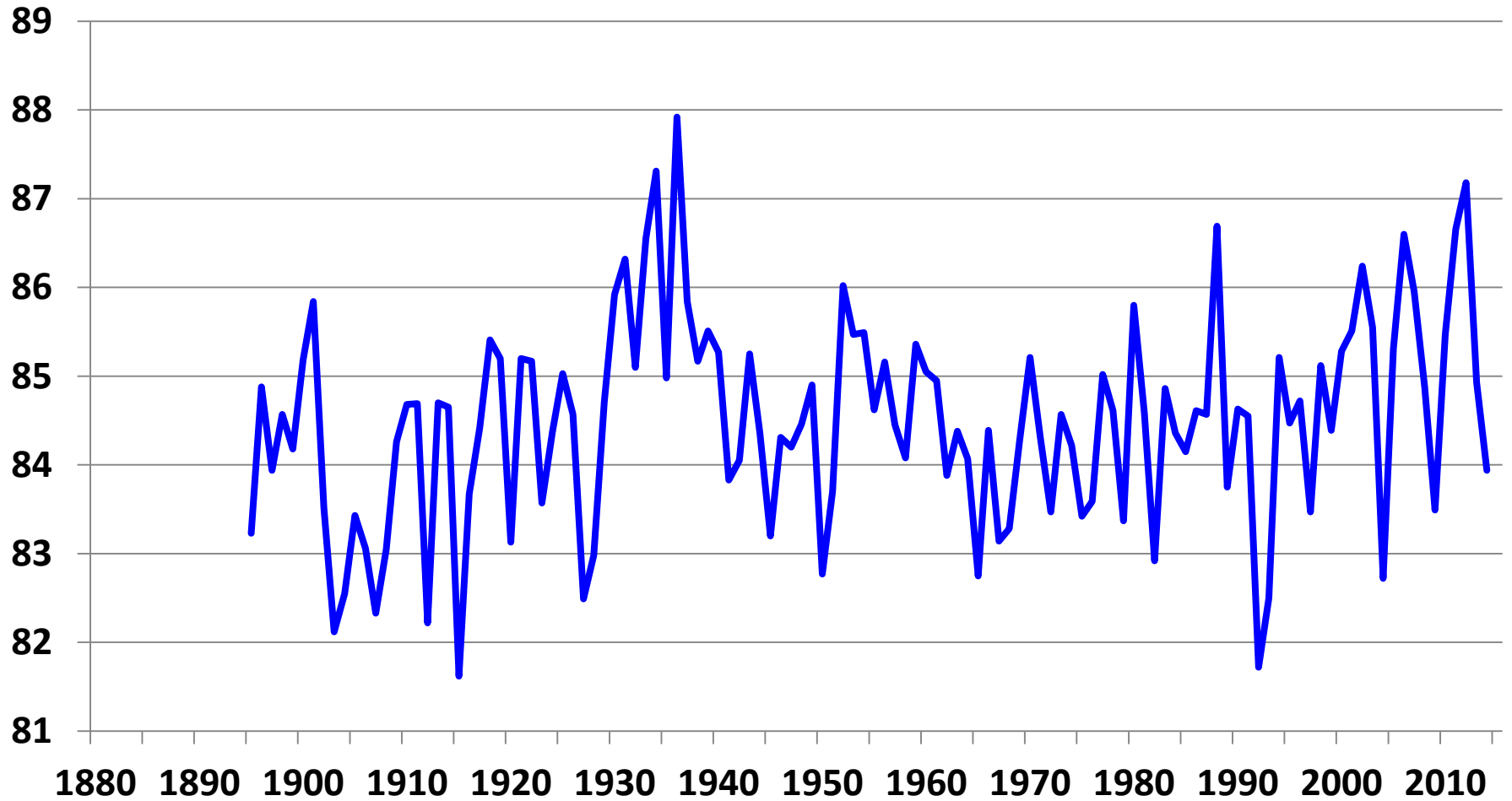


Louisiana Summer Daily Maximum Temperature

Average of 4, 100-mile-diameter regions centered on 1895-2014 (NOAA nClimDiv data)



USA 48 Summer Daily Maximum Temperature 1895-2014



NOAA/NCDC nClimDiv Data

**Views of “dangerous” Climate
Change rely on models that fail
simple testing and are not based
on the evidence we have**

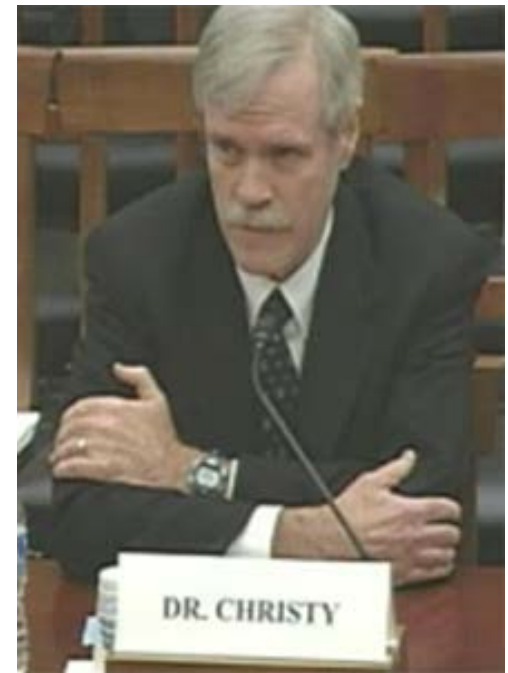
Climate Change is a Political Issue



**House Committee on
Natural Resources
13 May 2015**

**House Science, Space
and Technology
Committee
11 Dec 2013**

**Senate Environment and
Public Works Committee
1 Aug 2012**



Climate Change is a Political Agenda



U.S. Secretary of State John Kerry during a speech on climate change in Jakarta on Sunday. Agence France-Presse/Getty Images

*The science is **unequivocal**, and those who refuse to believe it are simply **burying their heads in the sand**. We don't have time for a meeting anywhere of the **Flat Earth Society**. And in a sense, climate change can now be considered another weapon of mass destruction, perhaps the world's **most fearsome weapon of mass destruction**. —*

**John Kerry
Feb 16 2014**

Climate Change is a Political Agenda

THE WALL STREET JOURNAL.

OPINION

McNider and Christy: Why Kerry Is Flat Wrong on Climate Change

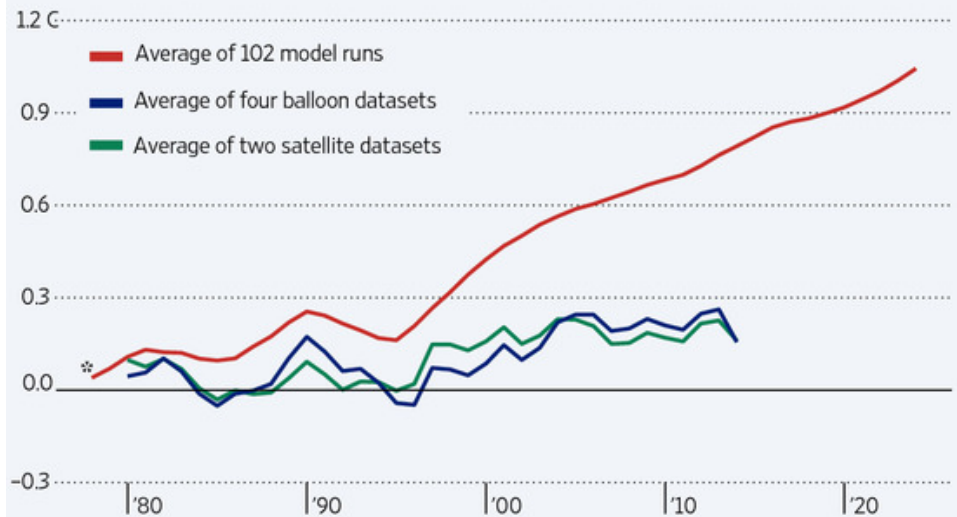
It was the scientific skeptics who bucked the 'consensus' and said the Earth was round.



U.S. Secretary of State John Kerry during a speech on climate change in Jakarta on Sunday. Agence France-Presse/Getty Images

Warming Predictions vs. the Real World

Global mid-tropospheric temperature 5-year averages, in degrees Celsius



* The linear trend of all three curves intersects at zero in 1979, with the values shown as departures from that trend line.

Sources: Various, as described in the "State of the Climate in 2012" in the Bulletin of the American Meteorological Society, August 2013

The New York Times

Though Scorned by Colleagues, a Climate-Change Skeptic Is Unbowed

By MICHAEL WINES JULY 15, 2014



John Christy, a professor of atmospheric science at the University of Alabama, Huntsville, with the weather data he recorded daily while growing up in Fresno, Calif., in the 1960s. Rob Culpepper for The New York Times

Arizona congressman asking questions about outside funding for UAH climate expert John Christy

By Paul Gattis | pgattis@al.com
Email the author | Follow on Twitter
on February 24, 2015 at 12:52 PM, updated February 24, 2015 at 1:29 PM

A U.S. Congressman from Arizona is requesting information from the University of Alabama in Huntsville about outside funding sources of John Christy, director of the school's Earth System Science Center.

Arizona Democrat Raul Grijalva sent a letter dated Tuesday to UAH President Robert Altенkirch about Christy - an outspoken critic of climate change governmental policies.

Altенkirch's chief of staff, Ray Garner, said the school has not received the letter.

The letter to UAH outlines a **New York Times** report that said Willie Soon, a scientist at the Harvard-Smithsonian Center for Astrophysics, has received more than \$1.2 million from the fossil fuel industry. The Times article said he has frequently omitted that information.

Soon is considered a skeptic that climate change is harmful.

Grijalva, the ranking member of the House Natural Resources Committee and a proponent of President Obama's efforts to address climate change, sent letters to seven climate experts asking about outside funding that could influence their testimonies before Congress as well as their research.

All seven climate experts who received letters are considered opponents to the belief of the harmful effects of climate change, **The Washington Post** reported.

"The whole reason we sent the letter is because we don't know (about Christy's possible outside funding)," said Adam Sarvana, communications director for Natural Resources Committee's Democratic delegation.



• View full size

Arizona Congressman Raul Grijalva.

Paul Gattis | pgattis@al.com



• View full size

John Christy, director of the UAH Earth System Science Center.
(AL.com file photo)

"The way we chose the list of recipients is who has published widely, who has testified in Congress before, who seems to have the most impact on policy in the scientific community and he definitely fits that bill. He was **profiled in The New York Times**."

Christy is also the state's climatologist.

Sarvana said the committee has no smoking gun on Christy.

Paul Gattis | pgattis@al.com

Congress of the United States
Washington, DC 20515

Feb. 24, 2015

Robert A. Altенkirch
President, The University of Alabama in Huntsville
Shelbie King Hall, room 374
Huntsville, AL 35899

Dear President Altенkirch:

As Ranking Member of the House Committee on Natural Resources, I have a constitutional duty to protect the public lands, waters and resources of the United States and ensure that taxpayers are able to enjoy them. I write today because of concerns raised in a recent *New York Times* report and documents I have received that highlight potential conflicts of interest and failure to disclose corporate funding sources in academic climate research. Understanding climate change and its impacts on federal property is an important part of the Committee's oversight plan.

As you may have heard, the Koch Foundation appears to have funded climate research by Dr. Willie Soon of the Harvard-Smithsonian Center for Astrophysics, some of which formed the basis of testimony before the U.S. House Committee on Science, Space and Technology and the Kansas State Legislature's House Energy and Environment Committee - funding that was not disclosed at the time. Exxon Mobil, in response to an inquiry from the House Science Committee, may have provided false or misleading information on its funding for Dr. Soon's work. Southern Services Company funded Dr. Soon's authorship of several published climate studies; Dr. Soon did not disclose this funding to many of those journals' publishers or editors.

If true, these may not be isolated incidents. Professor John Christy at the Earth System Science Center has testified many times before the U.S. Congress on climate change. His December 2013 testimony to the House Committee on Science, Space and Technology said of the Nobel Prize-winning U.N. Intergovernmental Panel on Climate Change, "We need to put down the IPCC as soon as possible - not to protect the patient who seems to be thriving in its own little cocoon, but for the sake of the rest of us whom it is trying to infect with its disease. Fortunately much of the population seems to be immune, but some governments seem highly susceptible to the disease."



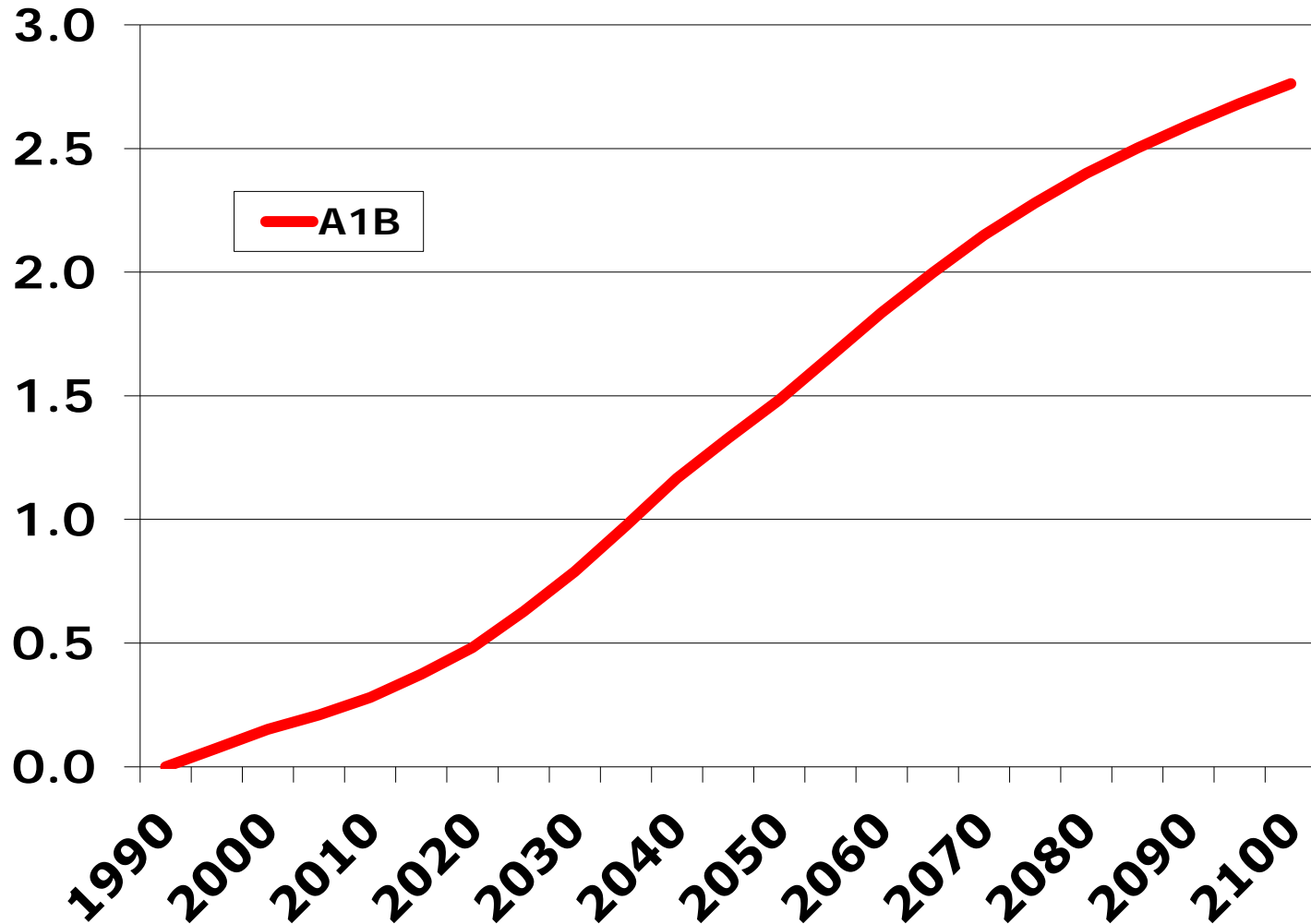
"The way we chose the list of recipients is who has published widely, who has testified in Congress before, who seems to have the most impact on policy in the scientific community and he definitely fits that bill. He was **profiled in The New York Times**."

**Will Regulations make a
difference?**

California believes Regulations will do something

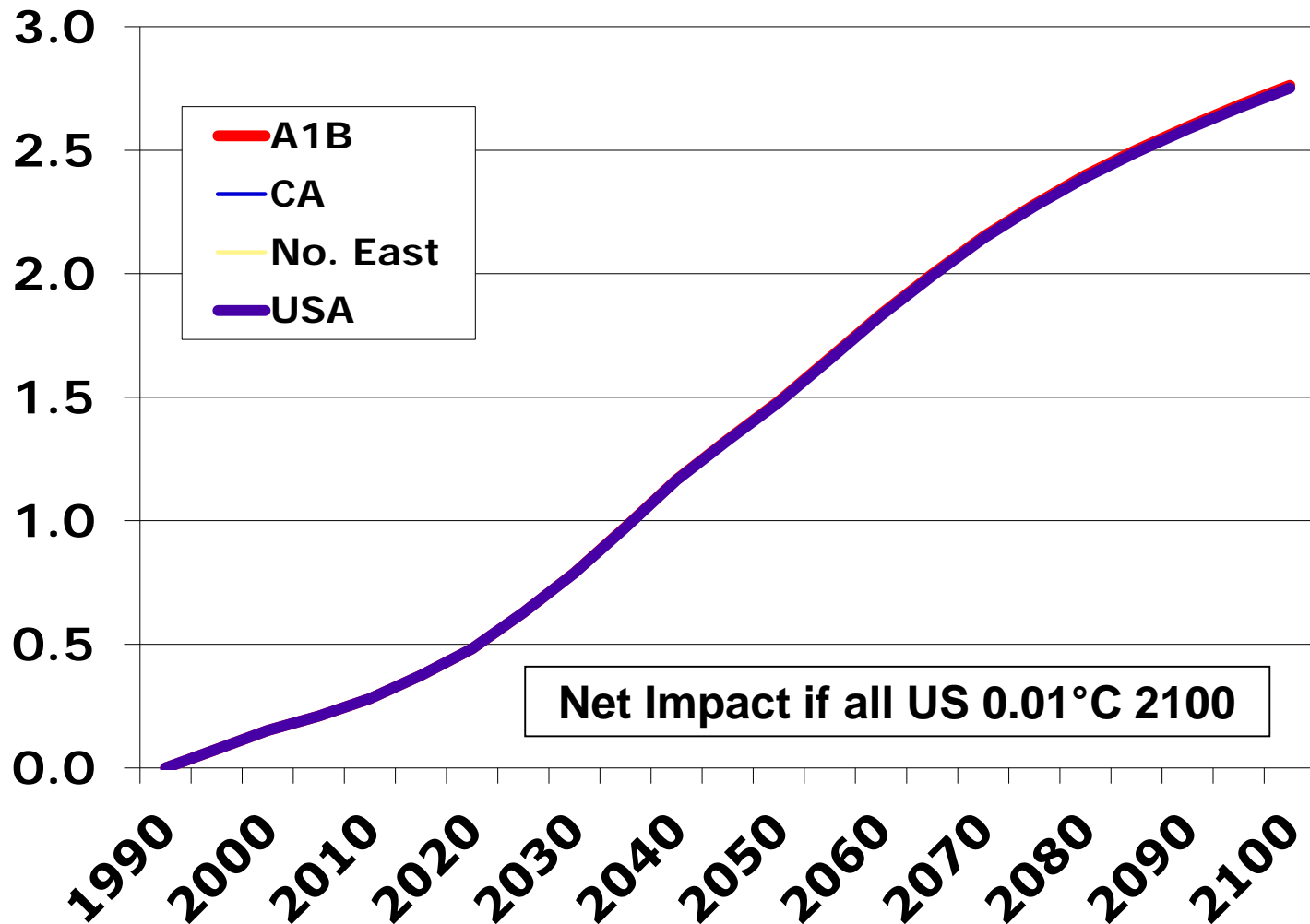
- Force a limit on emissions of Light Duty Vehicles
- California AB 1493 seeks to reduce tailpipe emissions of CO₂ by 26% by 2016
- 11 NE States adopted AB 1493
- Trial in Federal Court (Burlington VT) to address the engineering, legal and climate issues of AB 1493, April-May 2007

IPCC “Best Estimate”



California AB 1493

26% CO2 reduction LDV 2016



The temperature impact on global temperatures if the entire world adopted AB 1493 is an undetectable 0.03° C.

Latest sensitivity results suggest the impact is even smaller.

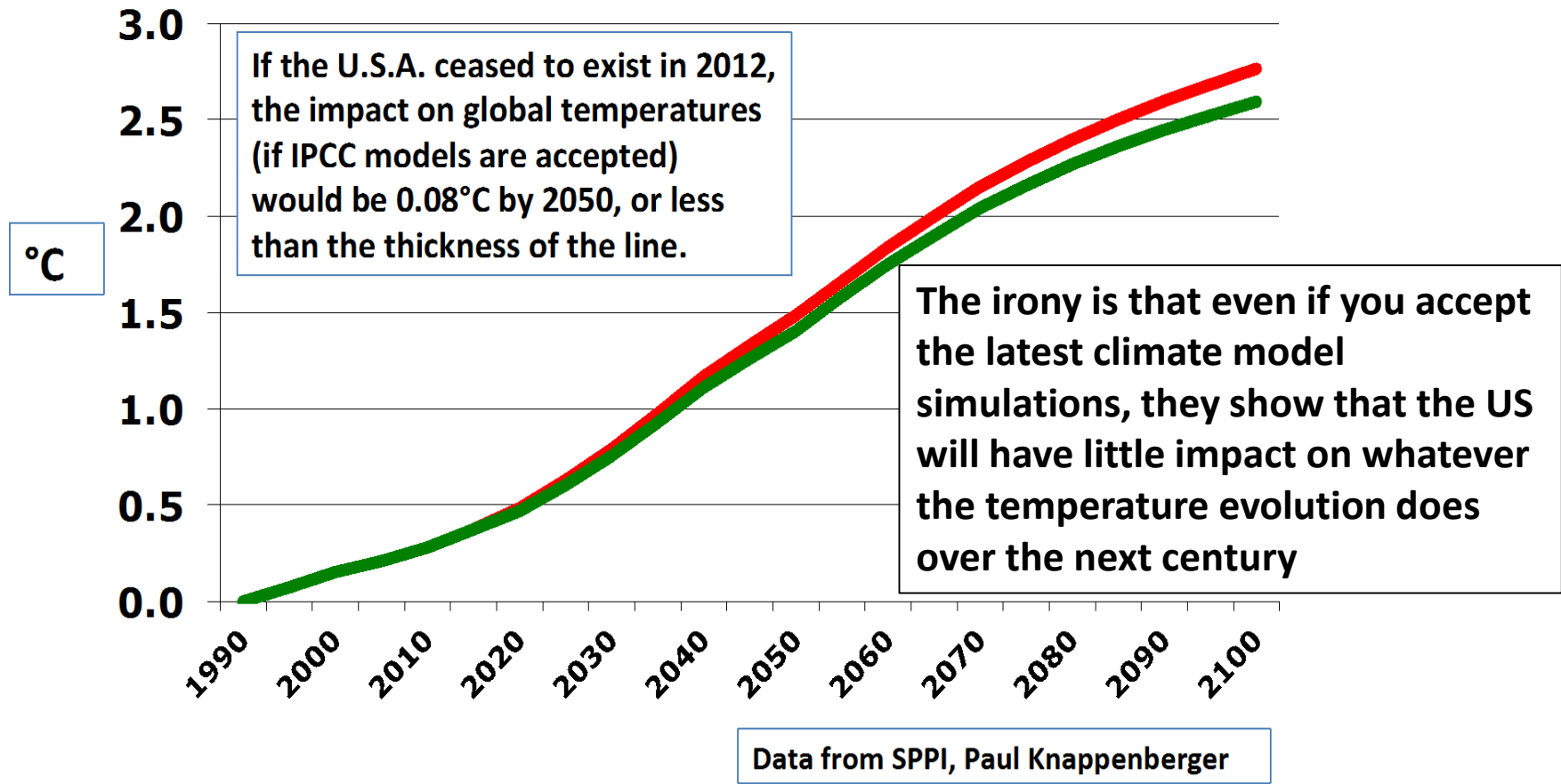
Judge William Sessions III Ruling 12 Sept 2007

AB 1493 is legal

Pg 46

“Plaintiffs’ expert Dr. Christy estimated that implementing the regulations across the entire United States would reduce global temperature by about $1/100^{\text{th}}$ (.01) of a degree by 2100. Hansen did not contradict that testimony.”

Red – Temperature IPCC A1B Emissions
Green – U.S. stops all emissions 2012

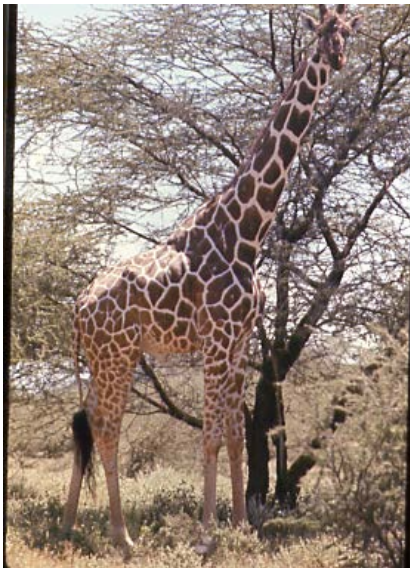


Scientific method shows:

**Regulations that impose higher
energy costs will do nothing
perceptible or attributable to
whatever the climate is going to do**

The Real World Happens

Kenya, East Africa



Energy System

Energy Source



Energy Transmission

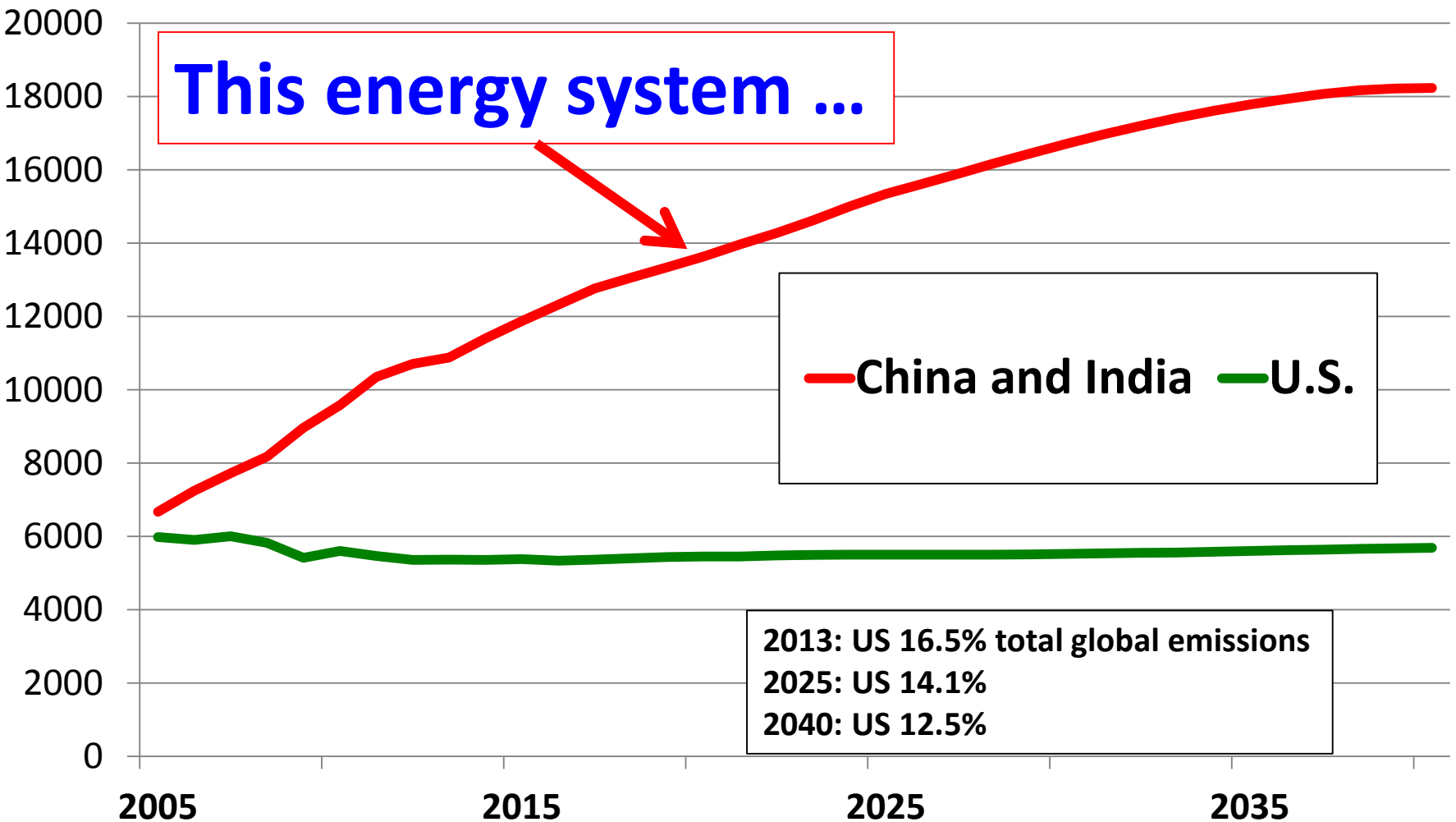


Energy Use



To value human life means
avoiding this energy system

CO2 Emissions EIA 2013 Outlook (million metric tons CO2)



... is better than this Energy System

Energy Source



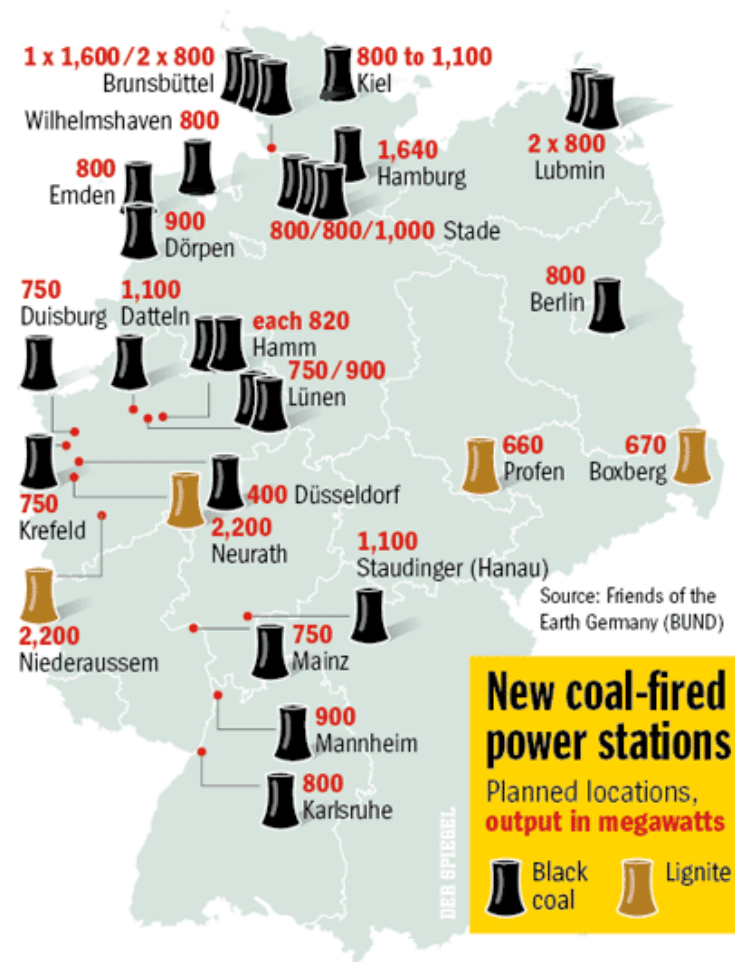
Energy Transmission



Energy Use



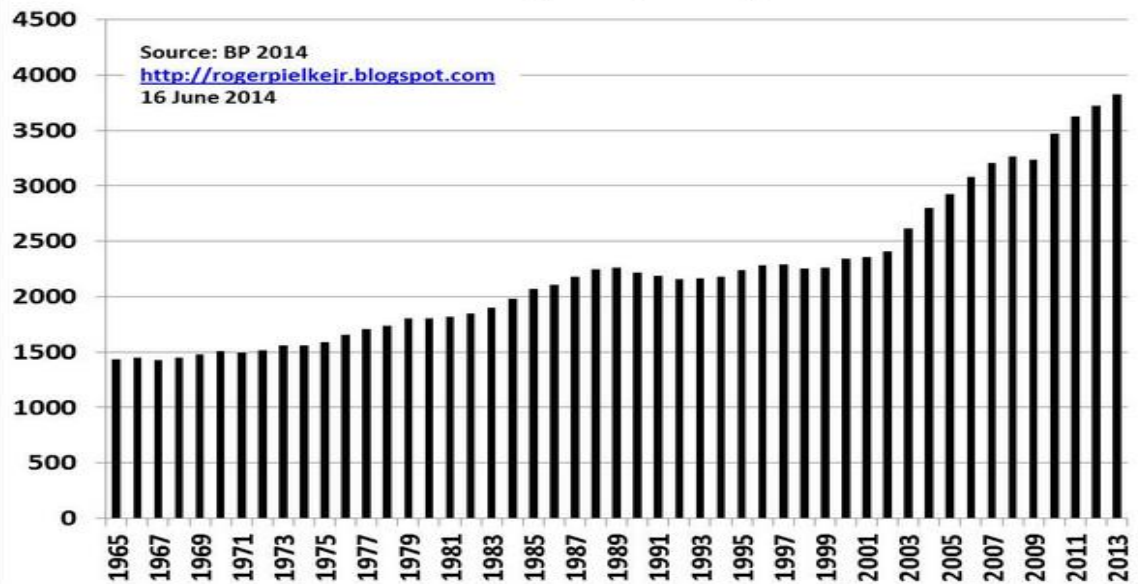
The drive to renewables in Germany should run counter to maintaining a high dependency on coal, but (and some may say hypocritically) **Germany has five new coal-fired power plants with a combined capacity of around 4 GW going through their “first fire” trials this summer.** Overall, Germany’s coal-fired power plants (including lignite) contributed more than 50% to the nation’s electricity demand in the first half of this year, with more coal-fired capacity likely to be commissioned before the first nuclear plant is taken out of service in 2015. --Stuart Burns, Metal Miner, 22 October 2013



Japan has **43 coal fired power plants** under construction or planned to provide the dominant source of energy for electricity. *Bloomberg* 9 April 2015



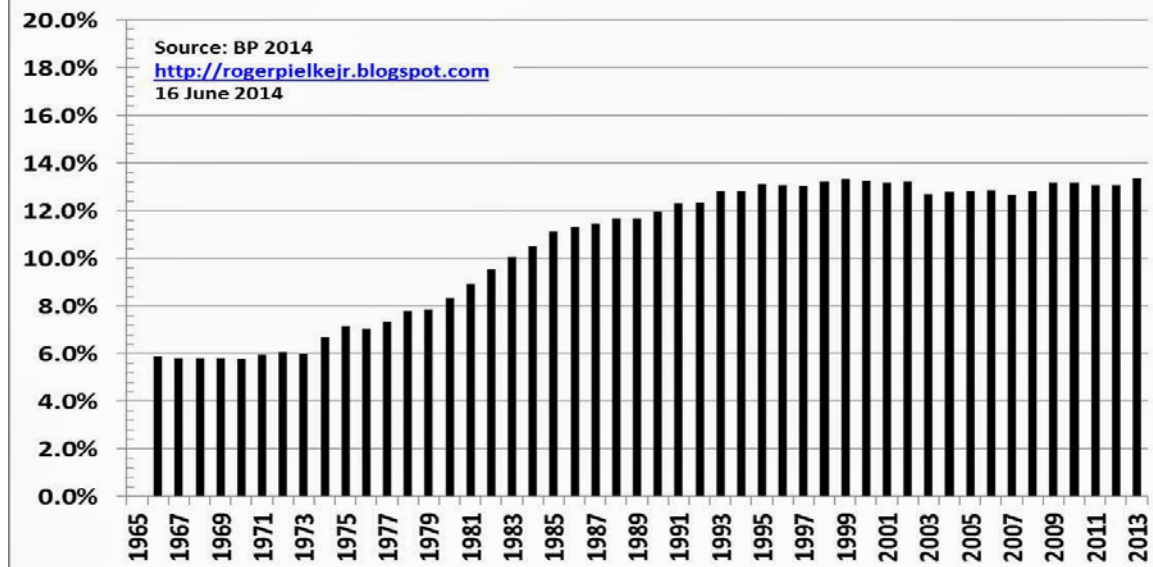
Global Coal Consumption (MTOE): 1965-2013



Coal – no one is following the U.S. example

The increase alone in hydrocarbon usage from 2012 to 2013 provided more energy than all of wind and solar combined (BP Report June 2014)

Proportion of Global Energy Consumption from Carbon-Free Sources: 1965-2013



The Moral Issue

What is the value of human life?

Affordable Energy

**Electrification
Transportation
Industry**

Carbon 87%
(coal, natural gas, oil)

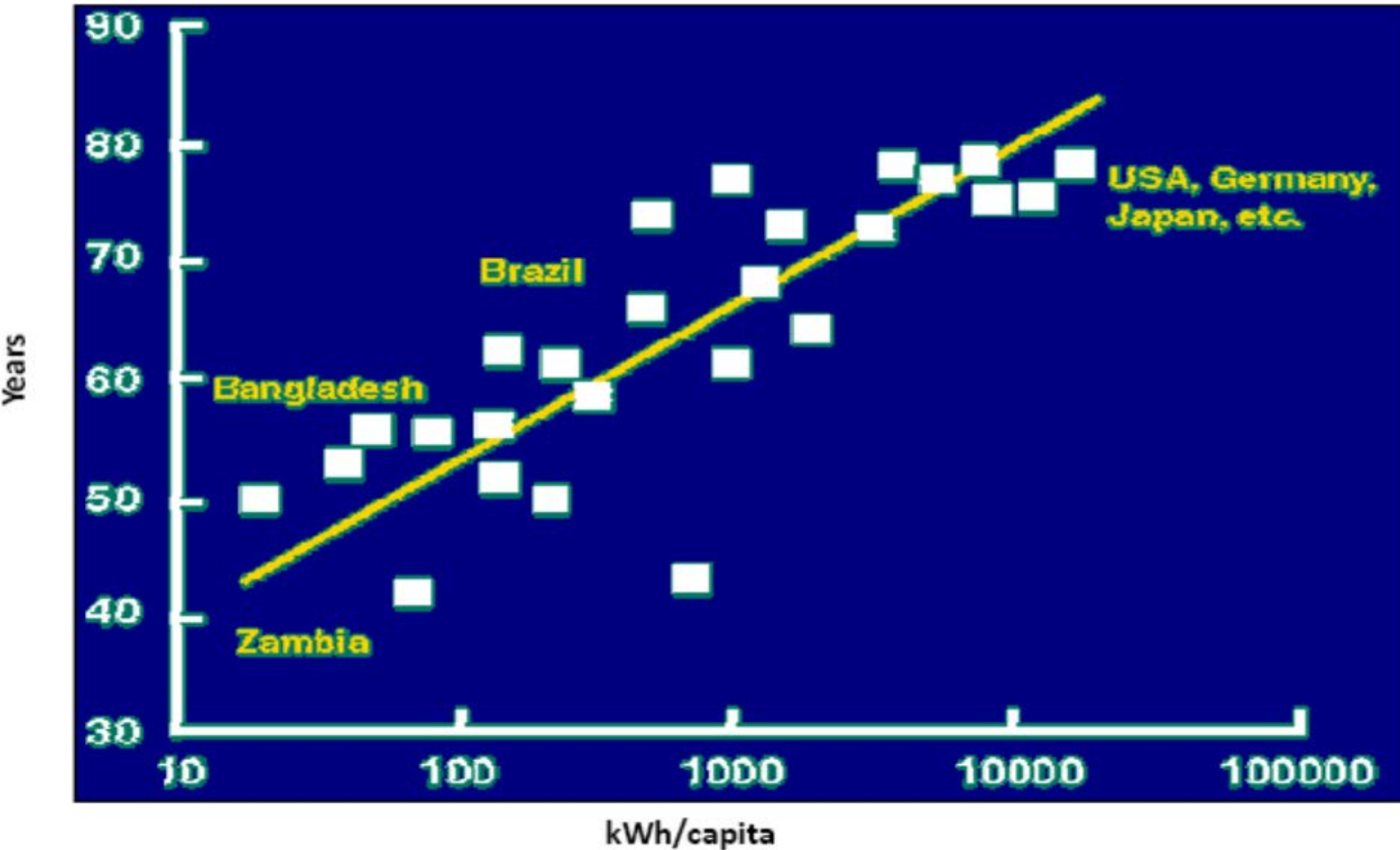
Nuclear 9%
Hydroelectric power 3%

CO2: Non-toxic
Invigorates Biosphere
Increases food production
Basis for Human Progress
Climate?????

We are addicted to:

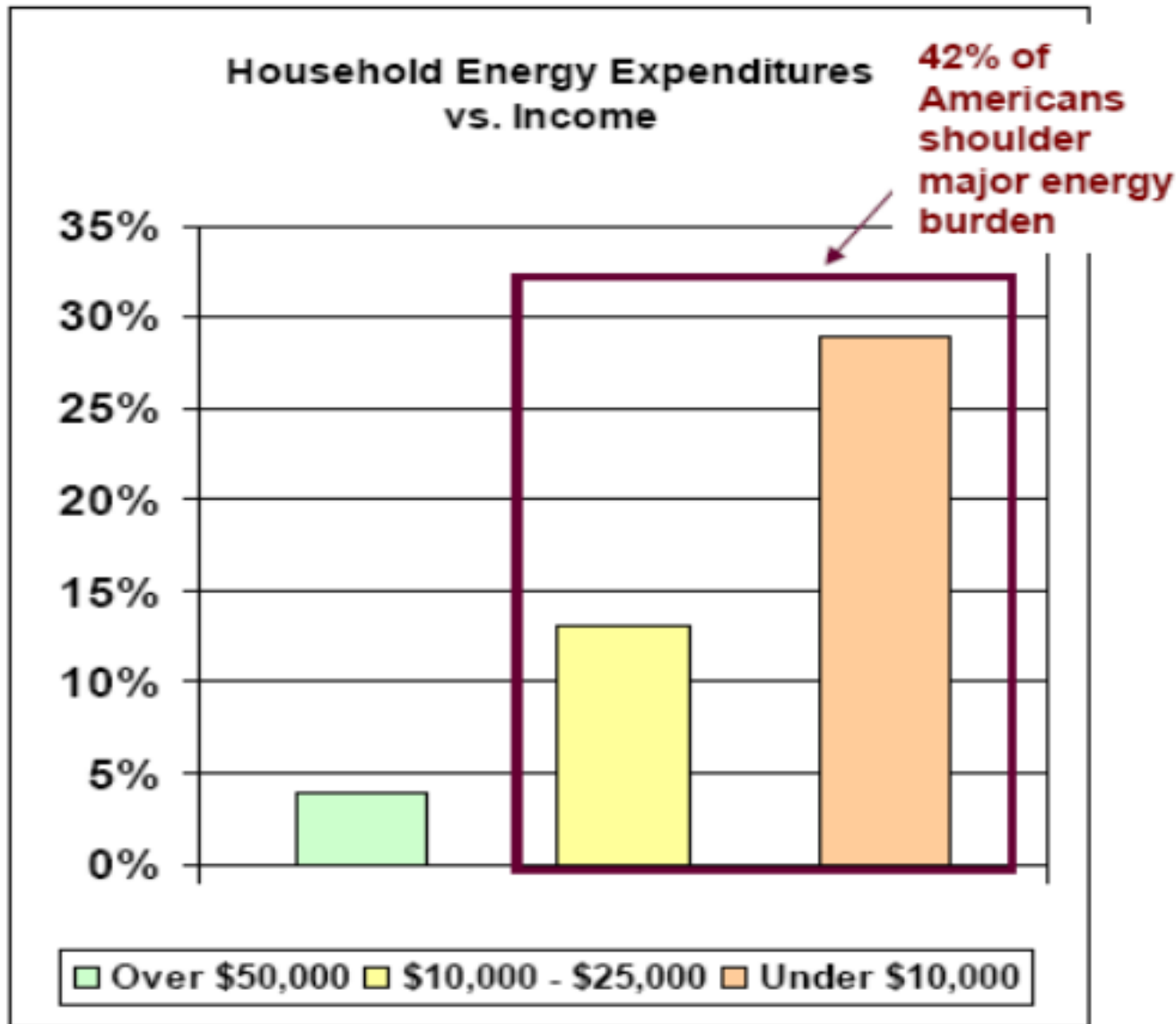
Long life
Good health/Medical advances
Technological Progress
Affordable Services
Freedom of mobility
Abundant and affordable food
Natural landscapes
Clean Water/Air

Value of Human Life?



A high value on Human Life means moving people up on on the energy curve

Source: World Resources Institute, IEEE Spectrum



Helping the poor means lowering energy costs
Hurting the poor means increasing energy costs

Law of Sustainability

What [CO2] cuts? That's for more developed countries. The moral principle of historic responsibility cannot be washed away. India's first task is eradication of poverty. Twenty percent of our population doesn't have access to electricity, and that's our top priority. We will grow faster, and our CO2 emissions will rise.

--Indian Environment Minister Prakash Javadekar, [The New York Times](#) 24 September 2014

Law of Sustainability

If it's not economically sustainable,
it's not sustainable.

Lifting people out of energy poverty *with carbon* is morally right and is going to keep happening everywhere else no matter what the U.S. does

What do the numbers show?

The scientific method demonstrates the current theory of CO2 warming of the climate is out of step with reality.

The extreme weather events we care about are not increasing in frequency or intensity.

Punitive regulatory controls will do essentially nothing to change whatever the climate is going to do.

CO2-emitting Coal is increasingly powering the world's economies, including Germany's and Japan's along with developing countries, no matter what the U.S. says.

What does my experience say?

Climate Change is a political issue and there is a cost for those of us who are not politically correct

If there is value in enhancing the quality and length of human life, the moral imperative is to expand access to low-cost, carbon-based energy. This is happening anyway.