

# Climate Change: Facts and Fictions

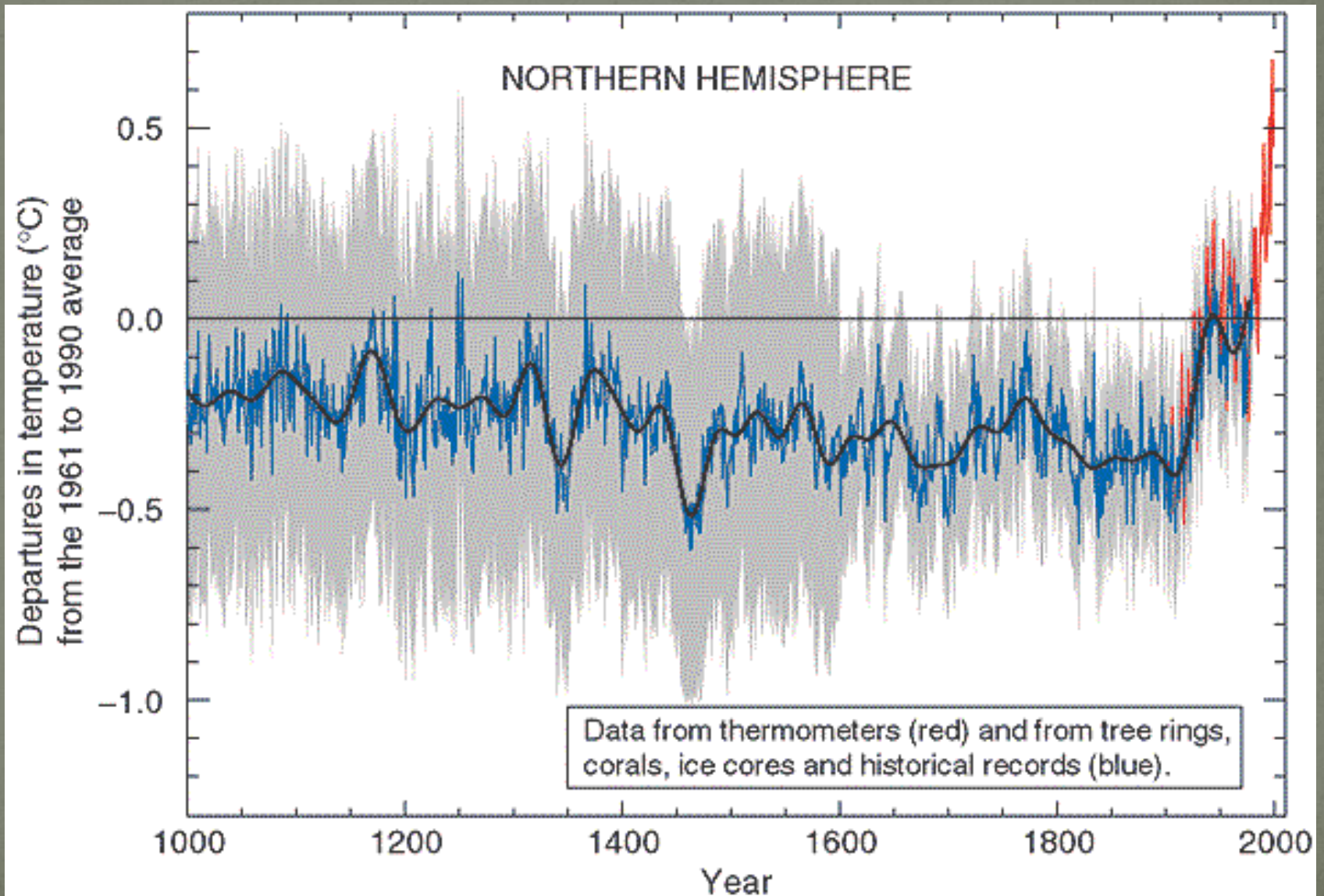
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W.C. Rusty Riese, PhD  
Adjunct Professor, Rice University

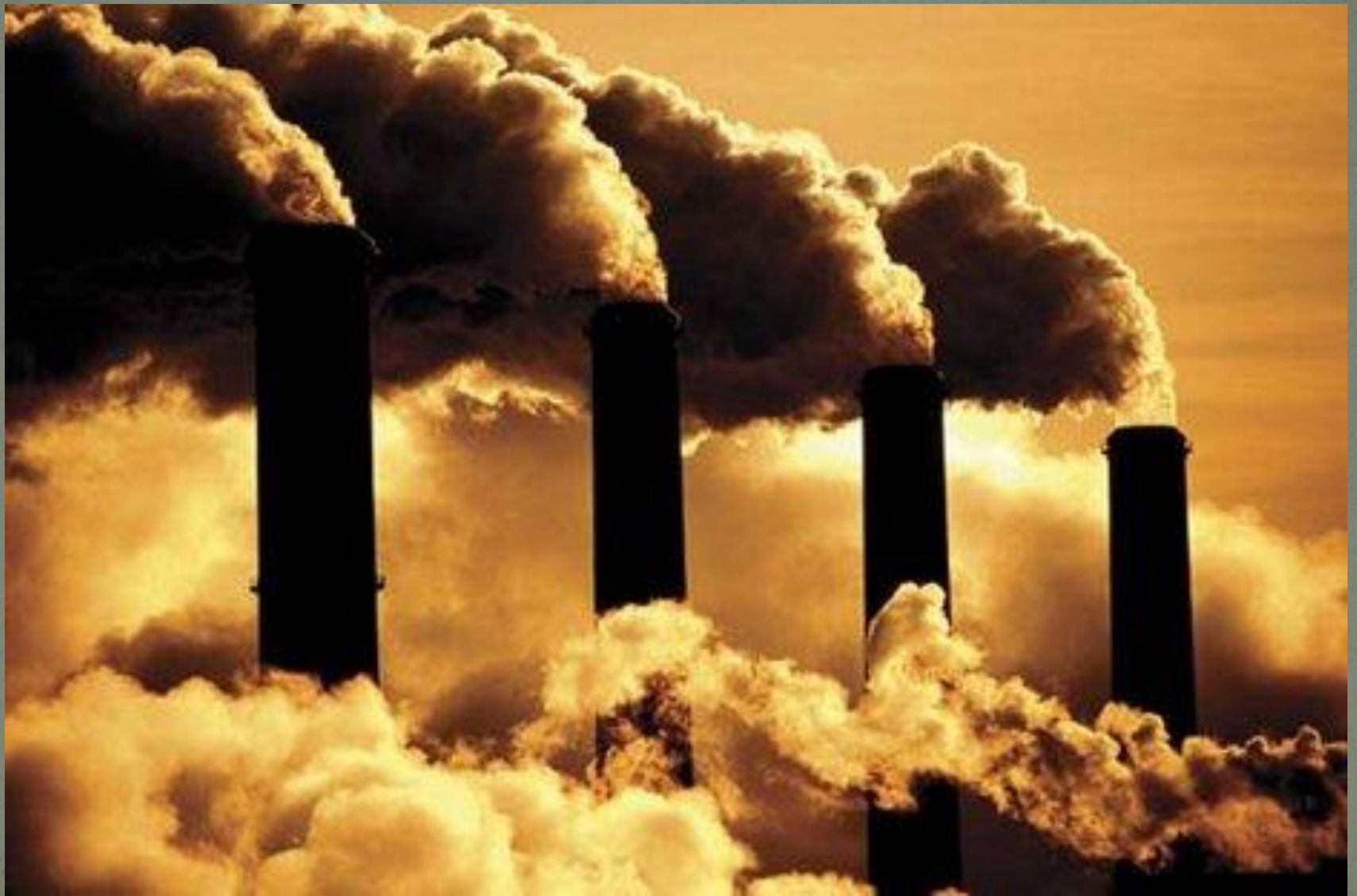
# Outline for today

- What are we being told?
- What are the data?
- What are the take-aways?
- What are your responsibilities?

# Mann "Hockey Stick" Curve









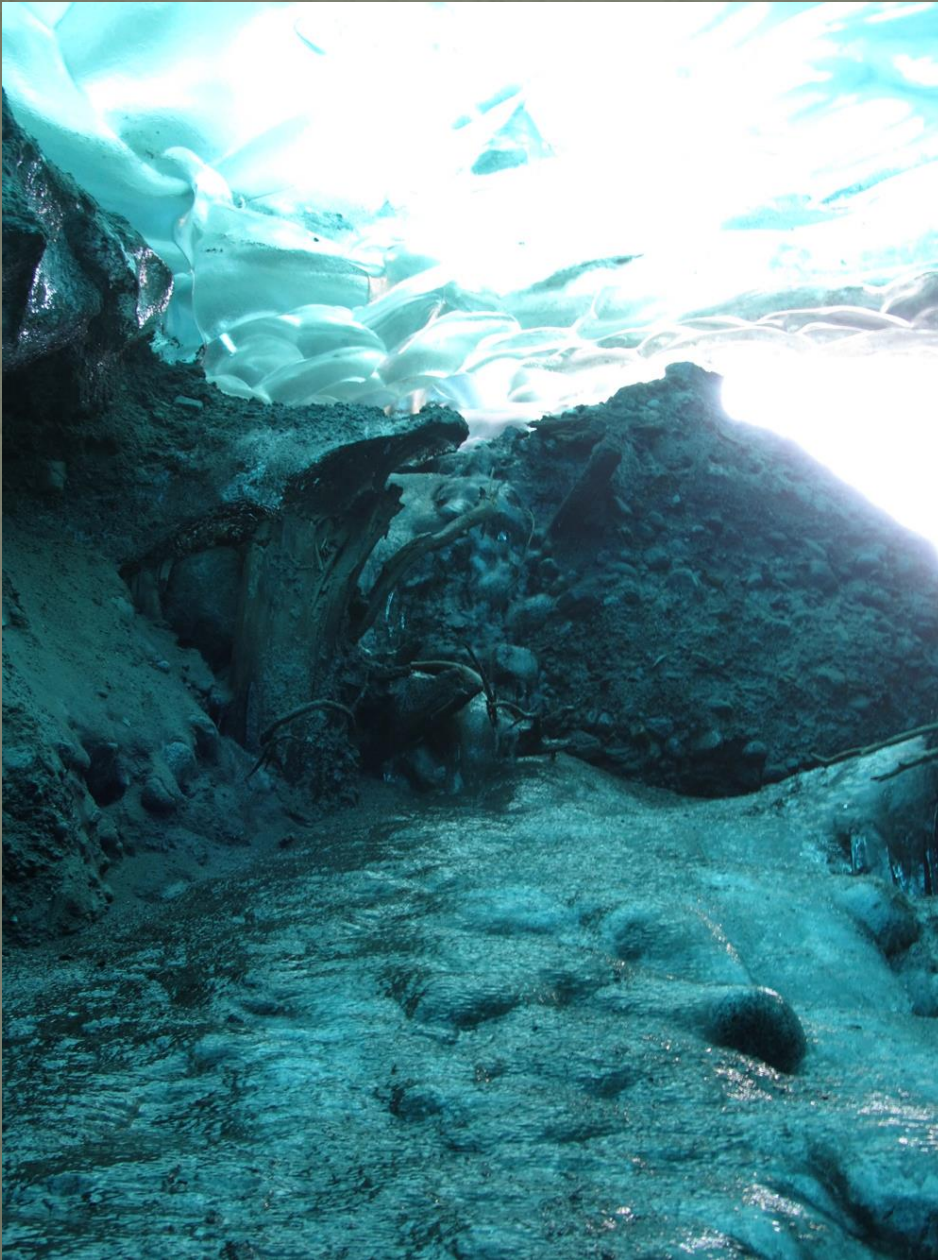
# The Arctic is melting

**September 1979**



**September 2007**





## Glaciers are retreating

Stumps have been thawing from beneath the Mendenhall Glacier for about 50 years, but recently, considerably more have been found in upright positions with roots still intact. *LiveScience*, 9/20/2013



Sea levels will rise



GETTY IMAGES

Coastal cities will be inundated





Tropical storms numbers and intensity will increase



Tornados will become more frequent and intense





Precipitation will increase in frequency and severity





Famines will kill millions of people



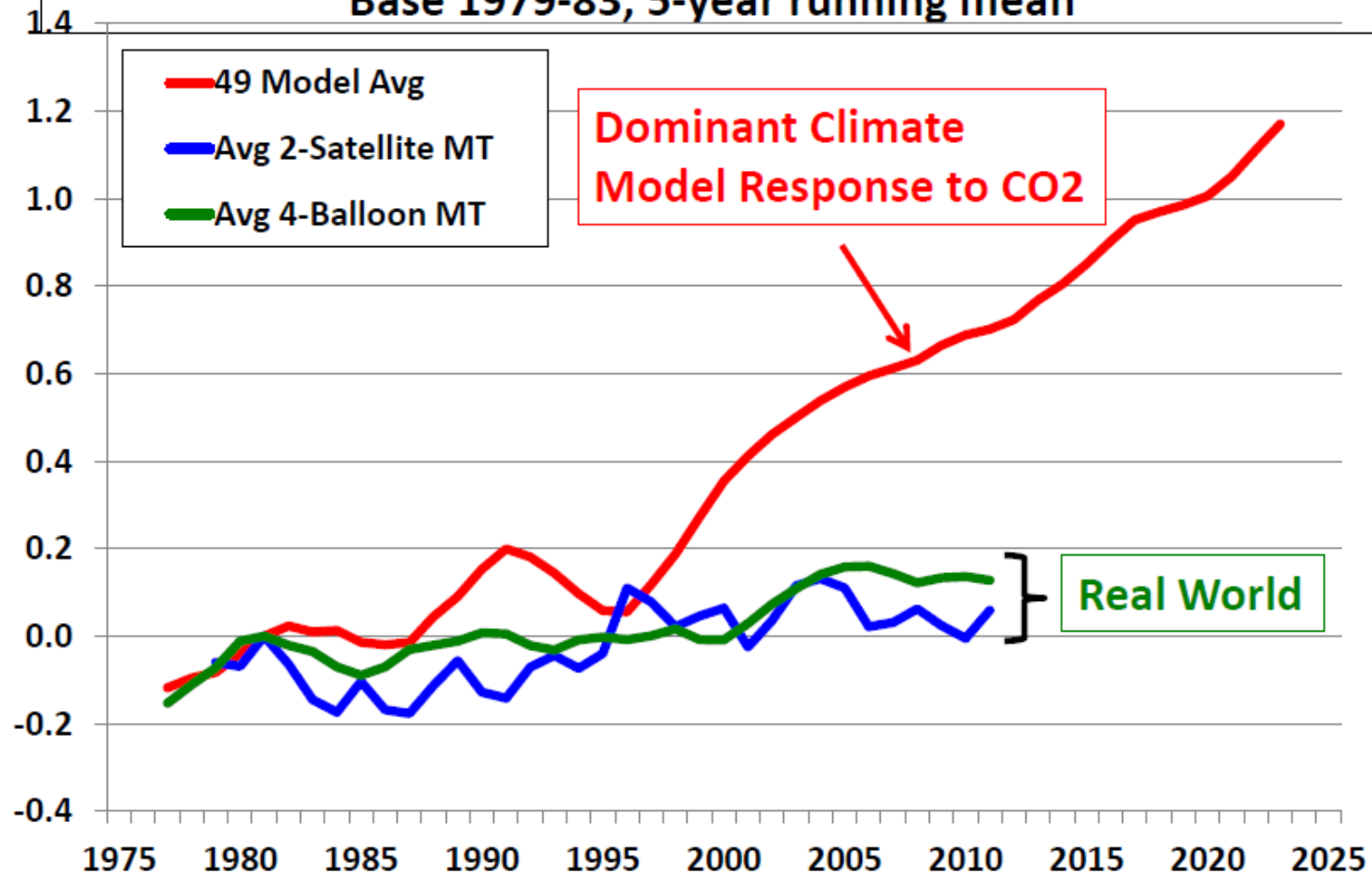


But what do the data show?

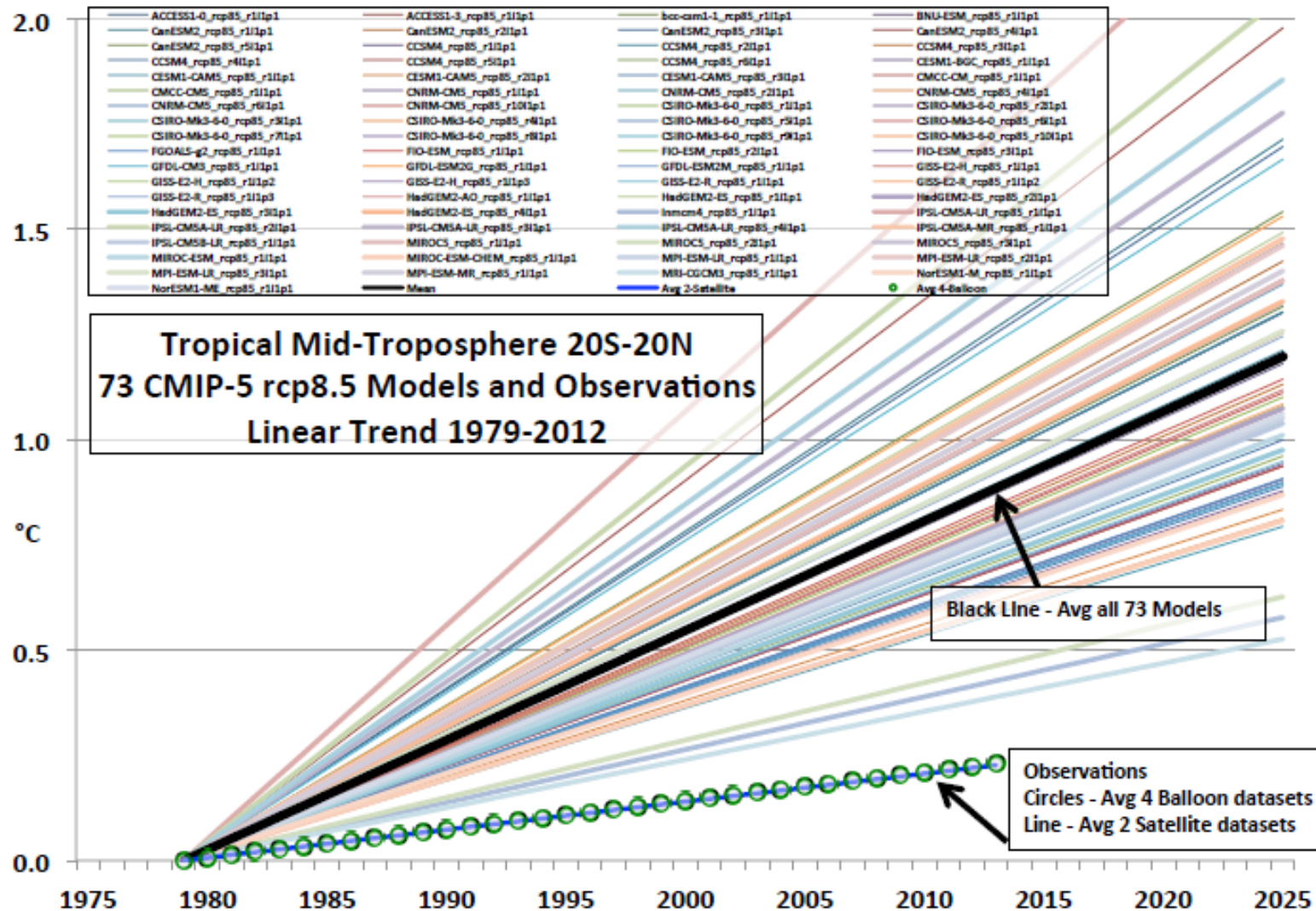
# Tropics: IPCC CMIP-5 Models vs. Observations

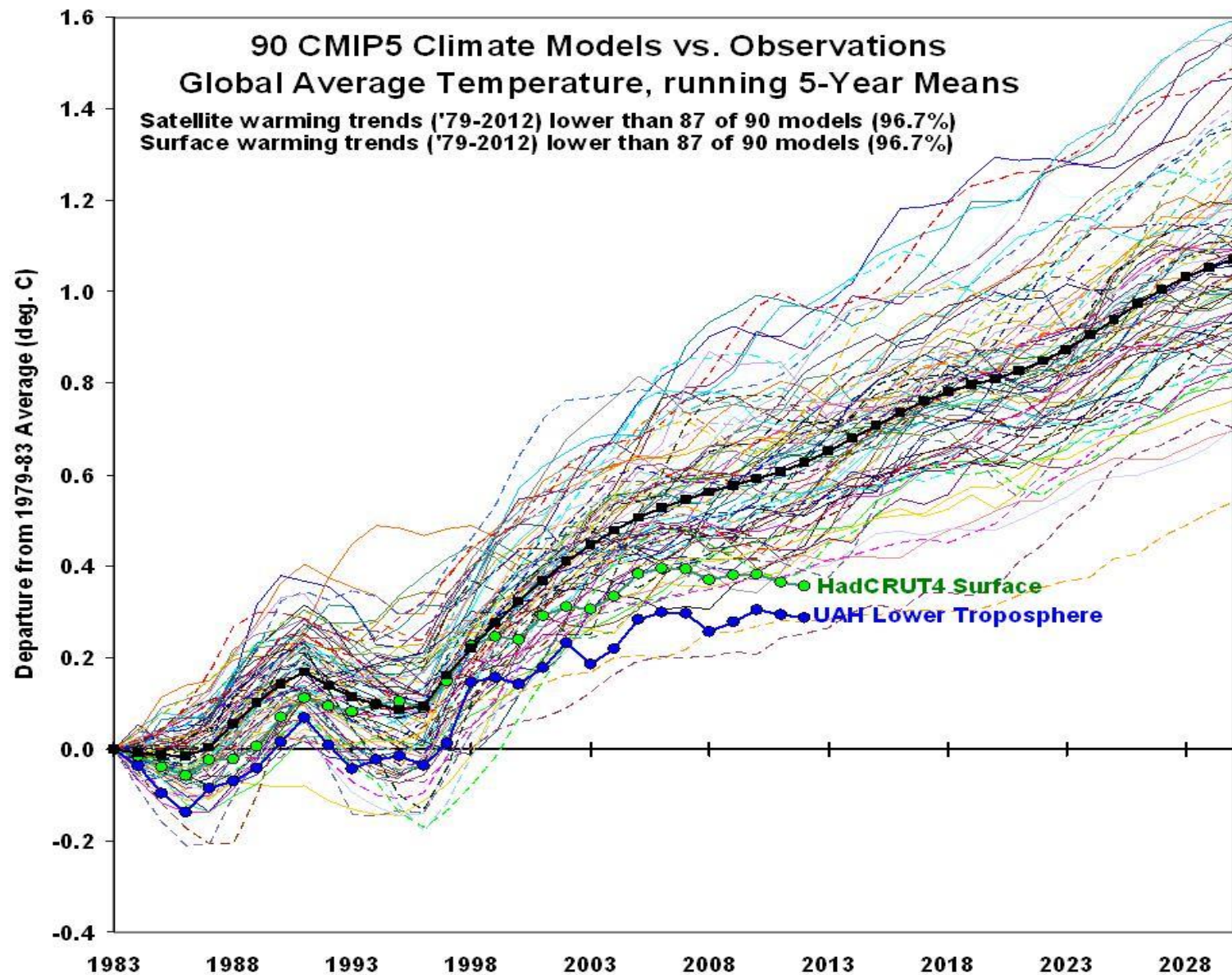
## Mid-Tropospheric Temperature

### Base 1979-83, 5-year running mean









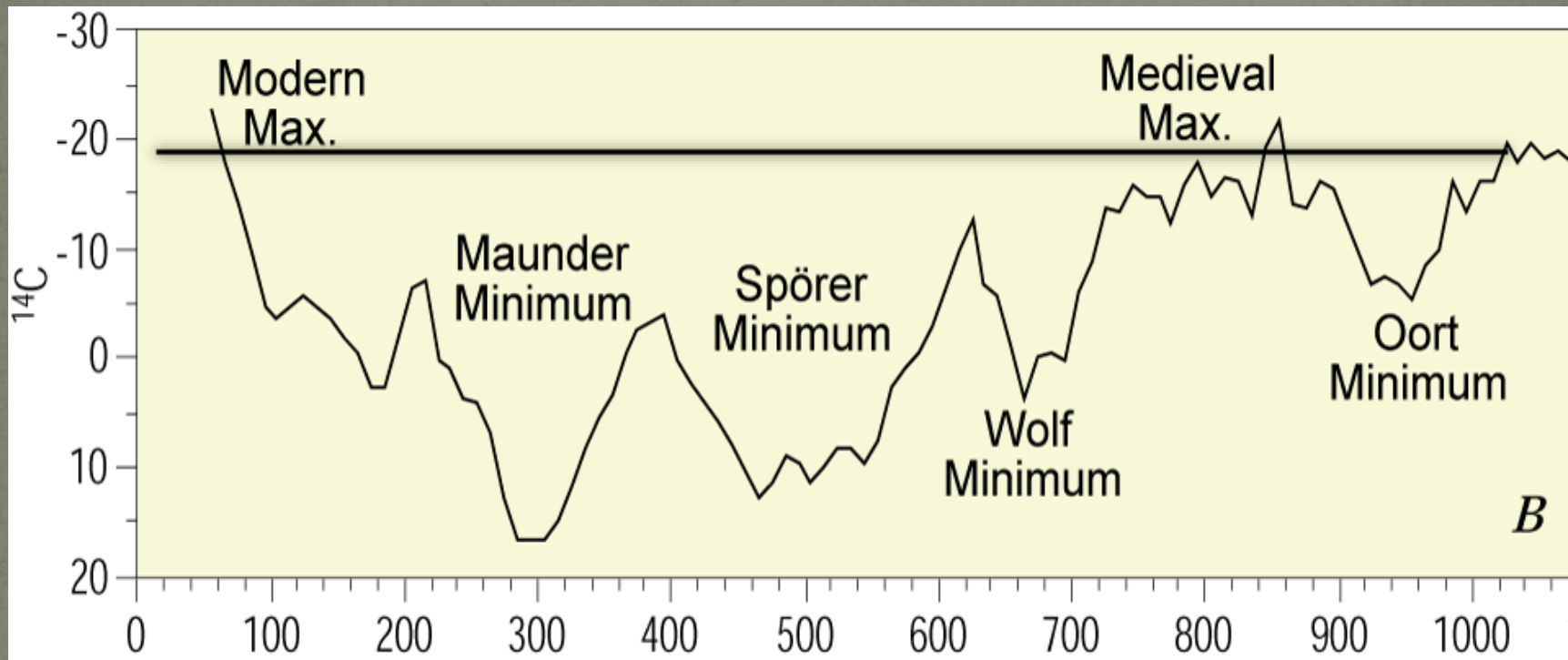


The most common reference points are  
1820, 1850, or 1880



Corresponds to the end of the  
“Little Ice Age”

If we change the reference point  
to the Medieval Maximum

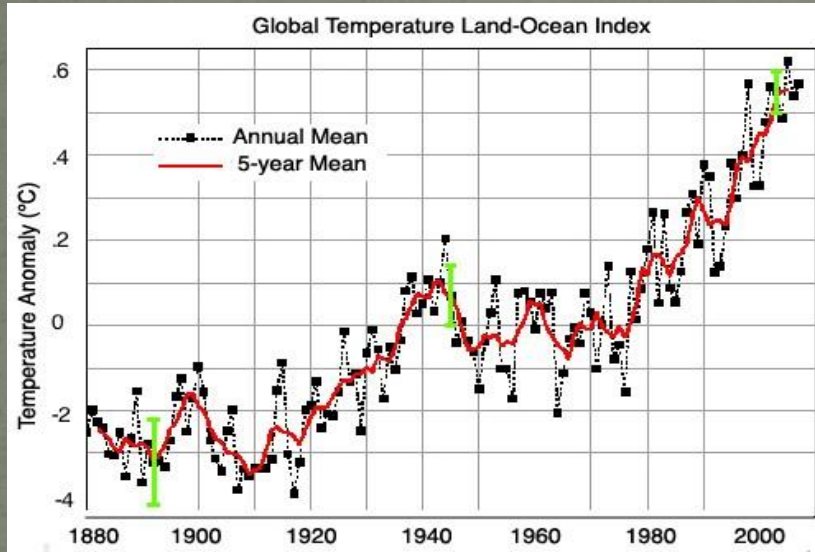


Then we are only just recovering  
from the "Little Ice Age"

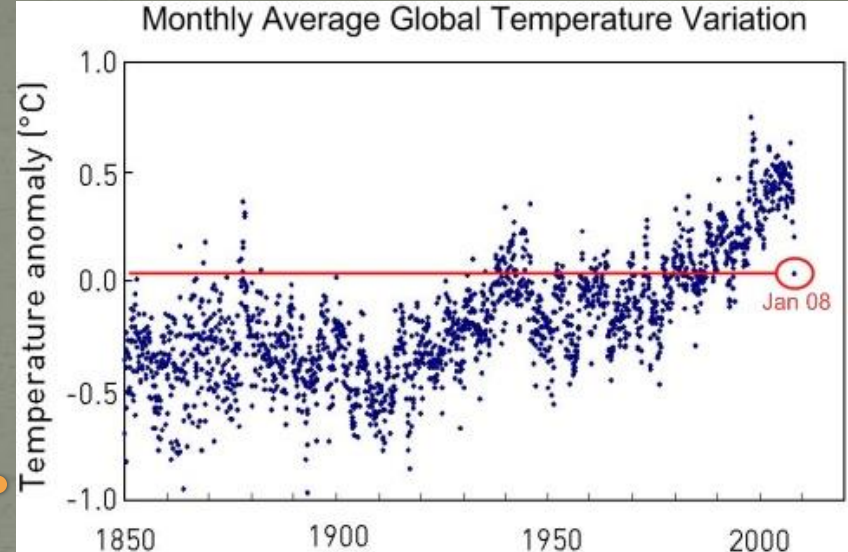


# Average Temperature Profiles

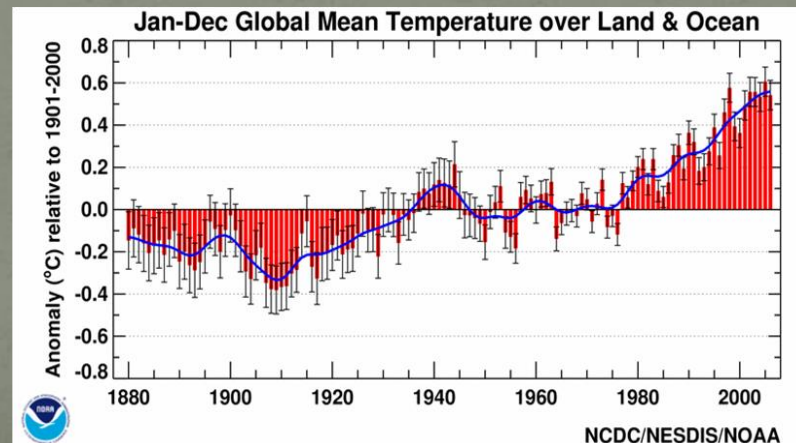
## Differ Slightly by Agency



NASA

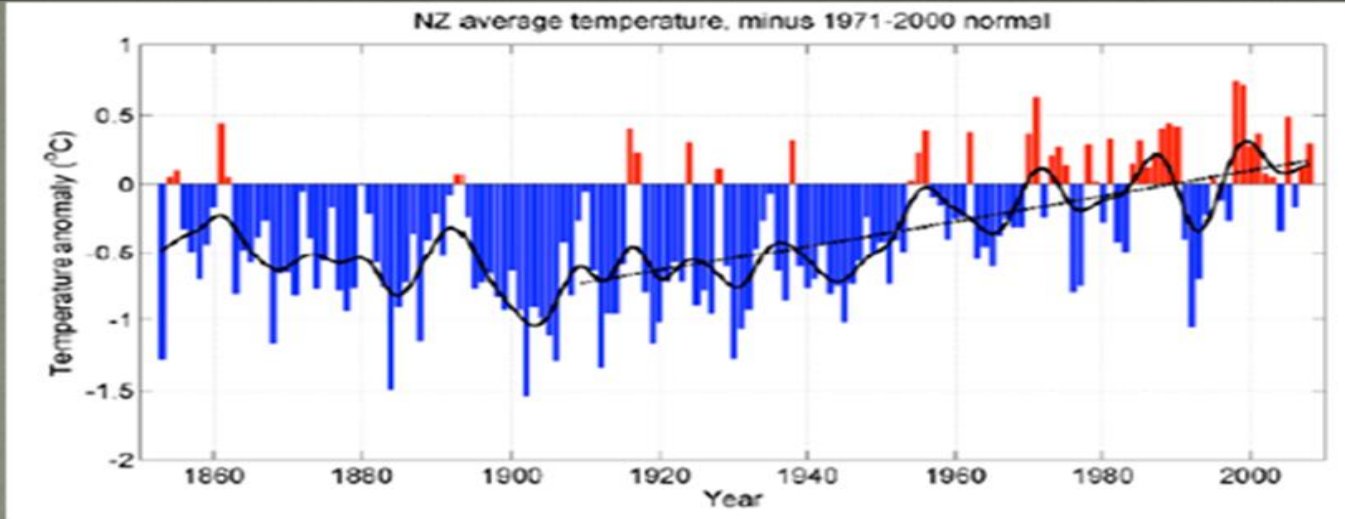


Hadley

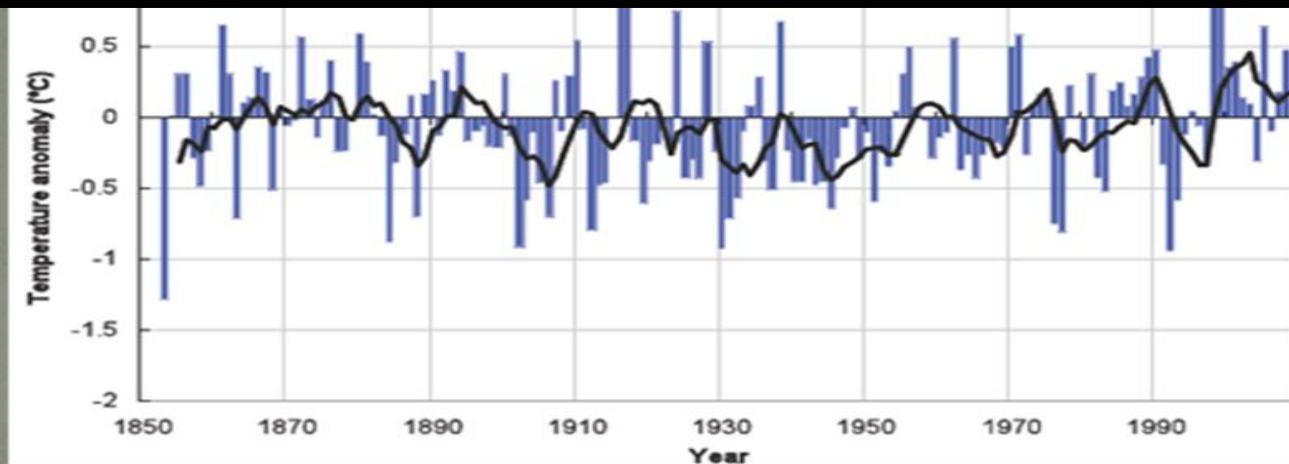


NOAA

# New Zealand Processed Data

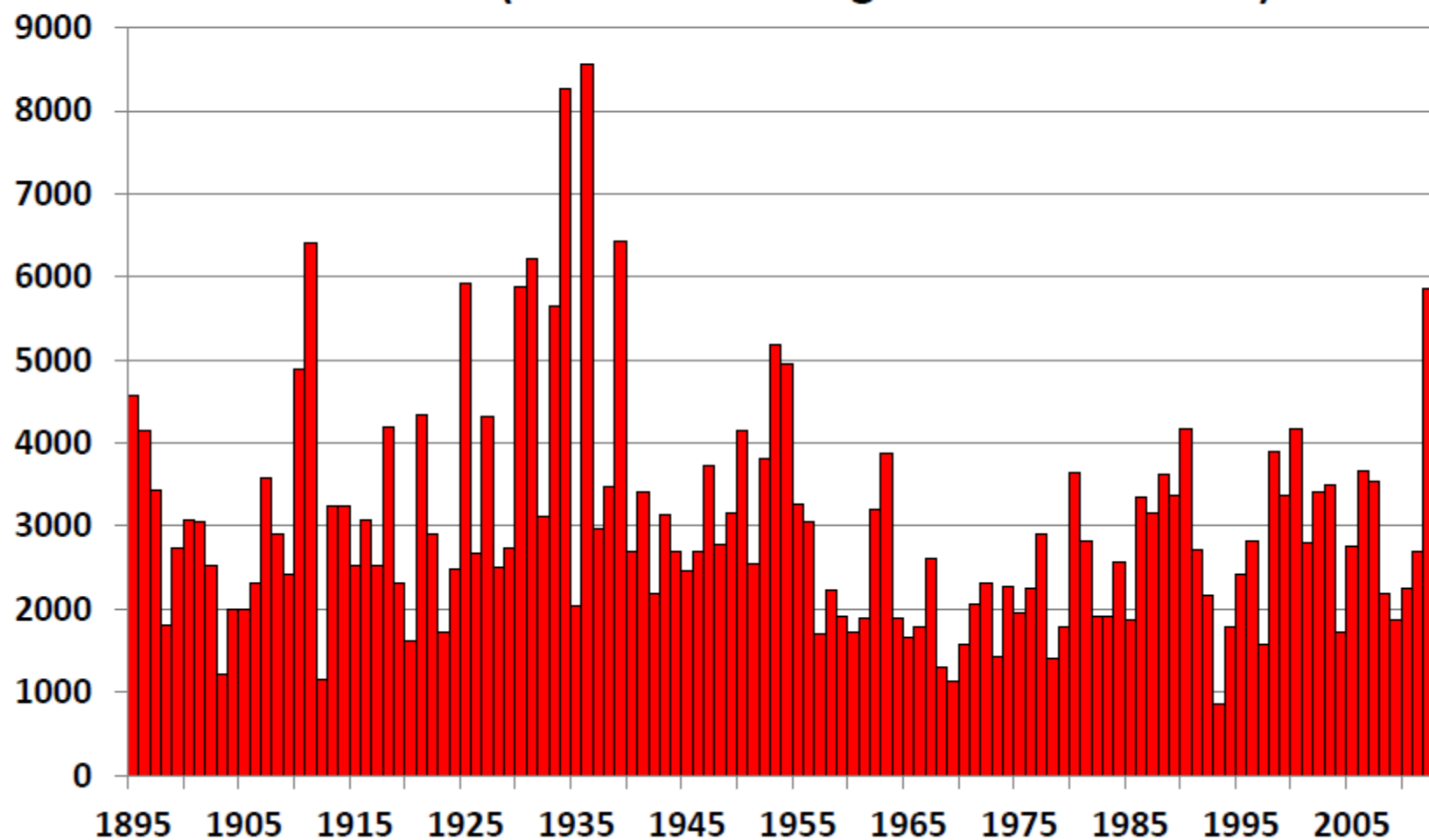


# New Zealand Raw Data

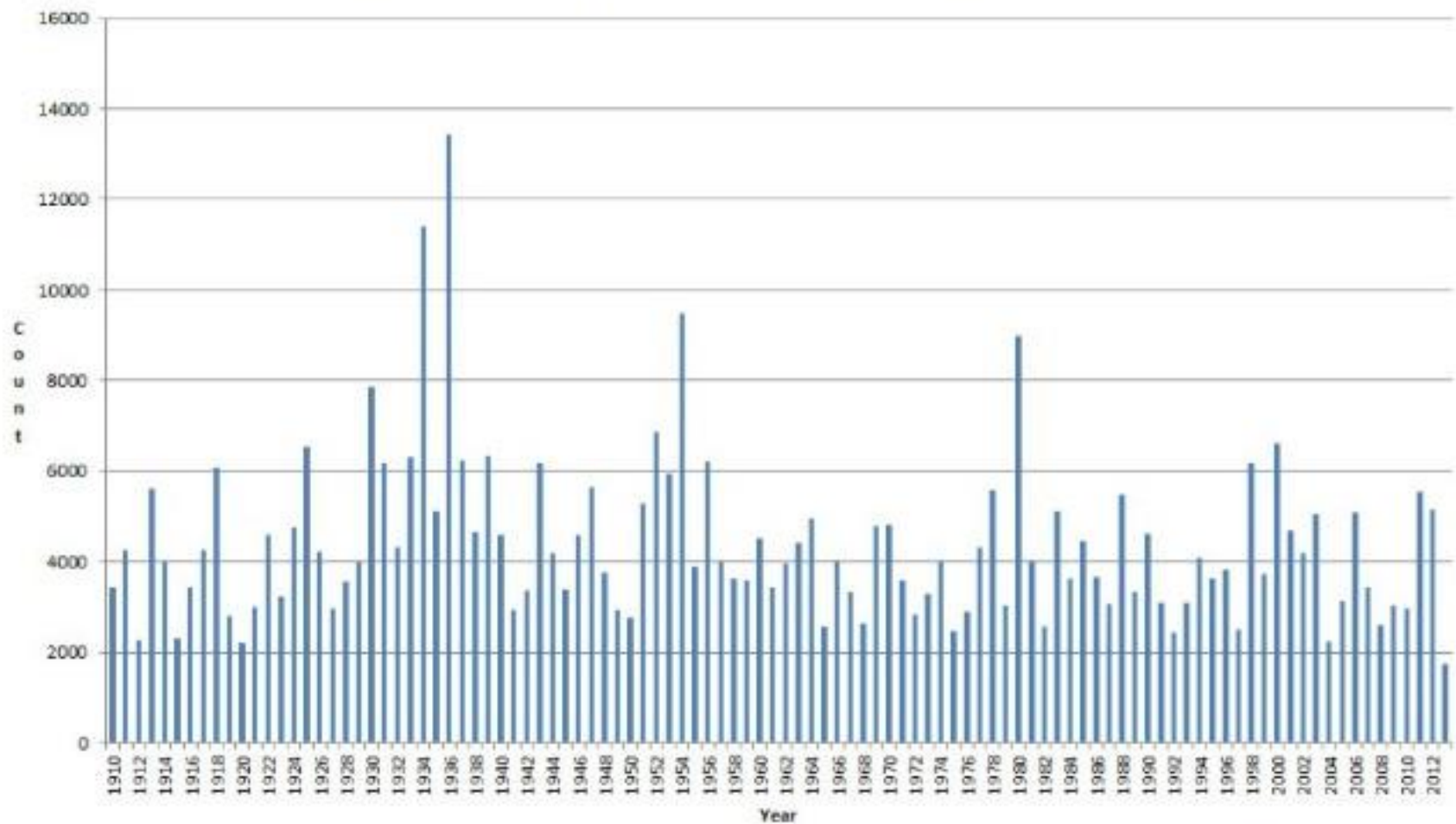




**Number of Daily High Temperature Records by Year**  
**974 USHCN stations with > 80 years data**  
**1895-2012 (Records standing as of 31 Dec 2012)**



Number Of 100 Degree Readings At All US HCN Stations





So, is the Arctic melting?



# HOW ICE SHEET GREW 533,000 SQUARE MILES IN A YEAR



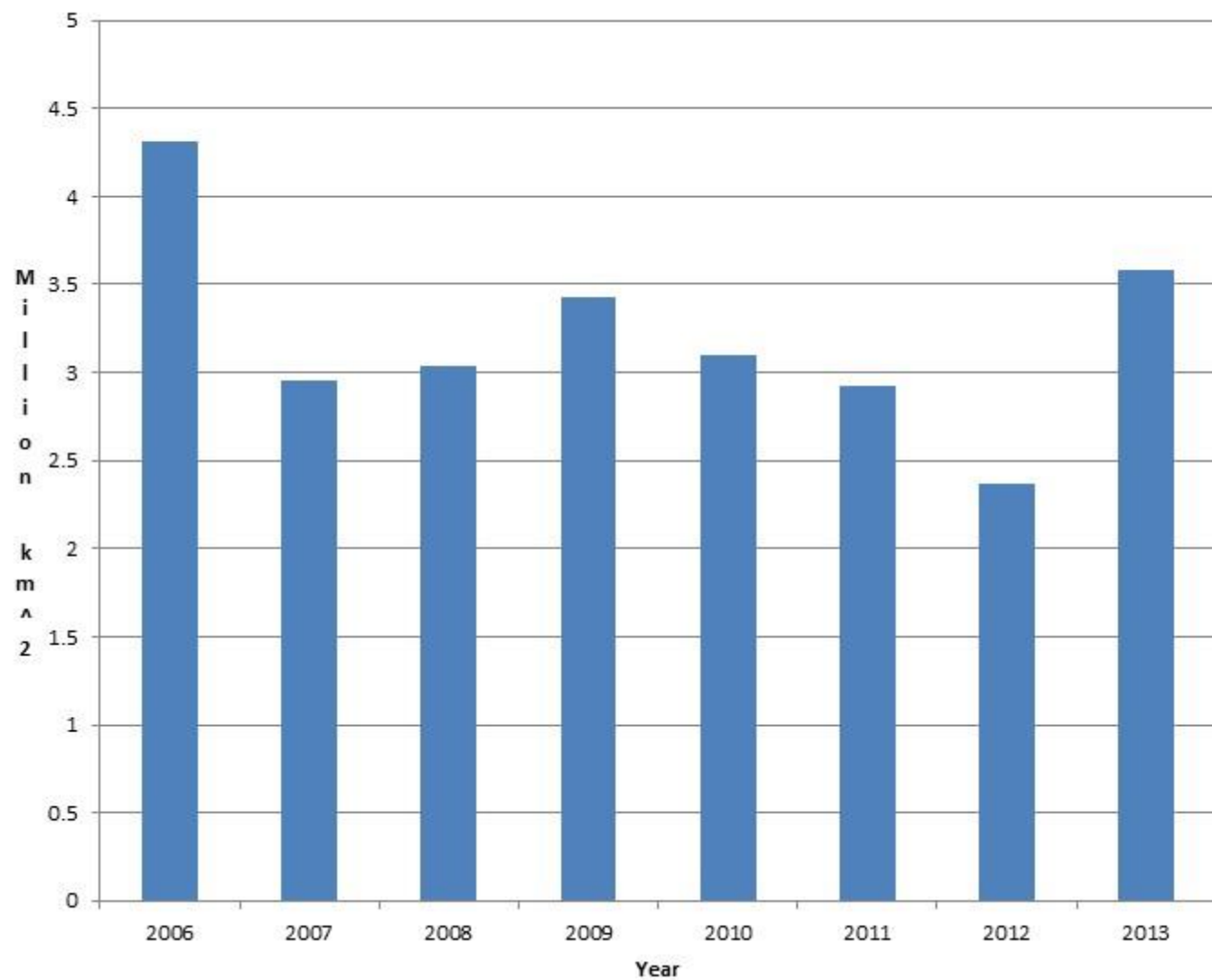
**CONTRACTION:** This Nasa satellite image shows the ice at the smallest extent on record, with much of the Arctic Ocean uncovered



**RECOVERY:** Contrary to predictions that the ice would have vanished by this summer, it has actually increased by 29 per cent from last year

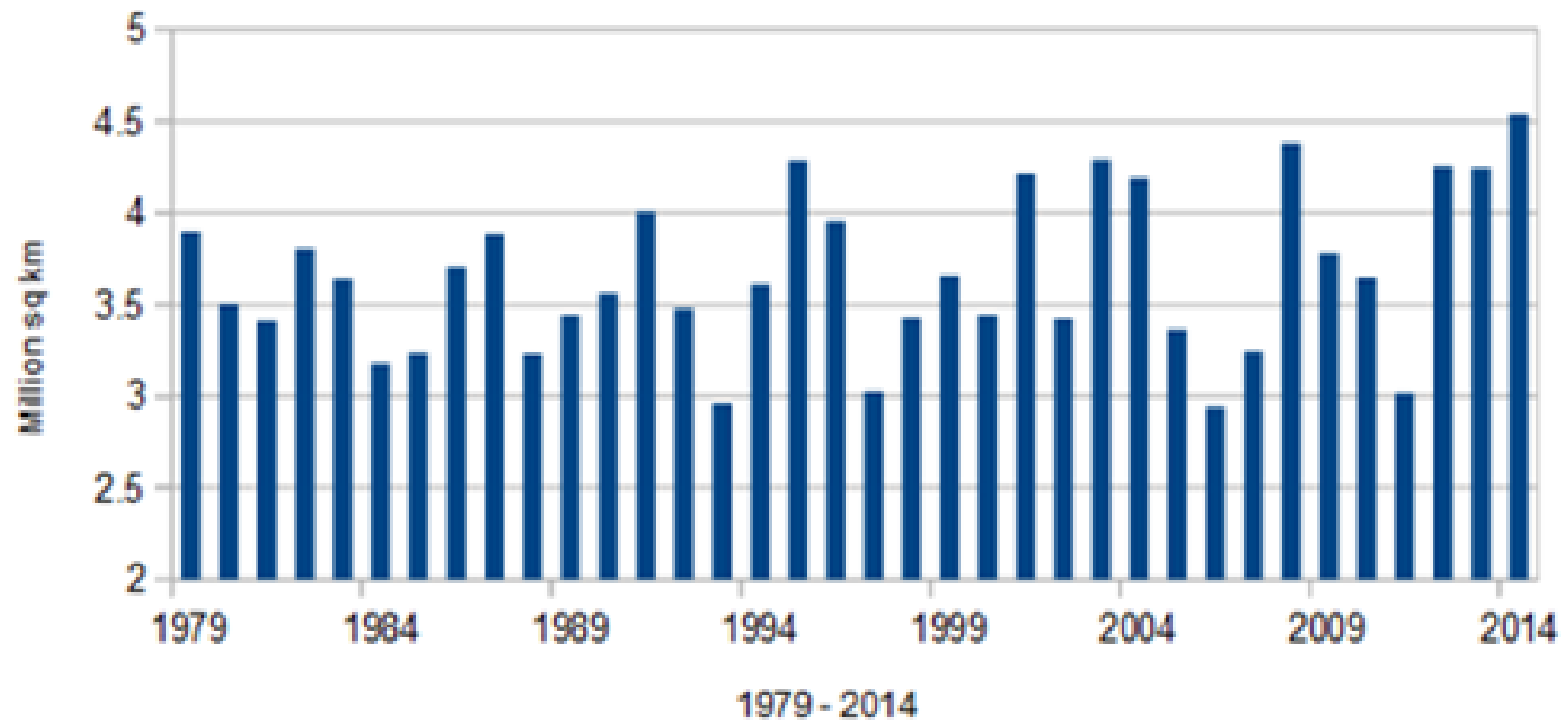


## September 10 Arctic Sea Ice Area



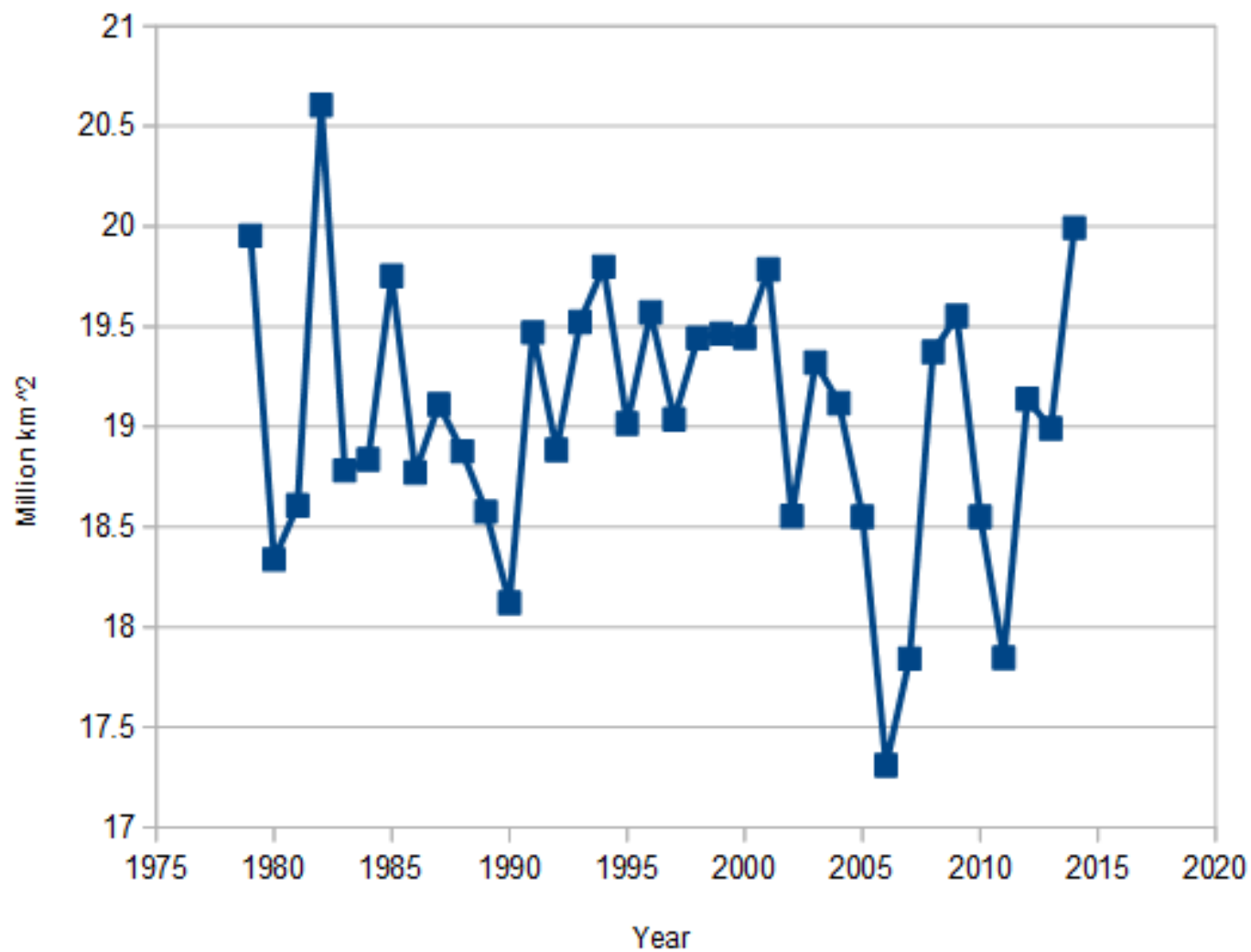
## Antarctic Sea Ice Extent

As at 31st January





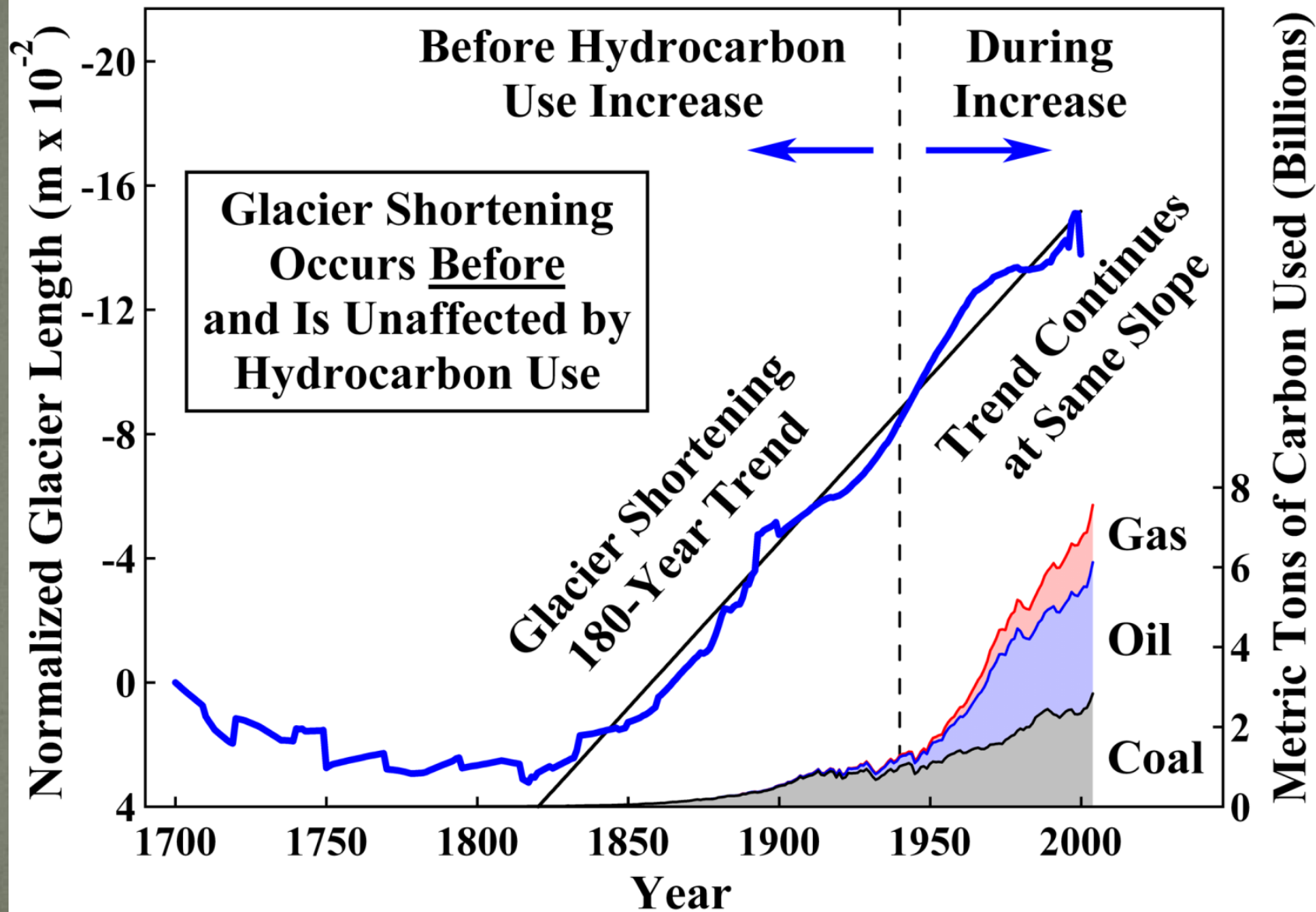
May 5 Global Sea Ice Area



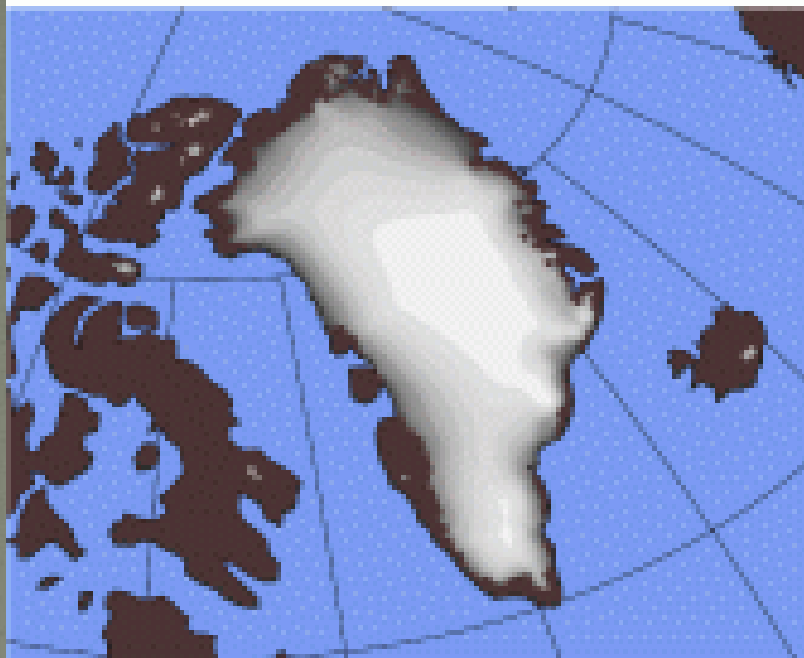
Are glaciers retreating?



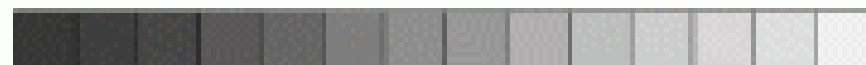
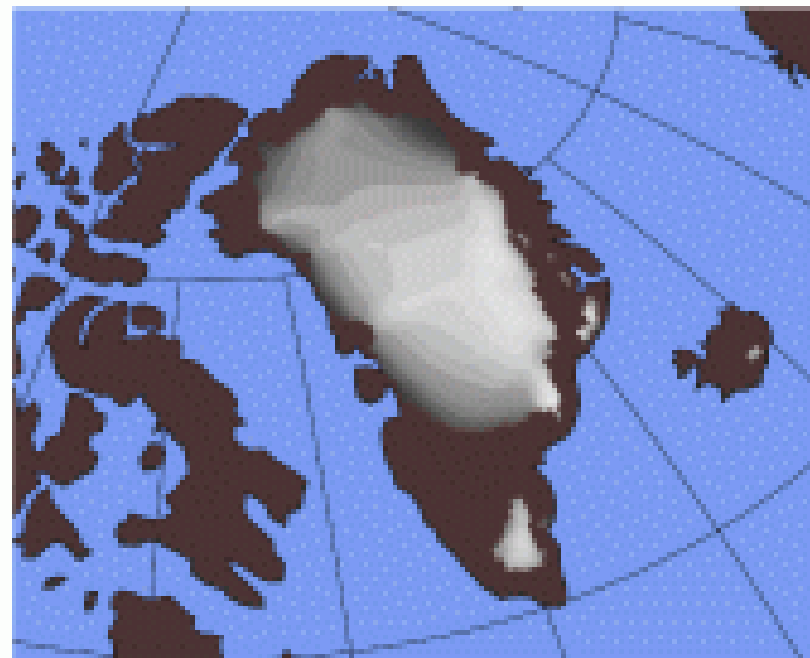




Present



Last Interglaciation



300

700

1100

1500

1900

2300

2700

Ice Sheet Topography (meters)



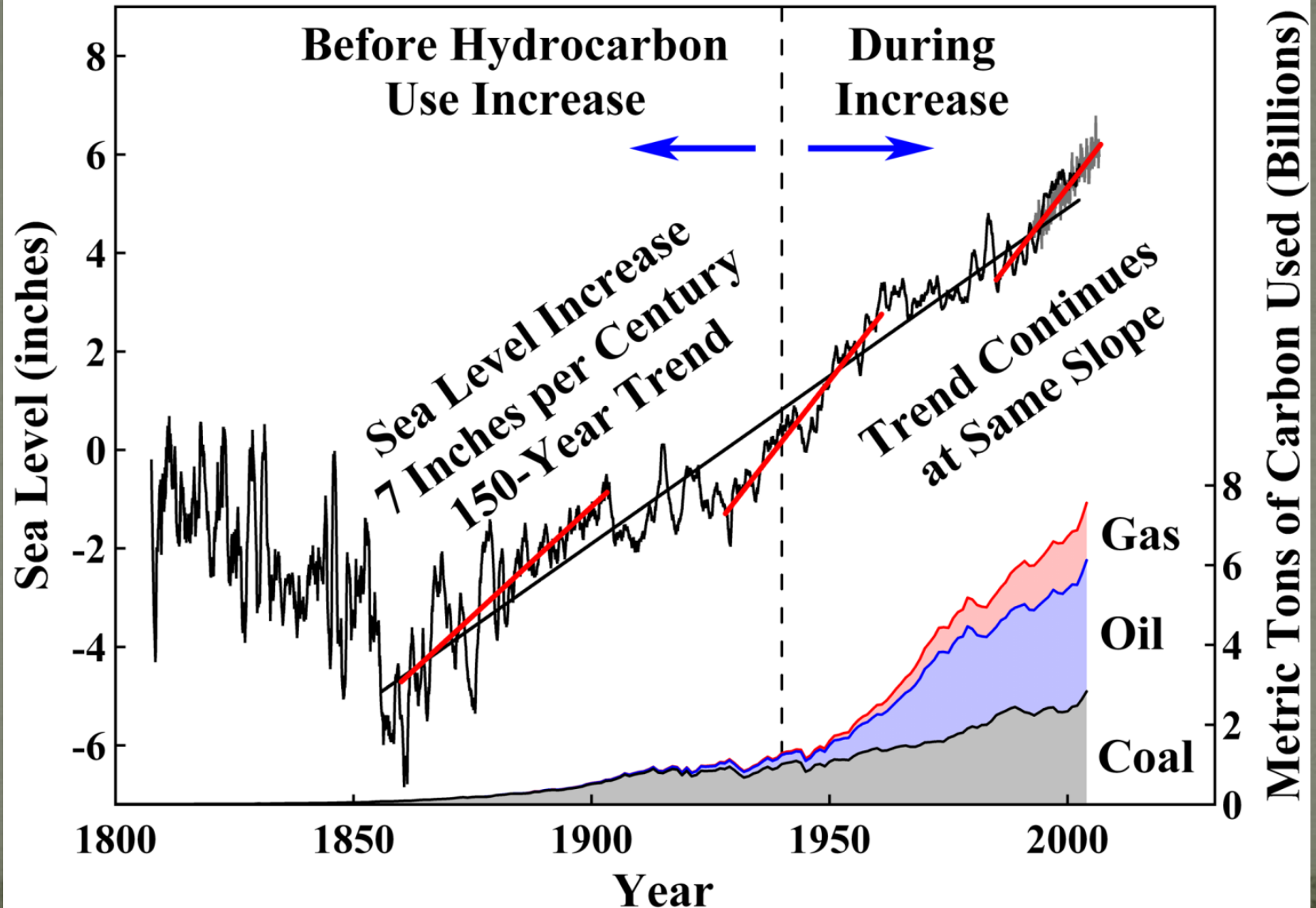


Archeologists from the Danish National Museum have now proven that Eric the Red, who founded the Icelandic settlement in Greenland at the end of the tenth century AD, and his contemporaries were able to brew ale\* *DailyNews*, 1/30/2012

*A barley field in Iceland. Photo by Páll Stefánsson*

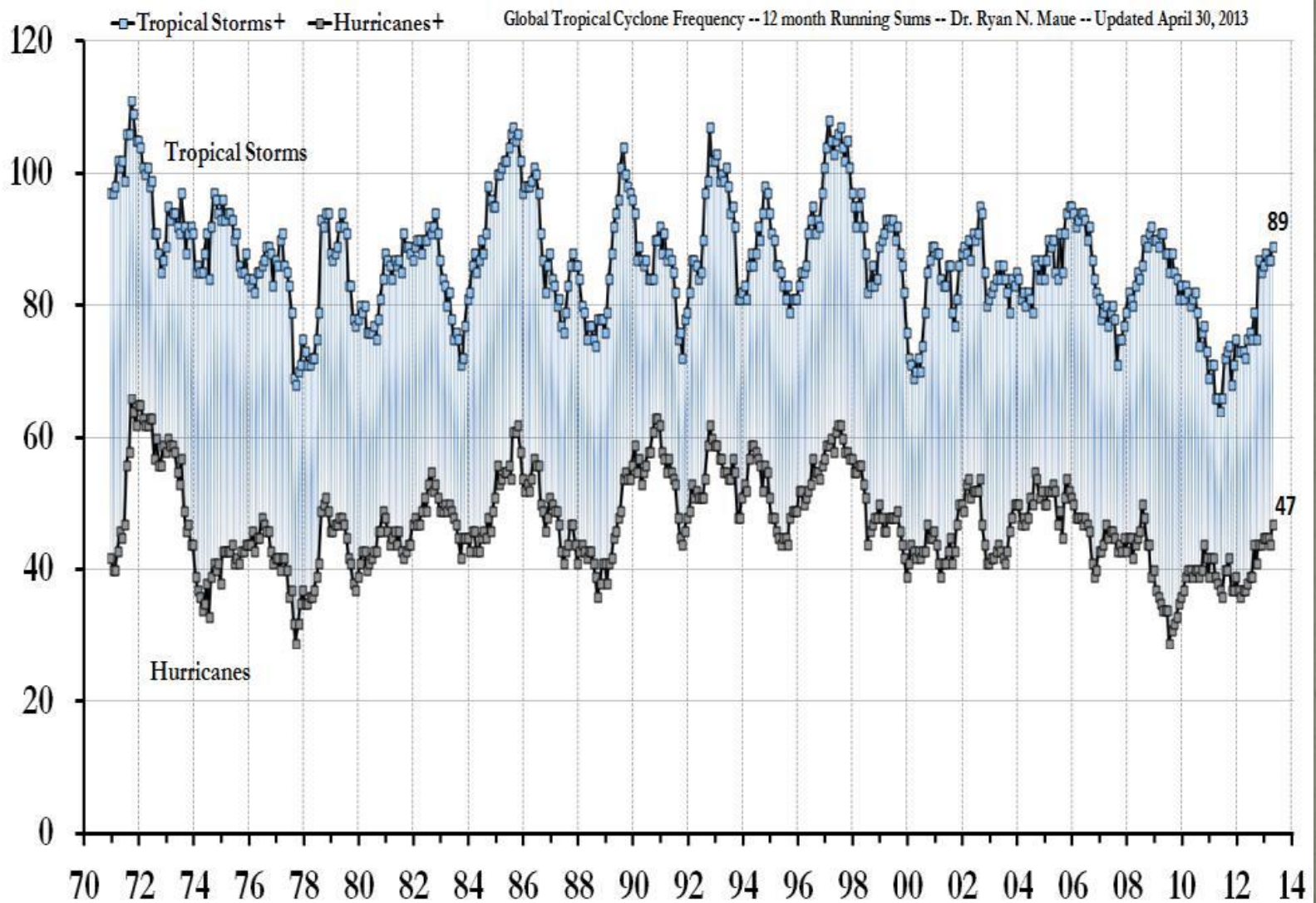
# Is sealevel rising?

Increases are following the 150 year trend



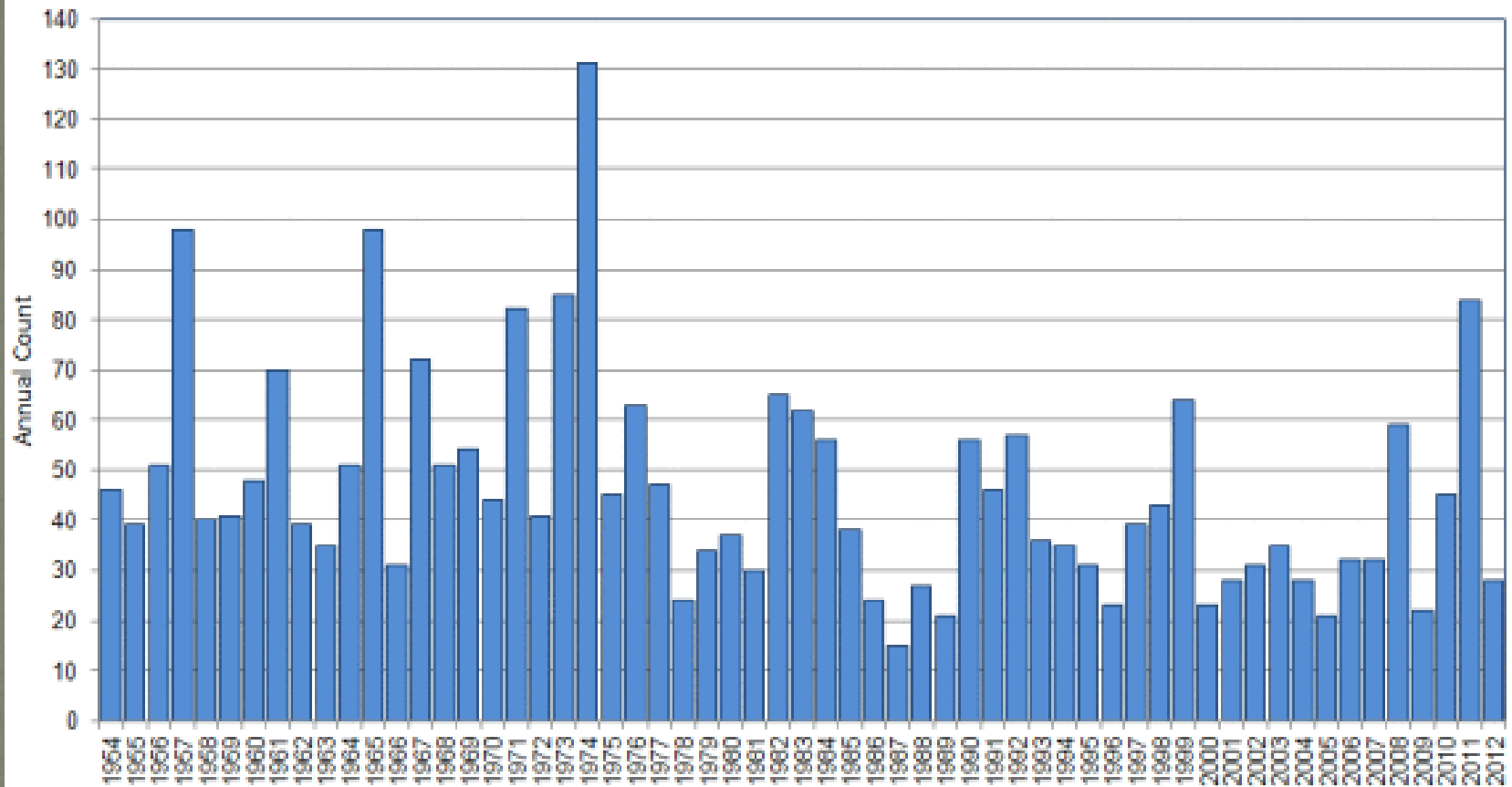


# Have tropical storms become more frequent or intense?



# Have tornados become more frequent and intense?

U.S. Annual Count of Strong to Violent Tornadoes (F3+), 1954 through 2012



Source: NOAA/NWS Storm Prediction Center



## The Cooling World

There are ominous signs that the earth's weather patterns have begun to change dramatically and that these changes may portend a drastic decline in food production—with serious political implications for just about every nation on earth. The drop in food output could begin quite soon, perhaps only ten years from now. The regions destined to feel its impact are the great wheat-producing lands of Canada and the U.S.S.R. in the north, along with a number of marginally self-sufficient tropical areas—parts of India, Pakistan, Bangladesh, Indochina and Indonesia—where the growing season is dependent upon the rains brought by the monsoon.

The evidence in support of these predictions has now begun to accumulate so massively that meteorologists are hard-

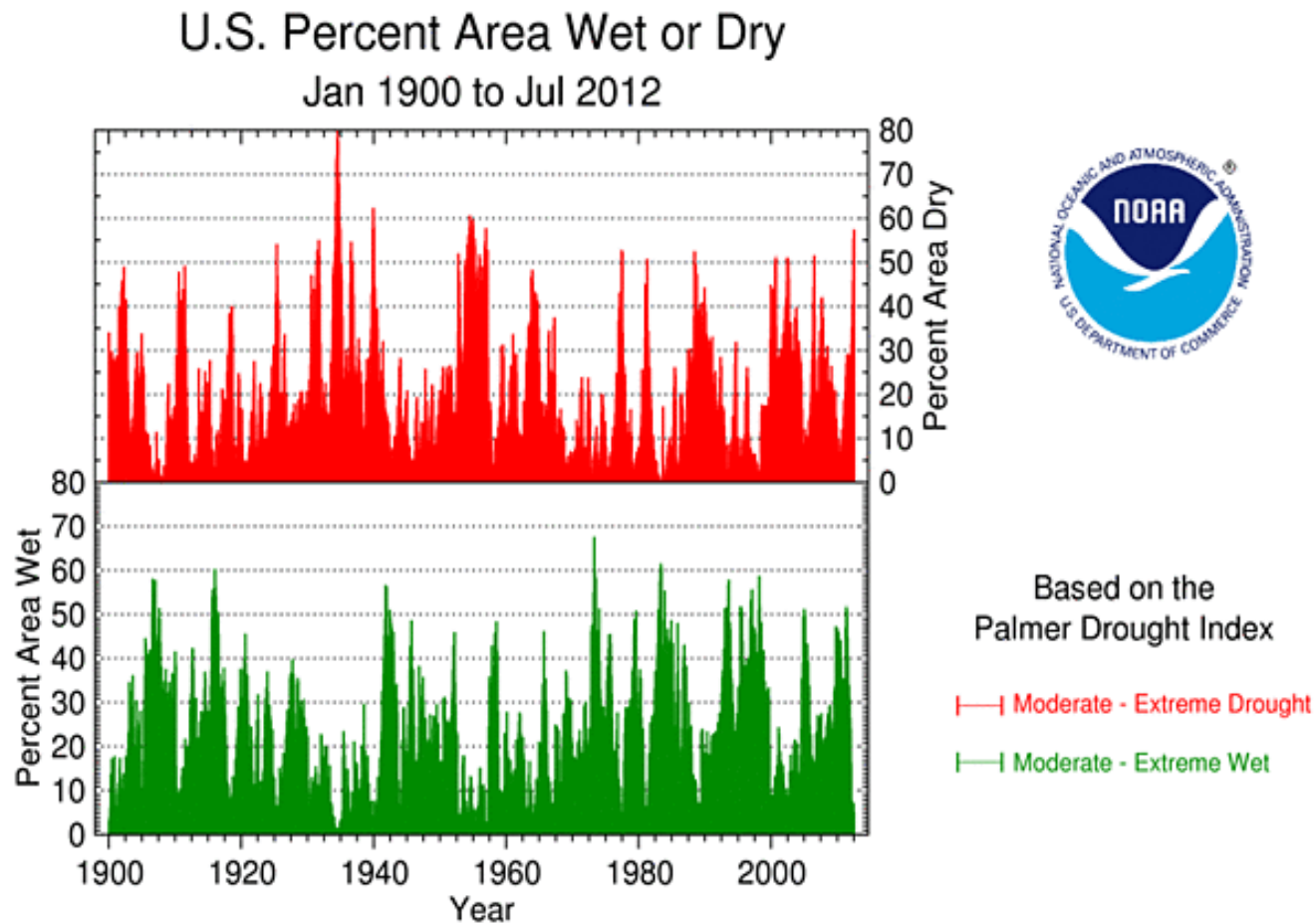
pressed to keep up with it. In England, farmers have seen their growing season decline by about two weeks since 1950, with a resultant over-all loss in grain production estimated at up to 100,000 tons annually. During the same time, the average temperature around the equator has risen by a fraction of a degree—a fraction that in some areas can mean drought and desolation. Last April, in the most devastating outbreak of tornadoes ever recorded, 148 twisters killed more than 300 people and caused half a billion dollars' worth of damage in thirteen U.S. states.

**Trend:** To scientists, these seemingly disparate incidents represent the advance signs of fundamental changes in the world's weather. The central fact is that after three quarters of a century of extraordinarily mild conditions, the earth's climate seems to be cooling down. Meteorologists disagree about the cause and extent of the cooling trend, as well as over its specific impact on local weather conditions. But they are almost unanimous in the view that the trend will

reduce agricultural productivity for the rest of the century. If the climatic change is as profound as some of the pessimists fear, the resulting famines could be catastrophic. "A major climatic change would force economic and social adjustments on a worldwide scale," warns a recent report by the National Academy of Sciences, "because the global patterns of food production and population that have evolved are implicitly dependent on the climate of the present century."

A survey completed last year by Dr. Murray Mitchell of the National Oceanic and Atmospheric Administration reveals a drop of half a degree in average ground temperatures in the Northern Hemisphere between 1945 and 1968. According to George Kukla of Columbia University, satellite photos indicated a sudden, large increase in Northern Hemisphere snow cover in the winter of 1971-72. And

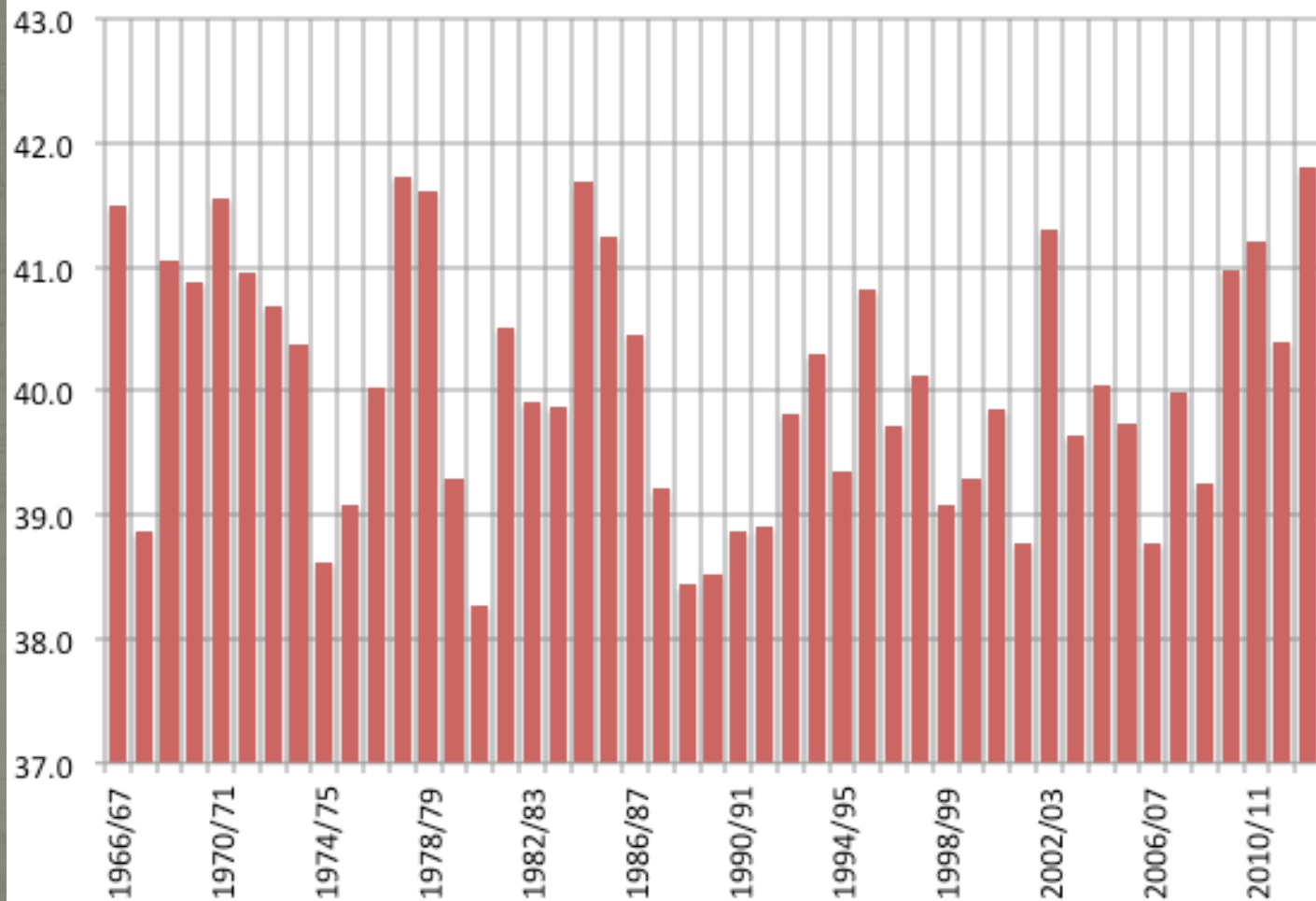
# Has precipitation changed in intensity or severity?

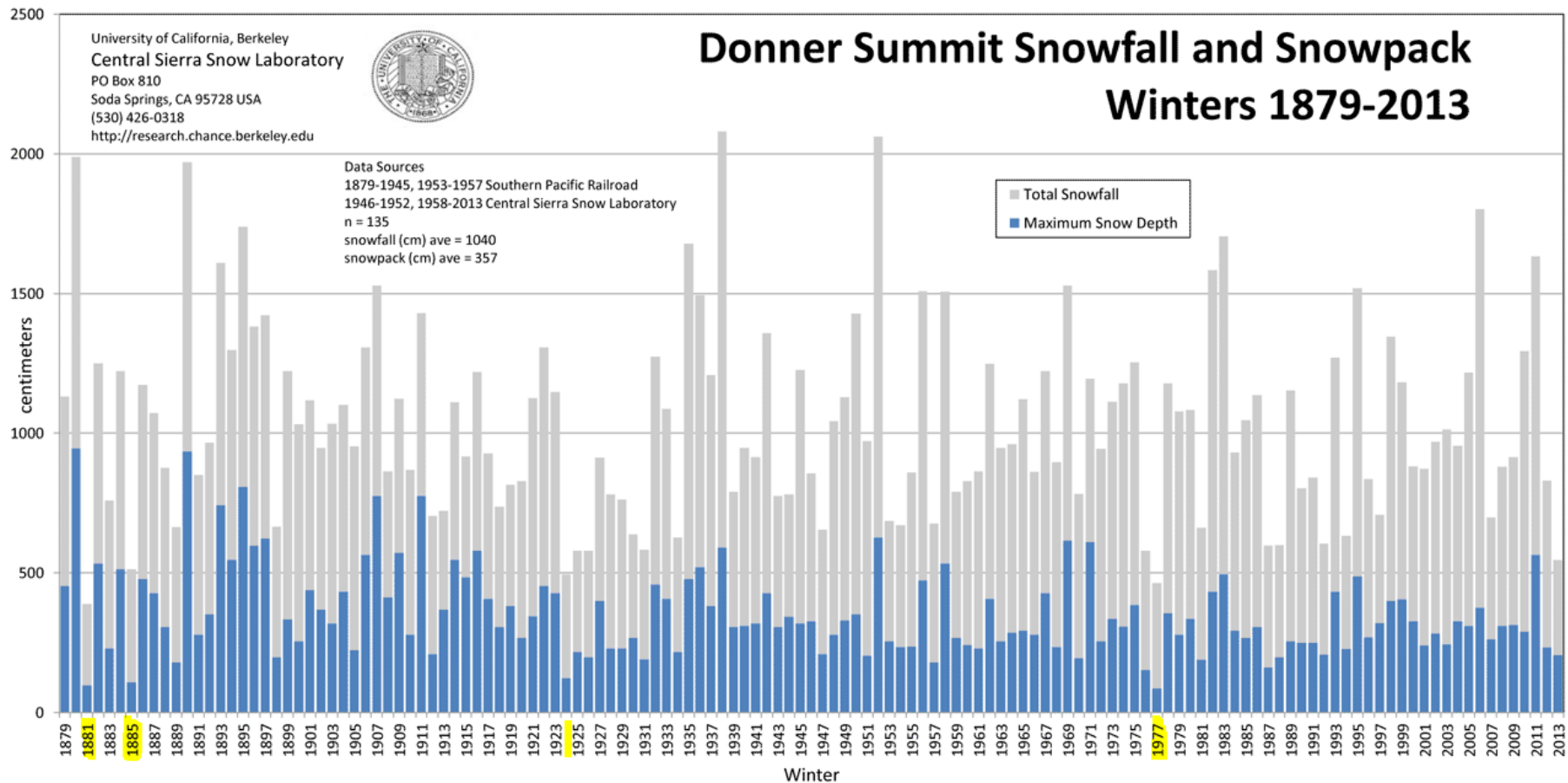


National Climatic Data Center / NESDIS / NOAA



## Northern Hemisphere Snow Extent November to April



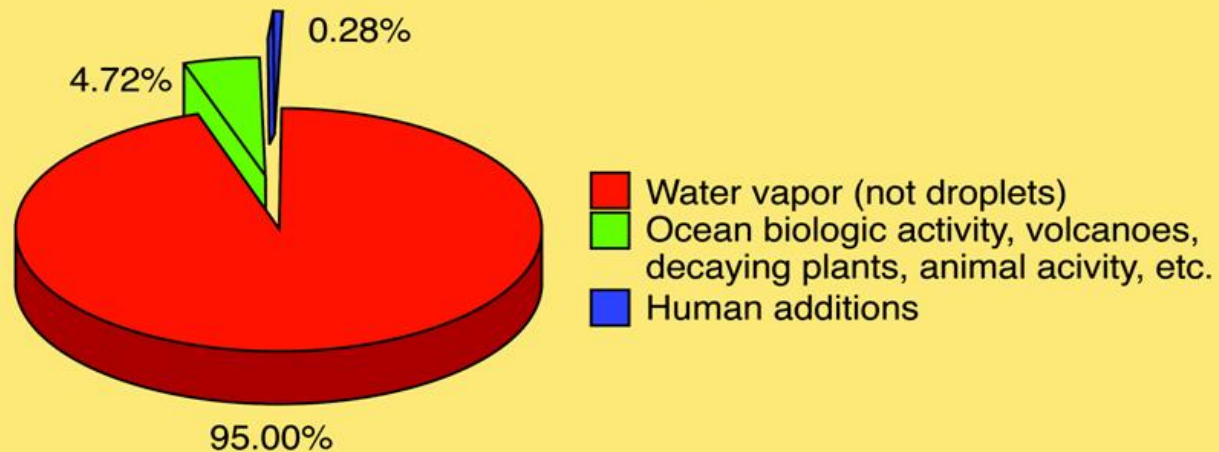




So, does atmospheric CO<sub>2</sub> really drive climate change?

## Sources of Greenhouse Gases

Contributions to the "Greenhouse Effect" expressed as % of total

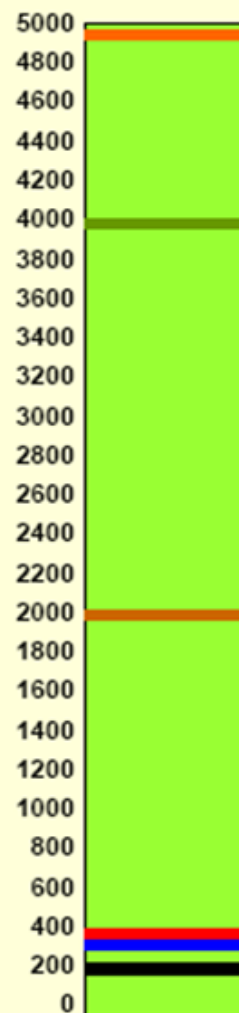


NOTE: "Contributions" are defined as concentrations adjusted for GWP (global warming potential, relative to CO<sub>2</sub>)



## Atmospheric CO2

In ppm



500 million years ago

400 million years ago

150 million years ago

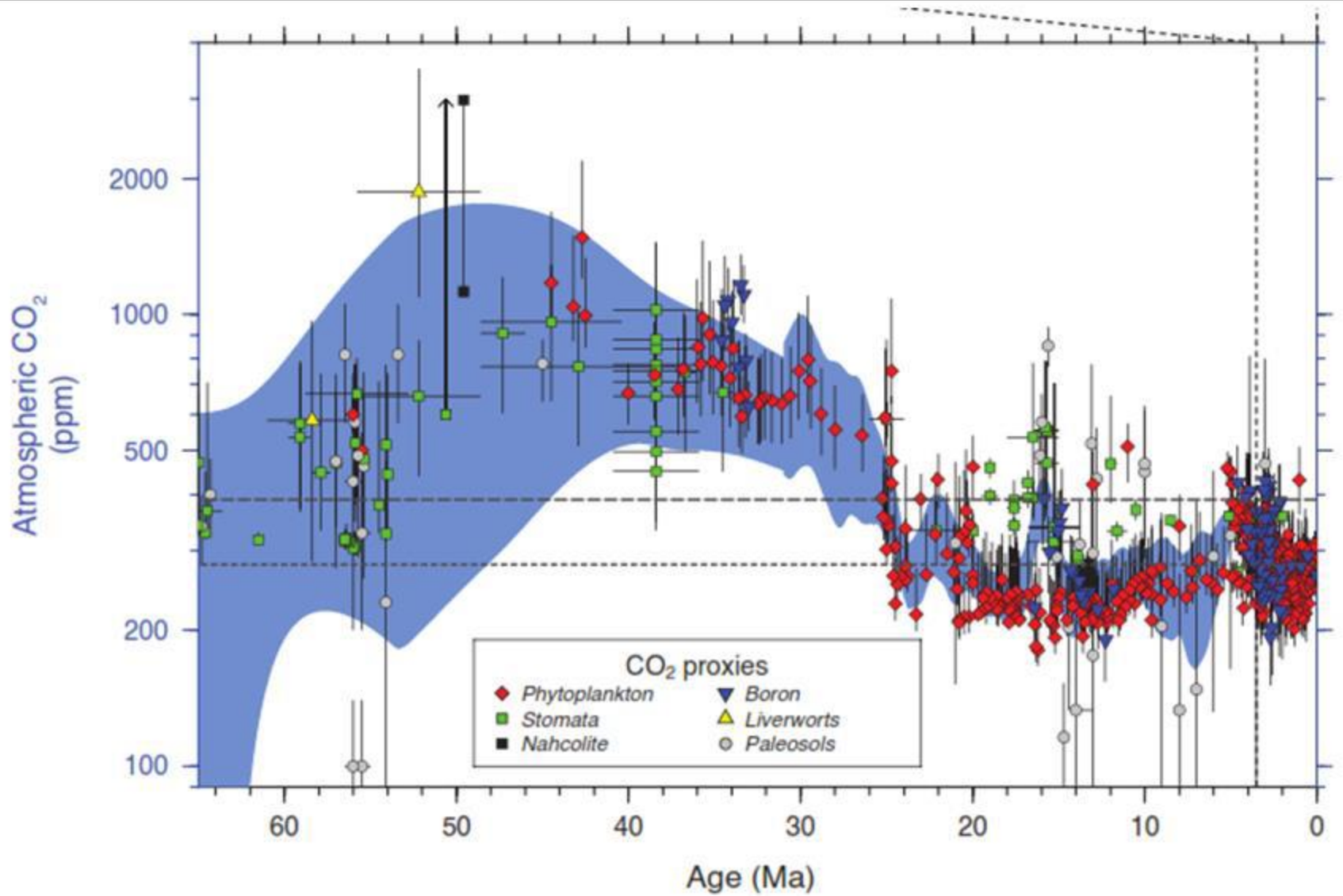
Dr Hansen's safe upper limit

Pre-industrial level of 280 ppm

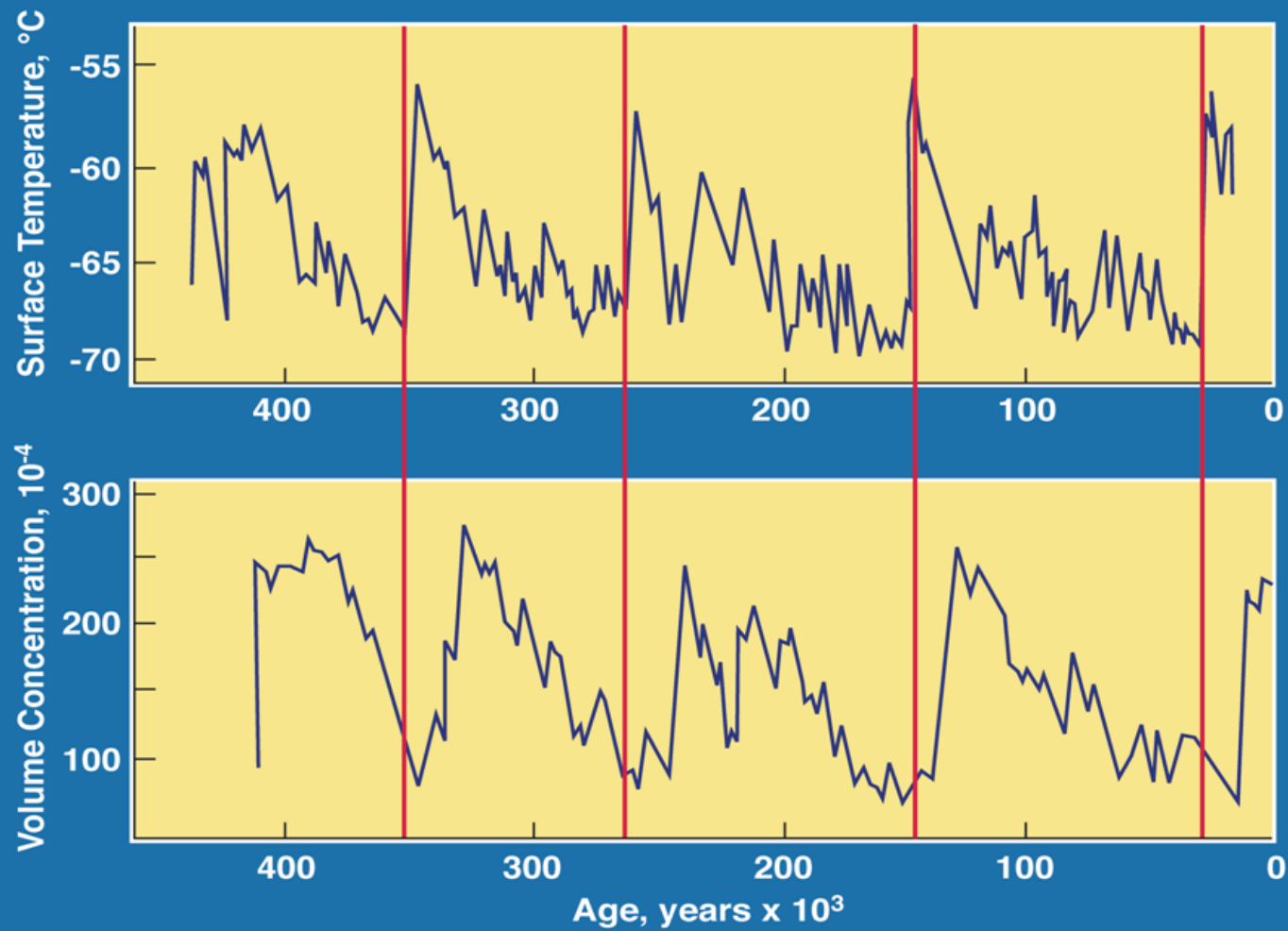
Level reached during interglacials, level below which plant growth shuts down

## Correct Safe Limit

“the safe upper limit for atmospheric CO2 is no more than 350 ppm”  
– Dr Hansen of NASA, American Geophysical Union meeting, San Francisco, December 2007

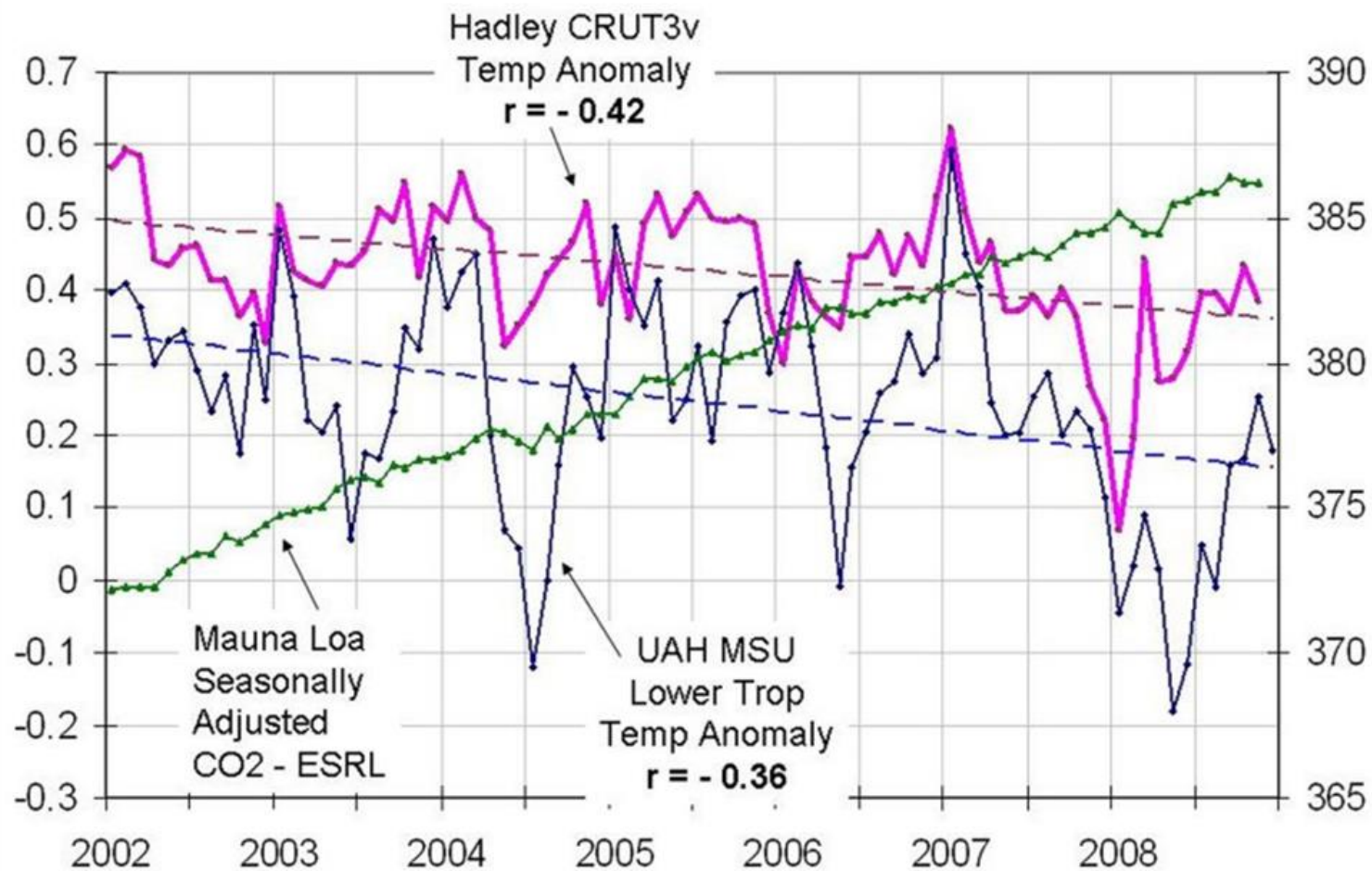


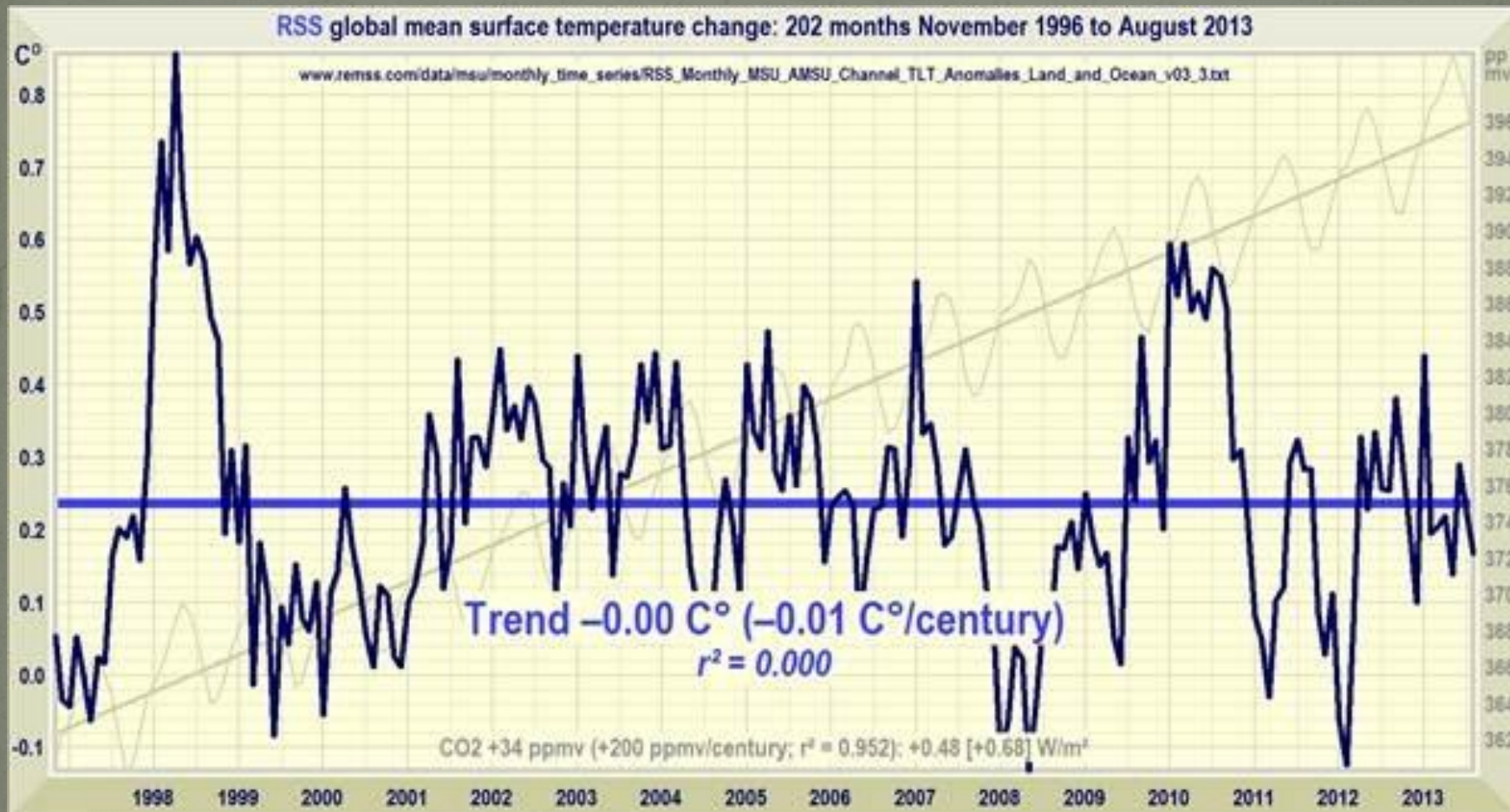




Khilyuk and Chilingar, 2003

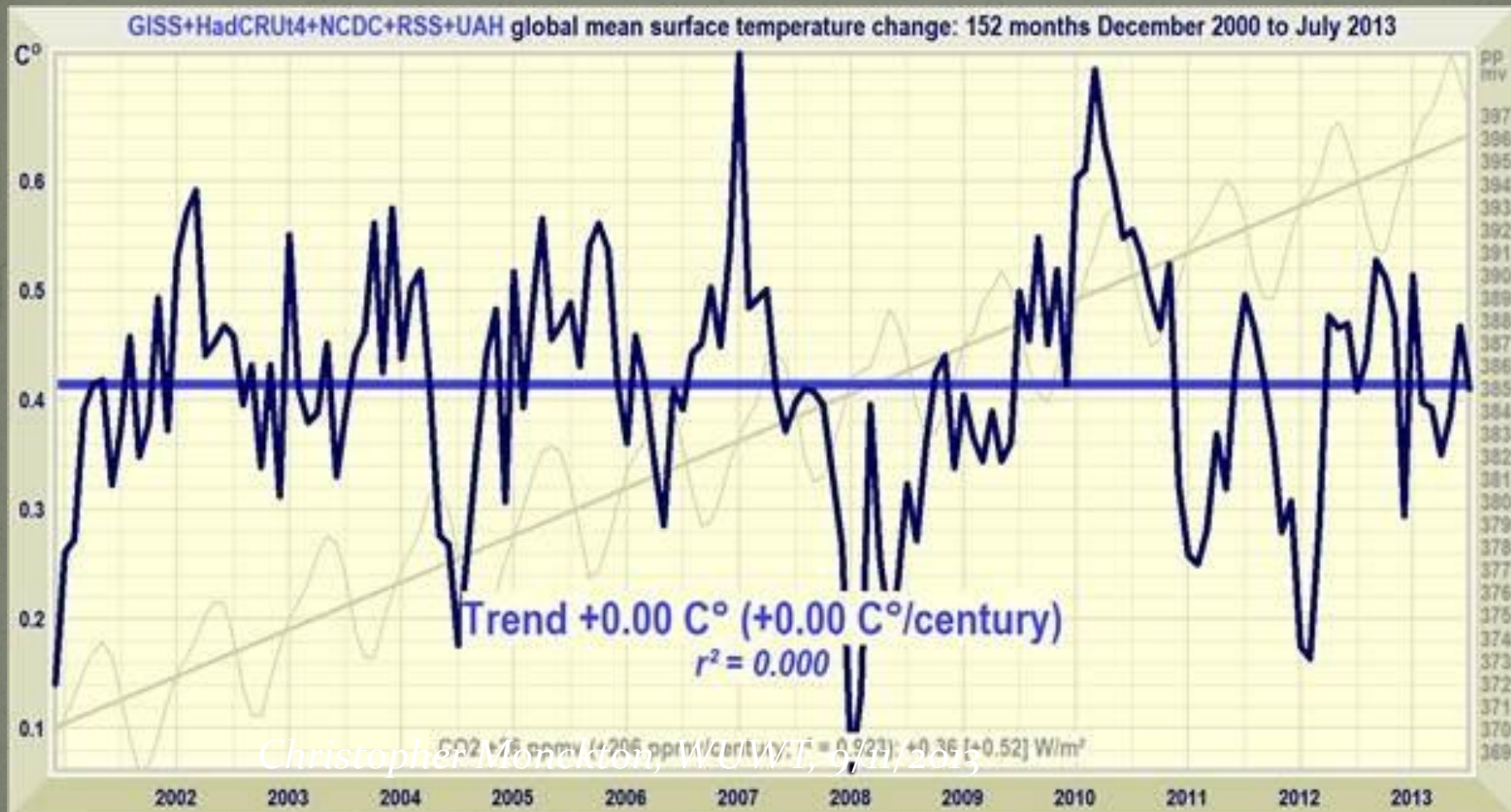
## Hadley CRUT3v and UAH MSU vs CO2





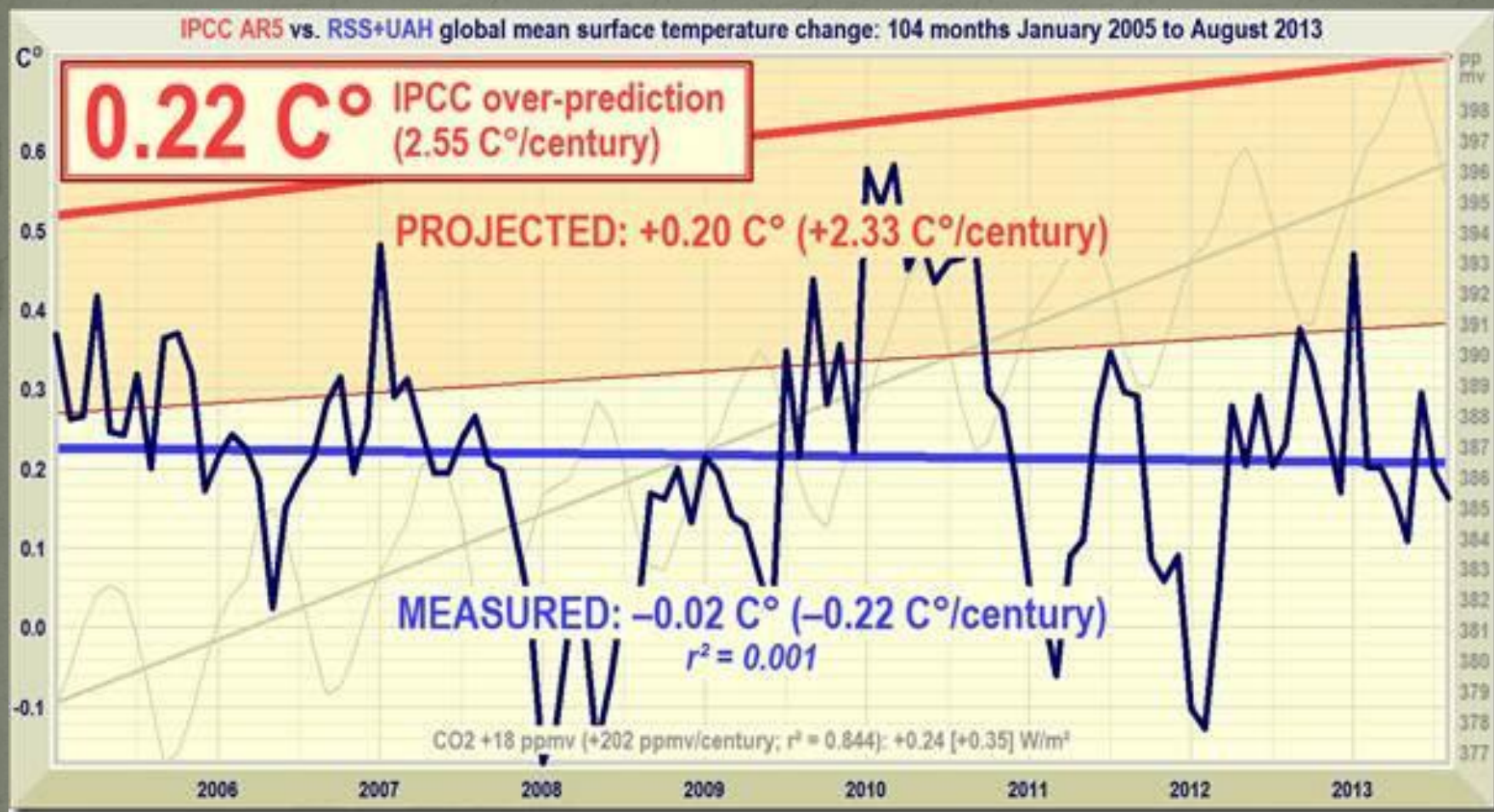
Christopher Monckton, WUWT, 9/11/2013





Christopher Monckton, WUWT, 9/11/2013

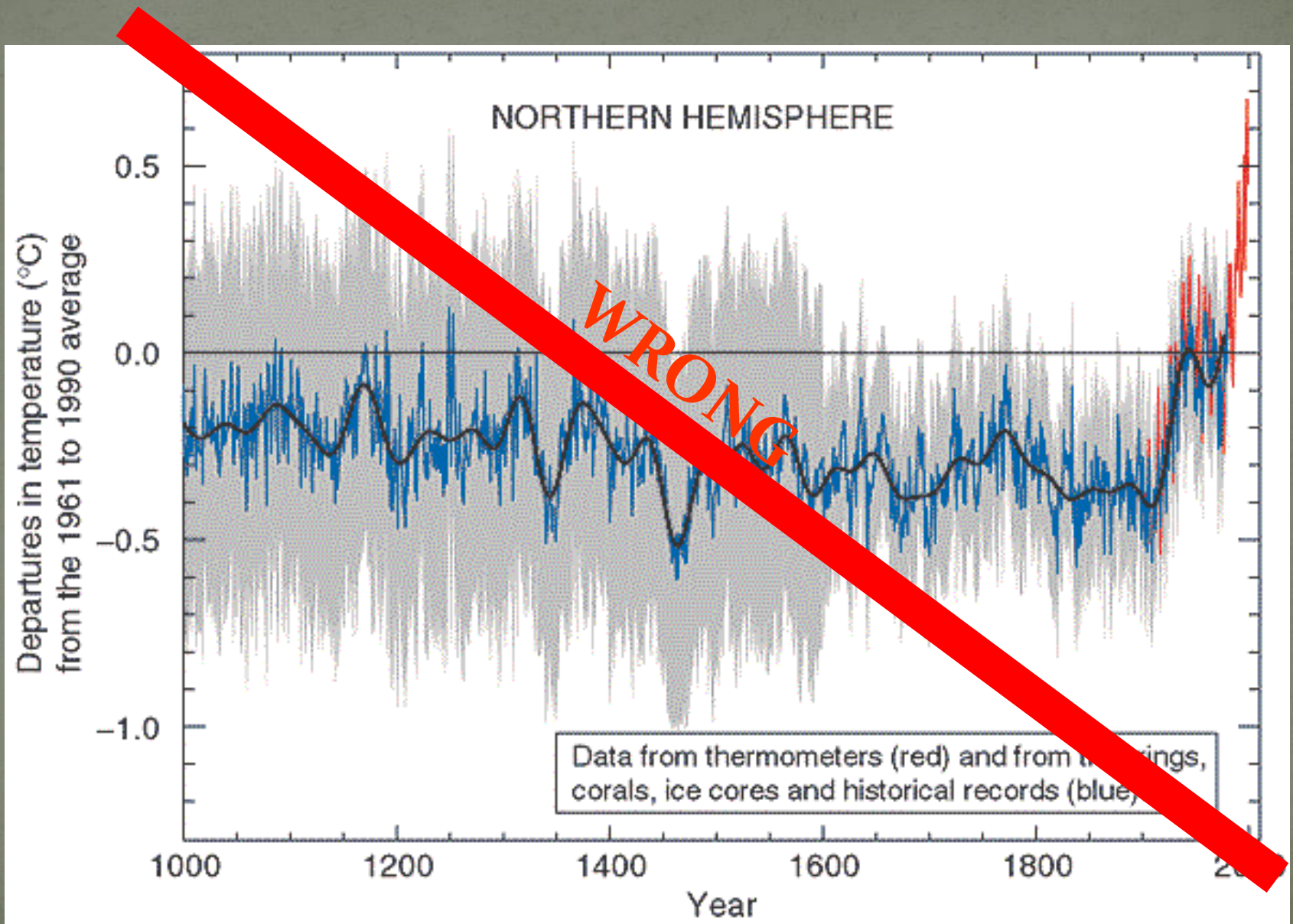
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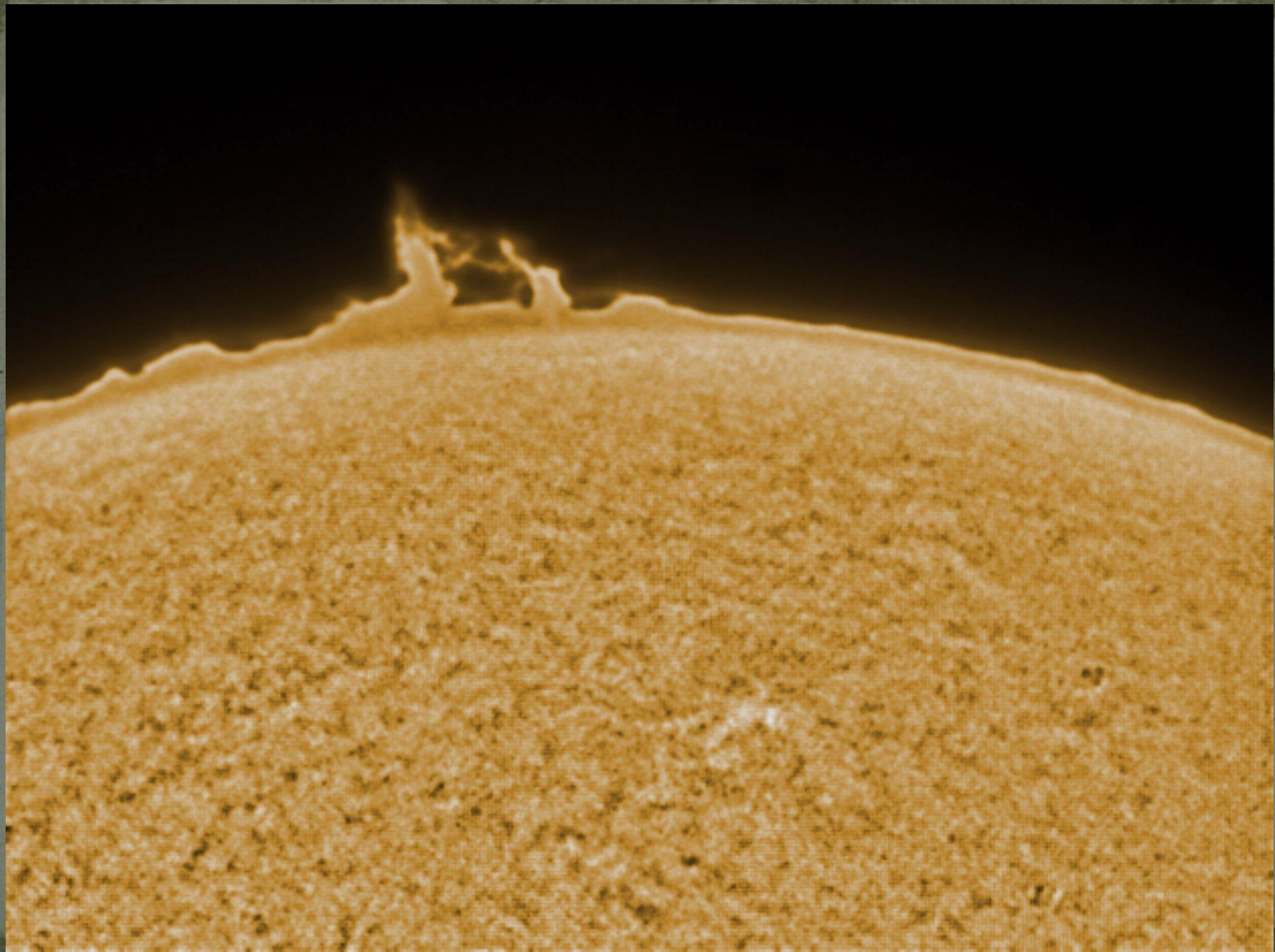


# Mann "Hockey Stick" Curve



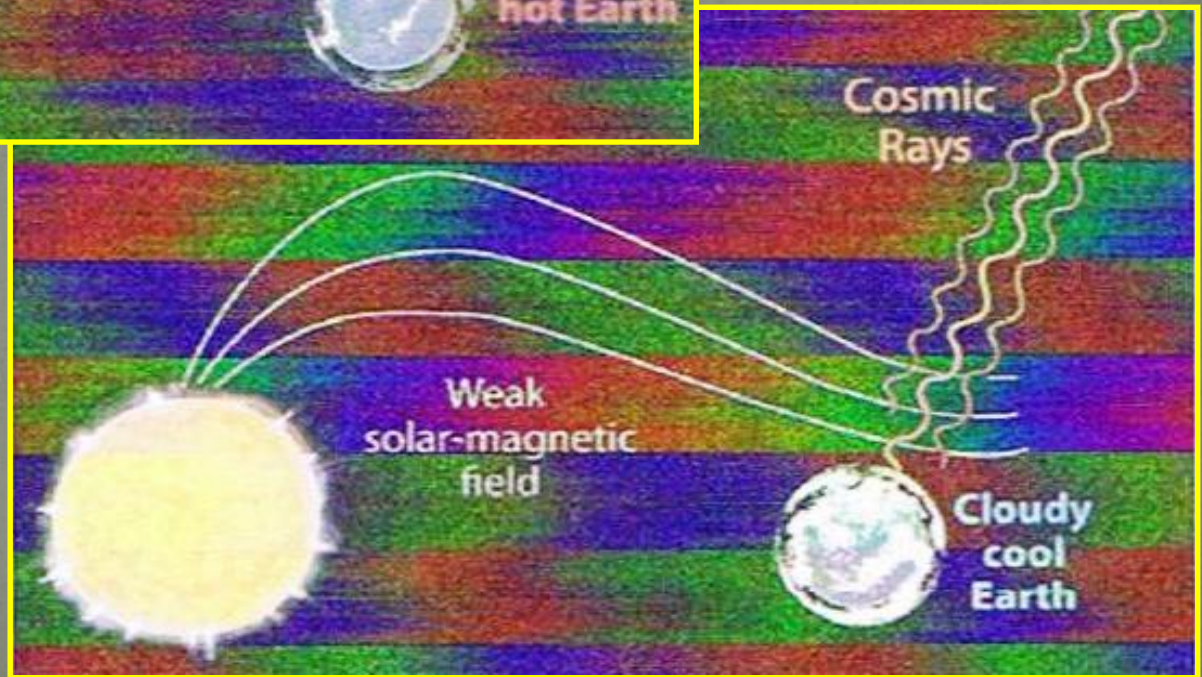
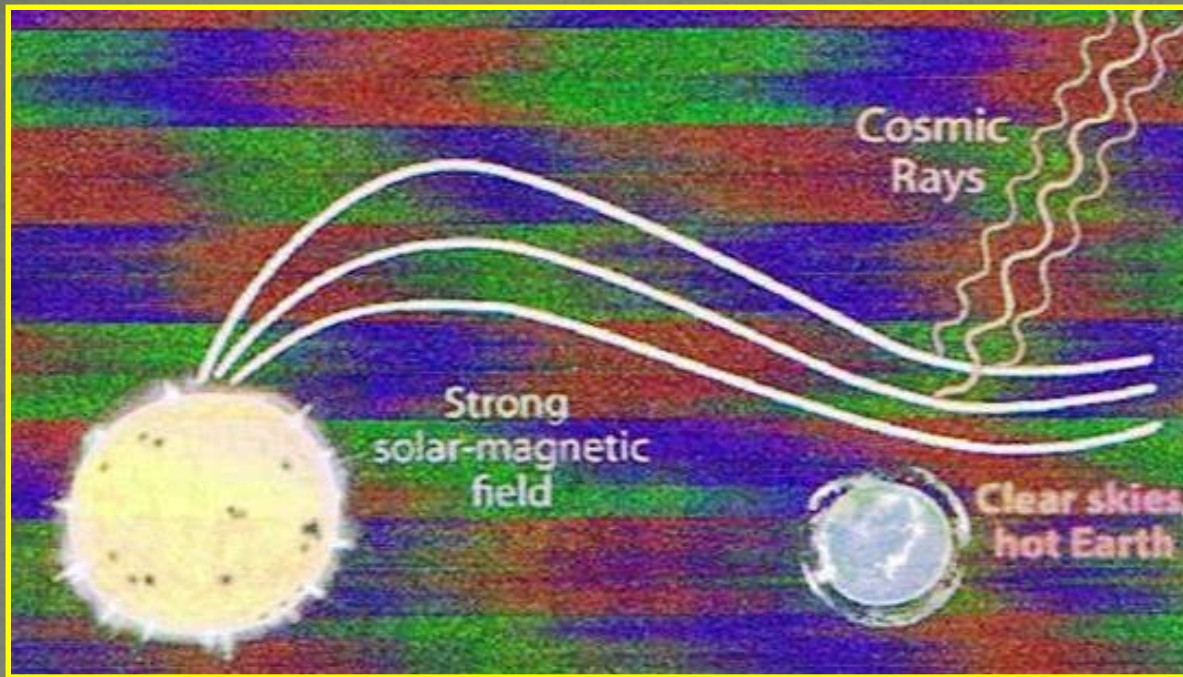


What then is driving climate change?





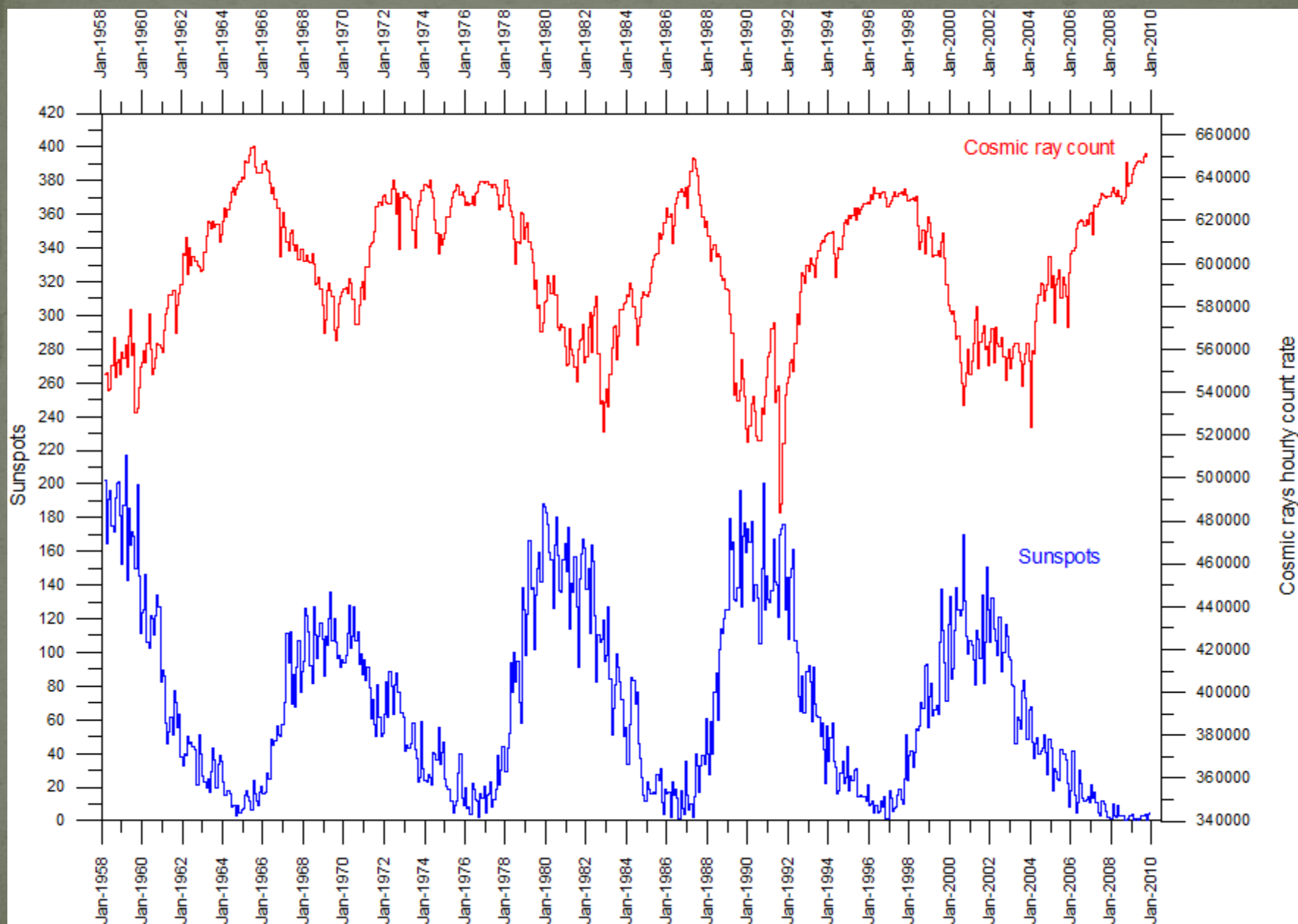
# Sunspots & Clouds

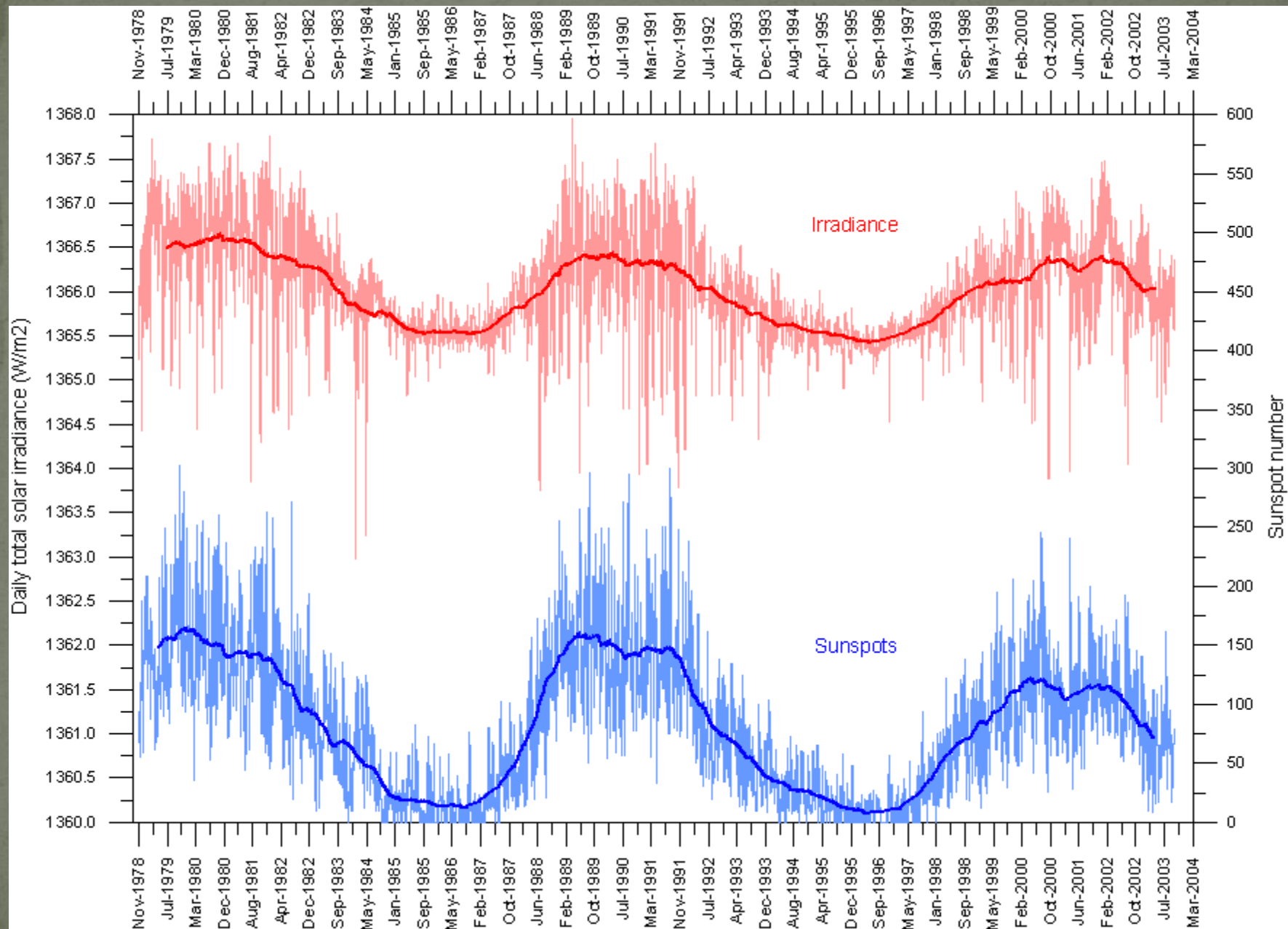


After Svensmark *re*  
Laken et al. 2010

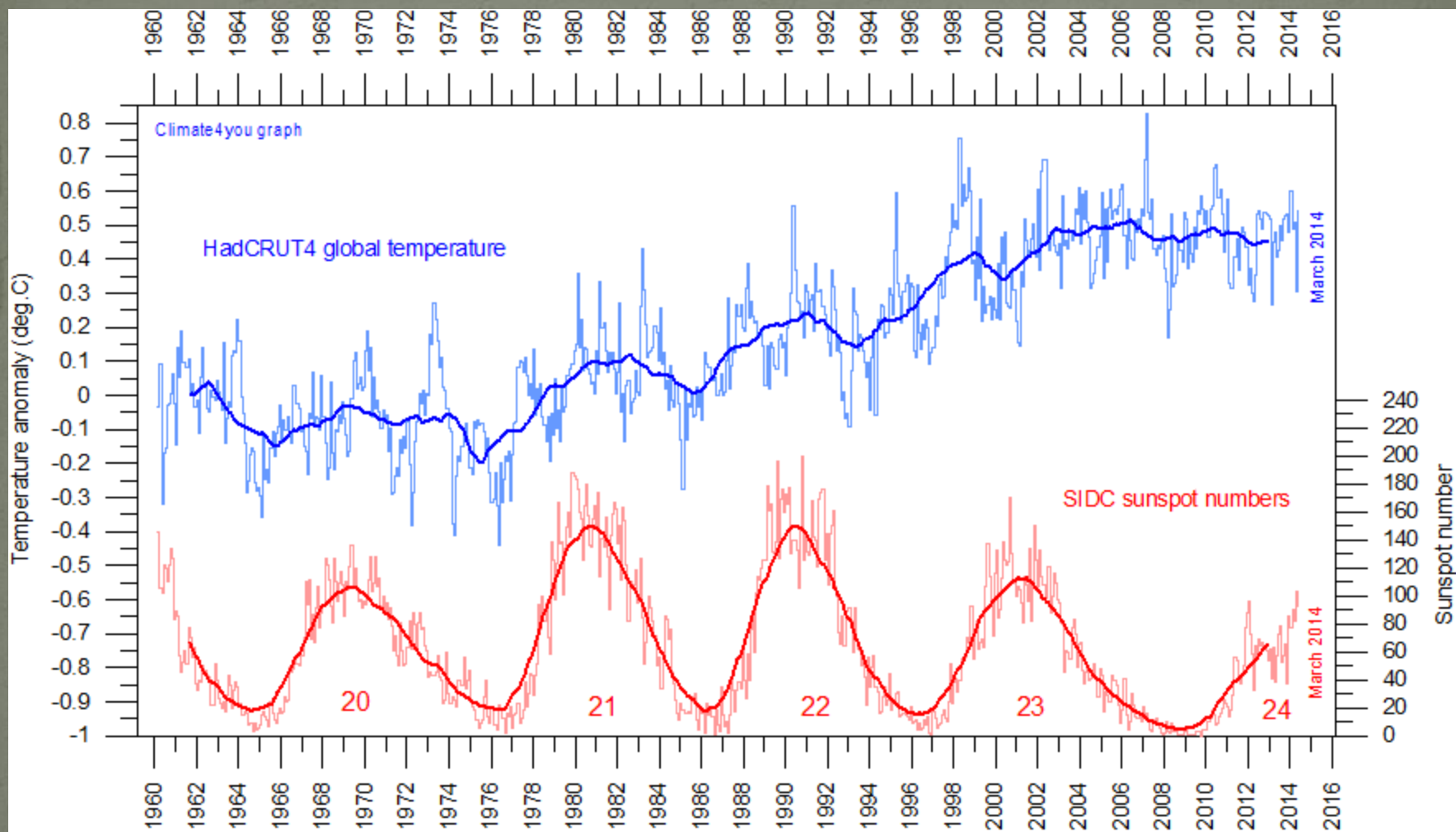
Image: Jo Nova

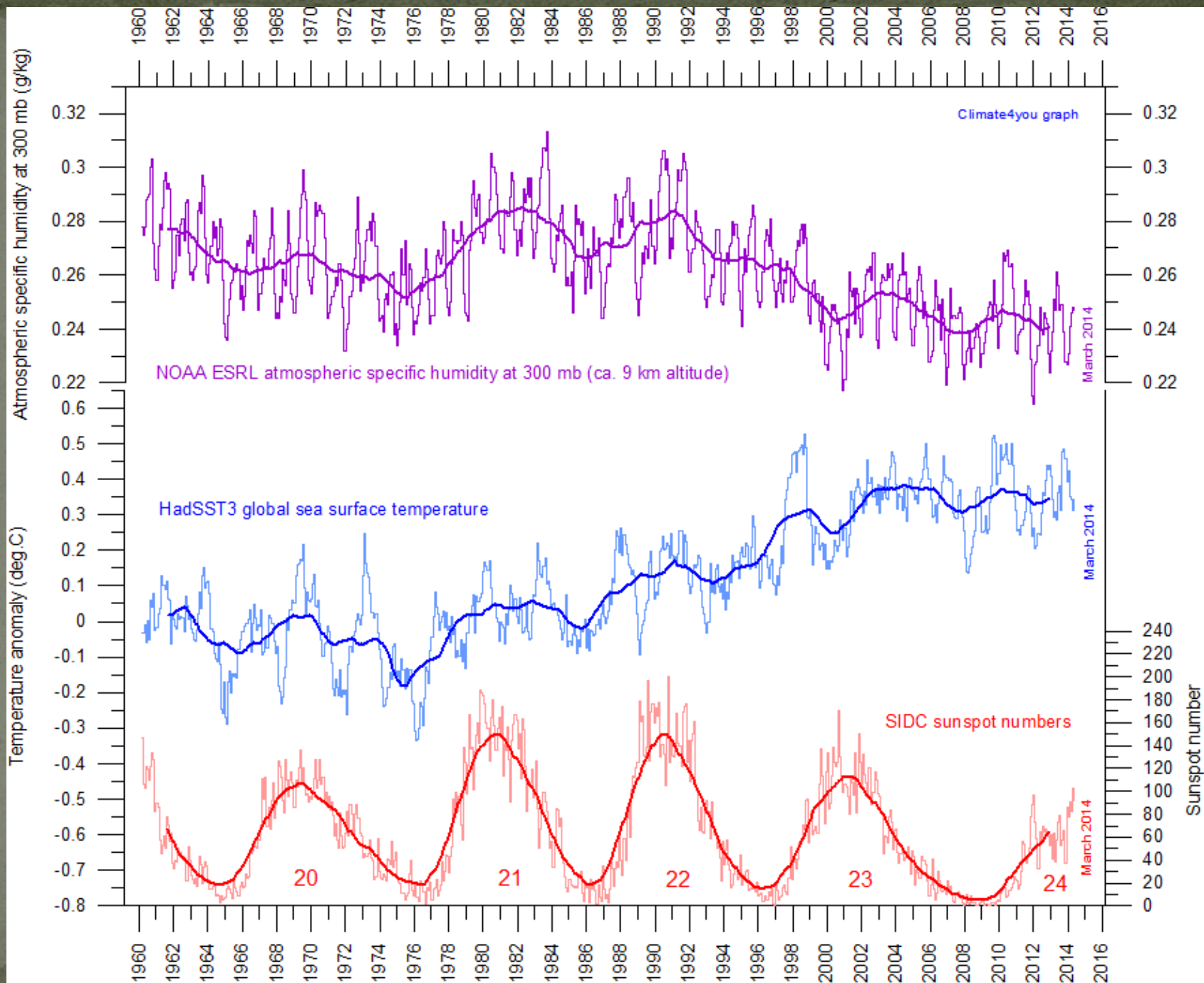




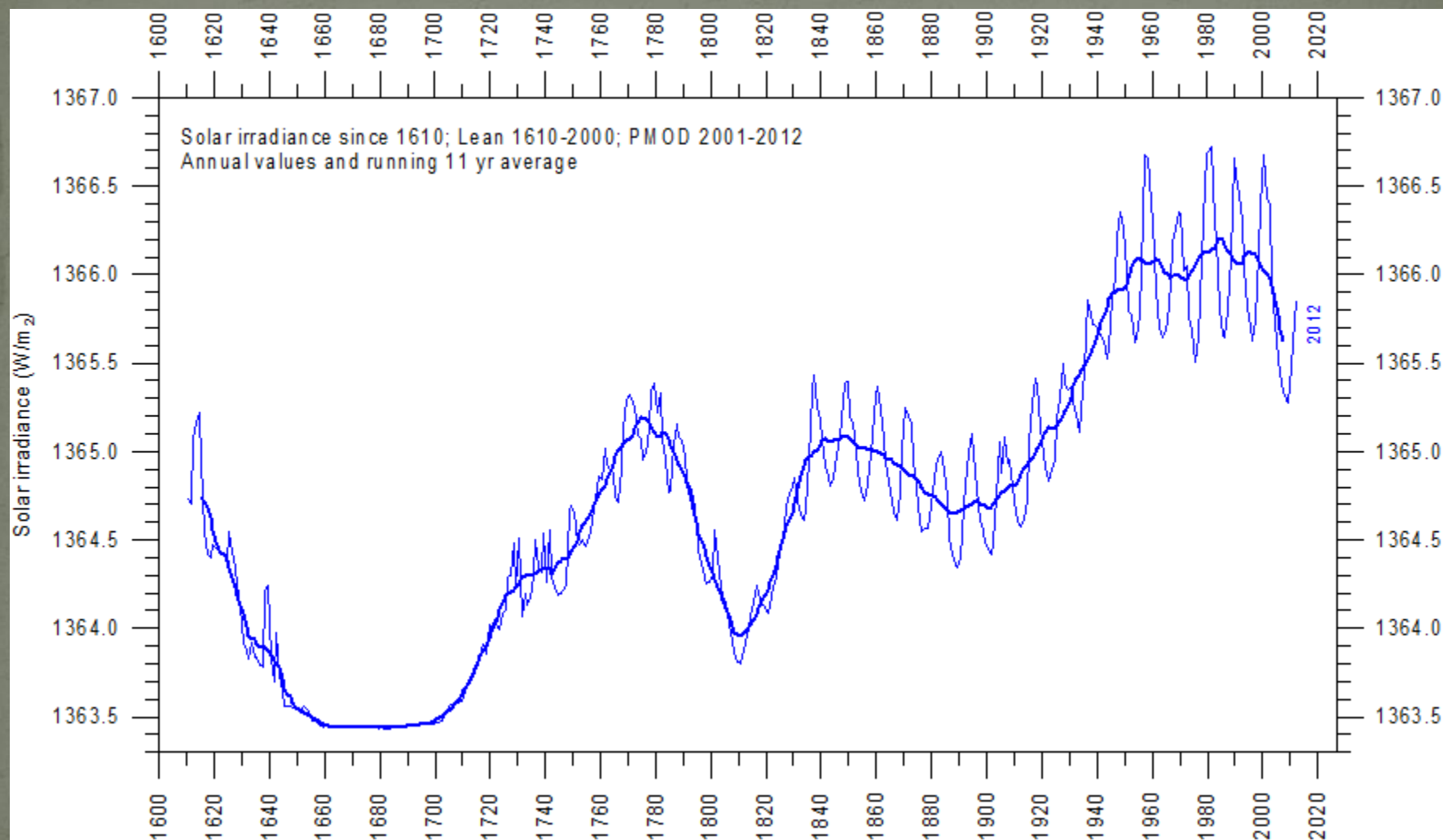




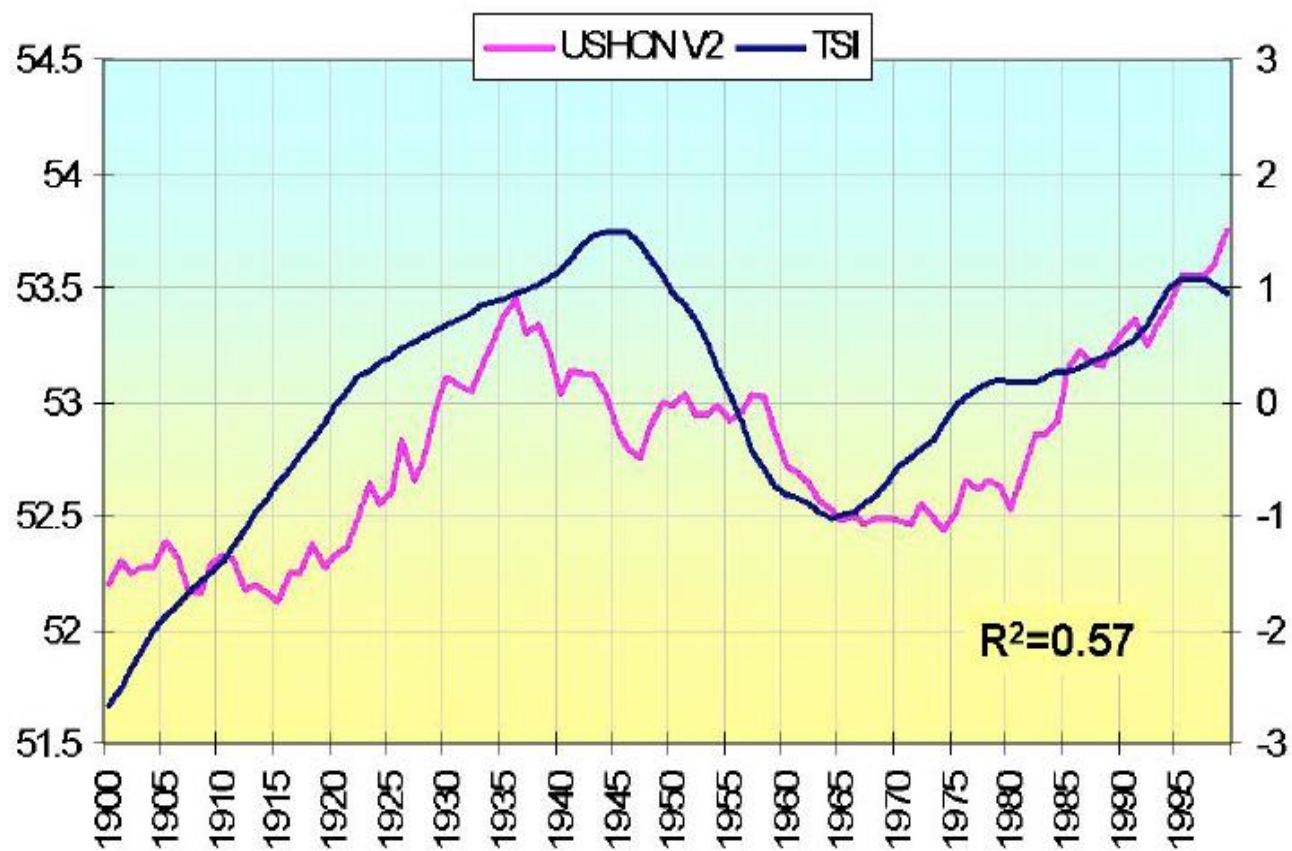




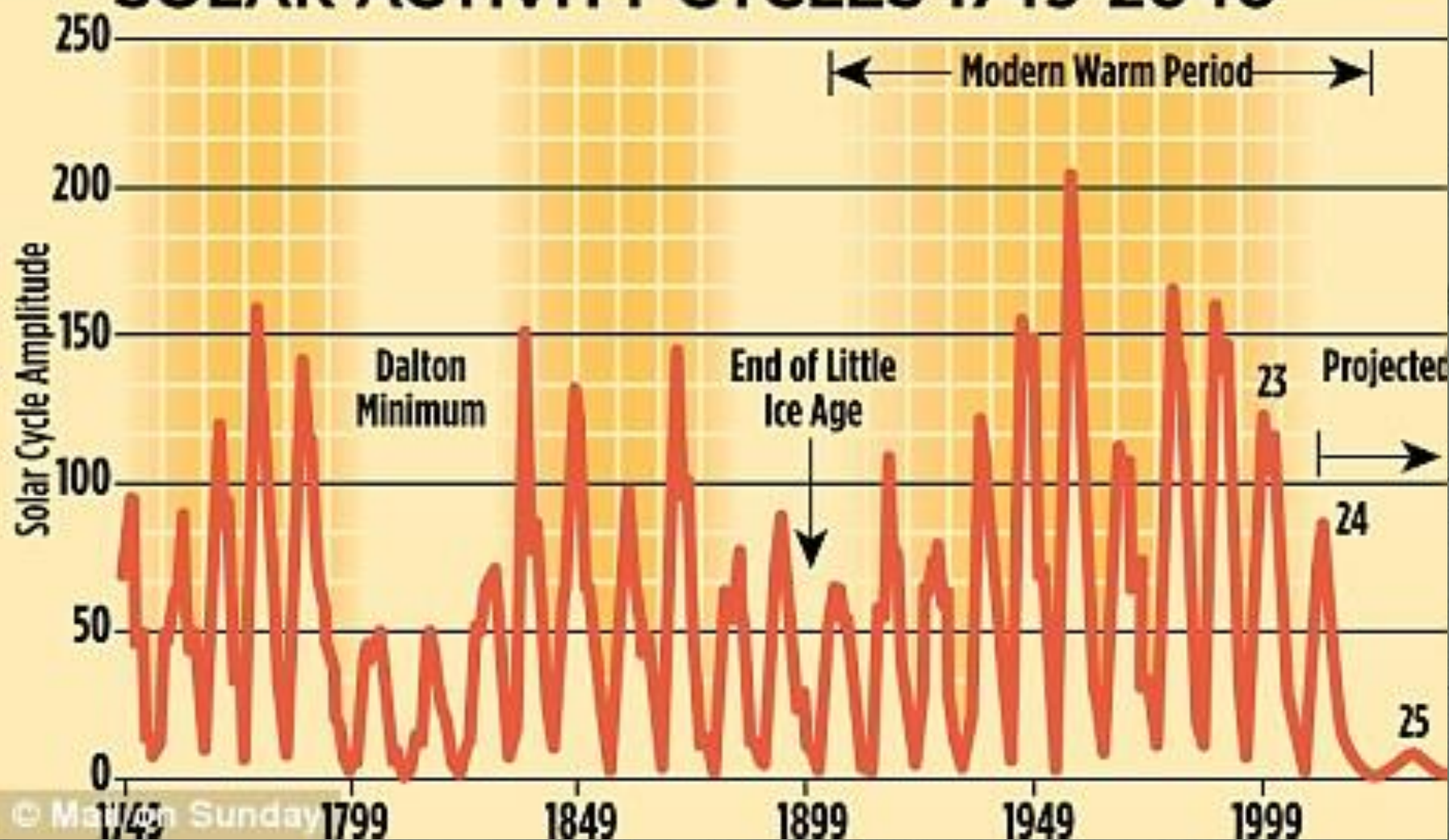




### Total Solar Irradiance (Hoyt) vs USHCN V2



# SOLAR ACTIVITY CYCLES 1749-2040





# Global Warming

## Just the Facts

### Sea Level Increase

Historical rate of 0.07 inches/year not catastrophic  
May go down

No more droughts or storms than normal

Ice melting is normal for interglacial periods

# Global Warming Just the Facts

CO<sub>2</sub> Is Not The Cause of Global Warming

Temperature increases may cause CO<sub>2</sub> increases

Solar Activity Has a Stronger Impact

Water vapor in the atmosphere  
demonstrates a more compelling correlation  
with temperature

# Global Warming Just the Facts

From mid 1800's to 1998

Temperatures increased  $0.8^{\circ}\text{C}$

From 1998 to 2007

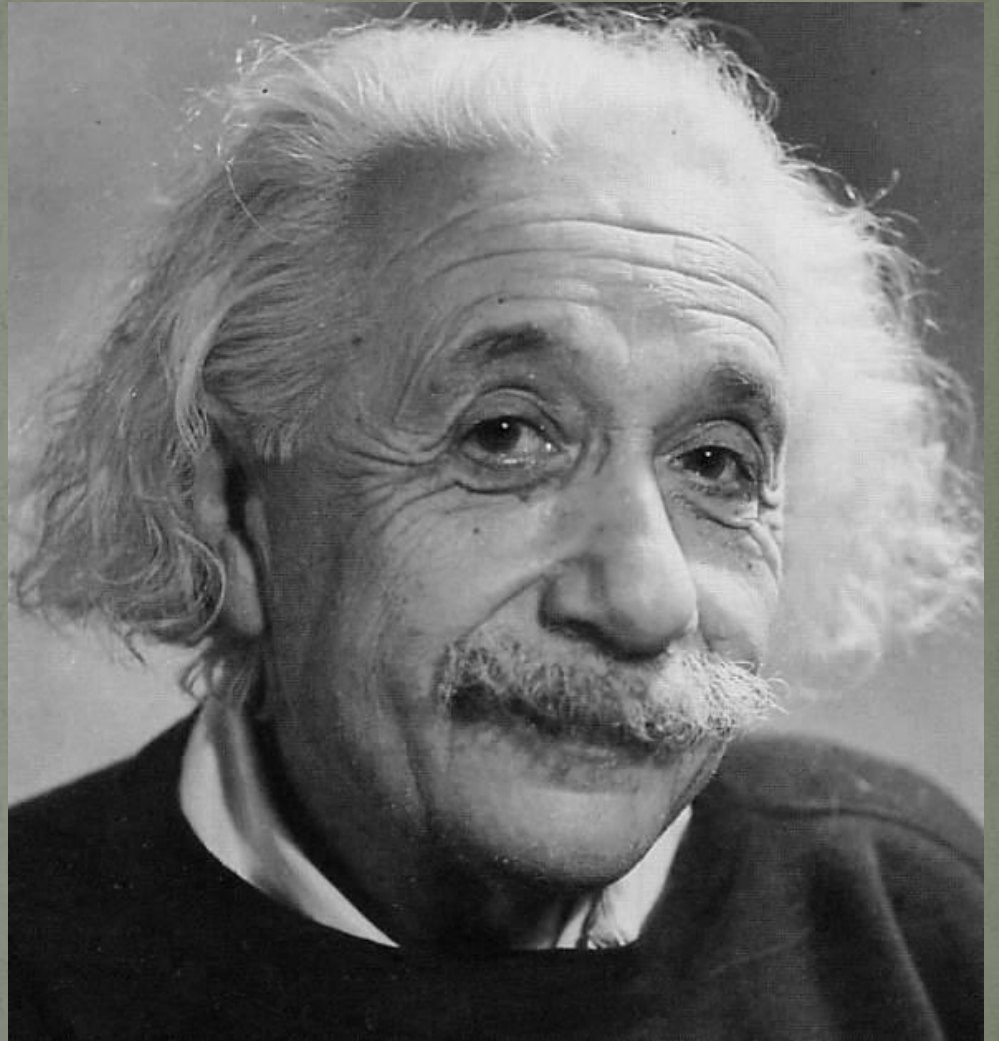
Temperatures were flat

From 2007 to 2012

Temperatures fell  $0.02$  to  $0.03^{\circ}\text{C}$

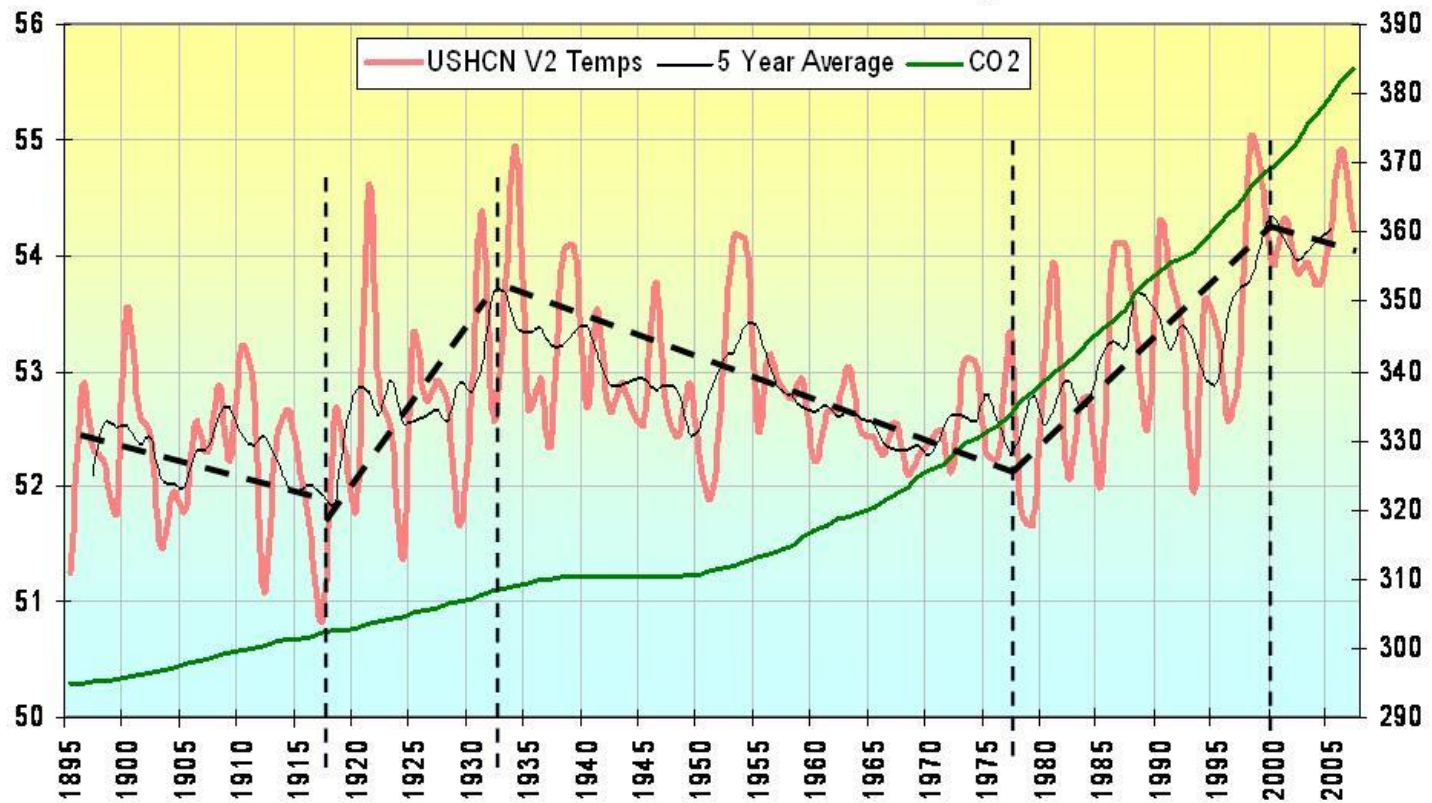


**“No amount of  
experimentation  
can ever prove me  
right; a single  
experiment can  
prove me wrong.”**



**Albert Einstein**

## Annual CO2 versus USHCN V2 Temps



Joe D'Aleo, Icecap.us

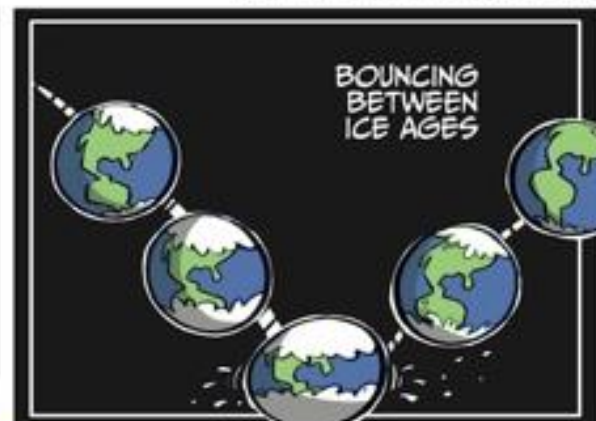






## PRICKLY CITY

BY SCOTT STANTIS



ISN'T CLIMATE  
CHANGE KIND  
OF WHAT THE  
EARTH DOES?



LUNATIC!

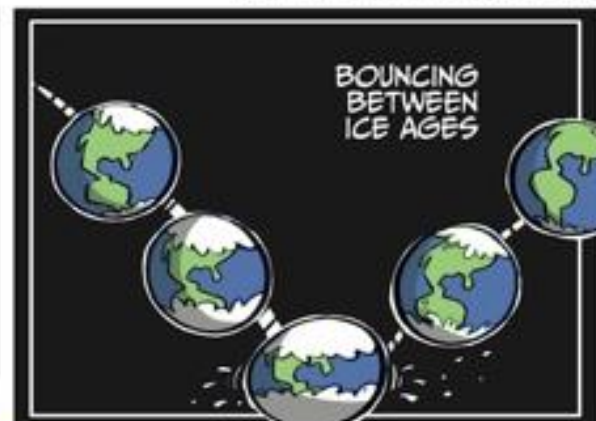
# Quotes from the U.S. National Climate Assessment Report (2014)

- “There has been no universal trend in the overall extent of drought across the continental U.S. since 1900.”
- “Other trends in severe storms, including the intensity and frequency of tornadoes, hail, and damaging thunderstorm winds, are uncertain.”
- “(there is) a lack of any clear trend in landfall frequency along the U.S. eastern and Gulf coasts”
- “When averaging over the entire contiguous U.S., there is no overall trend in flood magnitudes.”



## PRICKLY CITY

BY SCOTT STANTIS



ISN'T CLIMATE  
CHANGE KIND  
OF WHAT THE  
EARTH DOES?



LUNATIC!



Extra slides

I GOT YOUR STUPID  
EMAIL WITH YOUR  
STUPID LINK TO THAT  
STUPID SCIENTIFIC  
STUDY.



Dilbert.com DilbertCartoonist@gmail.com

I DON'T CARE ABOUT  
YOUR SO-CALLED  
"FACTS." I KNOW I'M  
RIGHT!



9-26-13 © 2013 Scott Adams, Inc. /Dist. by Universal Uclick

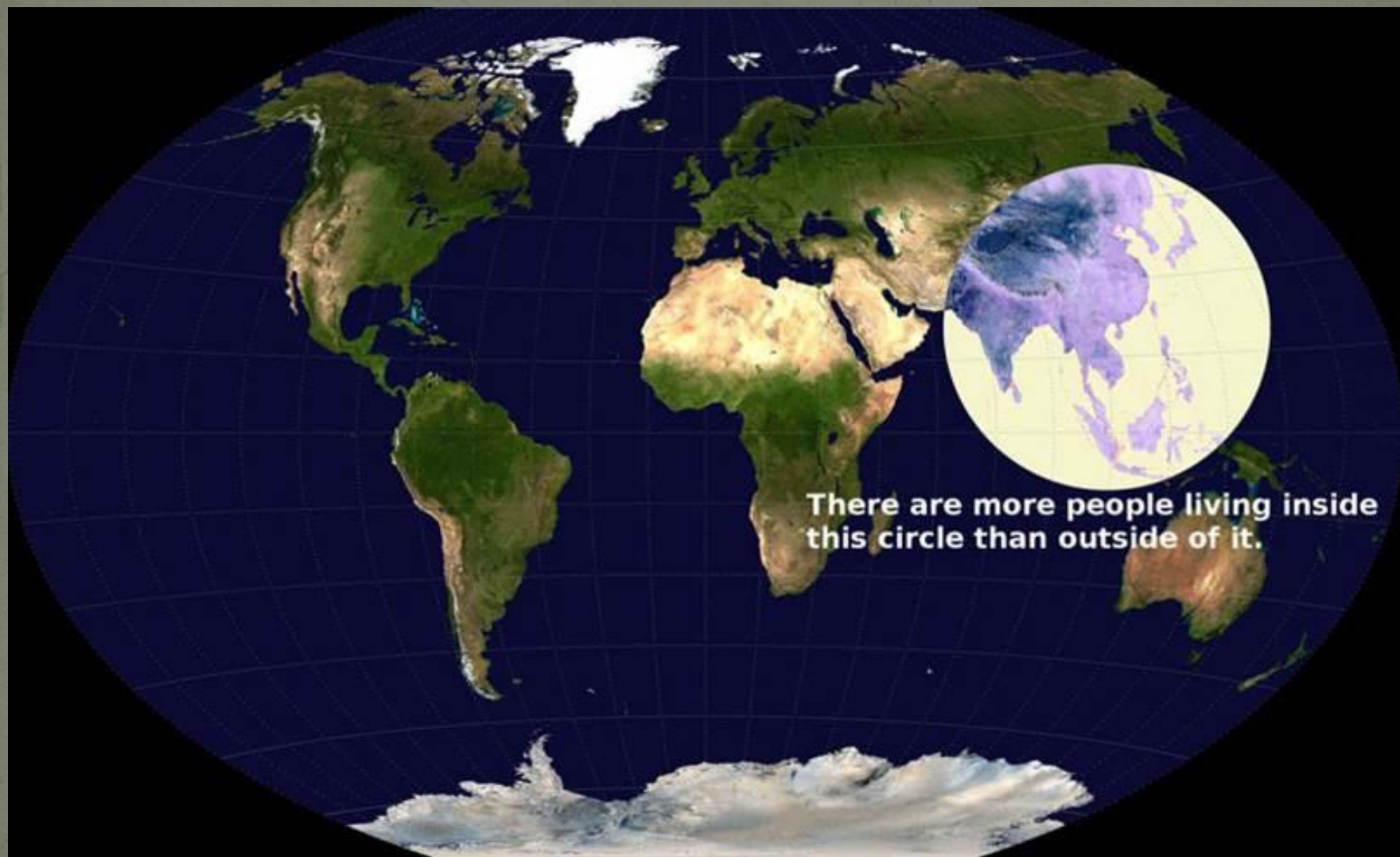
WINNING  
AN ARGUMENT  
NEVER **FEELS**  
LIKE WINNING.



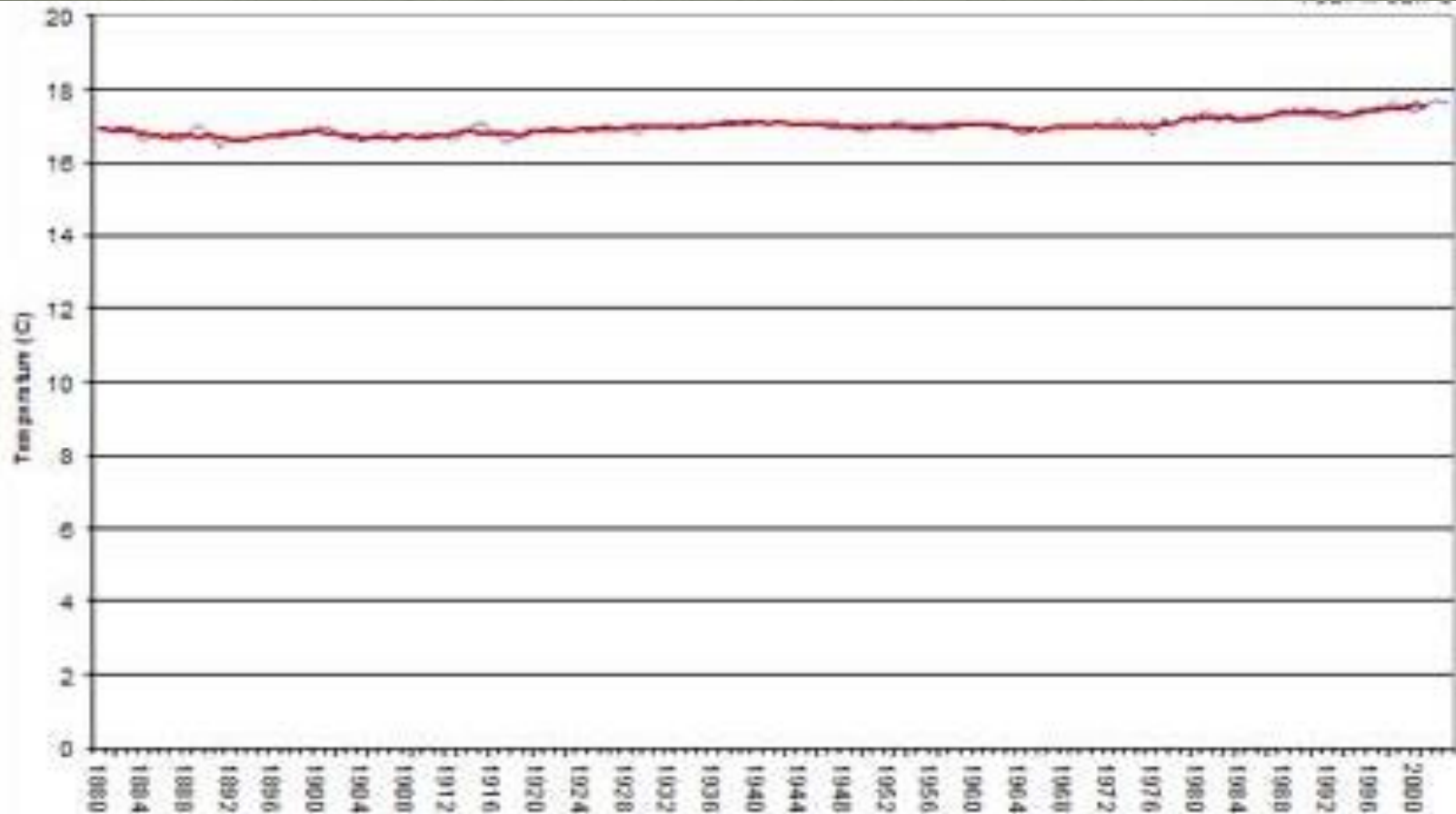
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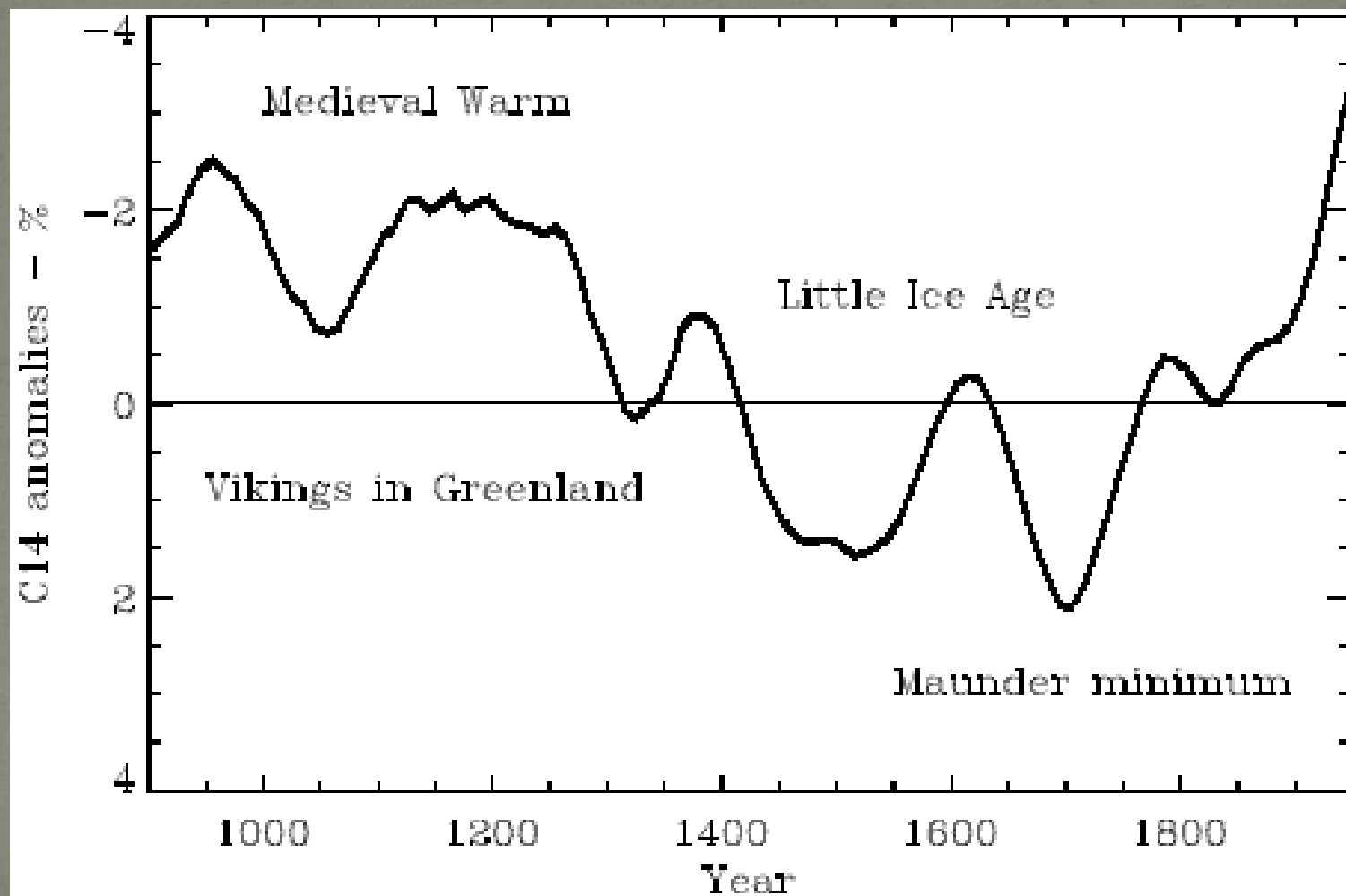


## Actual Average Temperature Scaled in whole Degrees



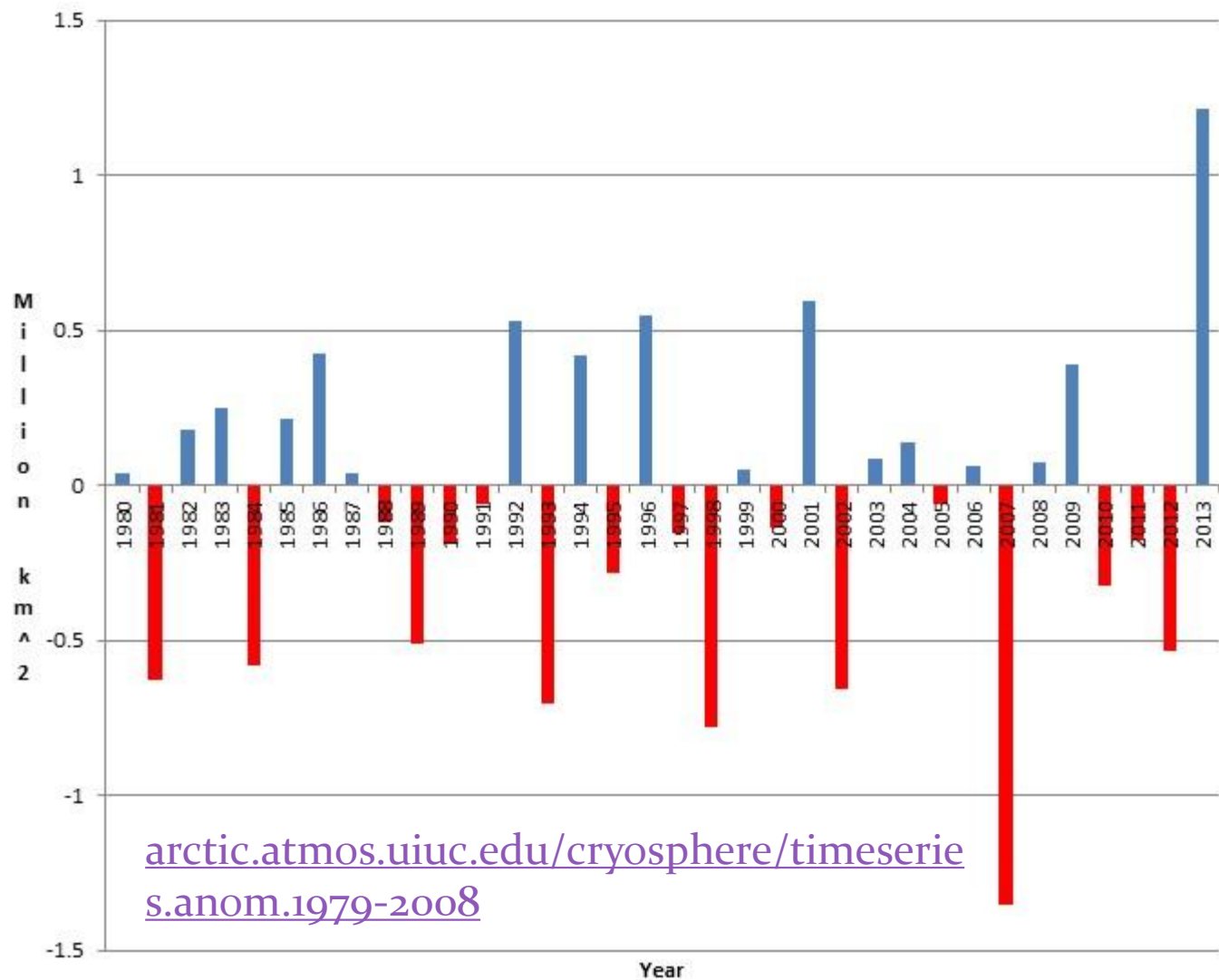
Global Mean Temperatures: 1880 - 2003

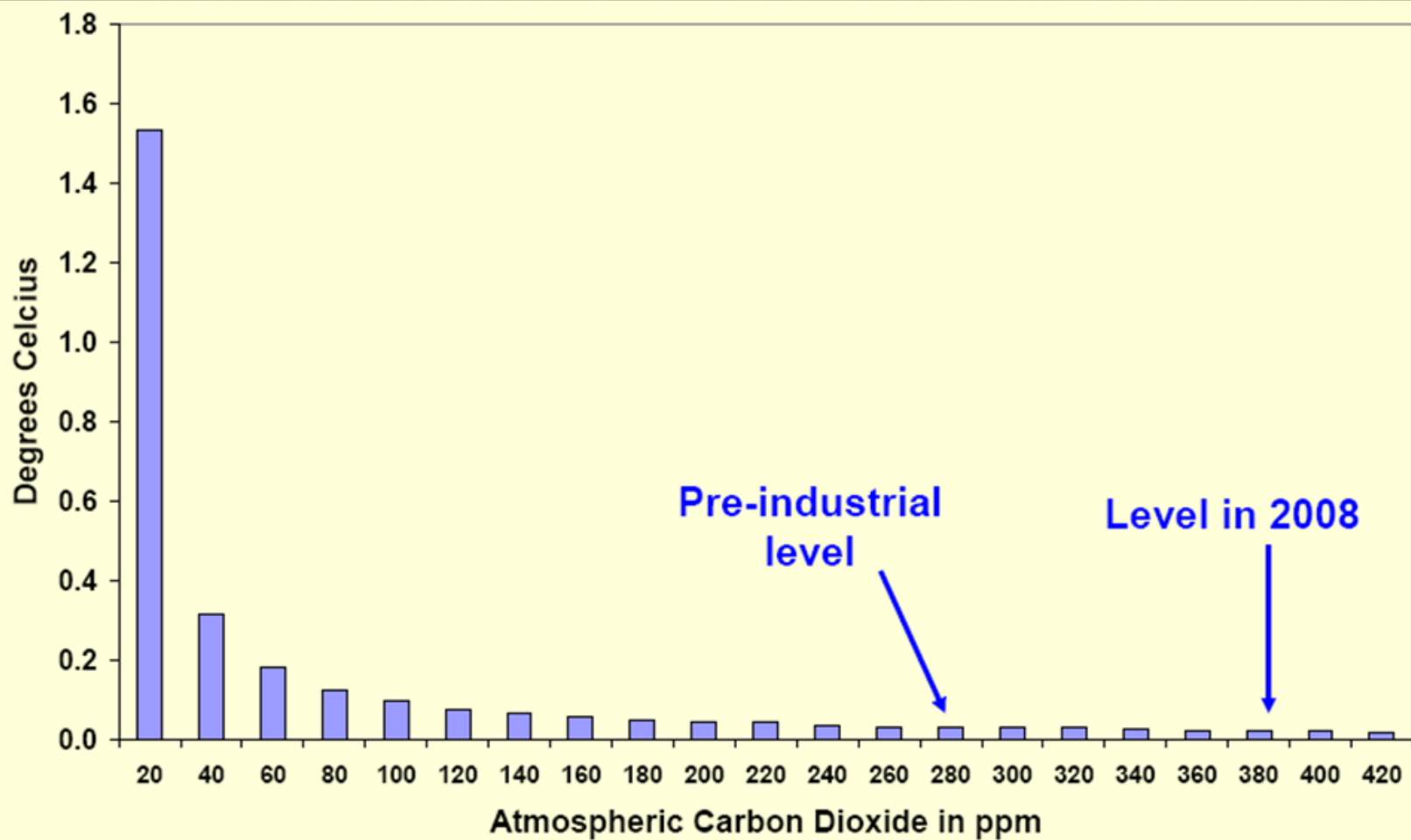
John Grisham, Source; NASA



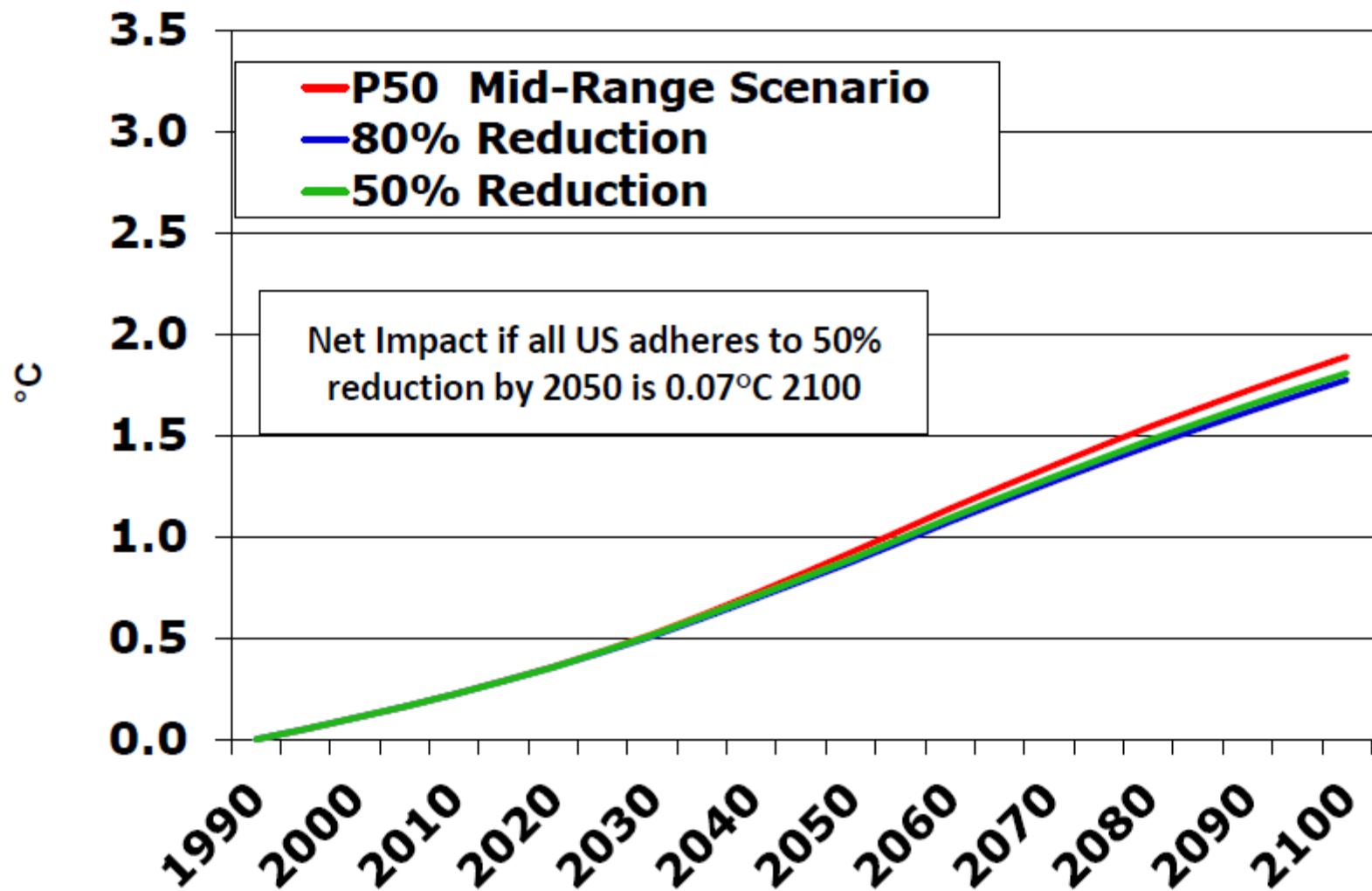


## September 10 Year Over Year Change In Ice Area





## Scenario: 50% and 80% reduction in US CO<sub>2</sub> emissions by 2050 Climate Sensitivity of 1.5° C (Similar to Waxman-Markey)



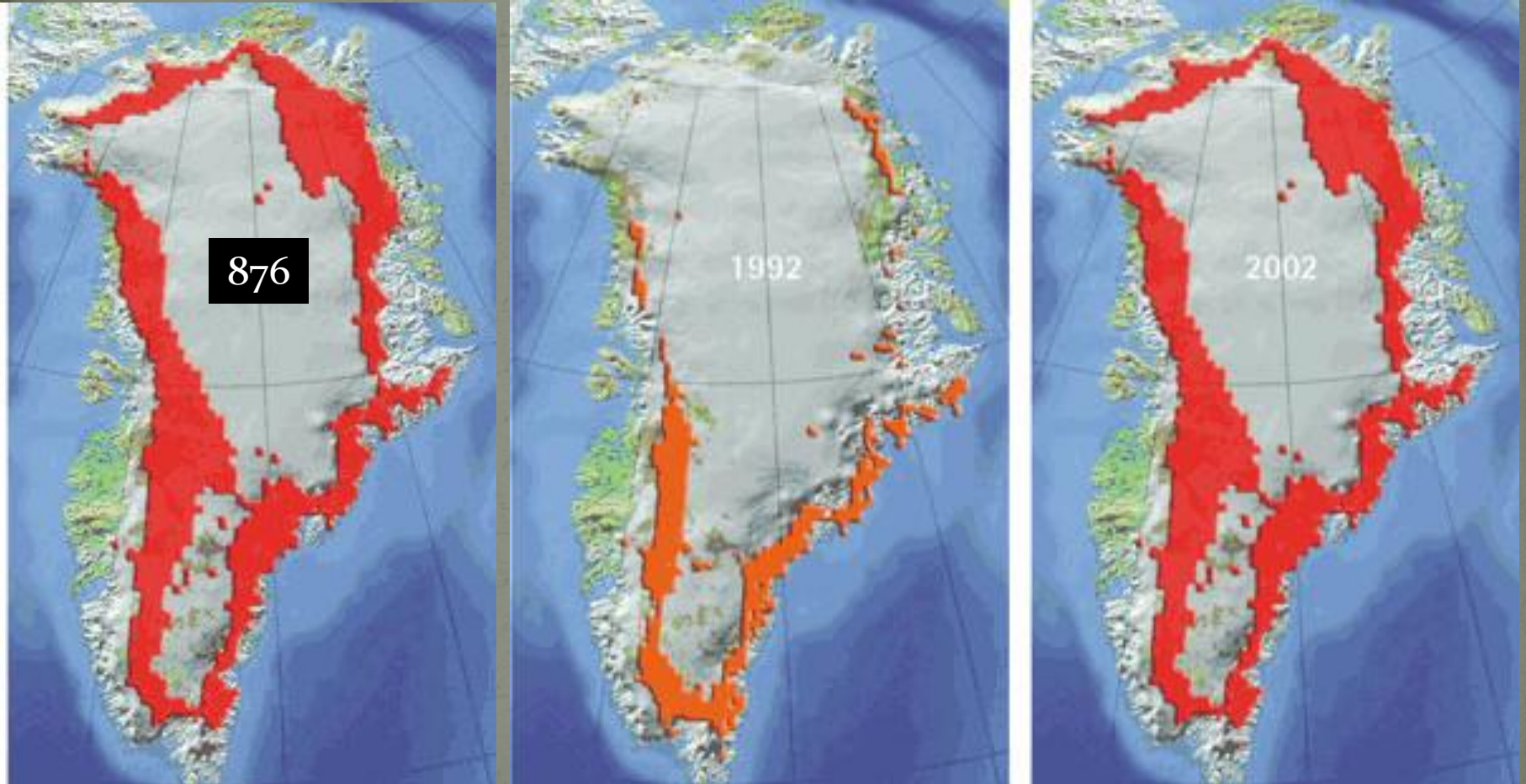


- The Arctic is melting
- Glaciers are retreating
- Sea levels will rise
- Coastal cities will be inundated
- Tropical storms numbers and intensity will increase
- Tornados will become more frequent and intense
- Precipitation will increase in frequency and severity
- Famines will kill millions of people

# Headlines

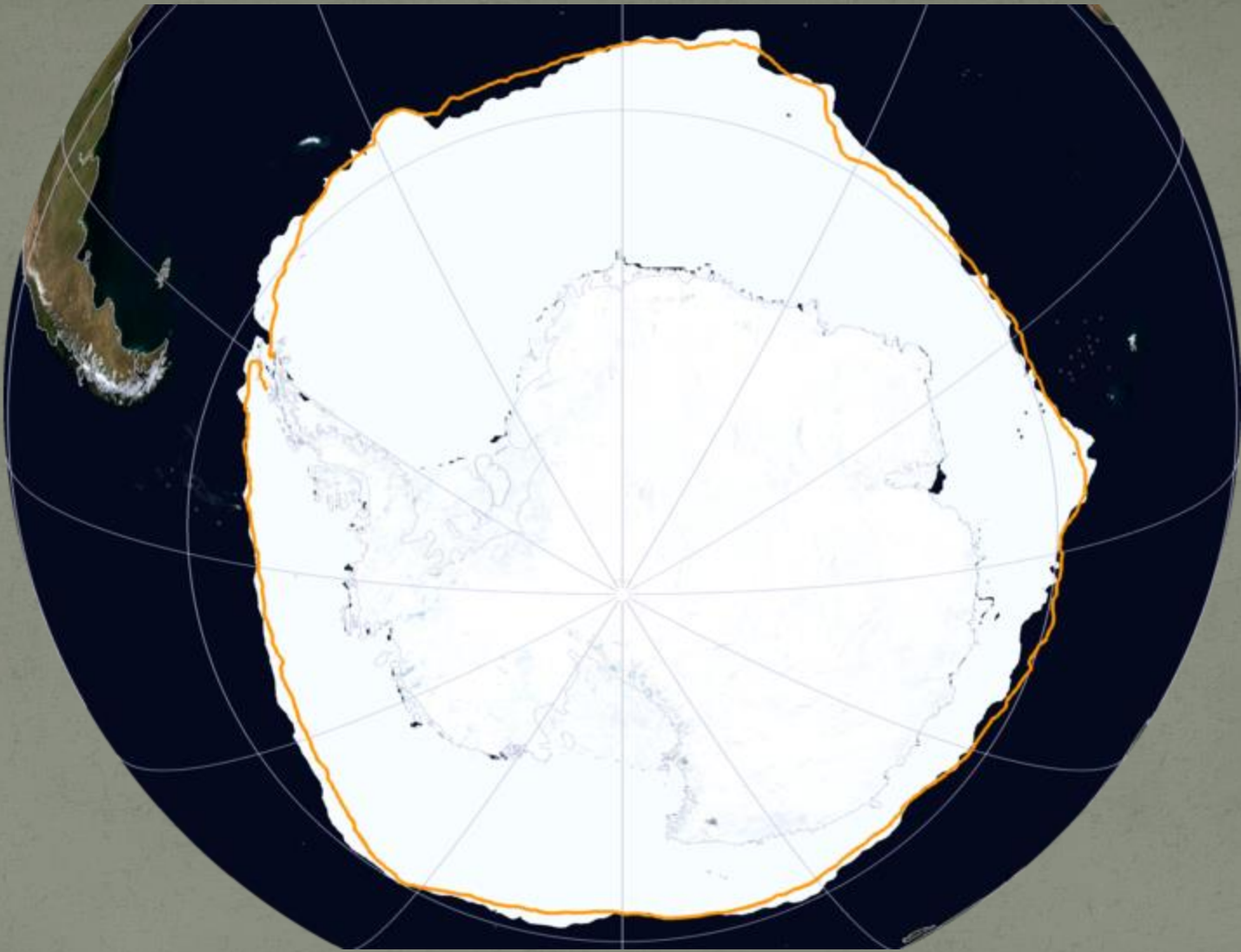
## Greenland Ice Disappearing

Greenland was Green when it was discovered in 876



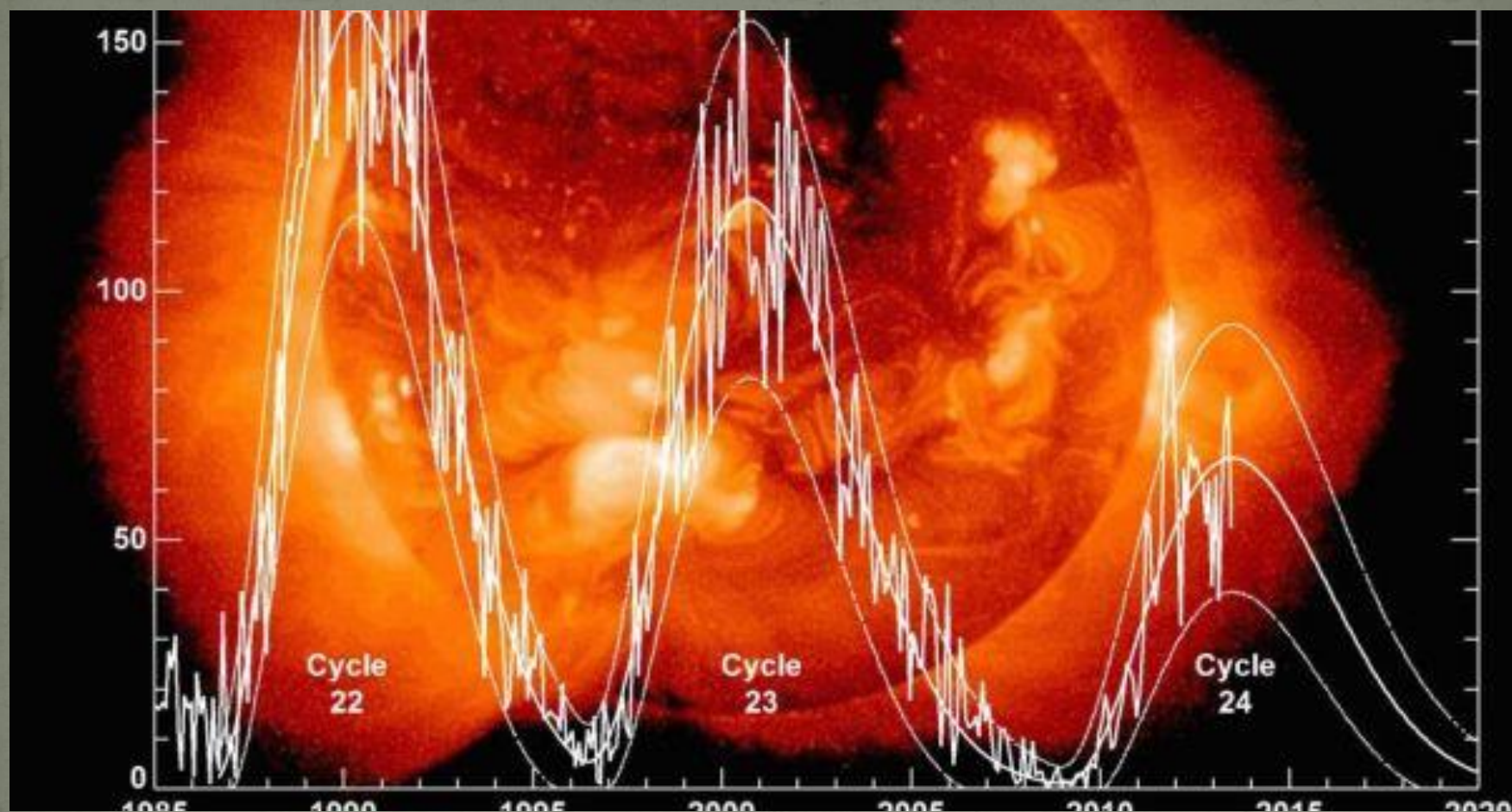
Been There, Done That



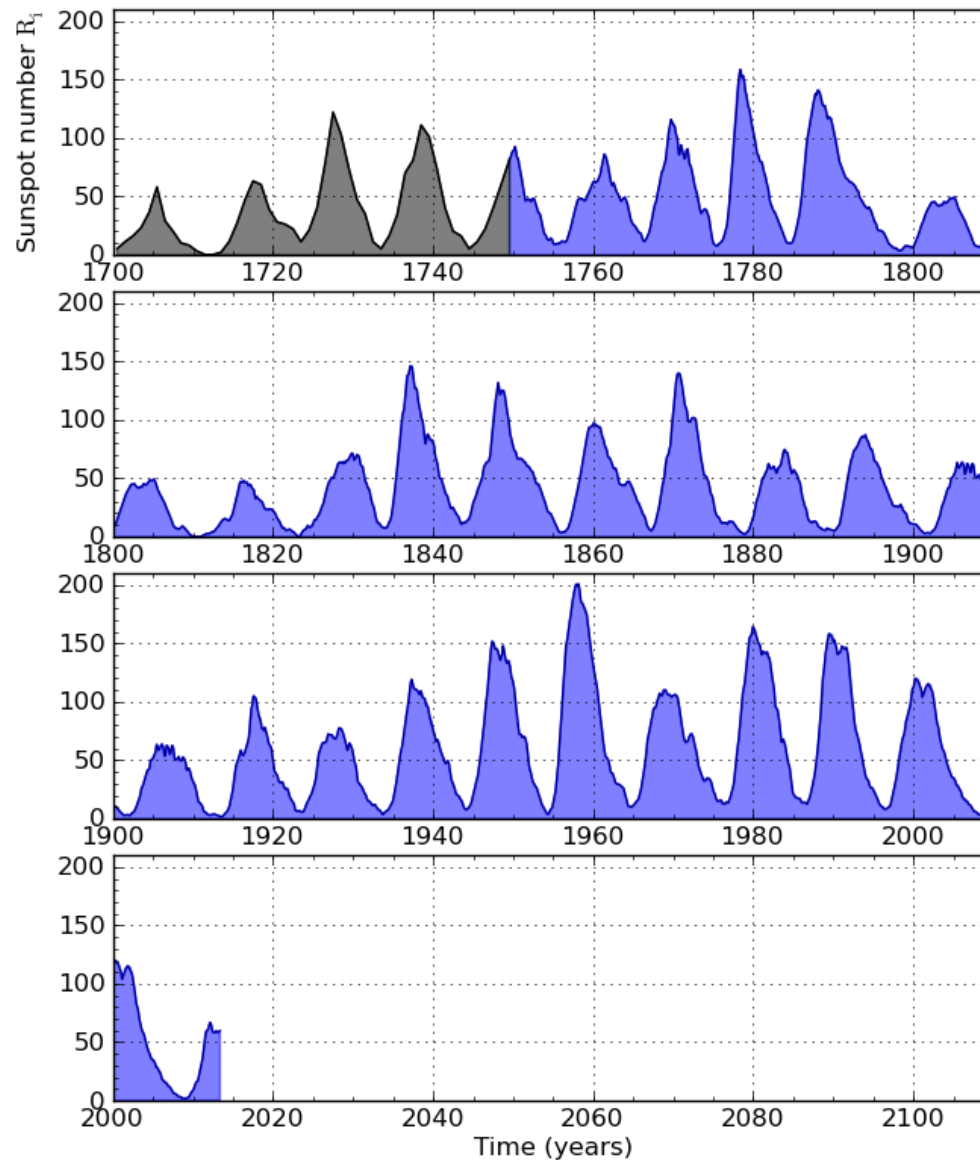


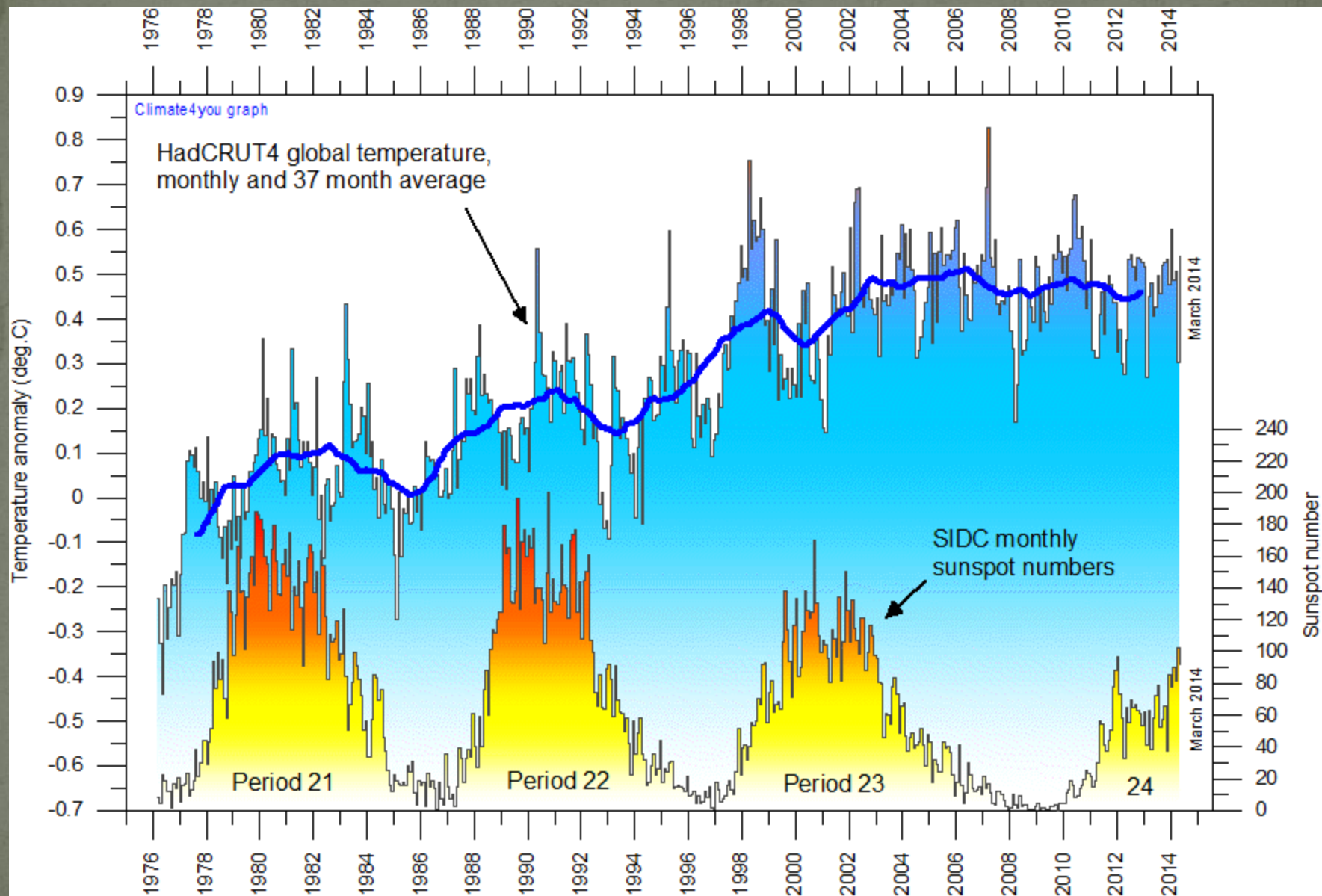
Antarctic sea ice extent on September 22 compared to 1981-2010 median depicted by orange curve (NSIDC)



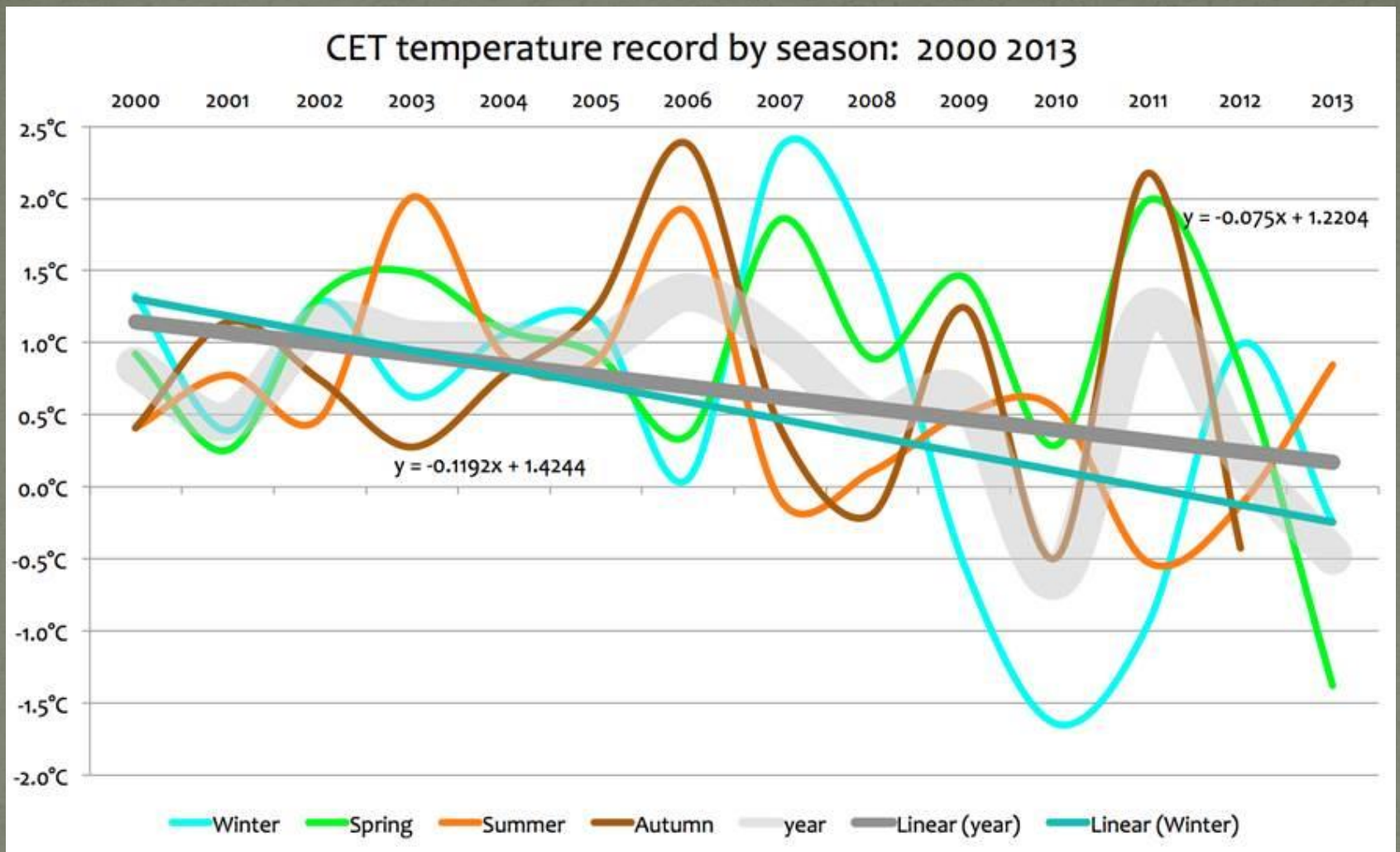


International sunspot number  $R_i$ :  
yearly mean and 13-months smoothed number



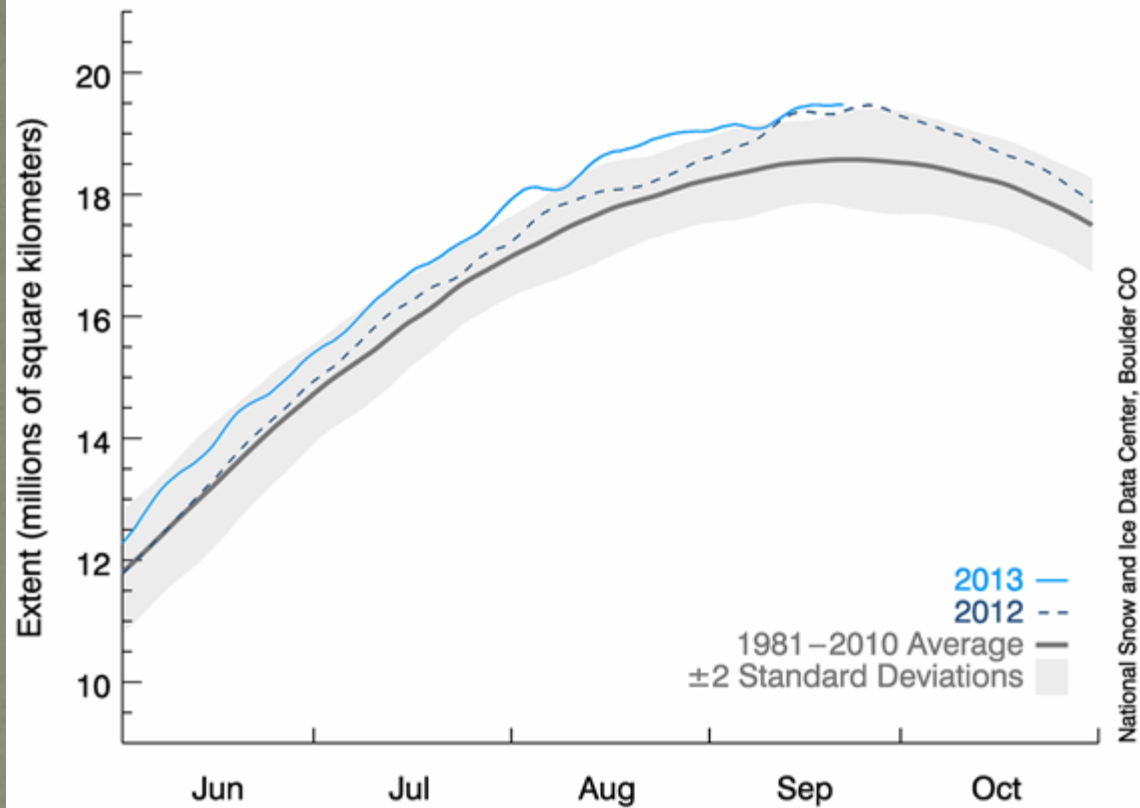






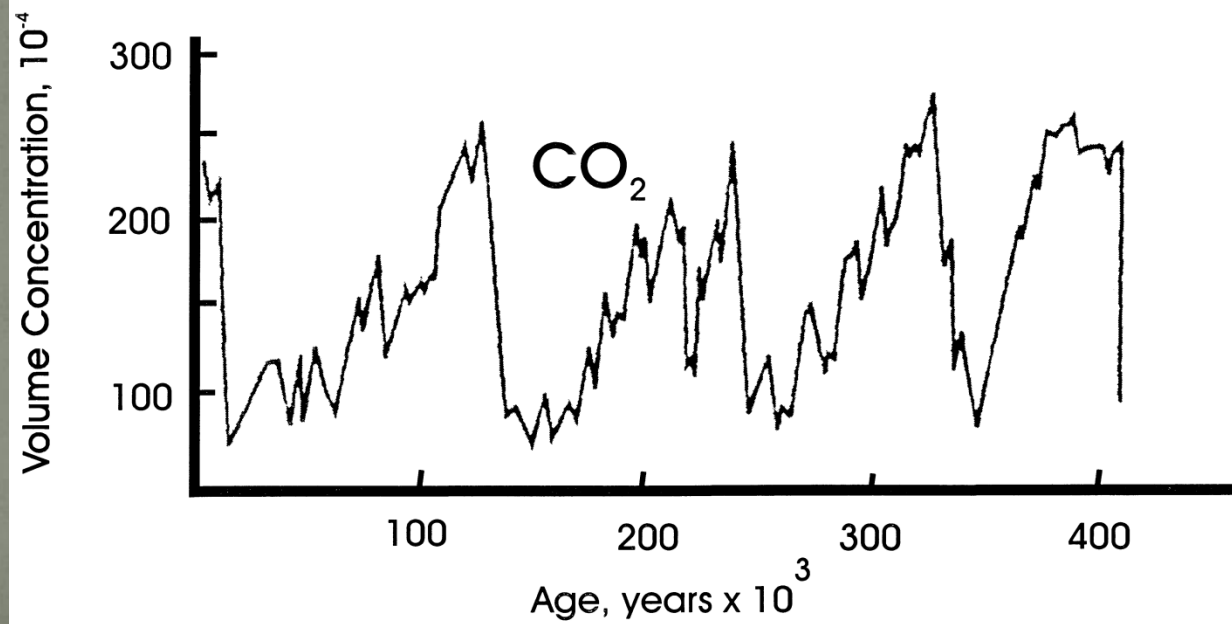
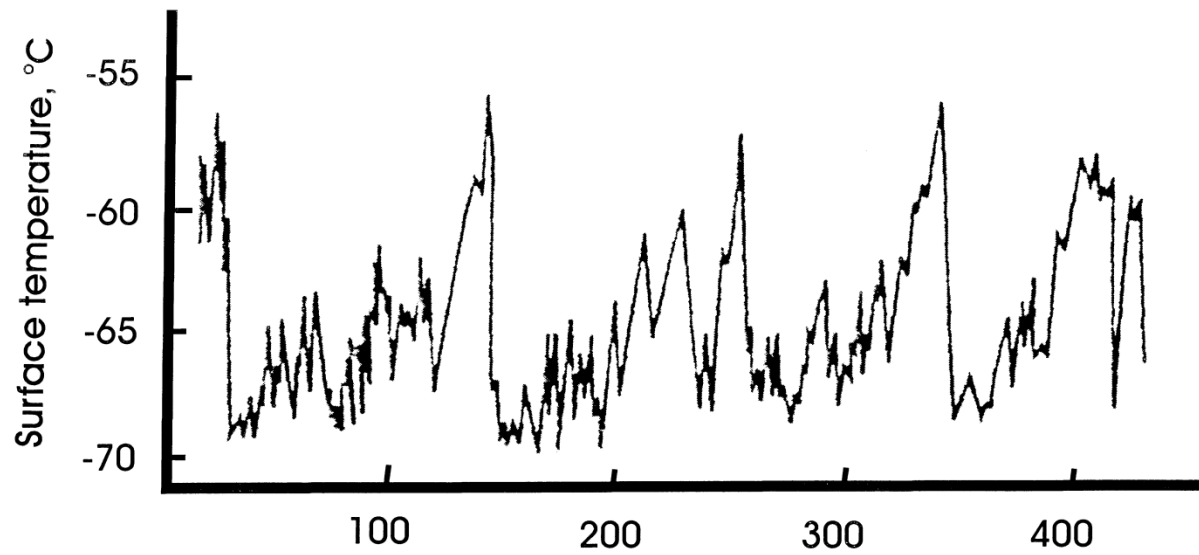
CET temperatures have been plummeting over the last 13 years (fall 2013 data not included). Chart by Ed Hoskins, data source: UK Met Office. - See more at: <http://notrickszone.com/2013/09/12/no-warming-left-to-deny-global-cooling-takes-over-cet-annual-mean-temperature-plunges-1c-since-2000/#sthash.ZF1mvbNI.dpuf>

Antarctic Sea Ice Extent  
(Area of ocean with at least 15% sea ice)



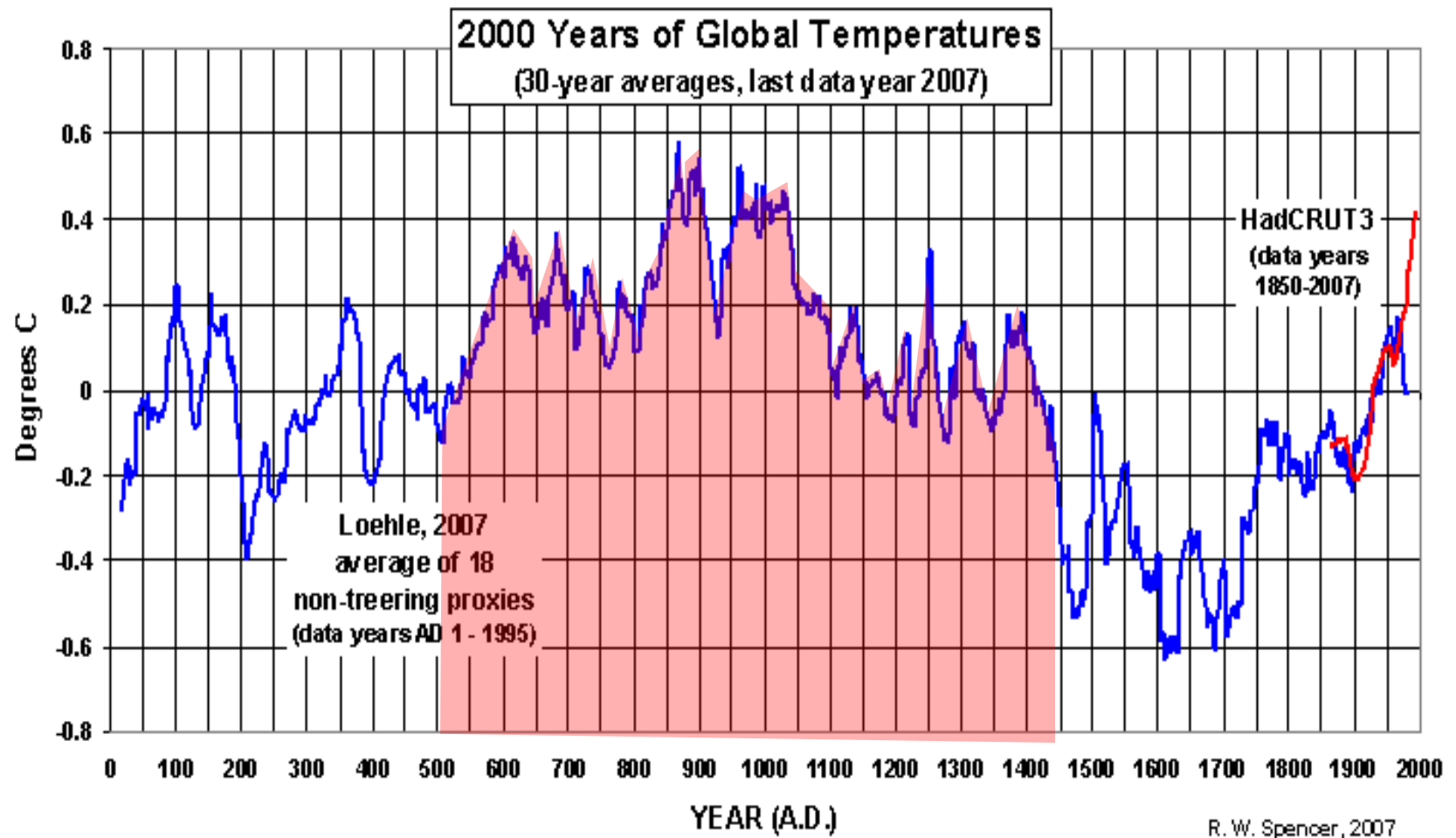
22 Sep 2013

National Snow and Ice Data Center, Boulder CO



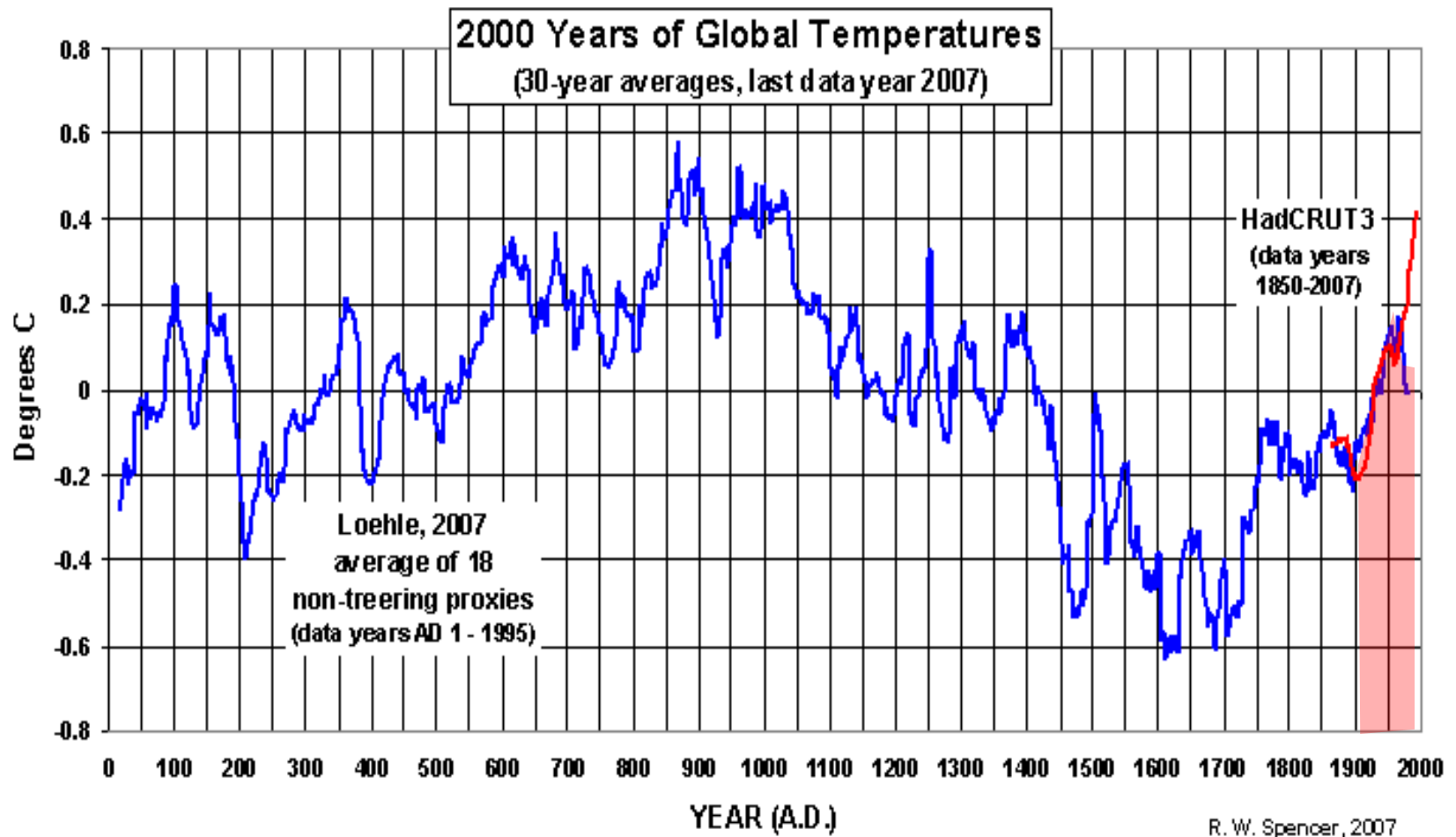


## Medieval Climate *Optimum*



Not Medieval Climate Crisis

# Why Call This A Climate Crisis?



Modern Climate Optimum



Jan. 23, 2013 — A new study provides surprising details on changes in Earth's climate during the last warm period (120,000-128,000 years ago). Even though temperatures in Northern Greenland were 5-8 degrees Celsius higher than today, the thickness of the ice sheet was only a few hundred meters lower. And this despite the fact that sea level was 4-8 metres higher than today. *Science News & Niels Bohr Institute*



# The Arctic is Melting

The Arctic seems to be warming up. Reports from fishermen, seal hunters, and explorers who sail the seas about Spitzbergen and the eastern Arctic, all point to a radical change in climatic conditions, and hitherto unheard-of high temperatures in that part of the earth's surface.

1922



“...A change in our climate is taking place very sensibly.”  
Snowfall has become “less frequent and less deep.” Rivers that once “seldom failed to freeze over in the course of the winter, scarcely ever do so now.”

And this is having an especially worrisome effect on the food supply: “This change has produced an unfortunate fluctuation between heat and cold, in the spring of the year, which is very fatal to fruits.”

“Notes on the State of Virginia” by Thomas Jefferson, 1785.

A background image of a sunset over the ocean. The sun is a bright, glowing orb in the center, casting a warm orange and yellow light across the sky. The sky transitions from a deep orange near the horizon to a dark, dusky blue at the top. The ocean below is dark and textured with small waves, reflecting the light from the sun.

# Global Warming

## Climategate

### Real Crisis?

### Alarmist Hype?

### Fraud?