

**WHAT YOU NEED TO KNOW ABOUT ~~GLOBAL WARMING~~ ~~CLIMATE CHANGE~~  
~~CLIMATE DISRUPTION~~ EXTREME WEATHER,  
OCEAN ACIDIFICATION AND **ISSUES IN SENATE BILL 5802****

In God we trust—all others send data

- ❖ **Dr. Don J. Easterbrook**  
Professor of Geology  
Western Wash. Univ



# Preamble

❖ I am --

Professor of *Geology* at Western Washington University.

A specialist in global climate change with 50 years of research in North America, New Zealand, South America, and Europe.

A lifelong environmentalist—taught environmental geology at WWU and been a professional consultant to environmental groups for five decades.

A scientist, not political—strongly opposed to politicizing of science.

Not associated with or funded by any business group.

Currently working actively with an international group of geologists atmospheric physicists, meteorologists, astrophysicists, oceanographers, sea level experts, and other scientists.

# What the news media isn't telling you

- ❖ Global warming ended in 1998.
- ❖ There has been NO global warming in 15 yrs. Global warming from 1978 to 1998 has been replaced by global cooling.
- ❖ The Antarctic ice sheet is growing, not melting.
- ❖ Sea level is rising 7" per century, not 20 ft.
- ❖ Snowfall is not below normal. Four of the past 5 years have set snowfall records.
- ❖ CO2 cannot cause global warming.
- ❖ Severe storms are not more frequent than normal.
- ❖ The oceans are not acid.

# SPECIFIC ISSUES IN SENATE BILL 5802

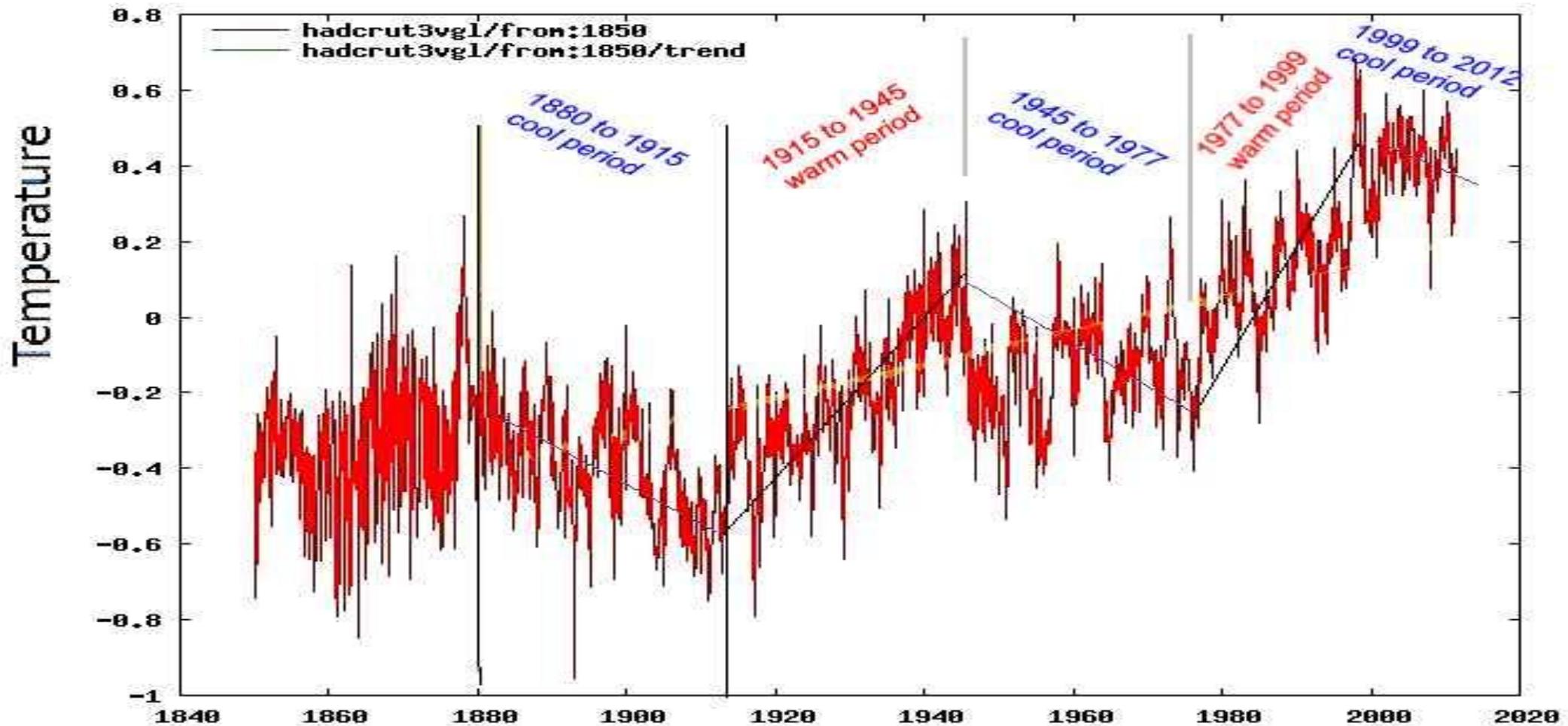
1. Emissions of greenhouse gases from human activities is the principal cause of climate change.
2. Sea level is rising at an increasing rate because of global warming.
3. The frequency of severe storms is increasing because of global warming.
4. Reduced winter snow packs and decreased summer streamflows.
5. Increasing acidification of the state's marine waters.
6. Produce more electricity from renewable energy while phasing out coal-powered electricity generation.

# SPECIFIC ISSUES IN SENATE BILL 58

1. Emissions of greenhouse gases from human activities is the principal cause of climate change.

# GLOBAL WARMING (AND COOLING) OCCUR NATURALLY AND HAVE BEEN GOING ON FOR MILLIONS OF YEARS.

Two periods of global warming and 3 periods of global cooling have occurred in the past century, 3 of which occurred before CO2 began to rise significantly.



Global warming occurred from 1915 to 1945 without increase in CO<sub>2</sub>; global cooling occurred from 1945 to 1977 during sharply increasing CO<sub>2</sub>, showing that CO<sub>2</sub> has nothing to do with global warming

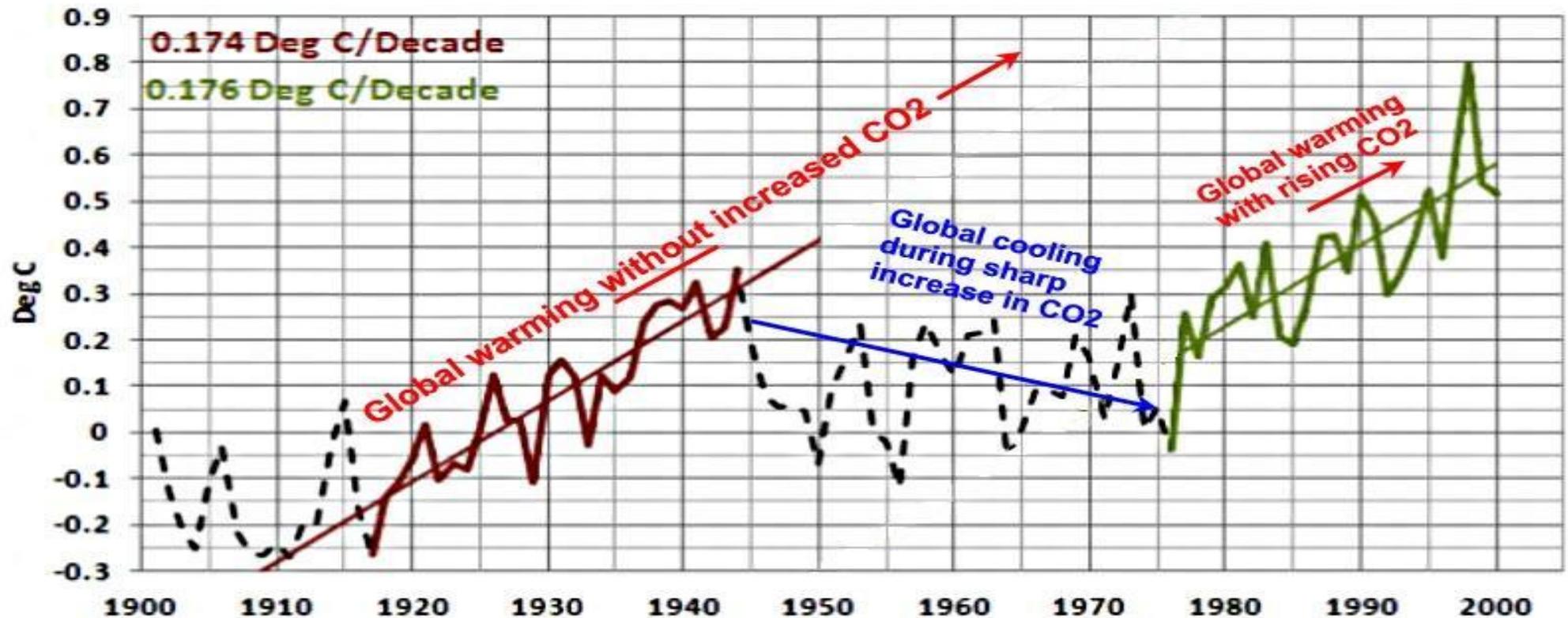
### Global Surface Temperature Anomalies & Linear Trends

Observations: HADCRUT

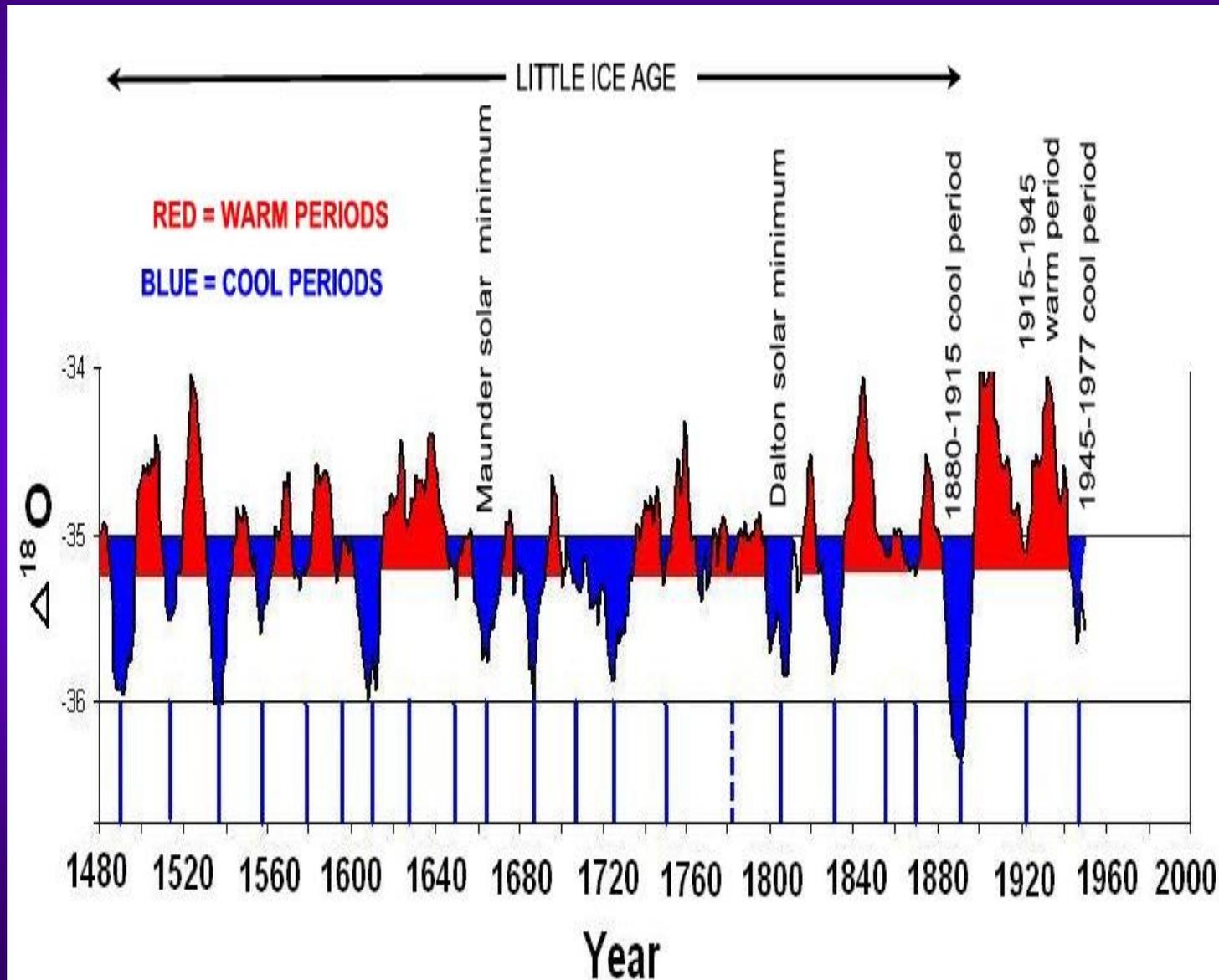
Early Warming Period: 1917-1944

Late Warming Period: 1976-2000

1901 to 2000

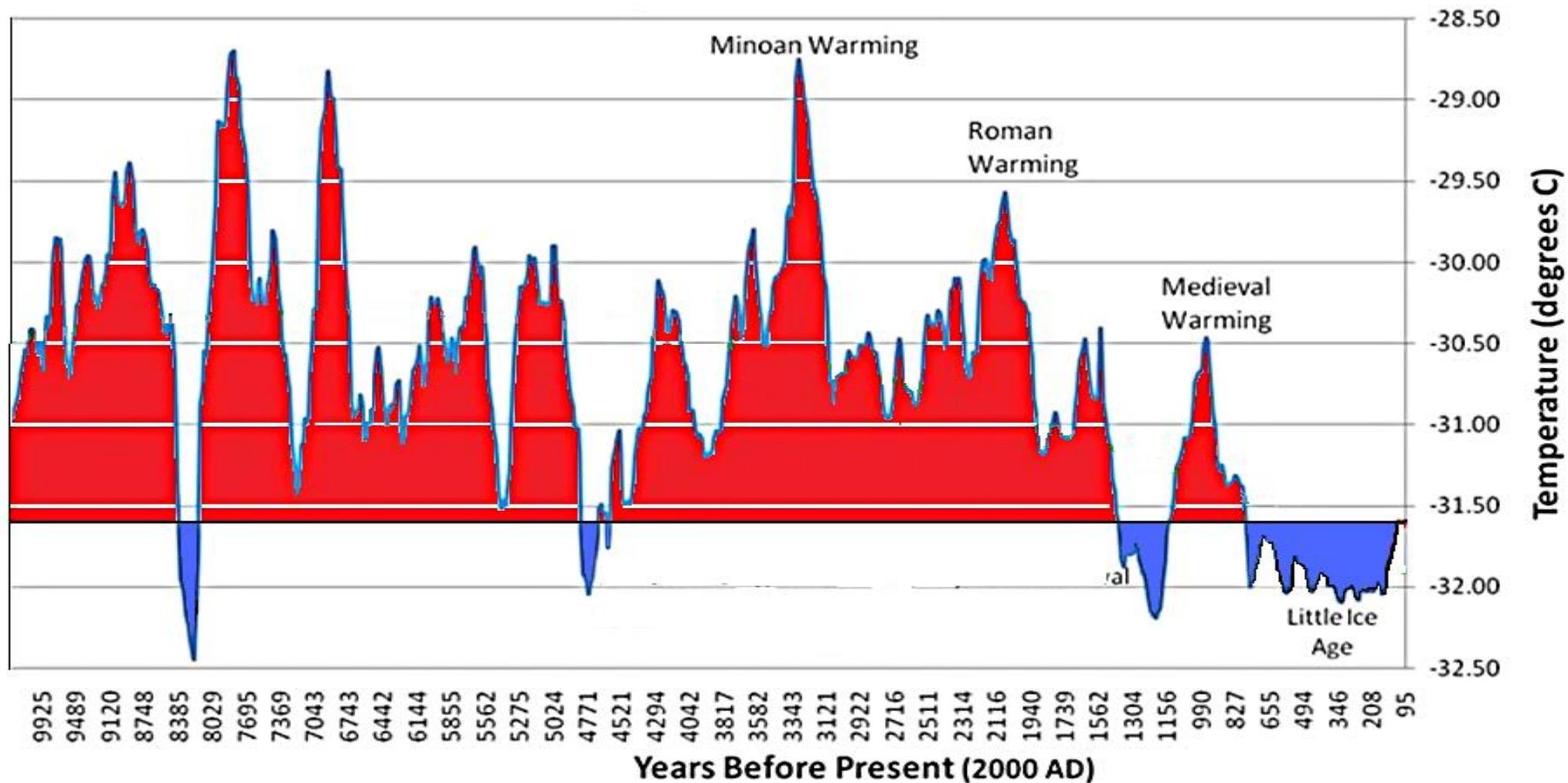


20 periods of global warming and 20 periods of global cooling have occurred since 1480 AD.



ALMOST ALL OF THE PAST 10,000 YEARS WAS WARMER THAN PRESENT.

Greenland GISP2 Ice Core - Temperature Last 10,000 Years



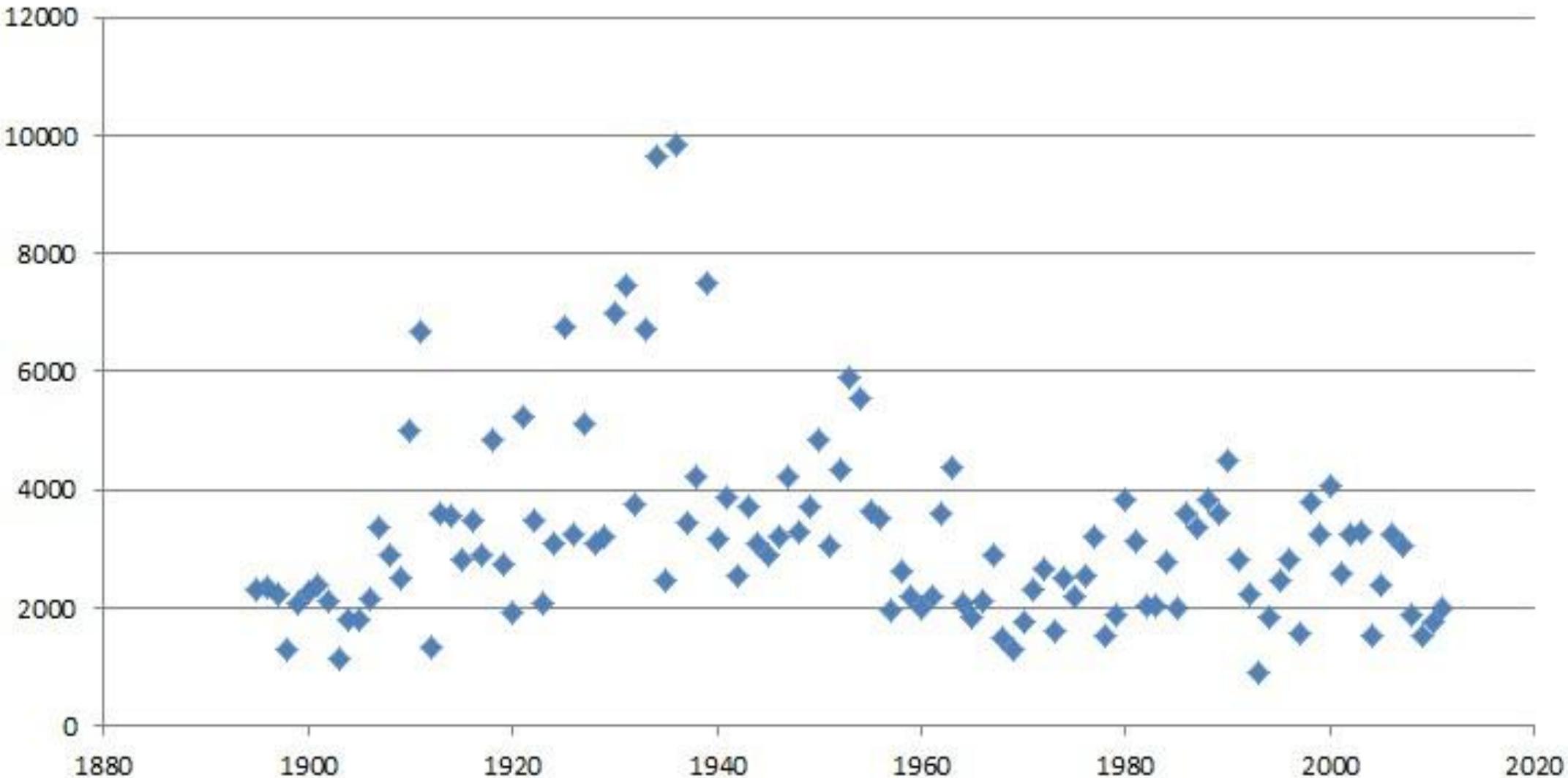
# Claims that temperatures are warmer now than they have ever been are not true

1930s were consistently much hotter

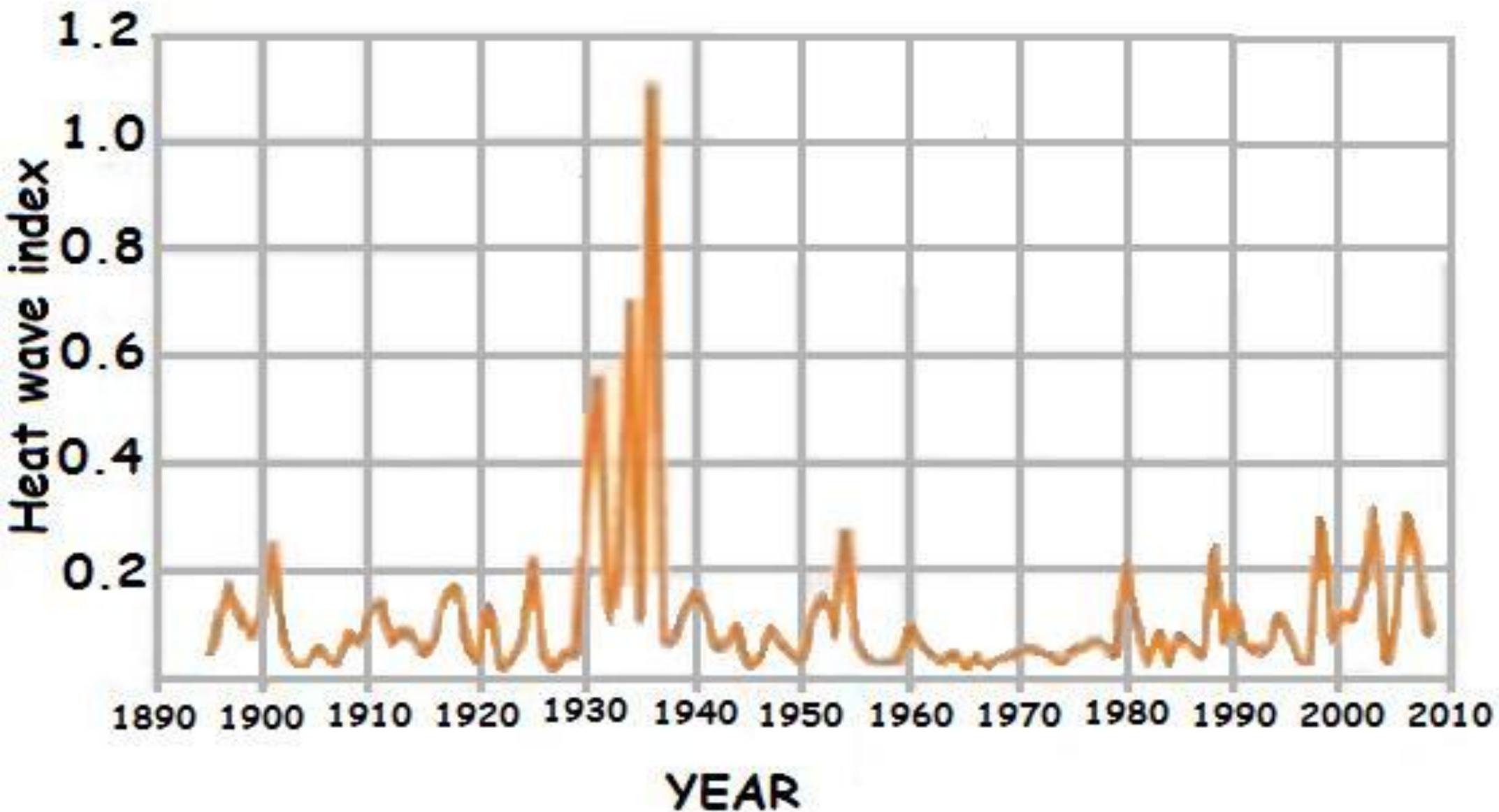
1930		6996	5	11	2002		3256
1931		7471	4	10	2003		3294
1932		3732	8	19	2004		1542
1933		6724	6	15	2005		2389
1934		9635	2	12	2006		3230
1935		2465	14	13	2007		3047
1936		9832	1	17	2008		1885
1937		3450	9	20	2009		1523
1938		4209	7	18	2010		1777
1939		7506	3	16	2011		2008

More global warming records were set in the 1930s than in any other time this century.

## Number Of USHCN Record Daily Maximums Per Year



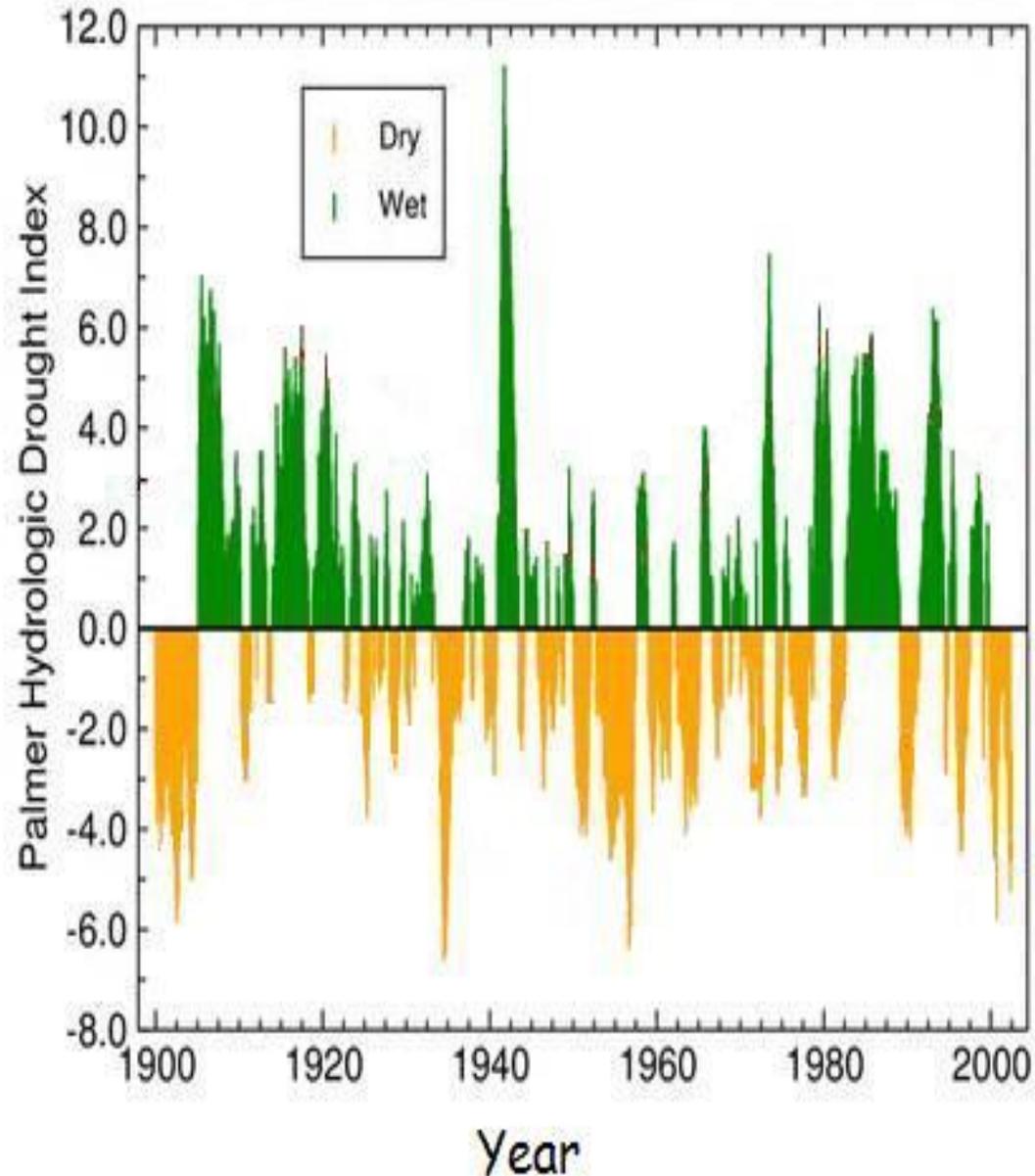
# U.S. Annual heat wave index 1895-2008



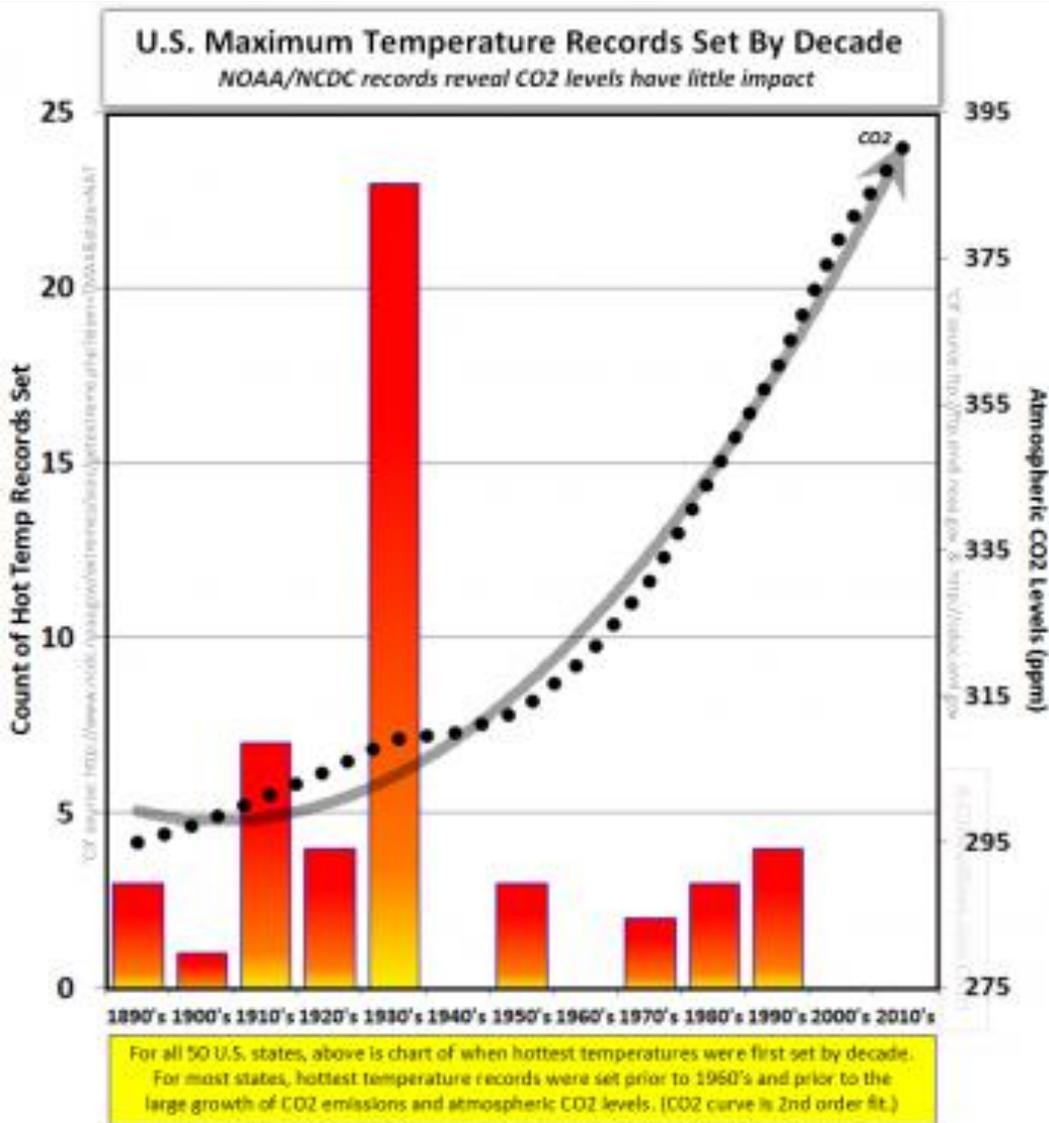
- ❖ Droughts, for the most part, have become shorter, less frequent, less severe, and cover smaller areas over the last century.

## Southwestern US drought index

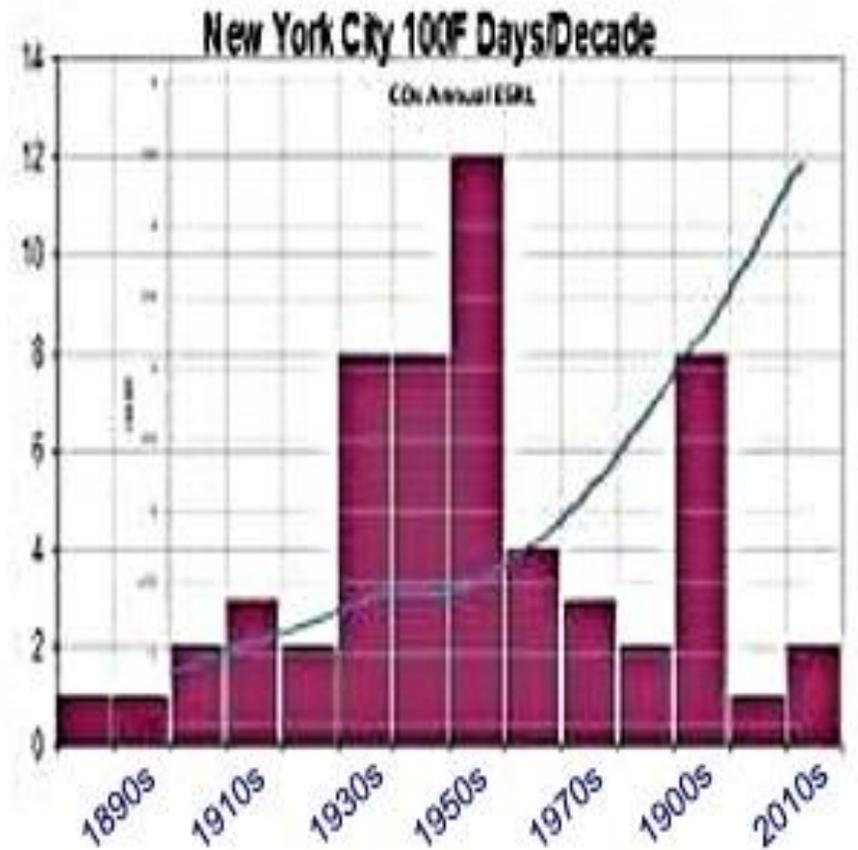
January 1900 - May 2002



# Almost all record high temperatures records were set in the 1930s before rise in CO<sub>2</sub>



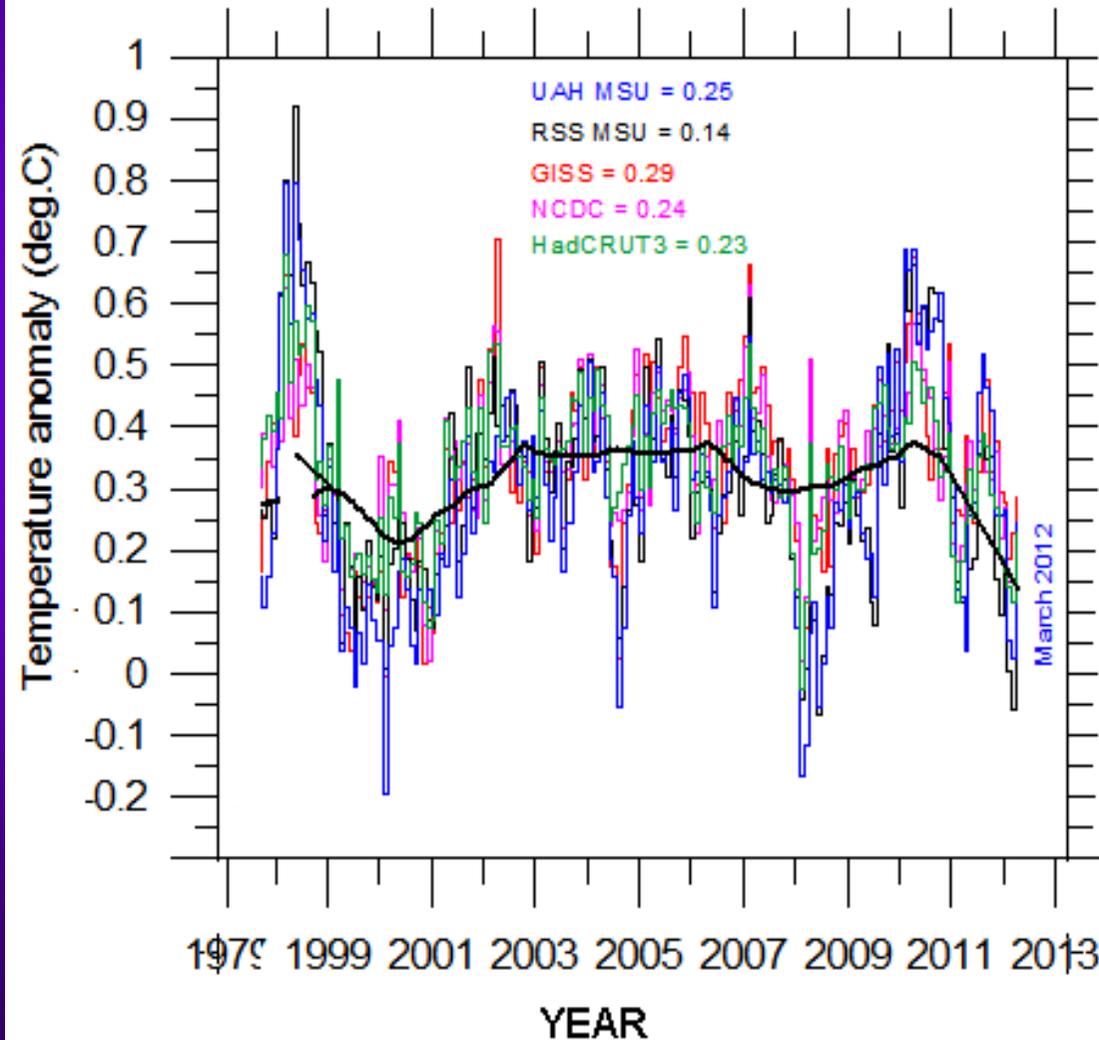
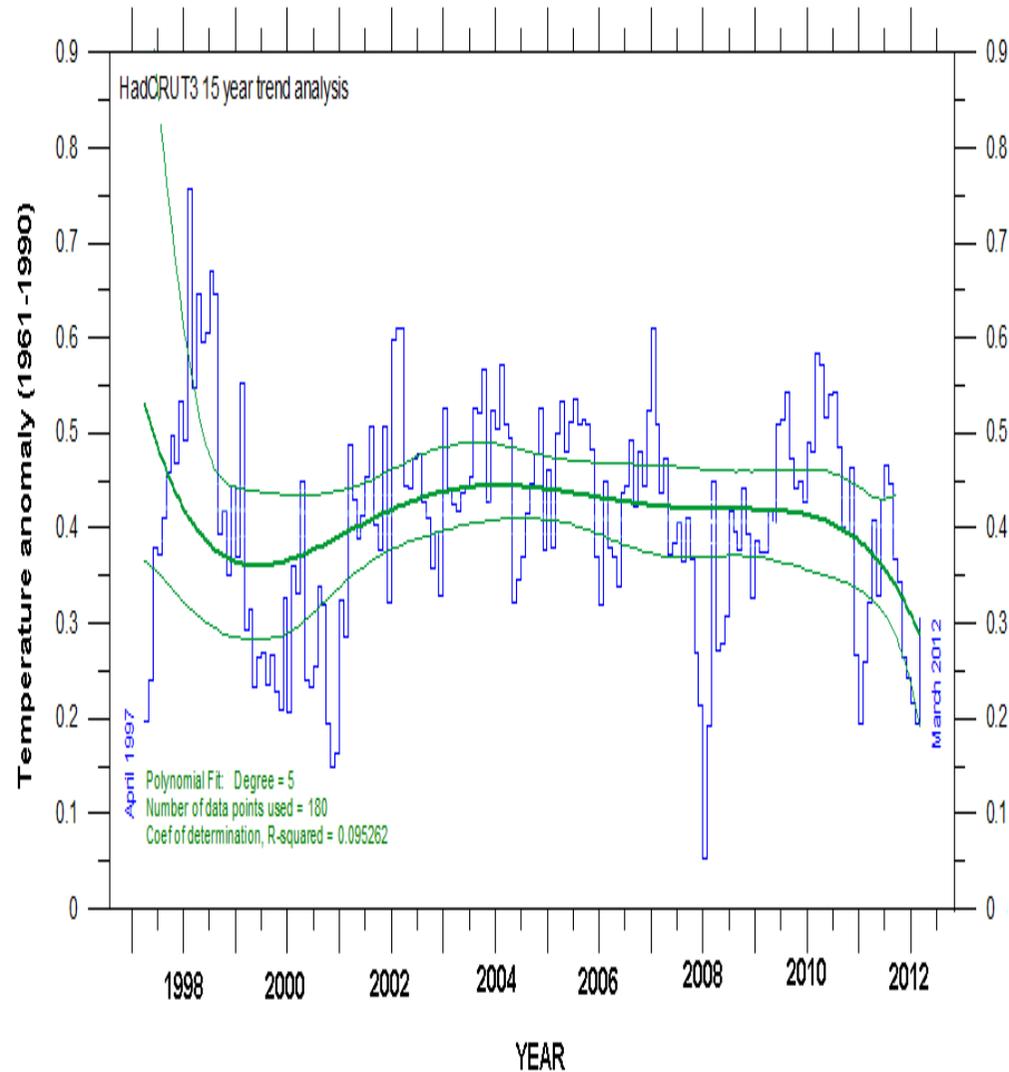
## 100 degree days compared with CO<sub>2</sub>



# CONCLUSIONS

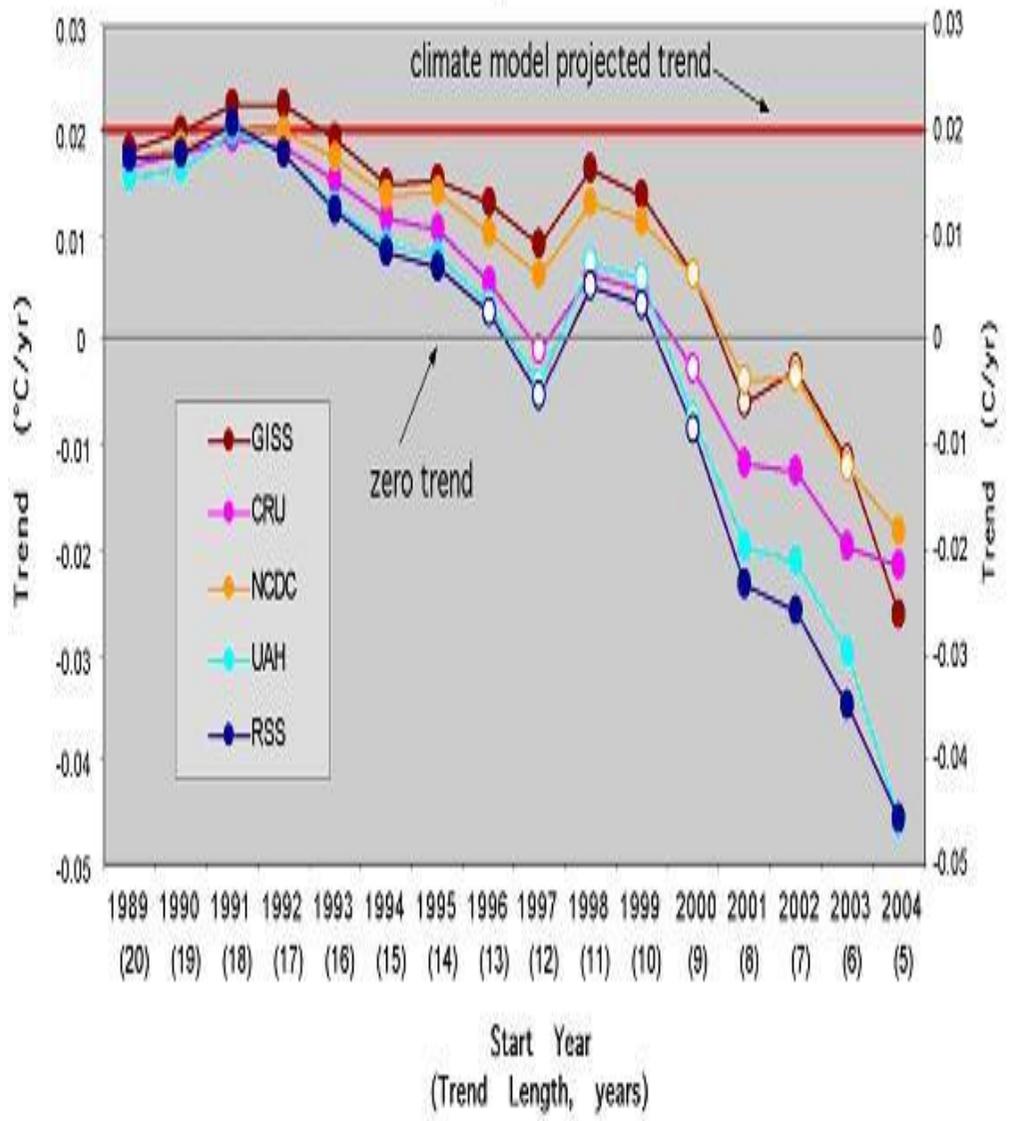
- ❖ NOAA—82% of all maximum temperature records were set prior to 1960, before accelerated human CO<sub>2</sub> emissions began in 1945. Thus, present conditions have nothing to do with CO<sub>2</sub>.
- ❖ Present drought conditions in the midwest are part of the normal weather pattern and are not related to global climatic climate or CO<sub>2</sub>.
- ❖ Present drought conditions are not as severe as those of the 1930's, the warmest decade this century, before CO<sub>2</sub> levels rose significantly.

# What happened to global warming? Global cooling since 1998.

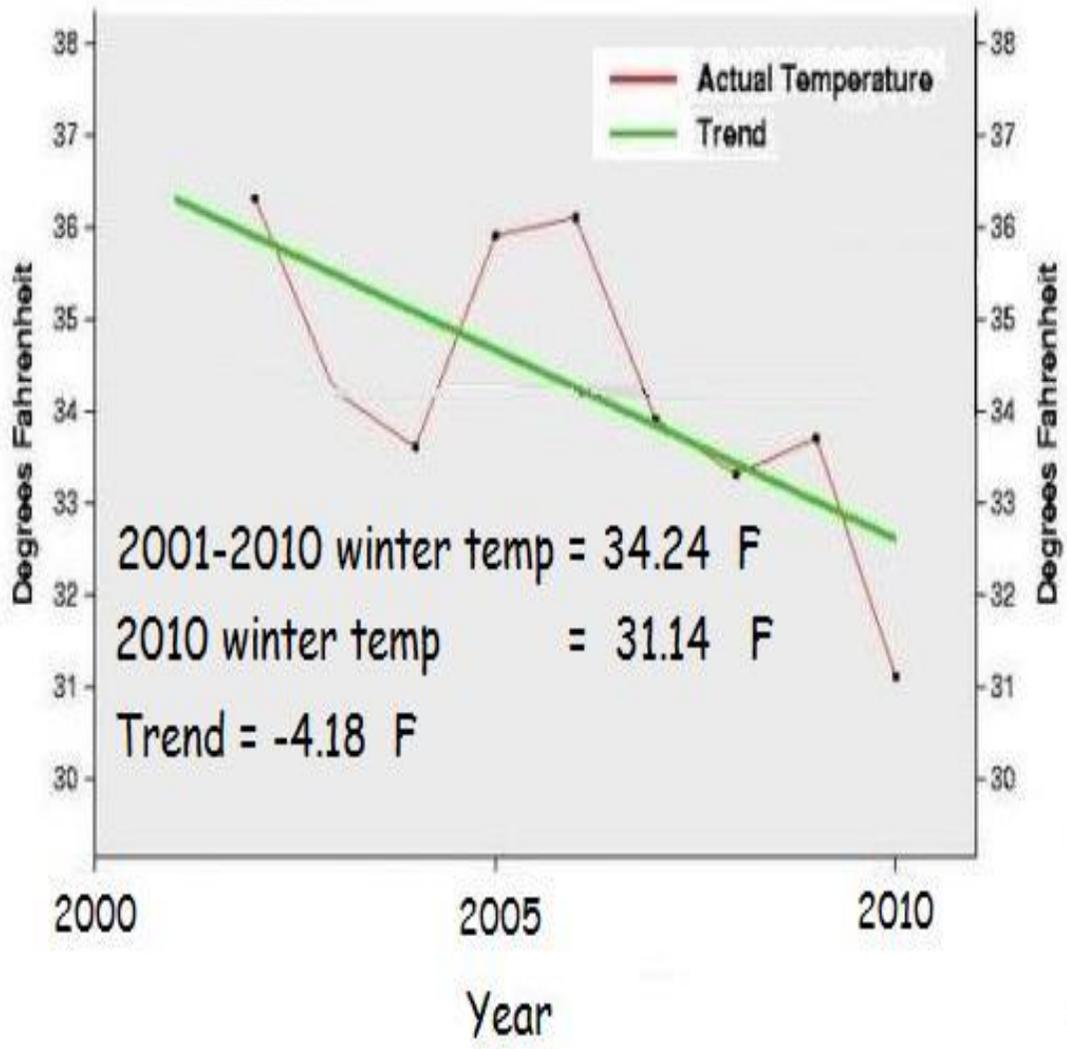


# GLOBAL TEMPERATURE HAS COOLED FOR 15 YRS

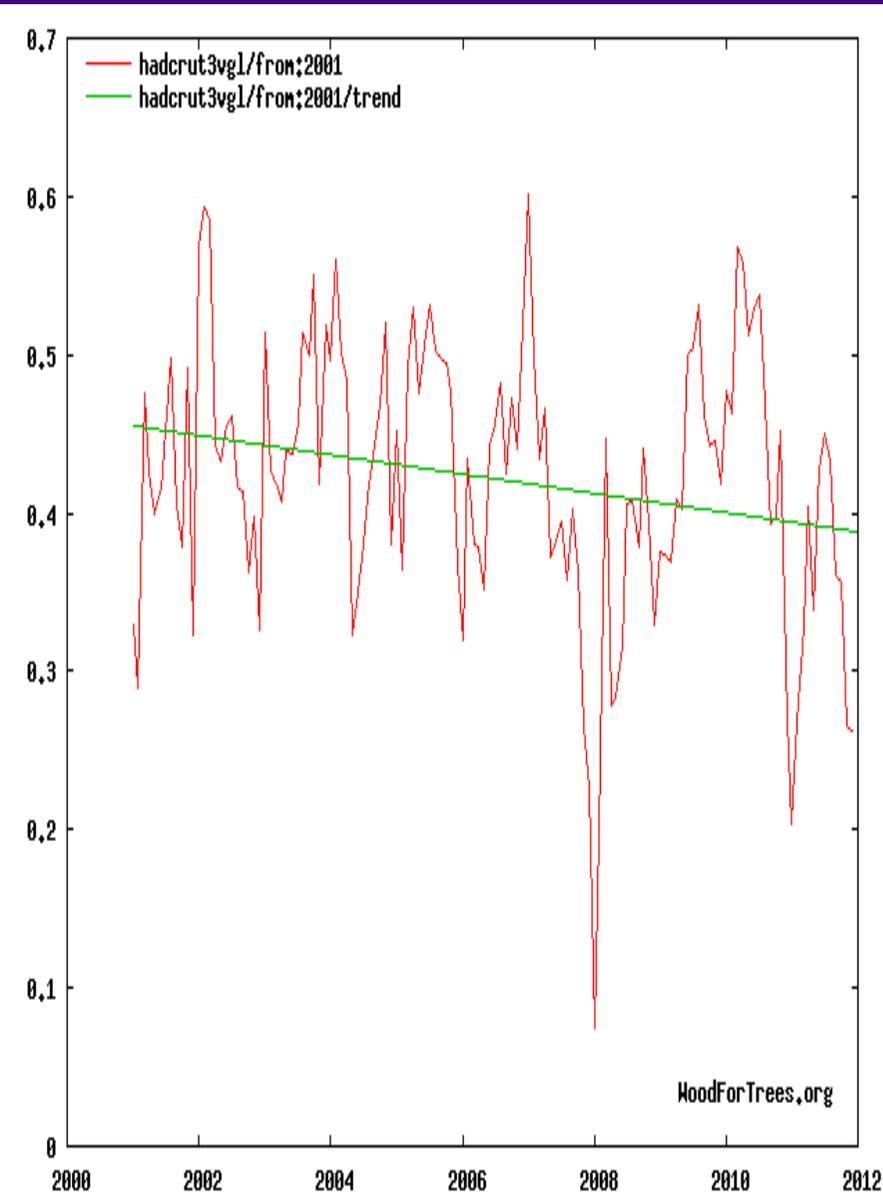
## Global Temperature Trend



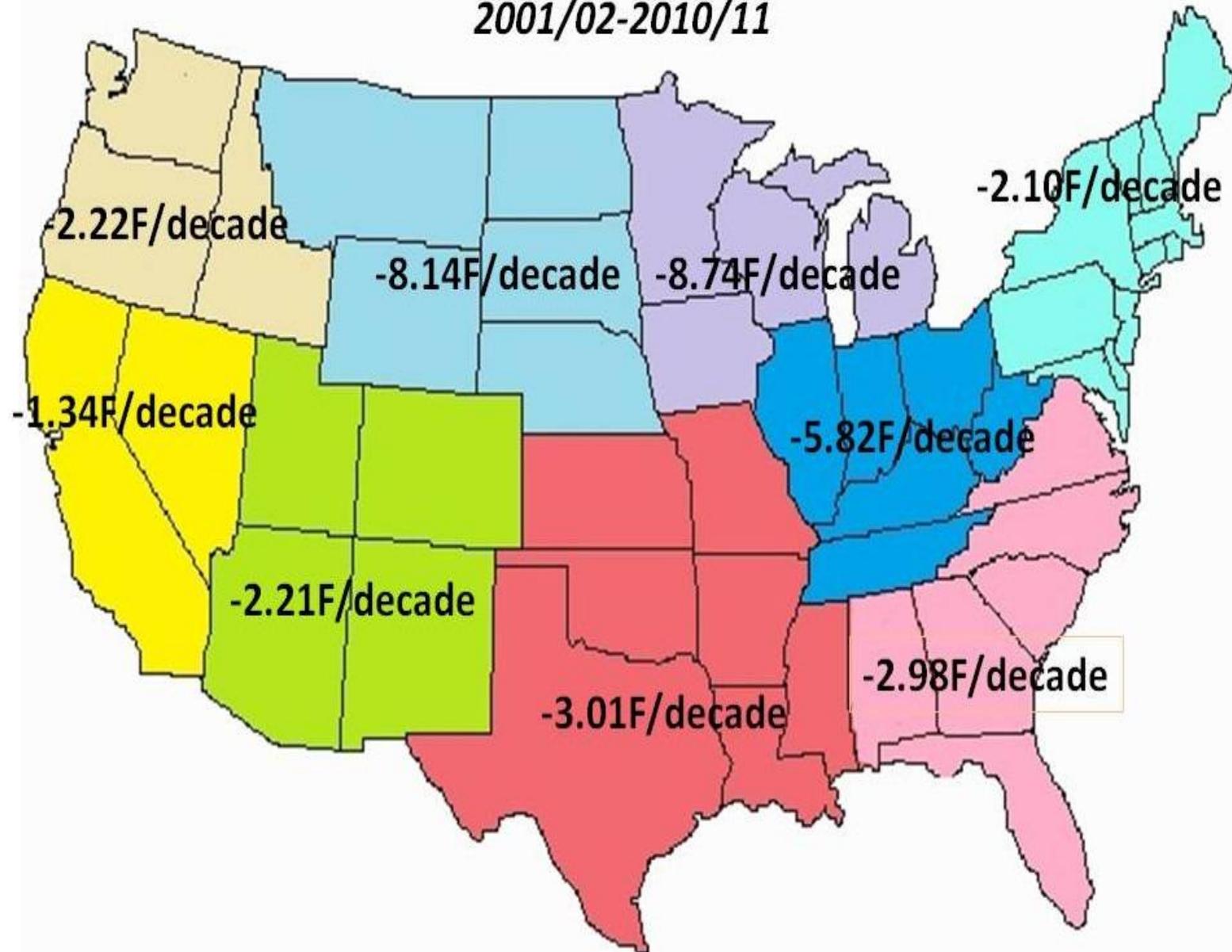
## WINTER (Dec-Feb) TEMPERATURES 2001-2010 Contiguous U.S.



# Temperature trend since 2001



# NCDC Decadal Change in Winter Temperatures 2001/02-2010/11

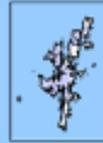


Winters in the US have been much cooler than usual during the past decade

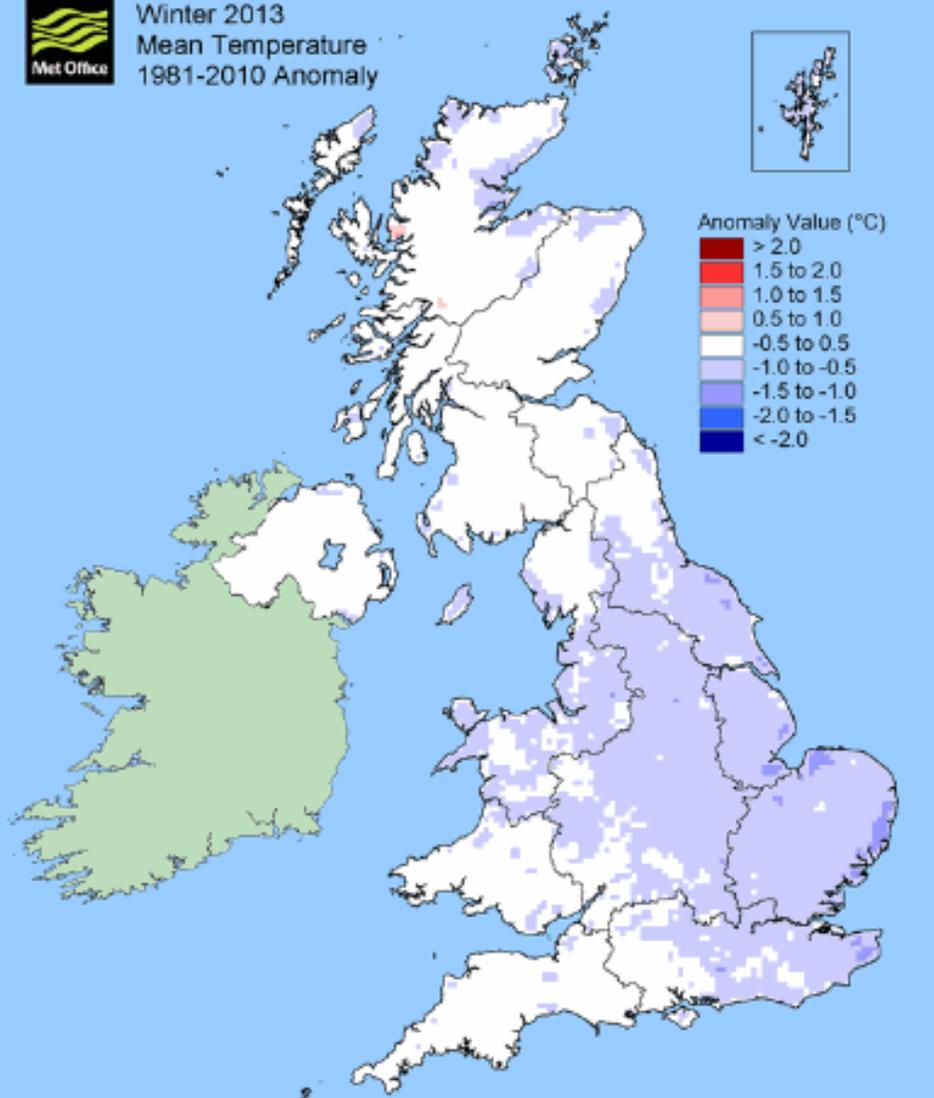
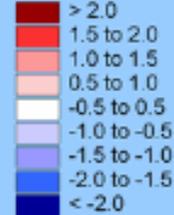
# Europe is having coldest winter in 100 years



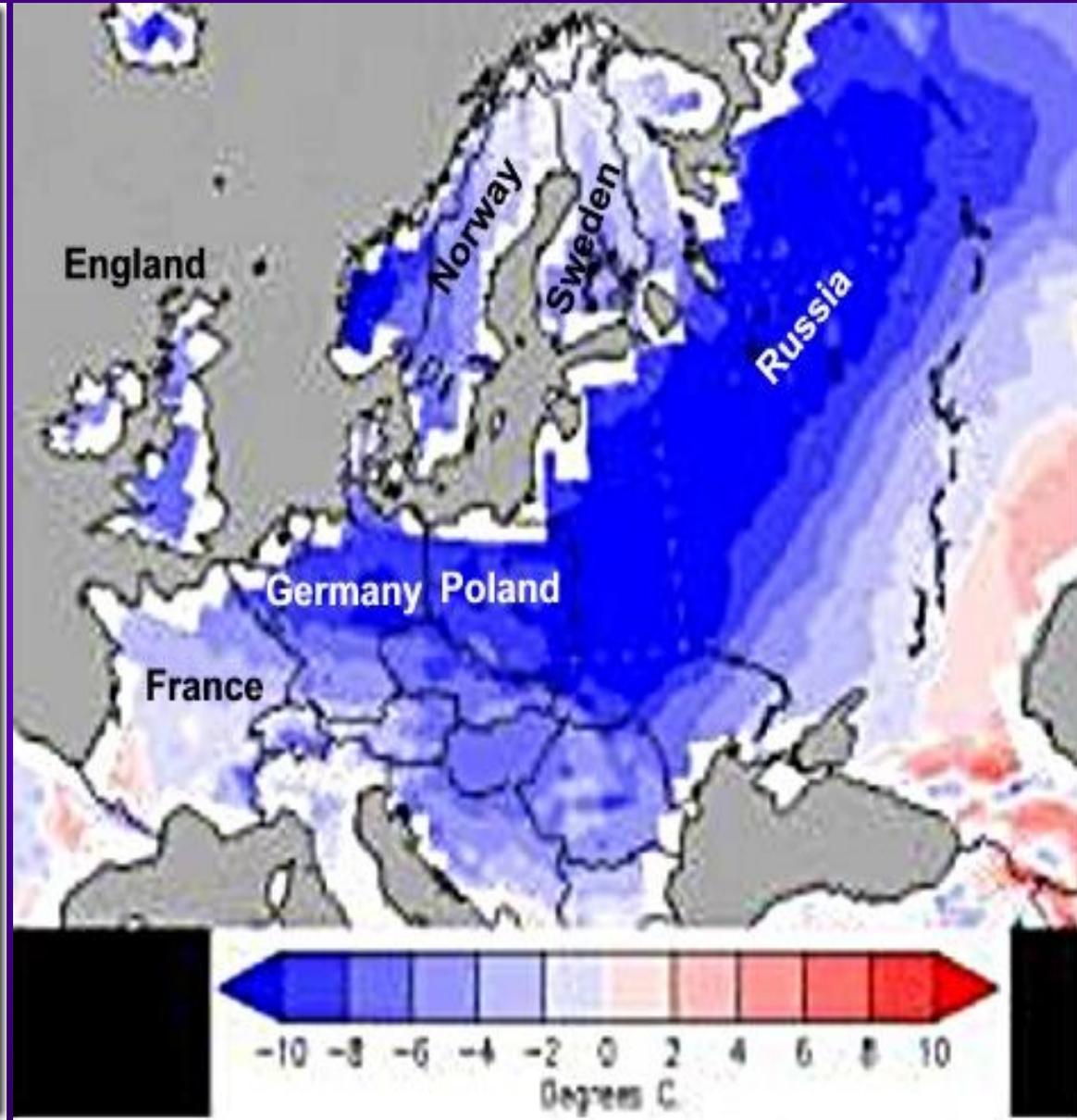
Winter 2013  
Mean Temperature  
1981-2010 Anomaly



Anomaly Value (°C)



© Crown copyright



# England's coldest spring in 50 years cost 5,000 lives

- ❖ "UK's coldest spring since 1963 claims 5,000 lives: Pensioners worst affected and experts say final toll could be 'horrendous.'
- ❖ "2,000 extra deaths registered in just the first two weeks of March. And for February, 3,057 extra deaths registered in England and Wales. Campaigners warn weather could prove deadly for thousands more."

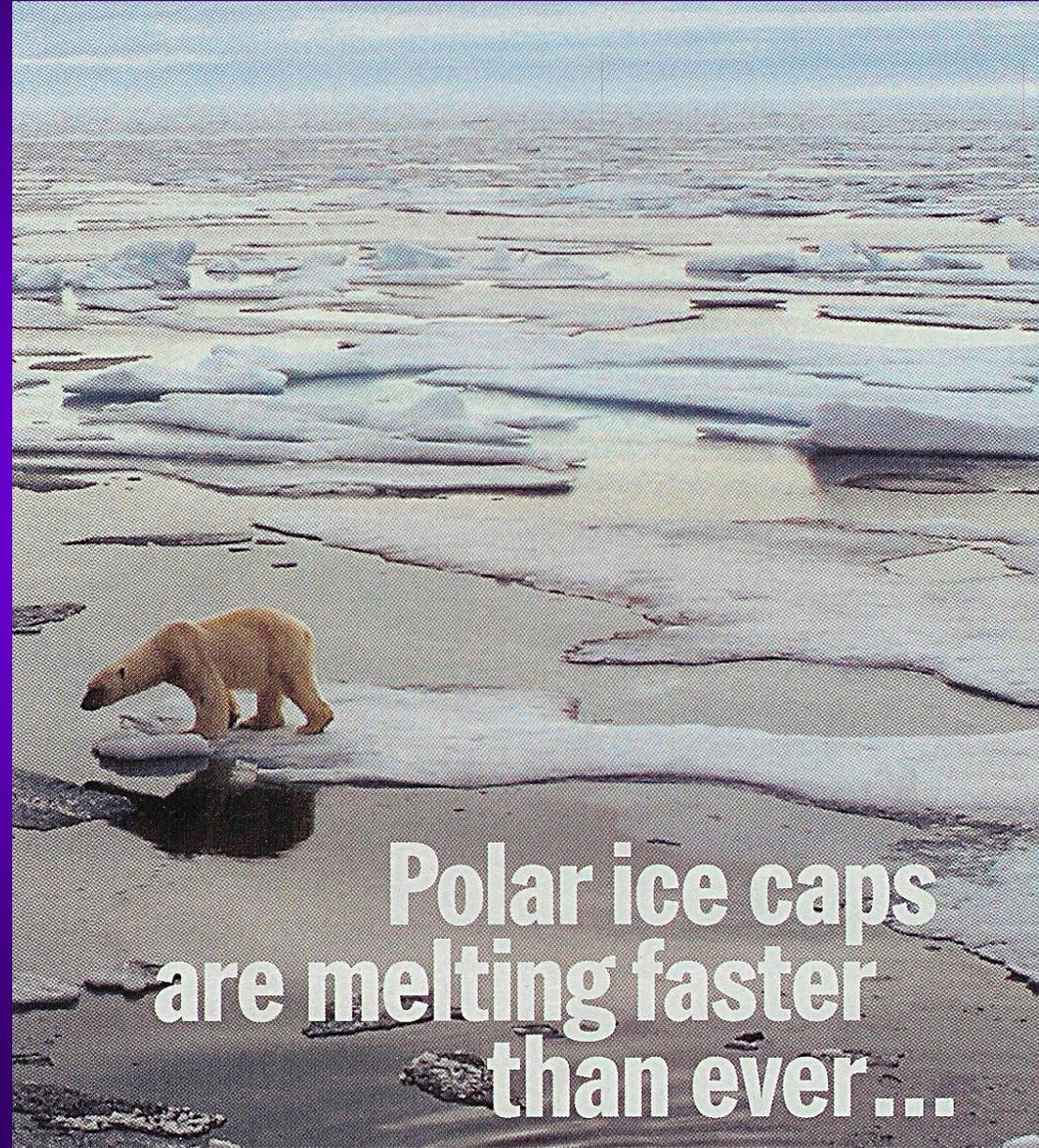
# CONCLUSIONS

- ❖ Modern global warming ended in 1998.
- ❖ There has been NO global warming in 15 yrs.
- ❖ The global warming of 1978-1998 has been replaced by global cooling the past decade.
- ❖ US winters cooled 2-8°F during the past decade.
- ❖ Temperatures today are not at all-time highs. Most recent temperature records in the past century were set in the 1930s
- ❖ The Antarctic ice sheet is growing, not melting.
- ❖ Almost all of the past 10,000 yrs has been warmer than at present.

# Are the polar ice caps melting?

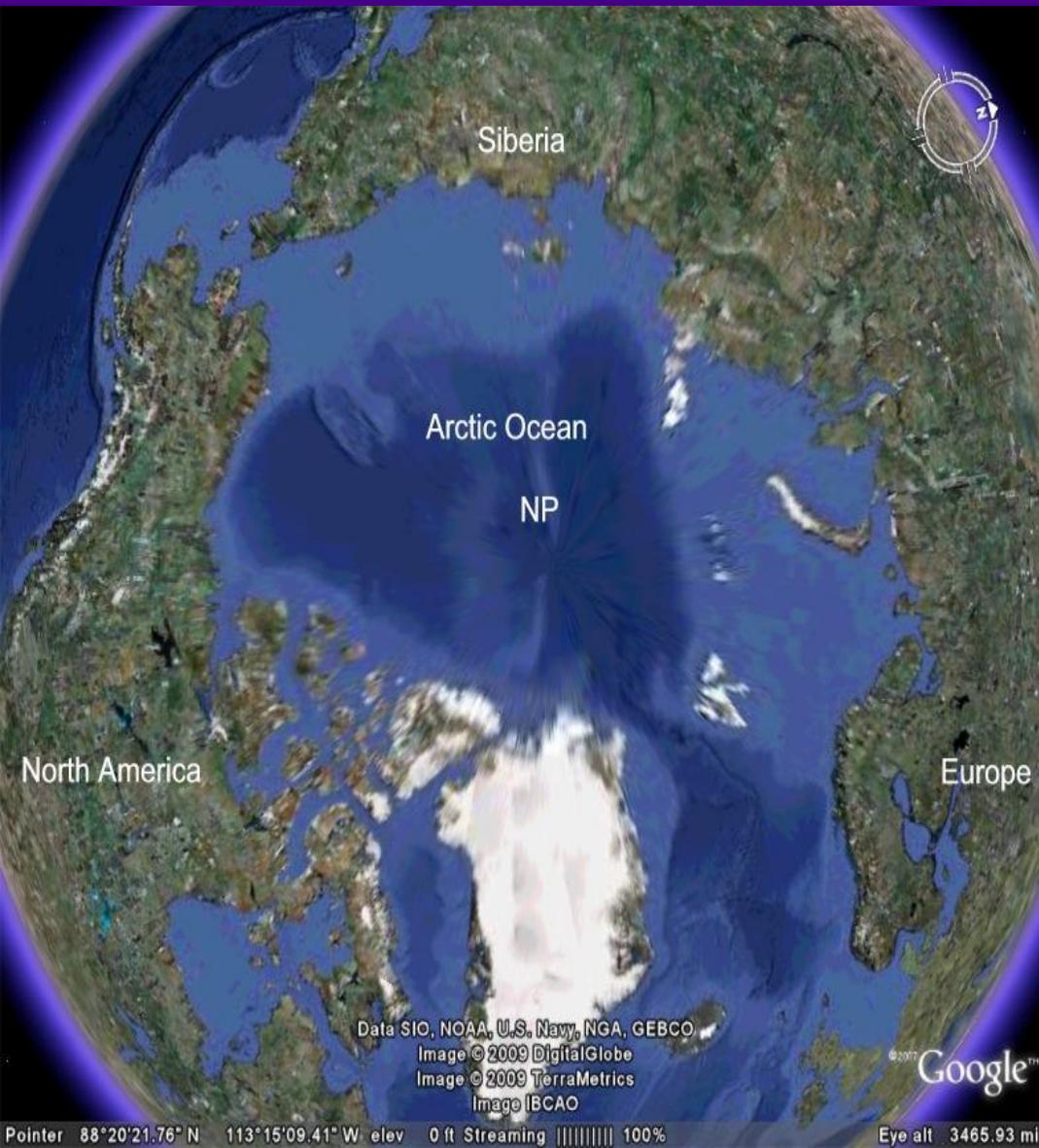
❖ James Hansen, NASA chief, said in the NY Times *"Global temperatures will become intolerable. Disintegration of the ice sheets will accelerate out of control."*

*"The North Pole ice cap is 40 percent gone already and could be completely and totally gone in the winter months in the next 5 to 10 years," (Gore, Nov. 2009).*



**Polar ice caps  
are melting faster  
than ever...**

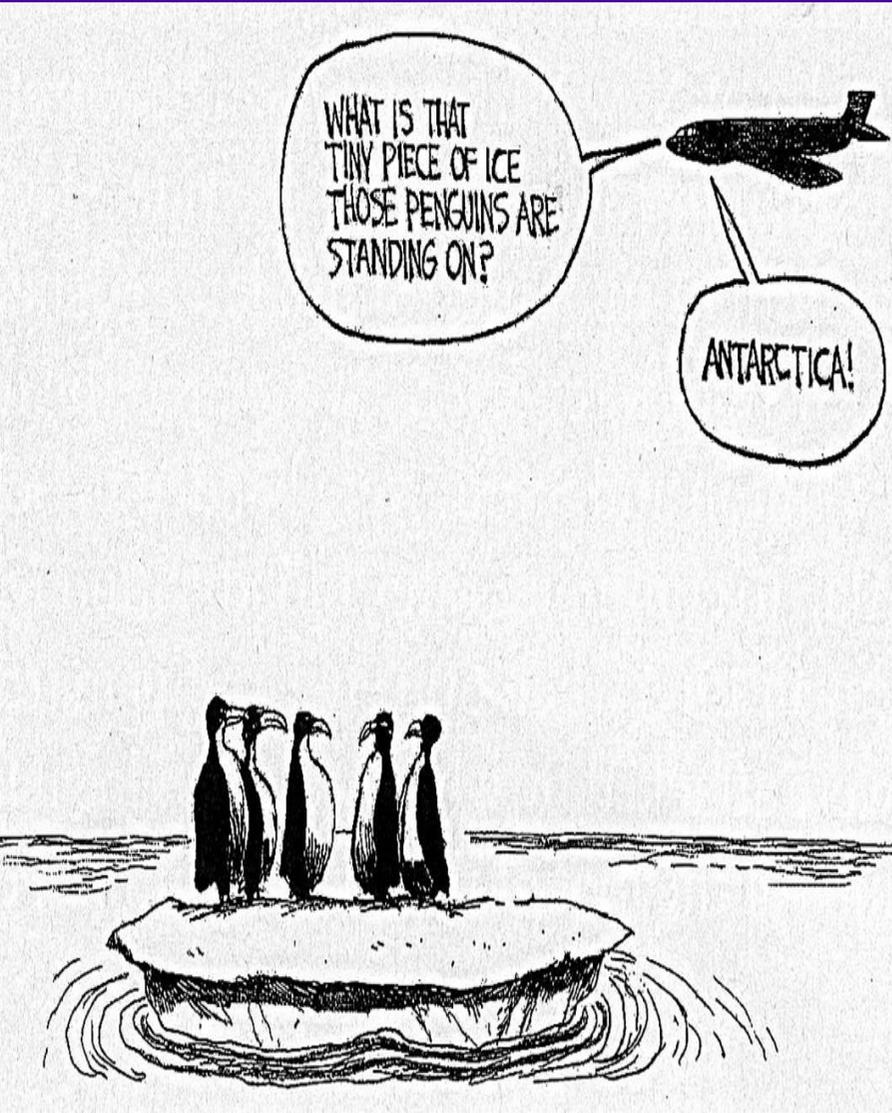
# The Arctic has no polar ice cap



Arctic sea ice fluctuates as global climate warms and cools. Over most of the past 10,000 years it has been less extensive than at present



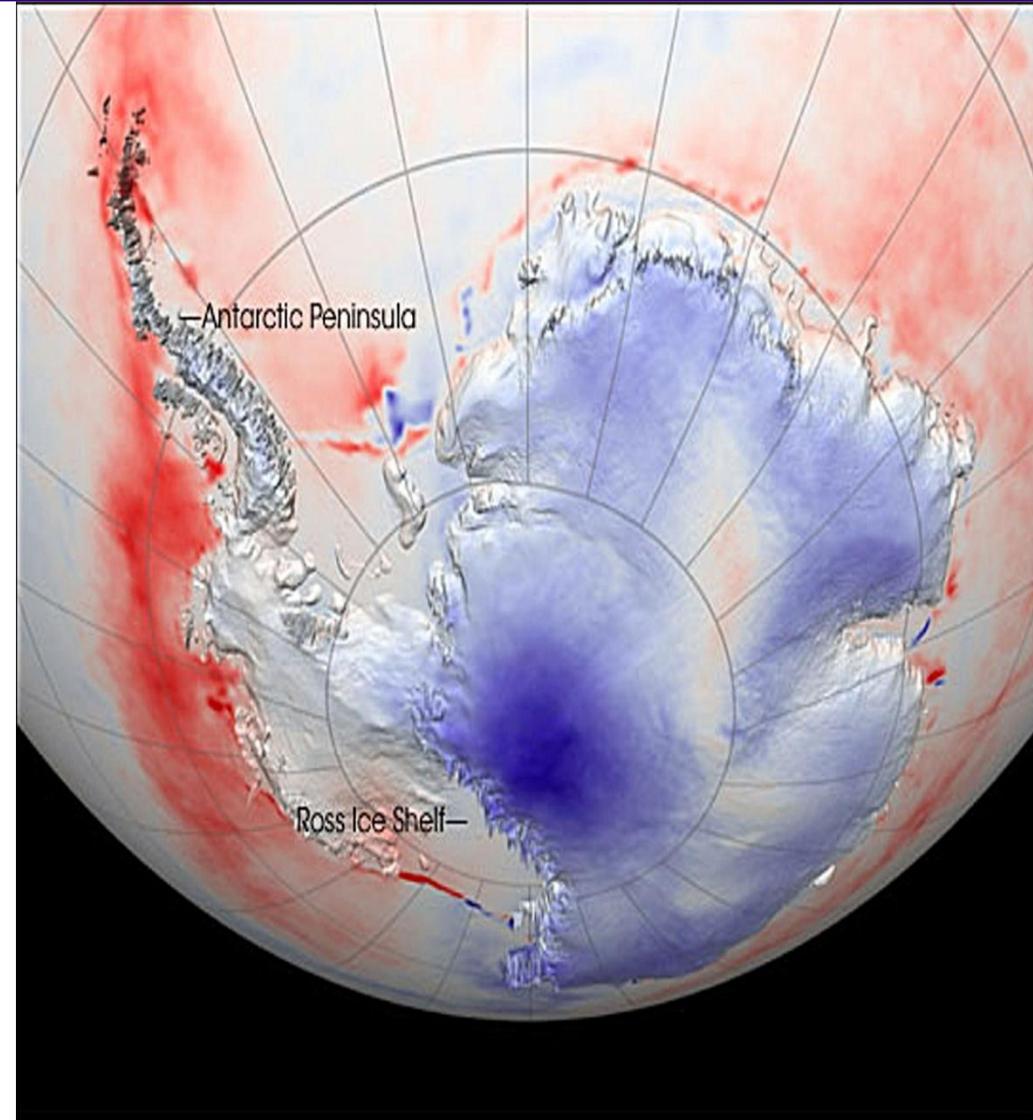
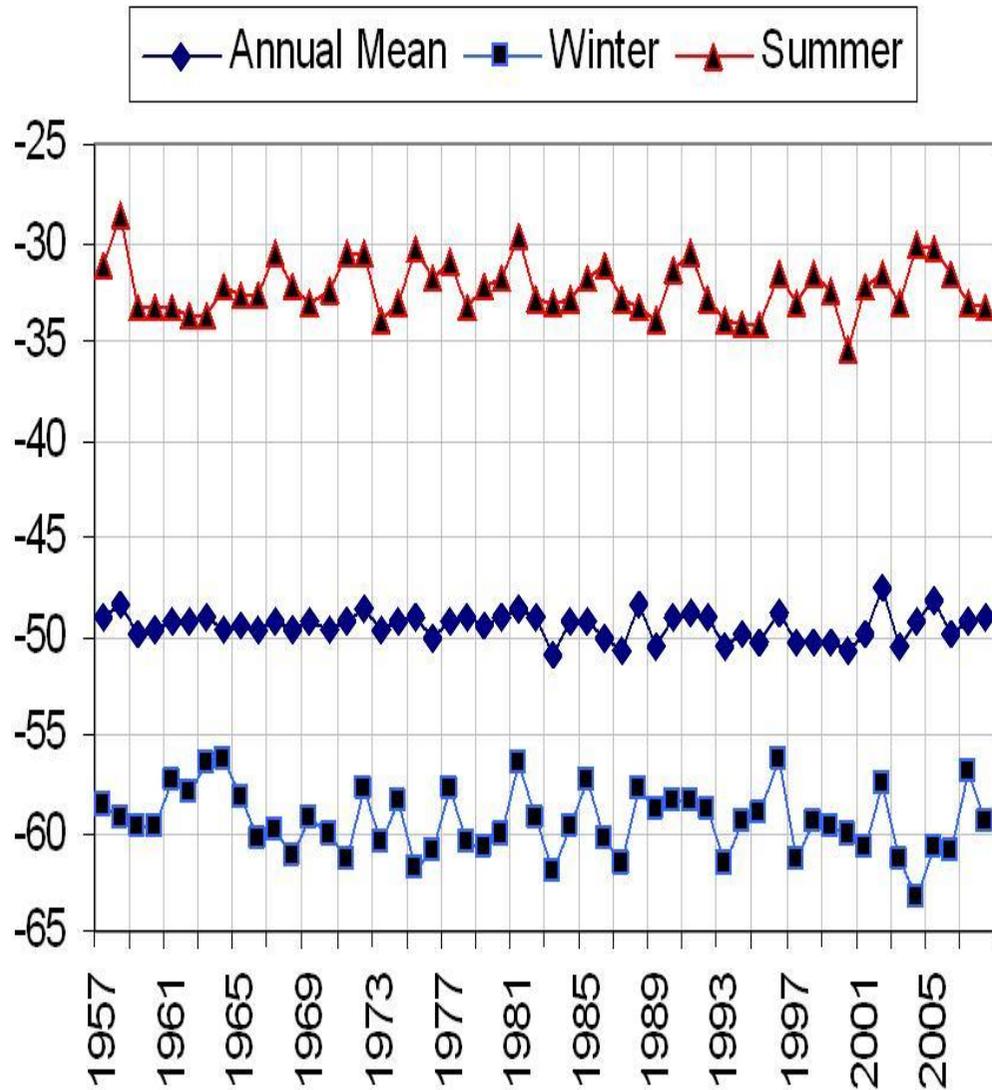
Claims that the Antarctic ice sheet is melting at an accelerating rate are untrue—the ice sheet is actually growing, not melting



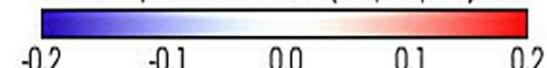
- ❖ *Average daily temperature in Antarctica is  $-58^{\circ} F$*
- ❖ *Last winter temp at the South Pole reached  $-106^{\circ} F$*
  
- ❖ *To get any ice to melt, would need to raise the average daily temperature from  $-58$  to  $+32^{\circ} F$  (melting point of ice), plus another  $\sim 10^{\circ} F$  = a total warming of  $+100^{\circ} F$ .*

# The Antarctic ice sheet is growing, not melting!

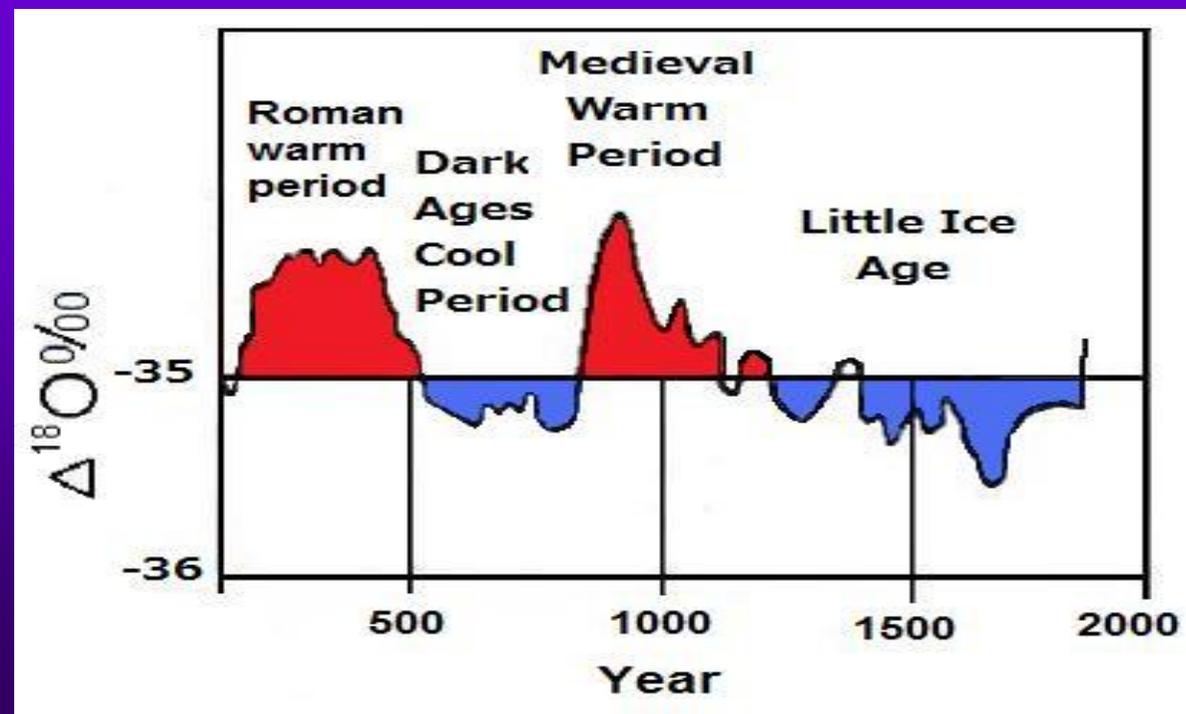
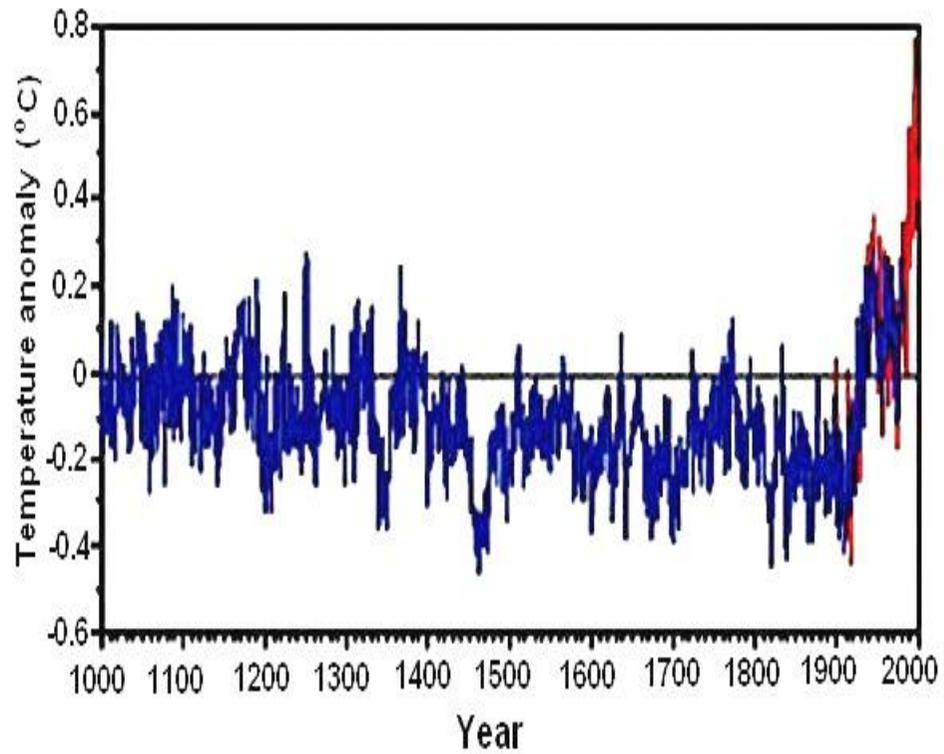
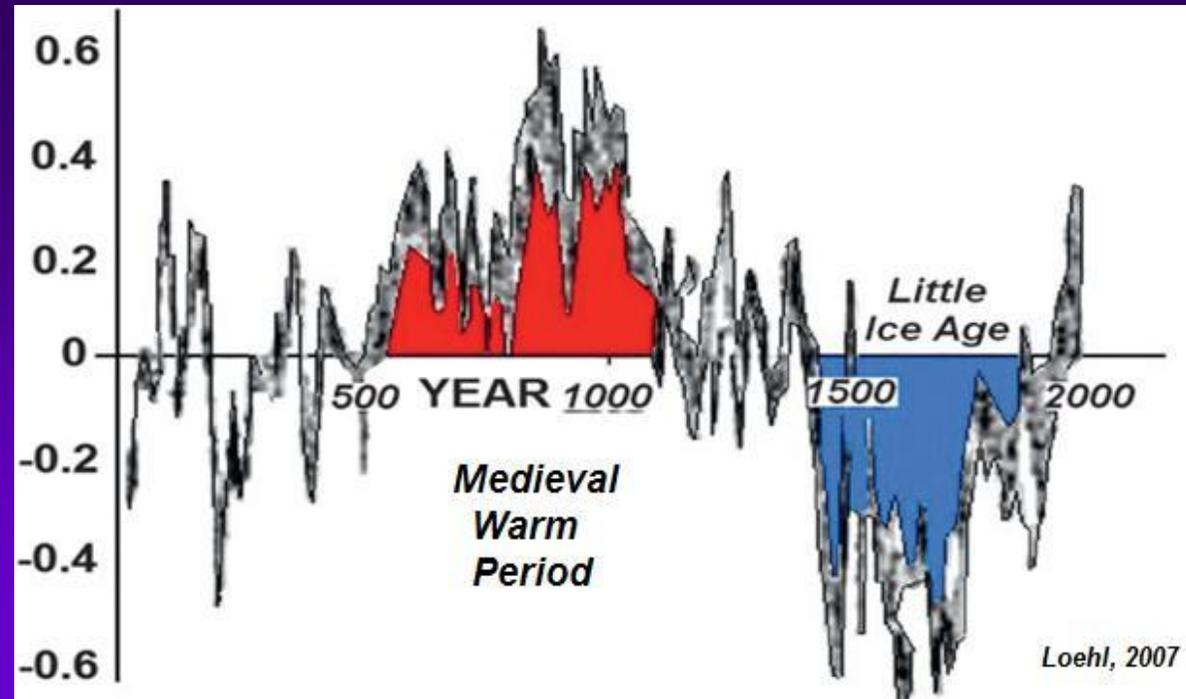
## Amundsen Scot - South Pole



Temperature Trends (°C per year)

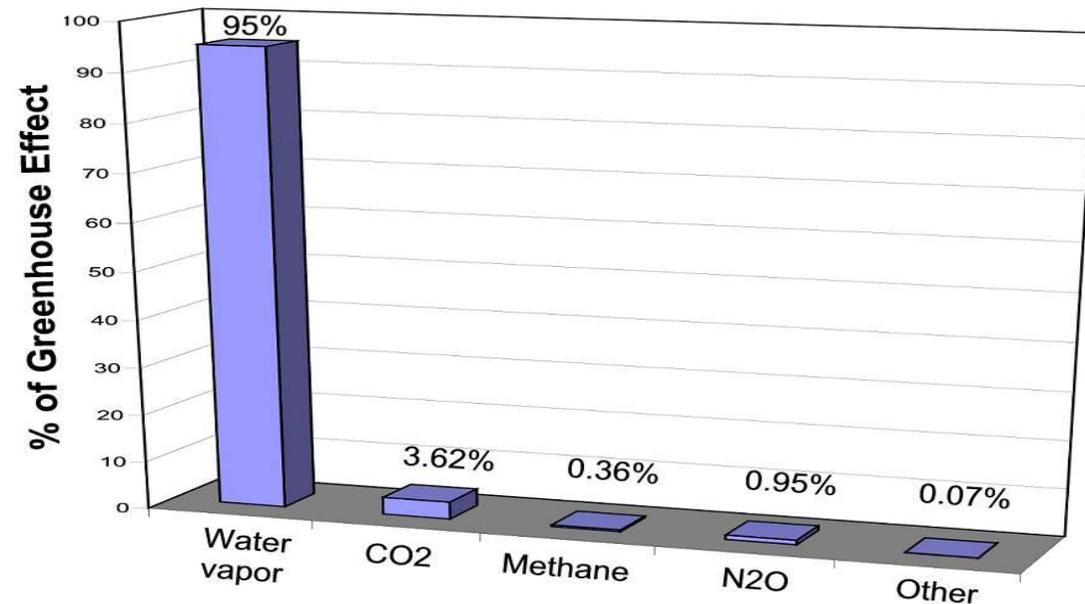
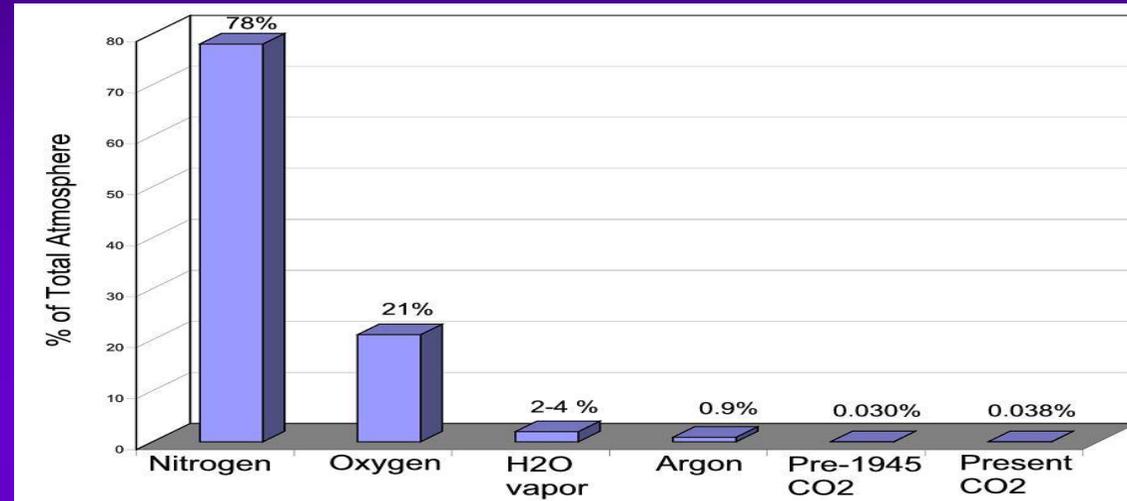


There is NO physical evidence that CO<sub>2</sub> causes global warming



# CO<sub>2</sub> cannot cause significant global warming by itself--the amount of CO<sub>2</sub> in the atm. is miniscule

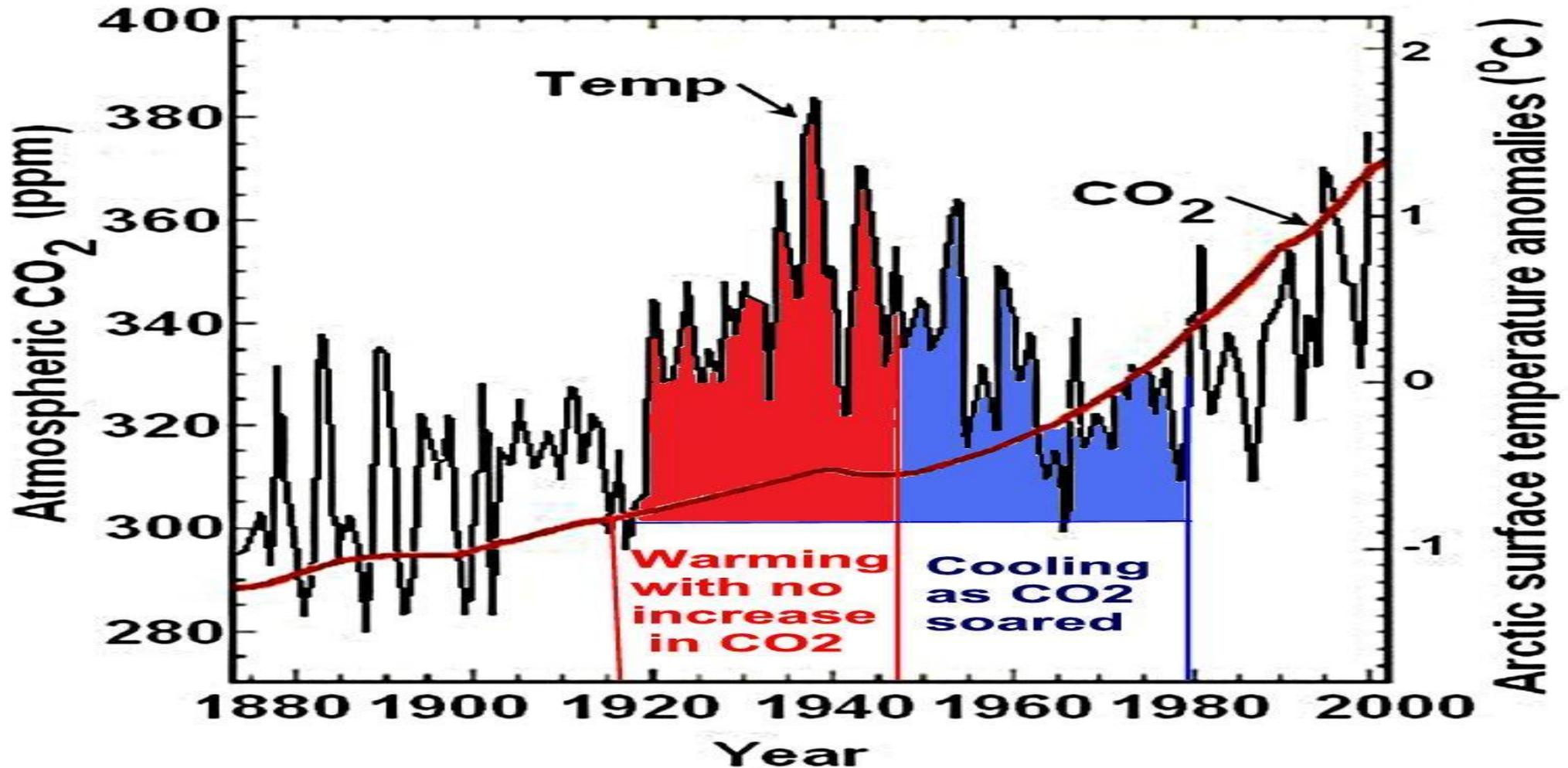
- ❖ The atmosphere consists of **0.039% CO<sub>2</sub>**
- ❖ Since 1950s, CO<sub>2</sub> has increased by only **0.0008%**
- ❖ CO<sub>2</sub> is responsible for **3.62%** of the greenhouse effect.
- ❖ Water vapor accounts for **95%** of greenhouse effect.
- ❖ Water vapor in the atm. has not increased





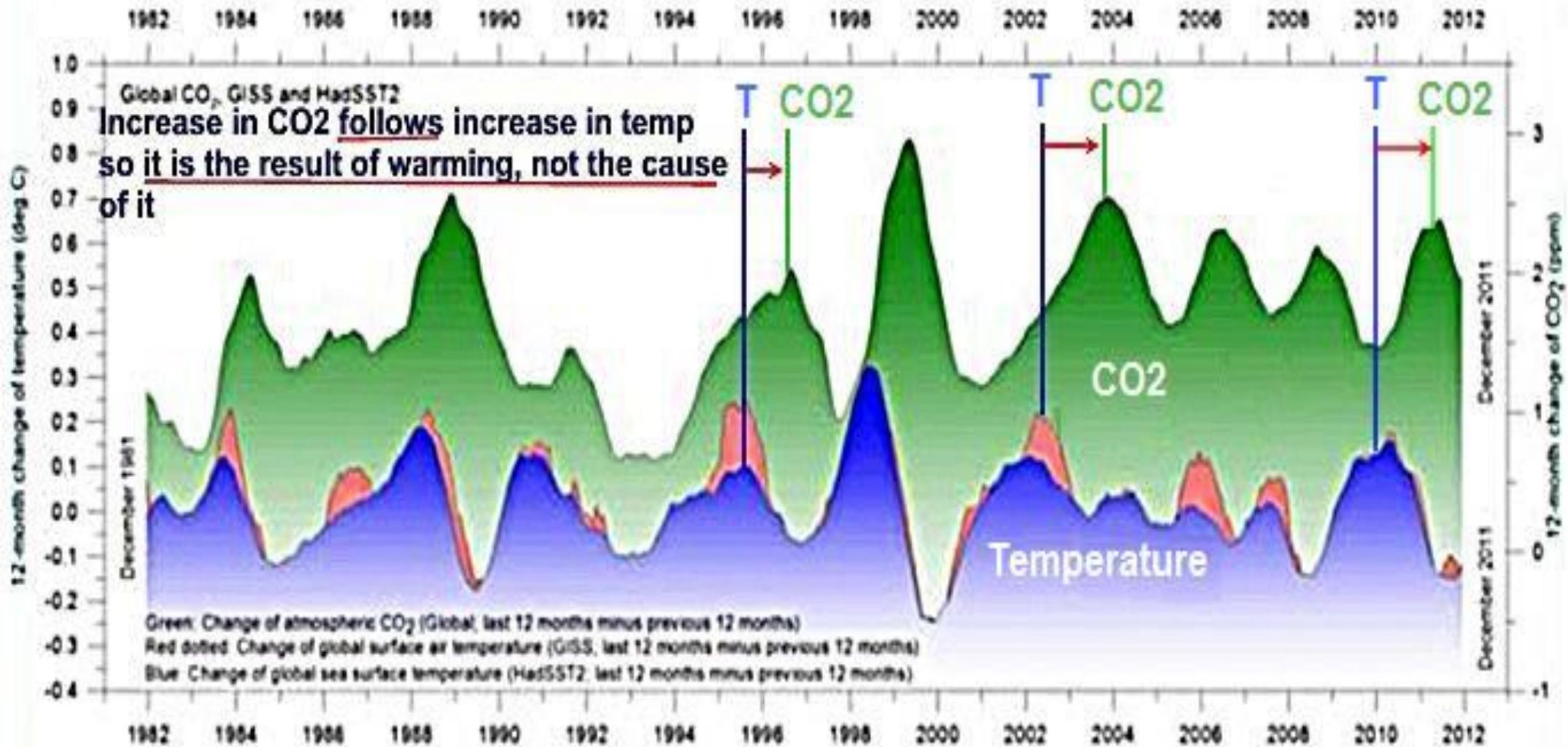
# NO correlation between CO<sub>2</sub> and temperature

## CO<sub>2</sub> and temperature



Modified from Soon, 2004

Whenever the oceans warm, atmospheric  $\text{CO}_2$  increases. Temperature always precedes  $\text{CO}_2$  increase so  $\text{CO}_2$  can't be the cause of warming.



# CONCLUSIONS

- ❖ The amount of  $\text{CO}_2$  in the atmosphere is miniscule.
- ❖ The total change in atmospheric  $\text{CO}_2$  is only 0.008% since  $\text{CO}_2$  emissions began to accelerate after 1945.
- ❖ There is no correlation between global temp and  $\text{CO}_2$ .
- ❖ Comparison of IPCC computer model predictions of global warming with actual measured observations have proven computer models to be totally inaccurate
- ❖  $\text{CO}_2$  is not capable of causing significant global warming.
- ❖  $\text{CO}_2$  is the result of warming, not the cause of warming.

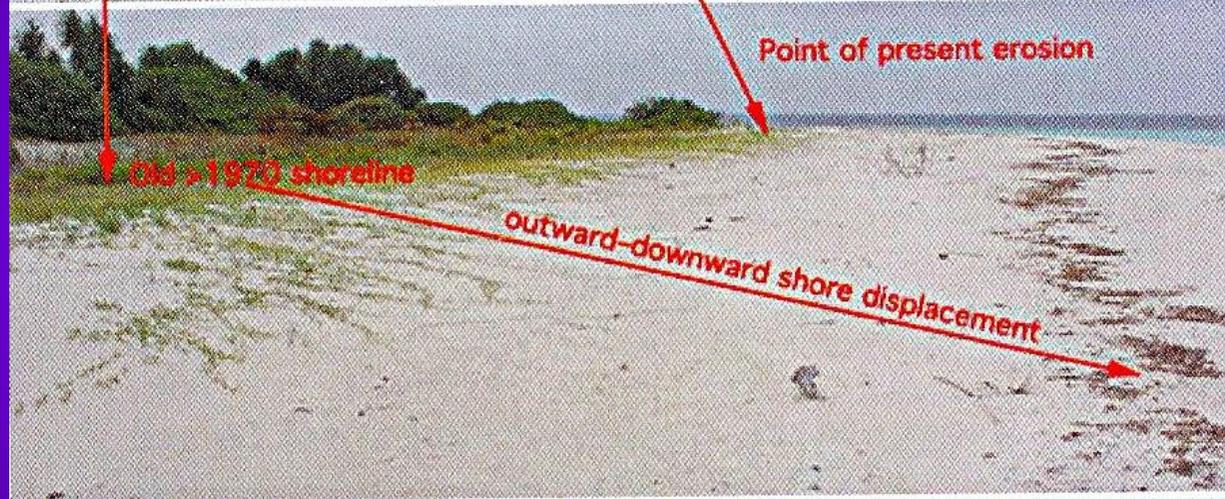
# SPECIFIC ISSUES IN SENATE BILL 58

2. Sea level is rising at an increasing rate because of global warming.

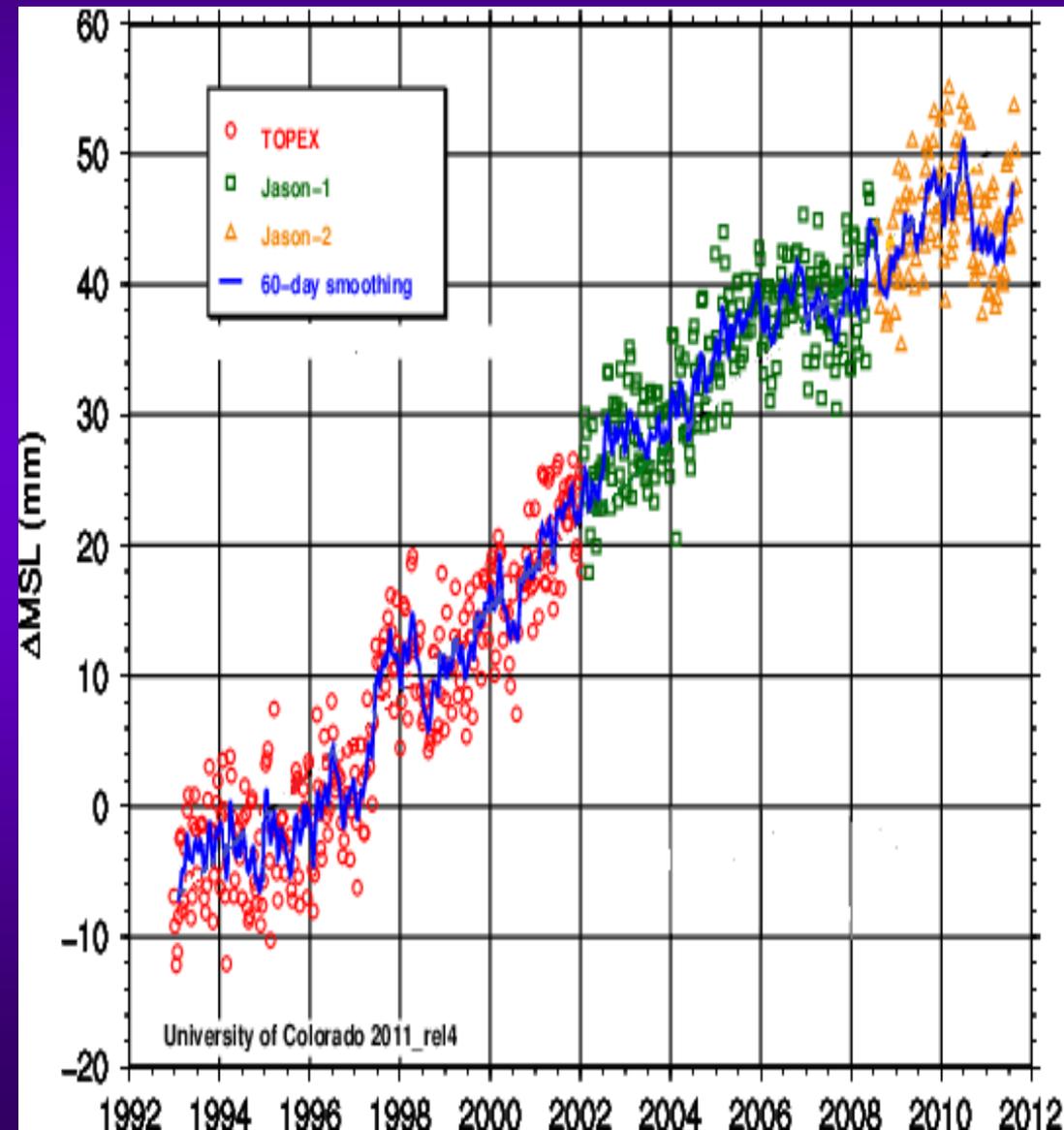
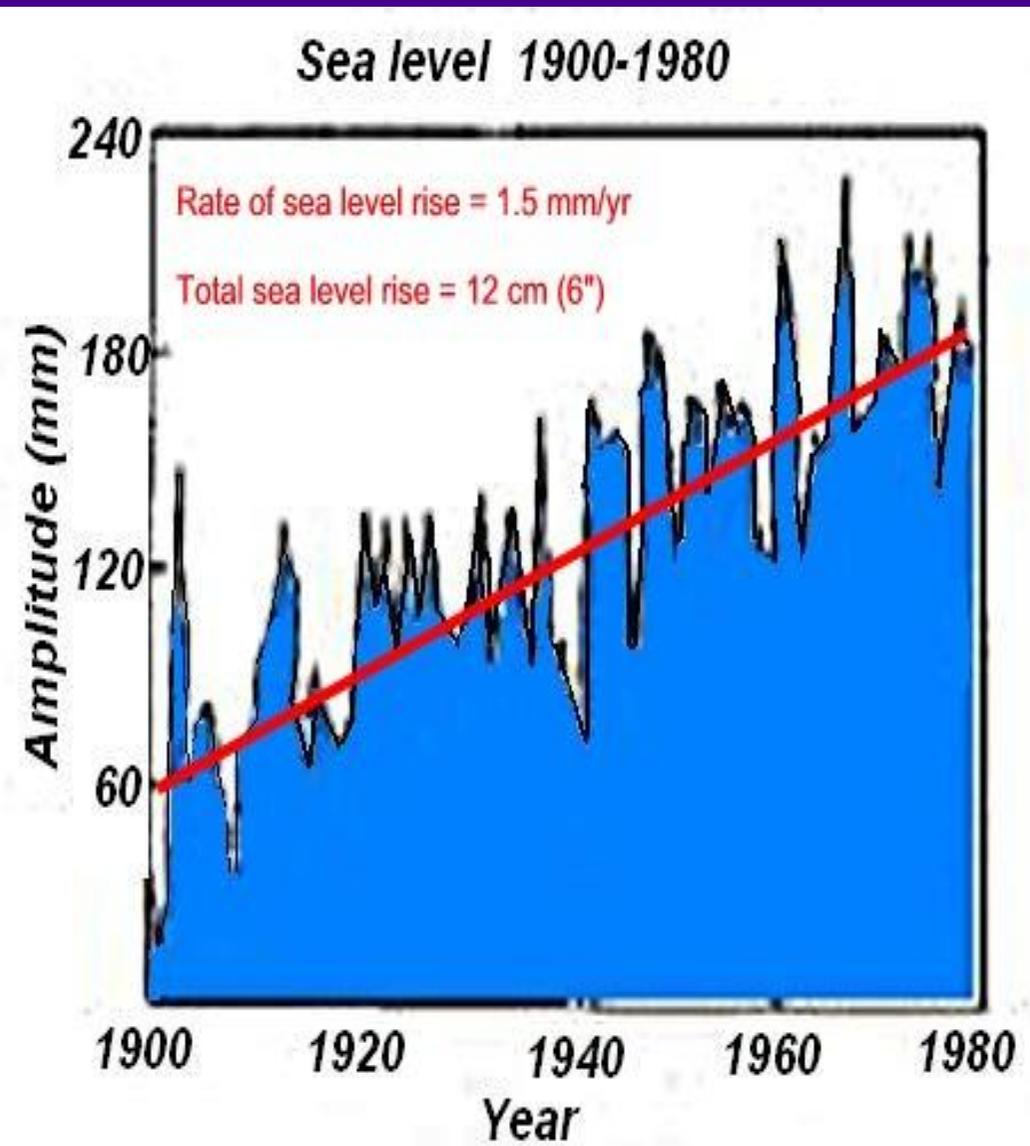


The Maldive Islands were cited by IPCC as being one of the first communities to "drown" from sea level rise due to global warming and the entire society would have to be relocated.

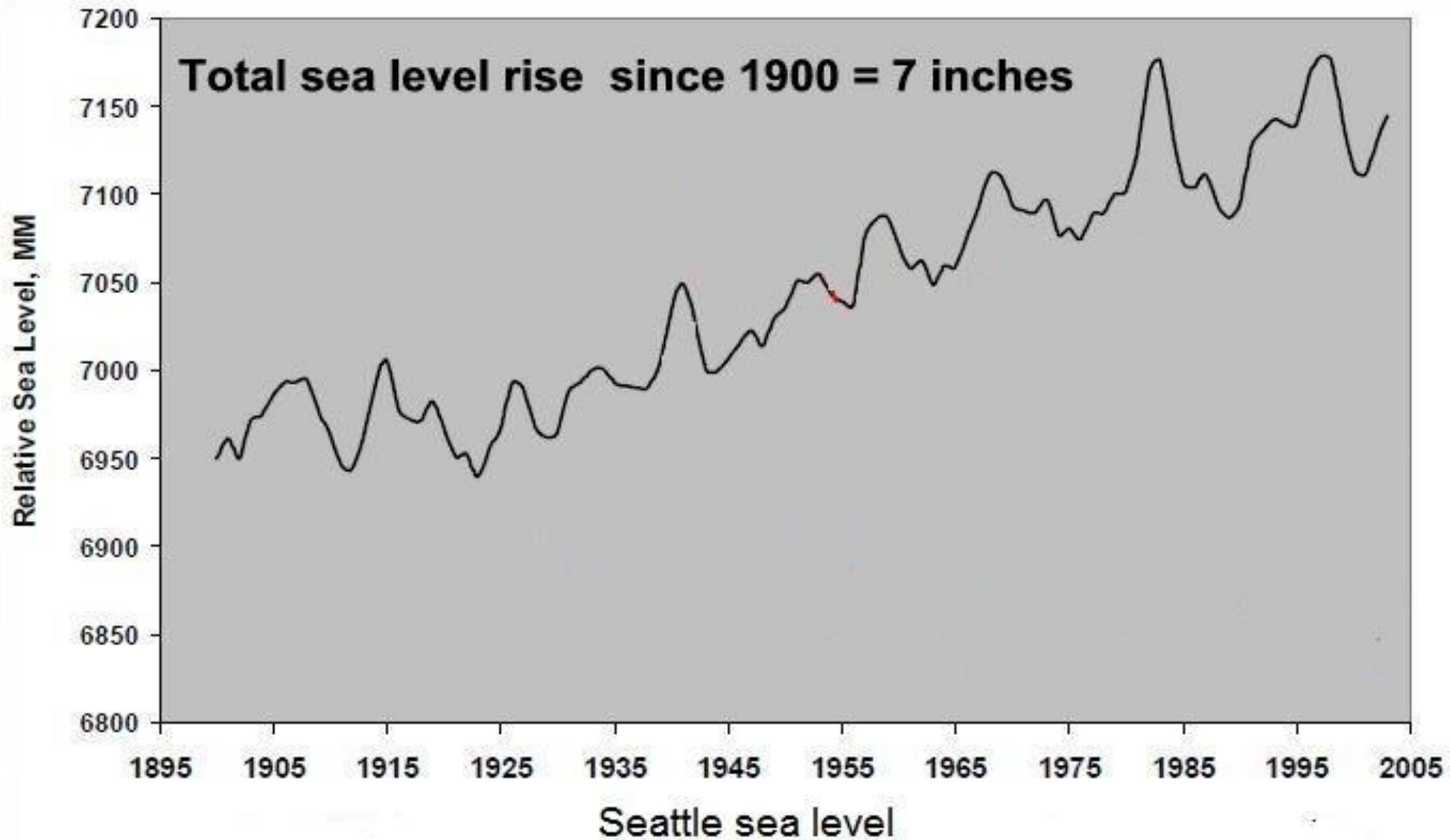
However, rather than drowning the islands, sea level there has actually been lowering.



As we thaw out from the Little Ice Age, sea levels have risen only 7 inches in the past century..



# Sea level record at Seattle since 1900



# Sea level records in the Pacific NW

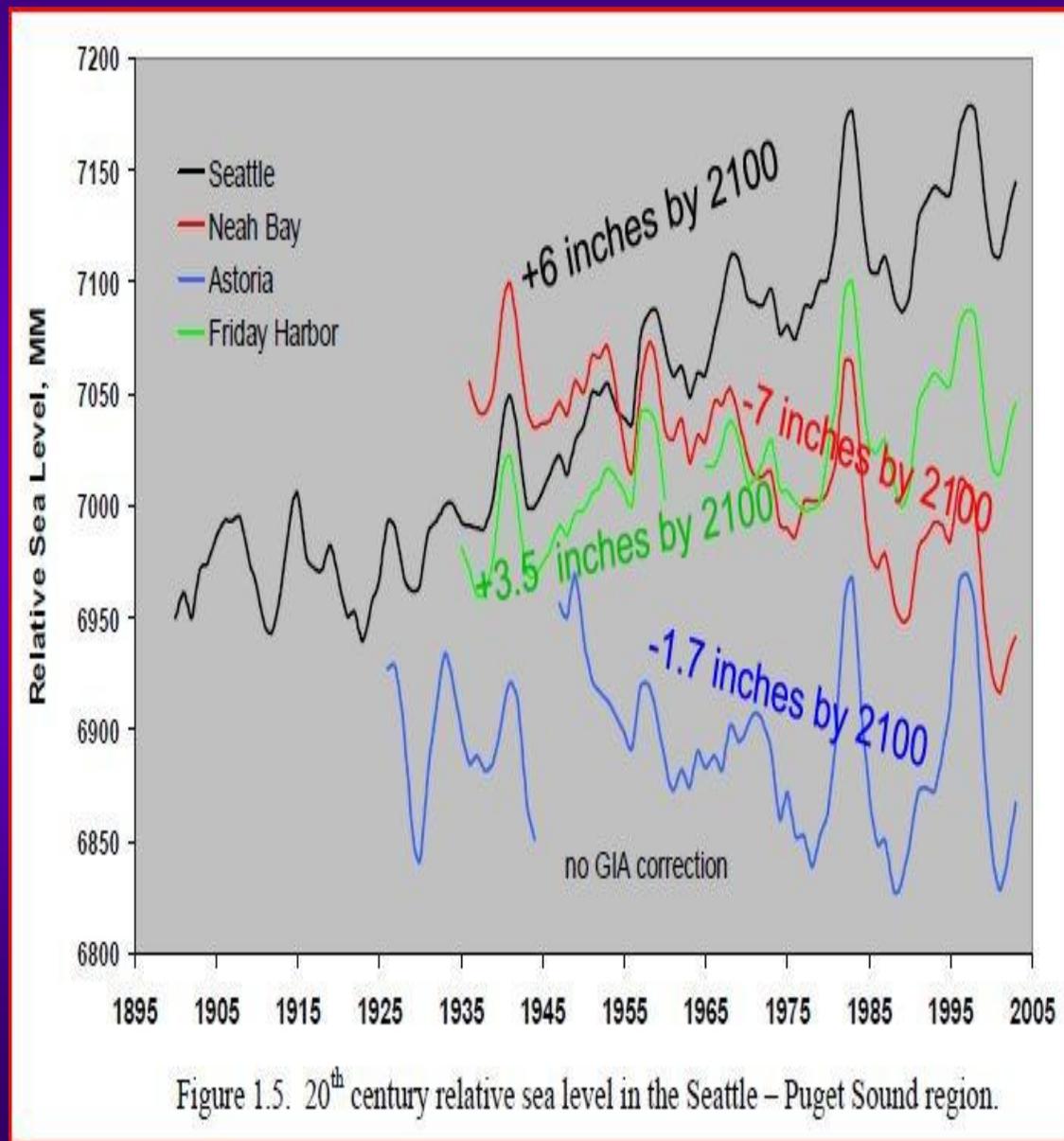
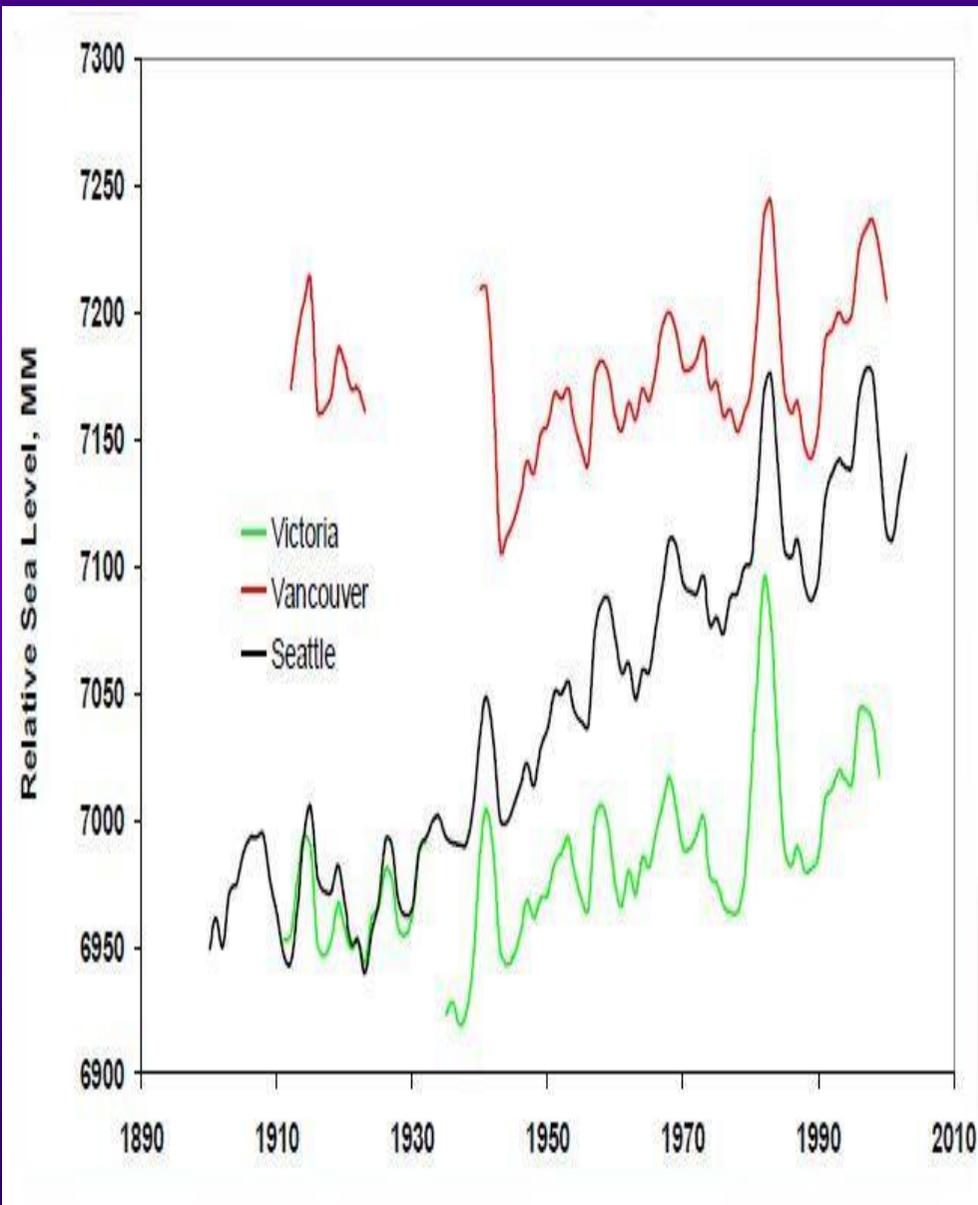
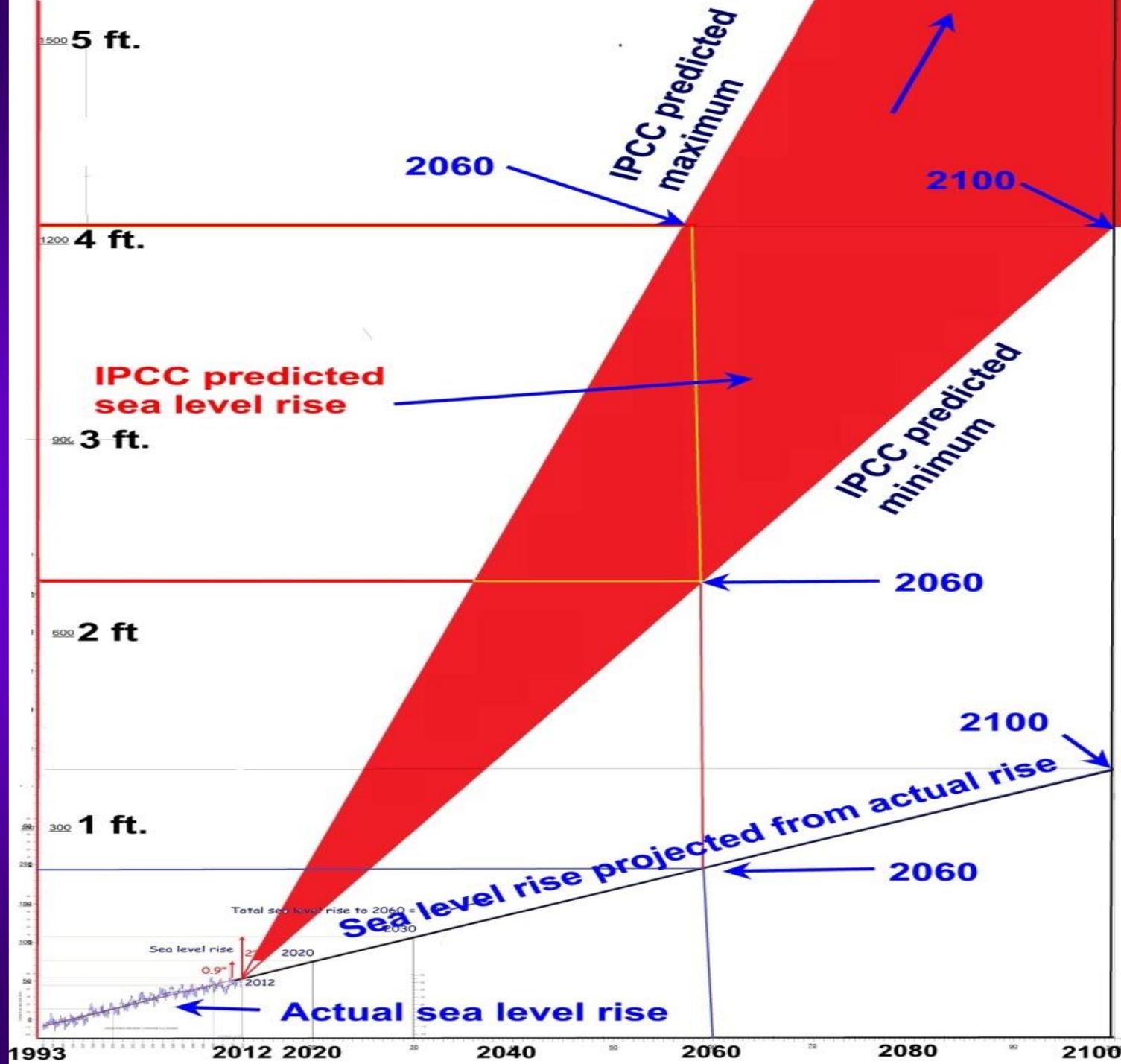


Figure 1.5. 20<sup>th</sup> century relative sea level in the Seattle – Puget Sound region.

# Comparisons of projected sea level rise



# CONCLUSIONS

- ❖ Sea level has risen only 7 inches in the past century as we thaw out from the Little Ice Age.
- ❖ The rate of sea level rise is constant, not accelerating.
- ❖ Sea level in some areas (Alaska, Maldives Is., Neah Bay, Astoria) is lowering, not rising.
- ❖ The IPCC predicted large sea level rise is unrealistic because global warming has stopped and the Antarctic ice sheet is growing, not melting.
- ❖ Sea level in the Pacific NW will rise only about 6 inches by 2100.

# SPECIFIC ISSUES IN SENATE BILL 5802

3. The frequency of severe storms is increasing because of global warming



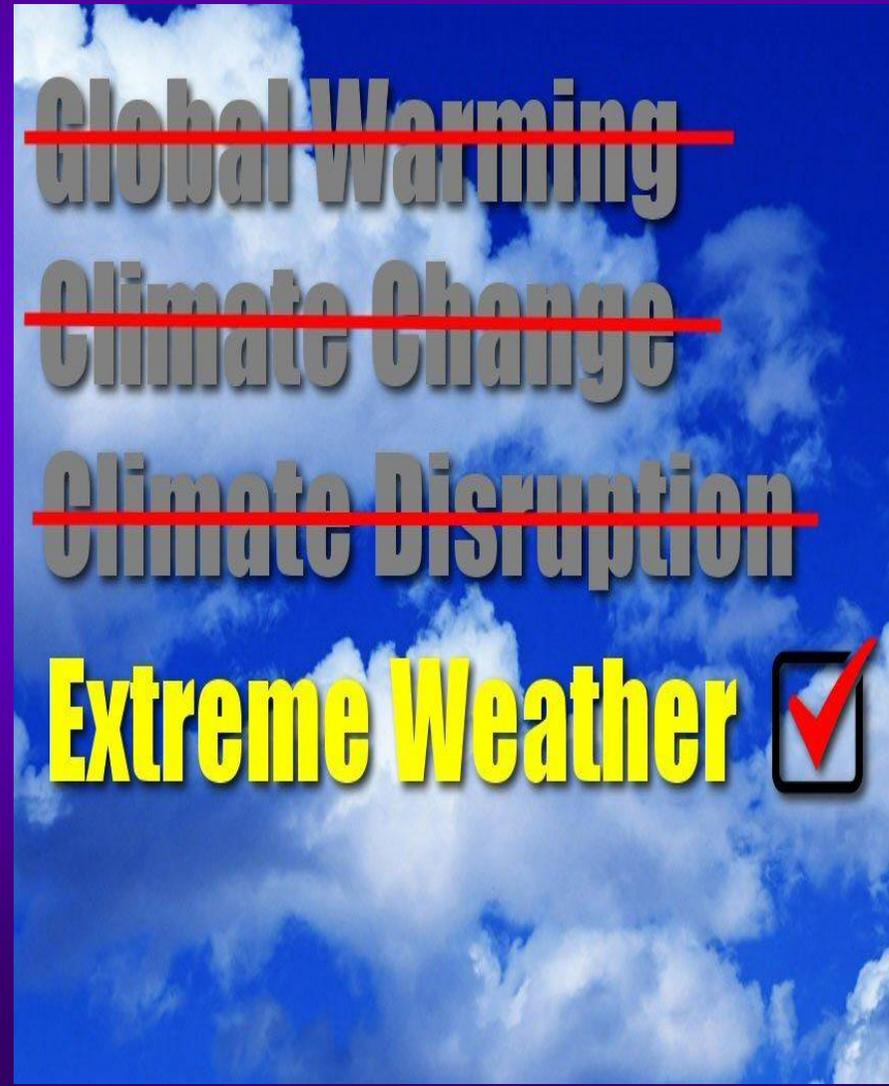
# Is the frequency of severe storms increasing because of global warming?

In the news media, every severe storm is now touted as due to global warming.

These are weather events, not climate.

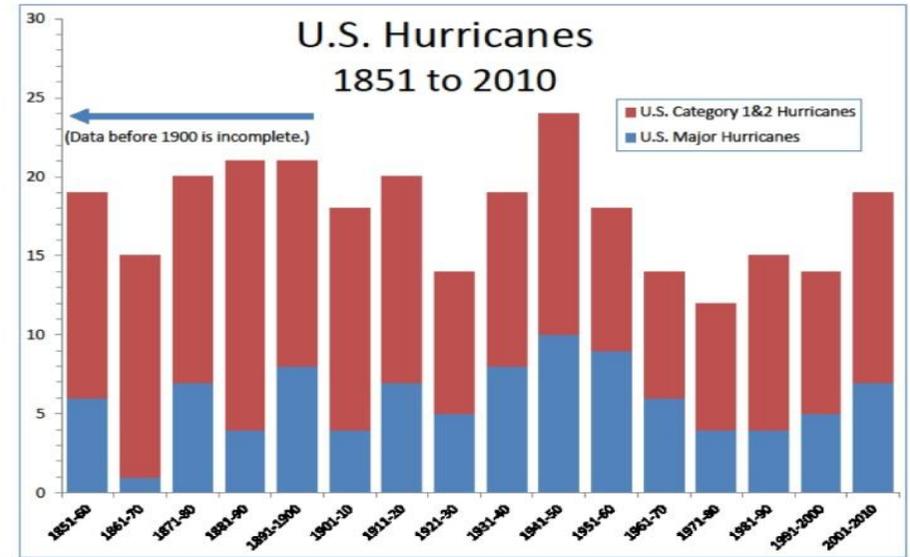
Weather is day-to-day--climate is the long-term average of weather.

What's happening now is weather, not climate

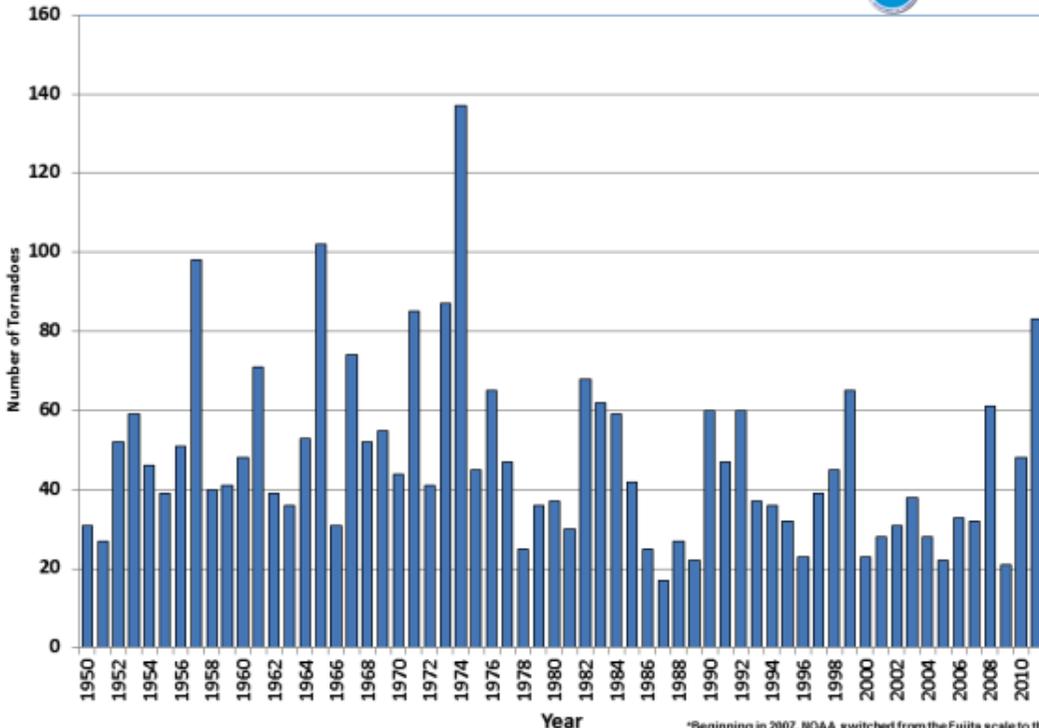


~~Global Warming~~  
~~Climate Change~~  
~~Climate Disruption~~  
**Extreme Weather**

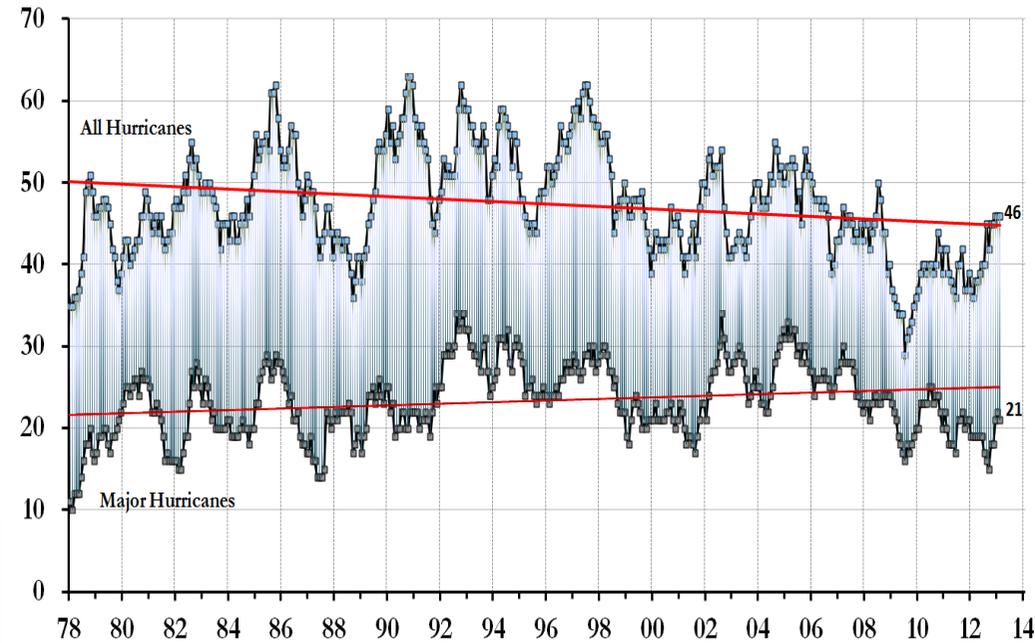
# Frequency of hurricanes and tornadoes



Number of Strong to Violent (EF3-EF5\*) Tornadoes



Global Hurricane Frequency -- Dr. Ryan N. Maue -- Updated February 28, 2013 --12 month running sums



# Precipitation and streamflow

Figure 1. Precipitation in the Lower 48 States, 1901–2009

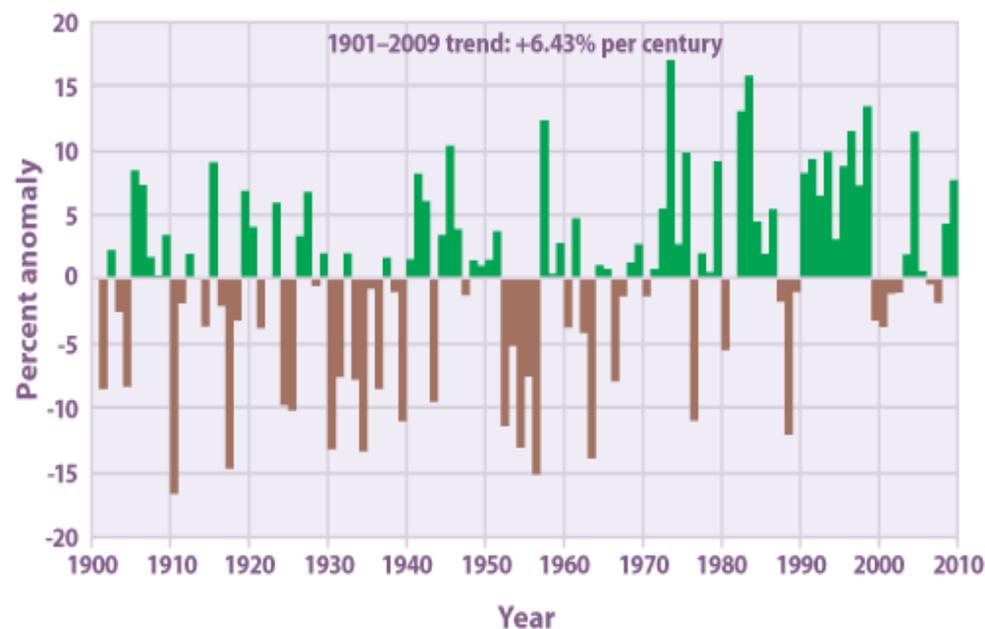
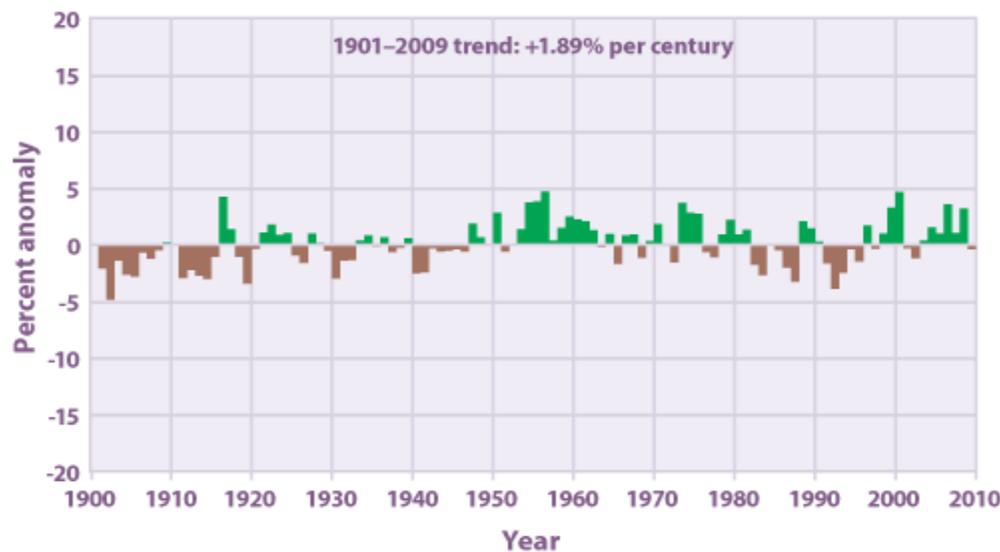


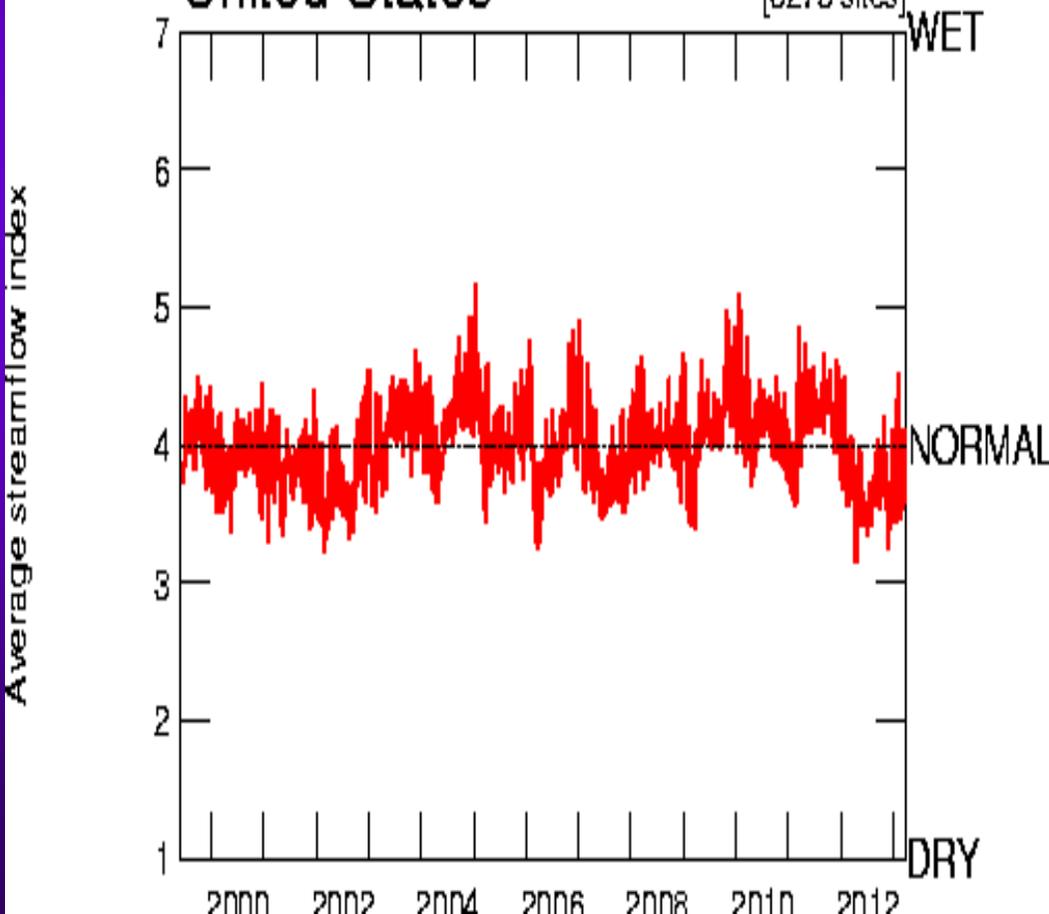
Figure 2. Precipitation Worldwide, 1901–2009



Since June 22, 1999

United States

[3275 sites]



# CONCLUSIONS

- ❖ The number of U.S. hurricanes has decreased 1851-2010.
- ❖ The global hurricane frequency has declined since 1978.
- ❖ The number of tornadoes has decreased since 1970s.
- ❖ Global precipitation has increased since 1950.
- ❖ Streamflow in the U.S. hasn't changed in 15 years.
- ❖ There is no basis for predicting increasing extreme weather

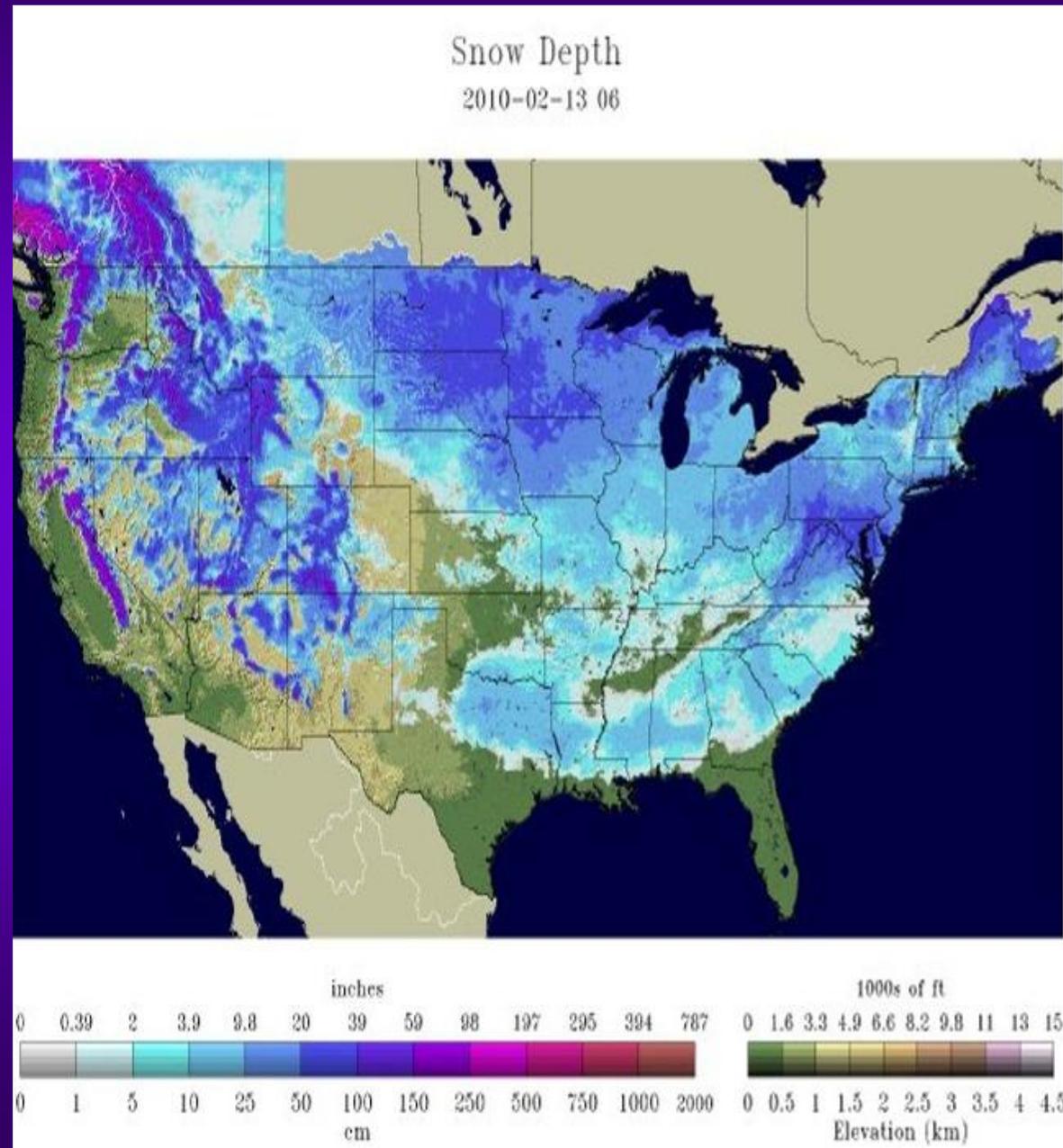
# SPECIFIC ISSUES IN SENATE BILL 5802

## 4. Reduced winter snow packs and decreased streamflows

- ❖ Since 1990, IPCC has been predicting the end of snow.
- ❖ CRU's of East Anglia forecast: UK winter snowfall will become "a very rare and exciting event"
- ❖ The Independent headline "Snowfalls are now just a thing of the past".
- ❖ In 2007, the Union of Concerned Scientists warned that snow would be a problem for ski areas in the future. That very winter set records for snow coast to coast, only to be exceeded by 2009/10 and 2010/11.

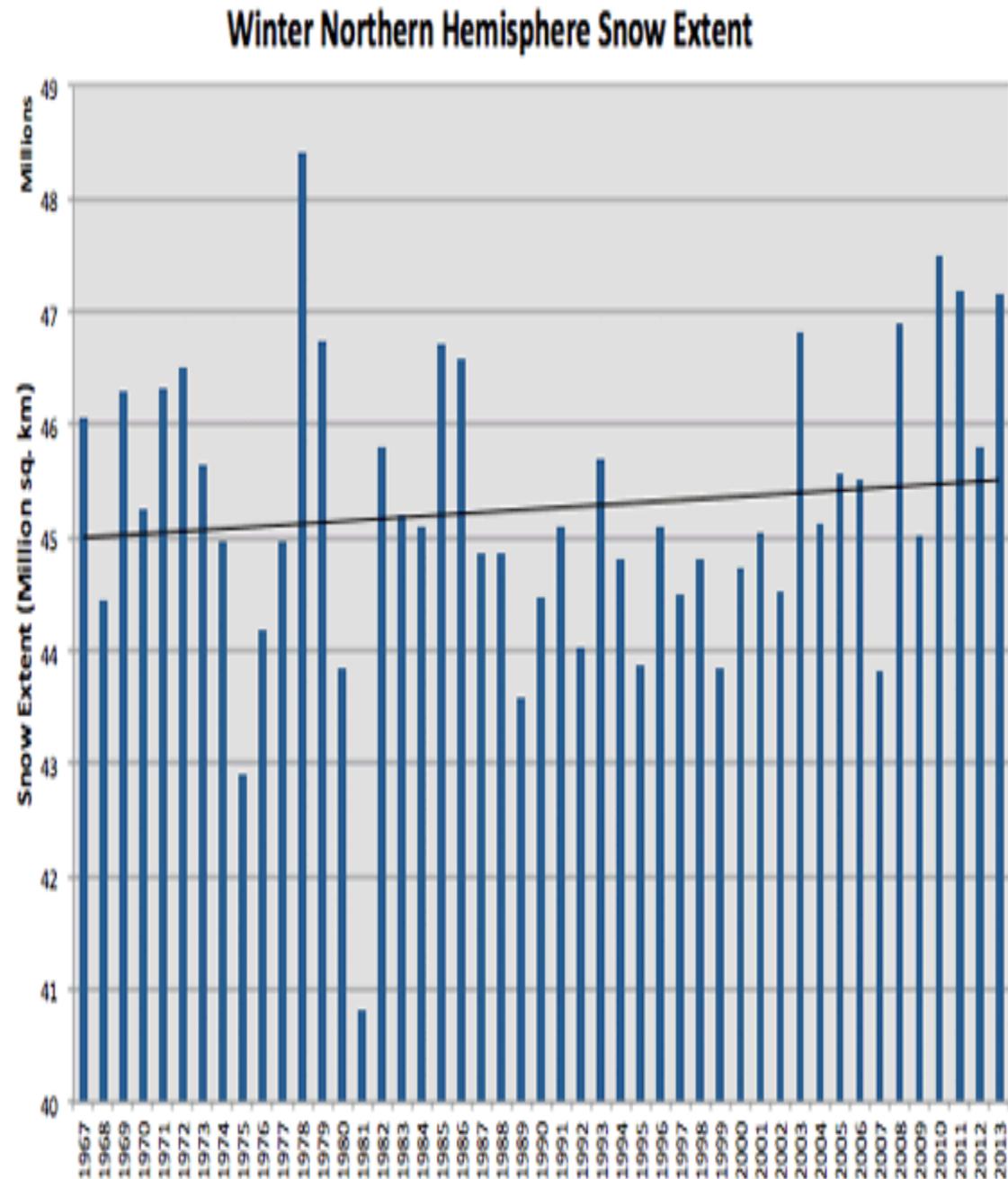
# Snowfall is increasing, not declining

- ❖ “Heaviest Snowfall in a Century Hits Moscow “
- ❖ “Anchorage Alaska sets all-time seasonal snowfall record”
- ❖ “China cold/snow has trains stopped in their tracks: The heaviest snowfall in northern China in nearly six decades. The unusually harsh winter weather also caused coal shortages, forcing some provinces to cut power supplies.”
- ❖ “Britain faces gas shortage due to deep freeze.”



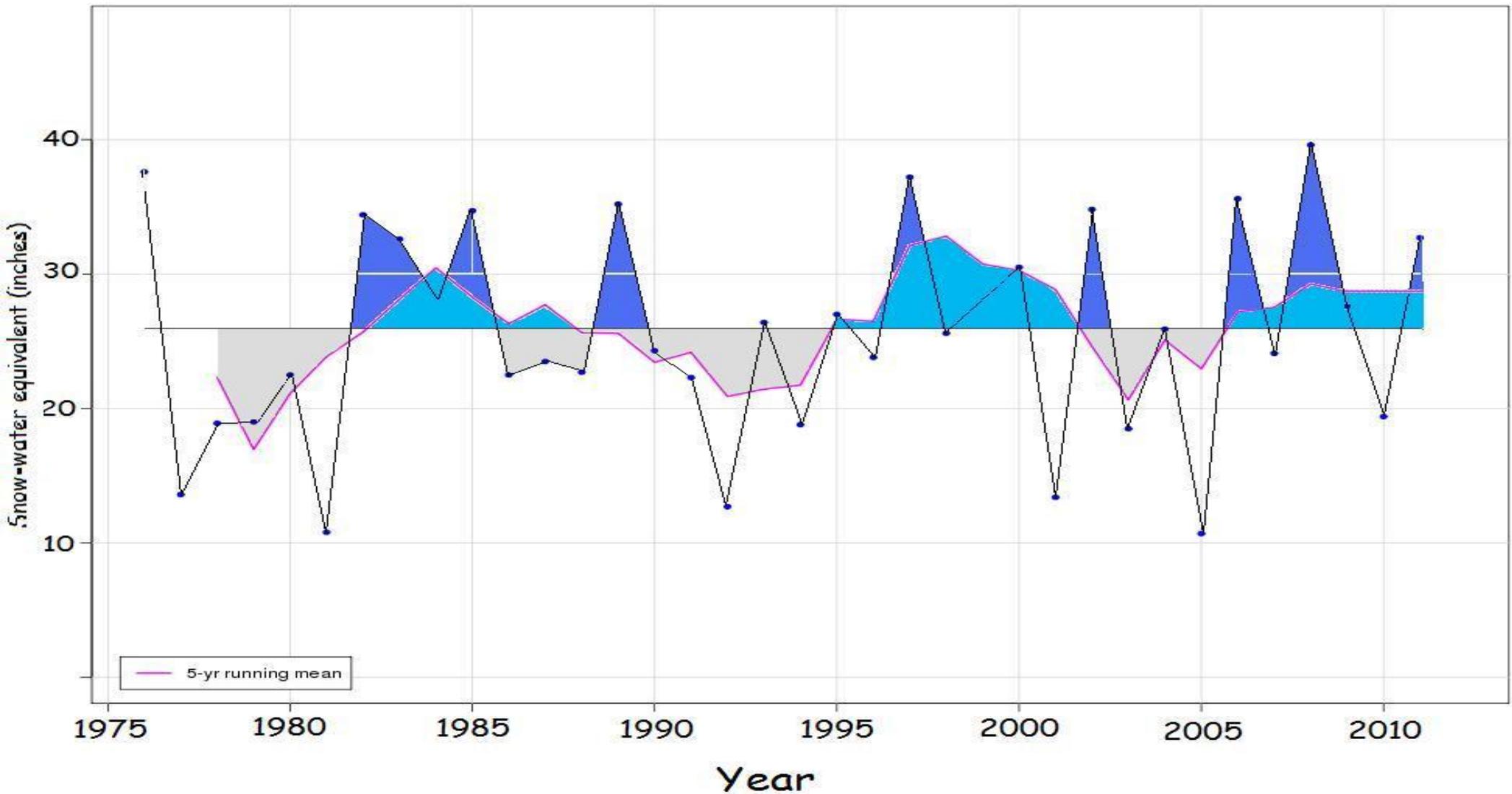
Data show snowfall is increasing, not decreasing

- ❖ Five of the top six snowiest winters for the northern hemisphere have occurred since 2002/03
- ❖ Winter 2012/13 ranked 4th behind 1977/78, 2009/10, 2010/11, (2012/13) and ahead of 2007/08 and 2002/03.



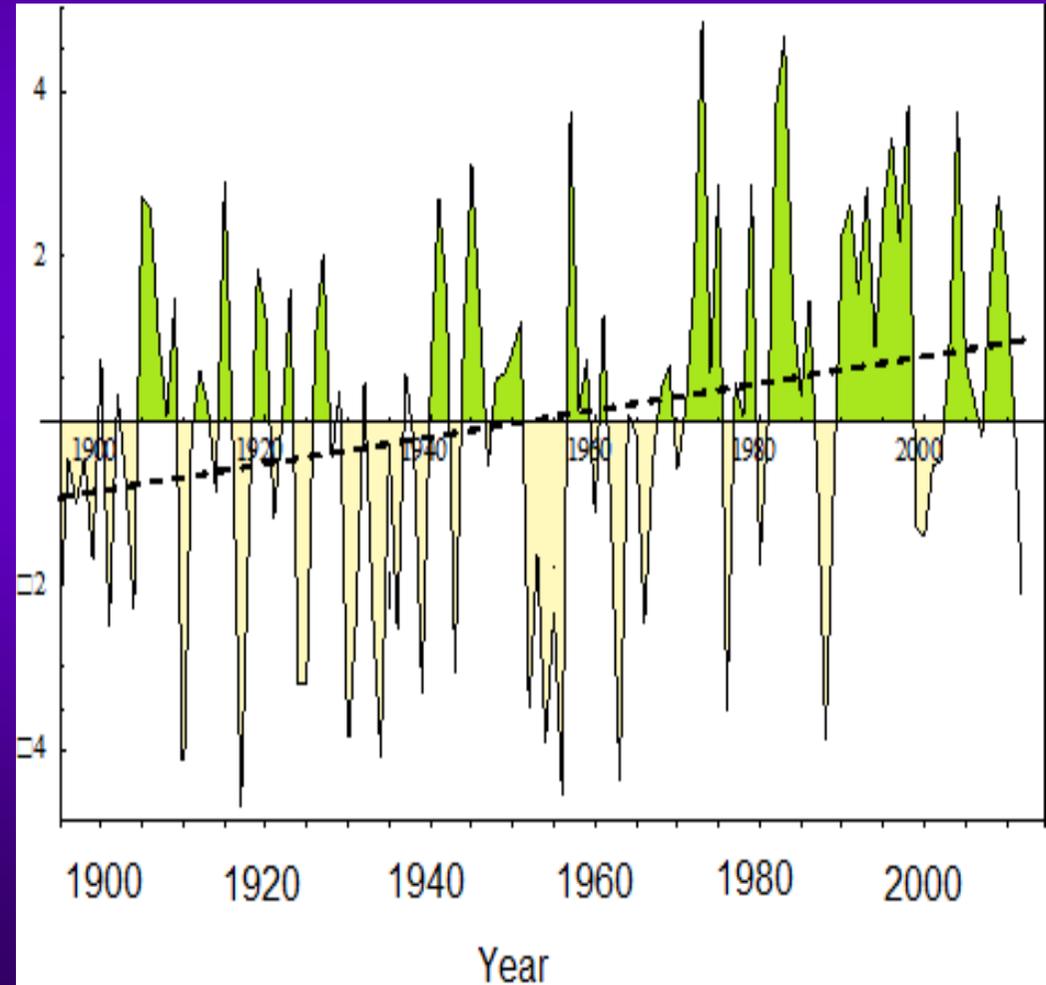
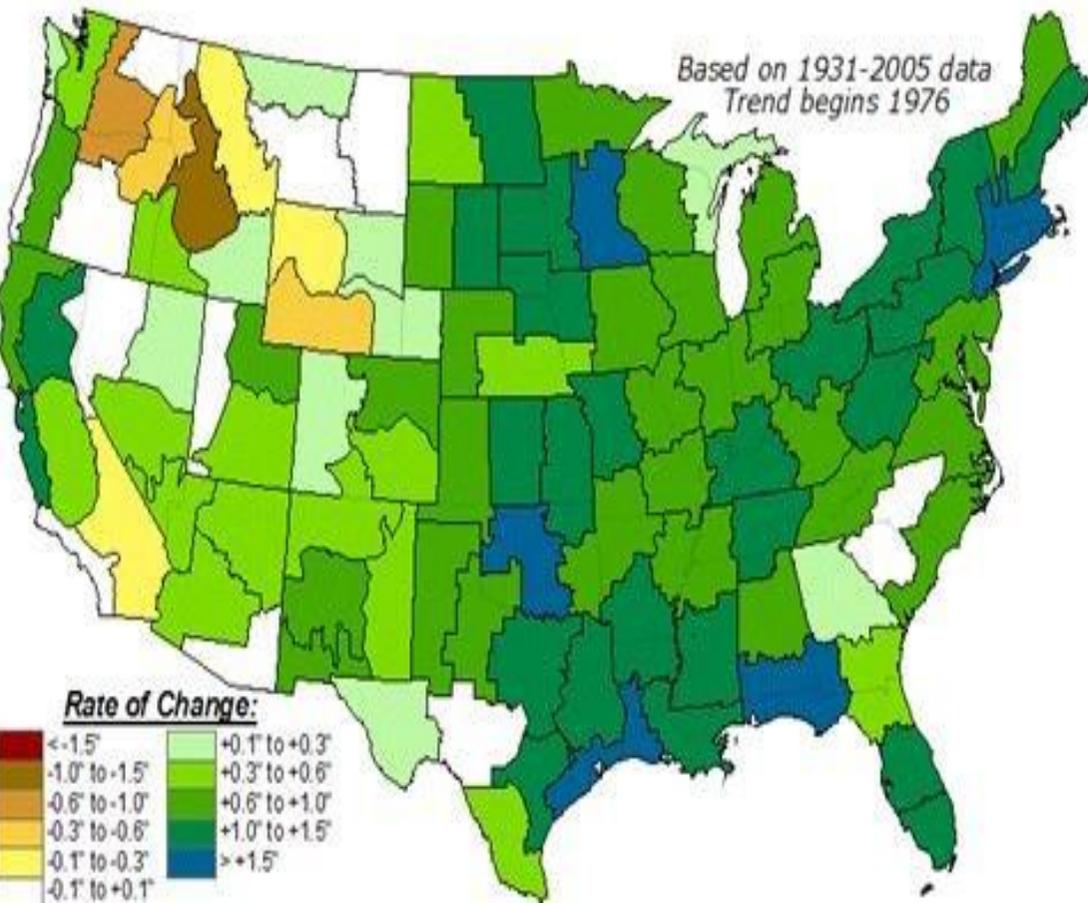
# Snow pack in the Cascades Mts.

Mean Snow-water equivalent depth, 1976-2011



# U.S. precipitation is increasing, not decreasing

Rate of Long-Term Trend Temperature Change (top; °F per decade) & Precipitation Change (bottom; inches per decade) – FULL YEAR



# CONCLUSIONS

- ❖ Despite numerous assertions since 1990 that snow will become a thing of the past, just the opposite is happening.
- ❖ Five of the top six snowiest winters for the northern hemisphere have occurred since 2002/03
- ❖ Temperatures in 2011 in the Pacific Northwest, were colder than the 30 year mean for the 5th straight year.
- ❖ Spring temperatures in the Northwest have been trending downward at a rate of  $-0.59^{\circ}$  F per decade for 30 years.
- ❖ Spring temperatures in the Northwest have been trending downward at a rate of  $-4.10$  degrees F per decade the past 10 years.
- ❖ The snow pack has been 120-150% of normal in recent yrs

# SPECIFIC ISSUES IN SENATE BILL 5802

## 5. Increasing acidification of the state's marine waters.

- ❖ Acidification is "the process of becoming acid or being converted into an acid."
- ❖ The oceans are NOT acid, they are strongly alkaline (pH=8.2).

# Can atmospheric $\text{CO}_2$ make the oceans acidic?

❖ Only trace amounts of  $\text{CO}_2$  exist in the atmosphere (0.038%), too little to have any significant effect. Oceans have 50 times as much  $\text{CO}_2$ .

❖ Atm  $\text{CO}_2$  at present = 0.038%

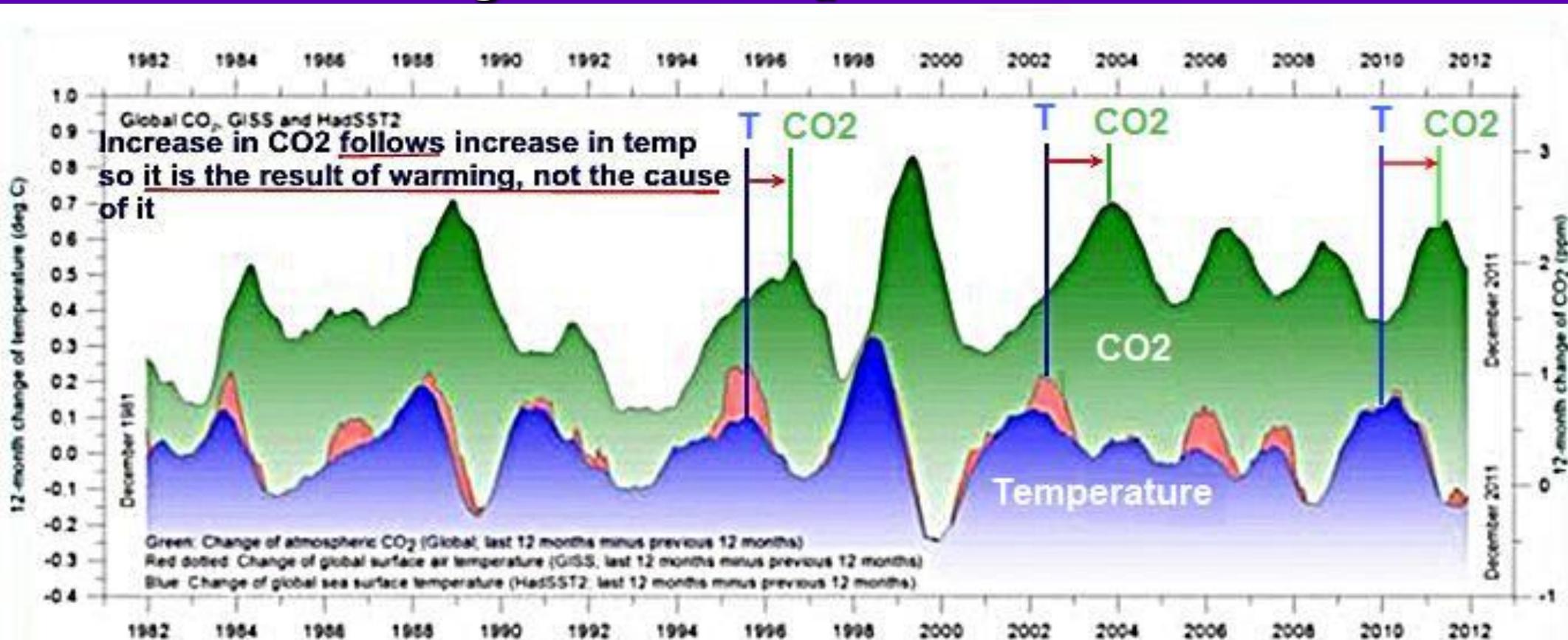
❖ Atm  $\text{CO}_2$  ~1950 = 0.030

❖ Total change in  $\text{CO}_2$  = 0.008%

Such a miniscule change in atmospheric  $\text{CO}_2$  (from a tiny amount to start with) cannot convert 300 million cubic miles of alkaline sea water into acid!

# Can global warming make oceans less alkaline?

- ❖ The effect of global warming is to make the oceans more alkaline, not more acidic, because warming drives  $\text{CO}_2$  out of the ocean.



# Effect of global warming on ocean pH

- ❖  $\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3^* + \text{H}^+ \rightleftharpoons \text{CO}_3^{--} + 2\text{H}^+$
- ❖ Cool sea water can hold more  $\text{CO}_2$  than warm water, so as warming occurs, oceans transmit  $\text{CO}_2$  from the sea to the atmosphere. (Drives equation to the left) and making the ocean more alkaline.
- ❖ Thus, global warming does not make oceans more acid, it makes them more alkaline.



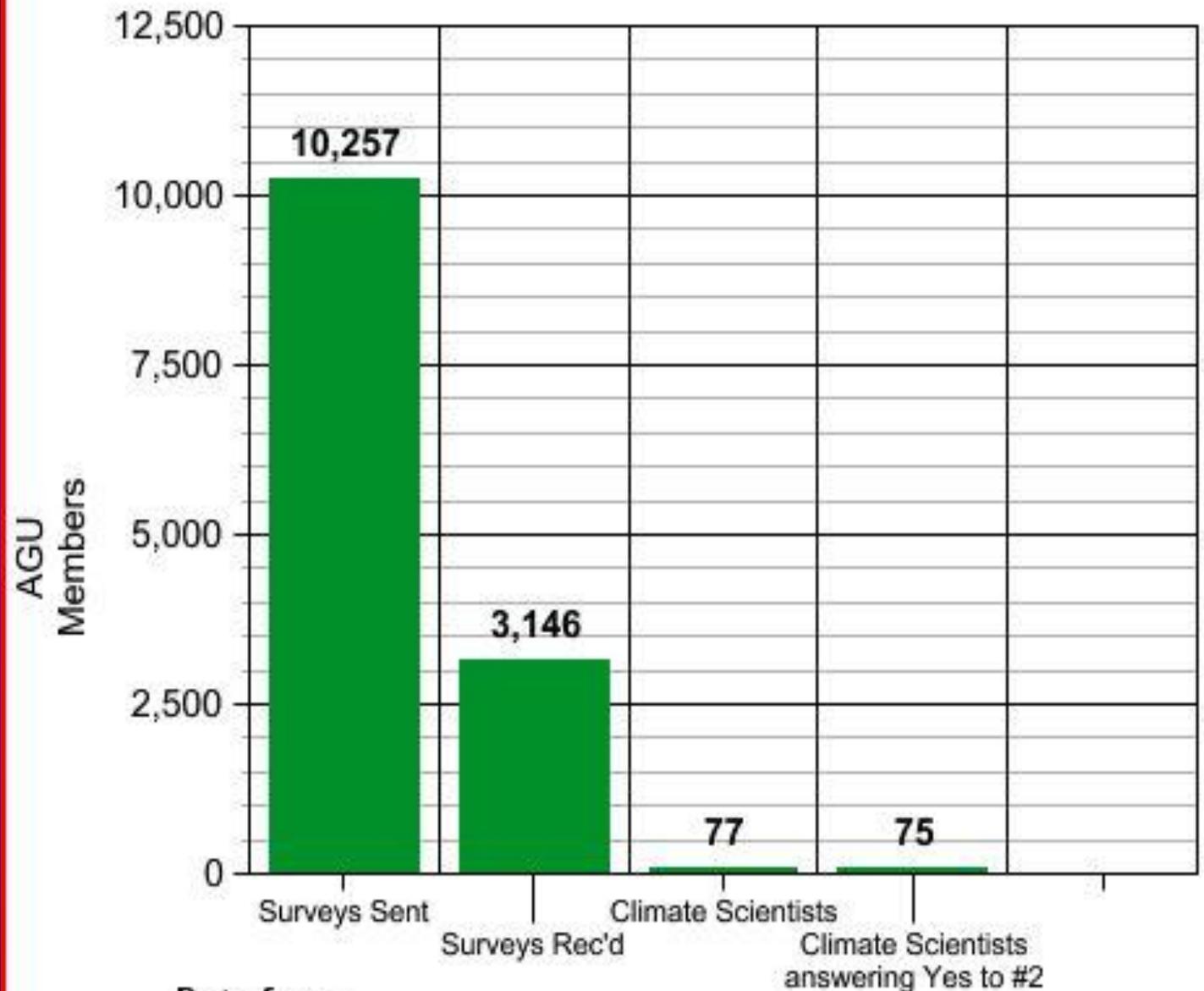
# CONCLUSIONS

- ❖ The oceans are alkaline, not acidic.
- ❖ The oceans contain 50 times more  $\text{CO}_2$  than the atmosphere and control how much  $\text{CO}_2$  is in the atmosphere.
- ❖ The  $\text{CO}_2$  content of the atmosphere is only 0.039 % and has increased only 0.008% since human emissions increased after 1945. This miniscule amount is not capable of significantly changing the pH of 300 million cubic miles of sea water and converting it from alkaline to acid.
- ❖ As oceans warm,  $\text{CO}_2$  is driven out of the oceans, thus decreasing the pH (i.e., becomes more alkaline).
- ❖ Global warming (which ended in 1998) cannot cause the oceans to become acidic.

The oft-quoted "97% of all scientists believe that manmade CO2 causes global warming" is fraudulent.



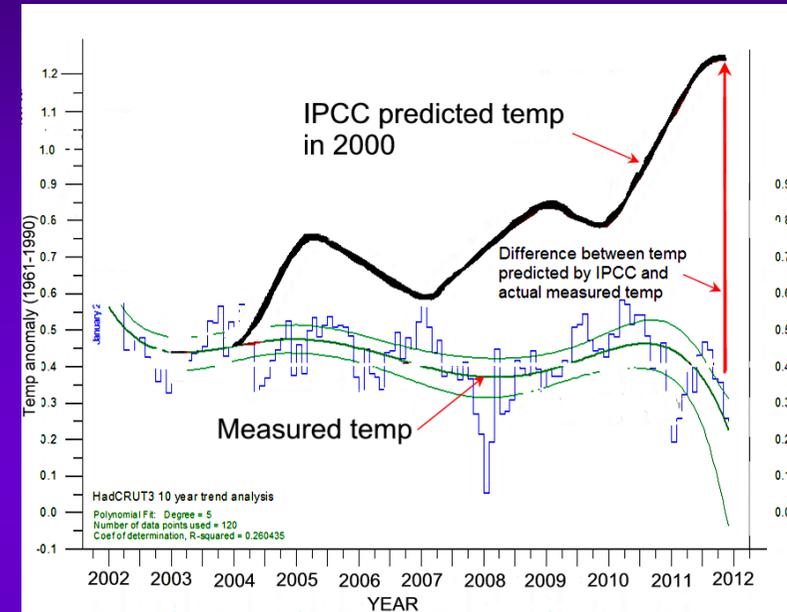
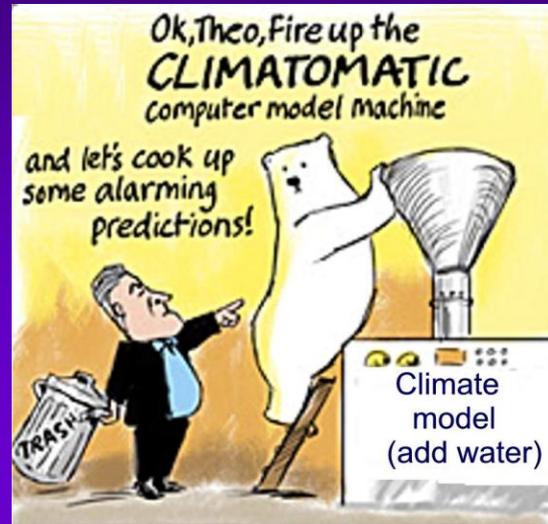
AGU Climate Science Survey Results



Data from:  
Doran, P. T. and M. K. Zimmerman (2009), Examining the Scientific Consensus on Climate Change, Eos Trans. AGU, 90(3), 22, doi:

# How can climate be predicted?

## 1. Computer models



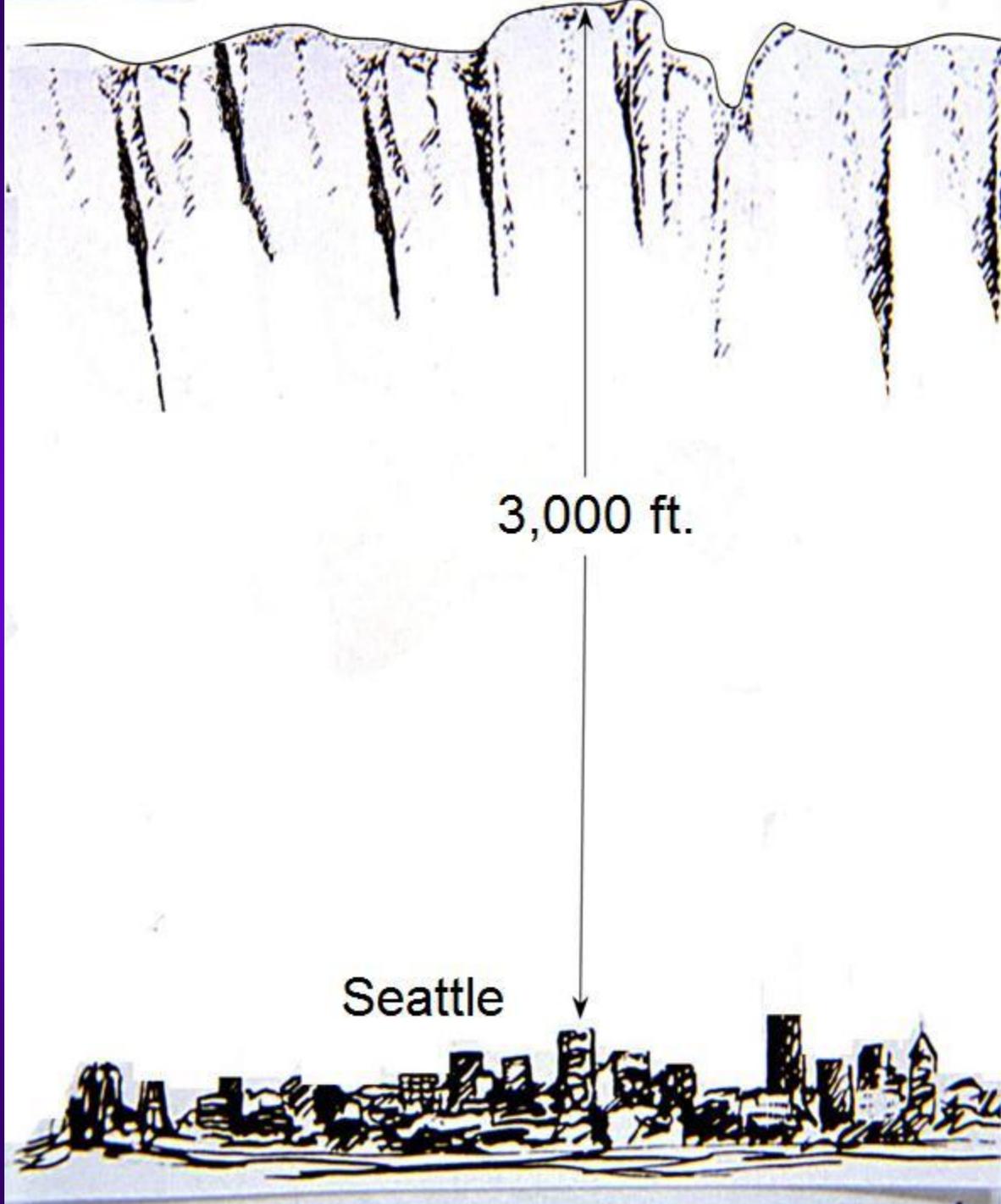
## 2. Real physical evidence to establish cyclical patterns



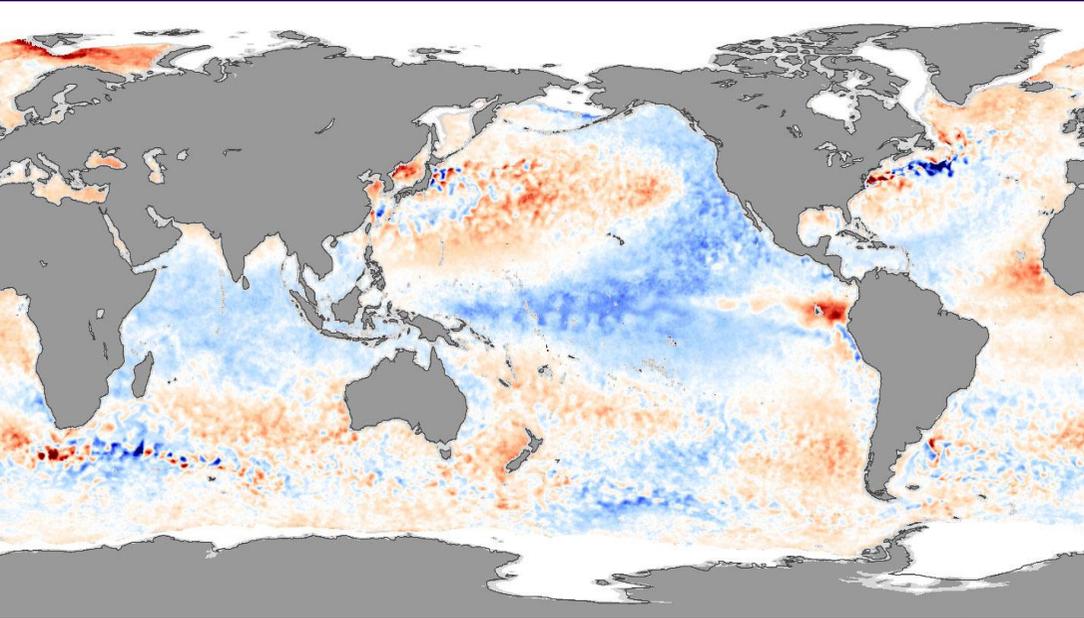
In order to predict where we are heading, we need to know where we've been.

The past is the key to the future

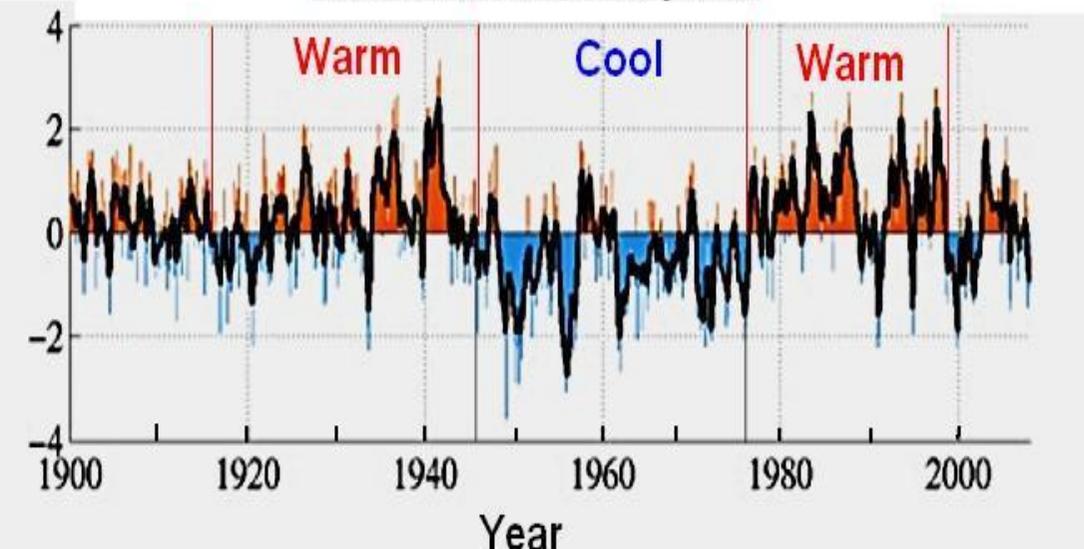
TRUST ME,  
I'VE BEEN  
DOING THIS  
FOR 4.5  
BILLION YRS



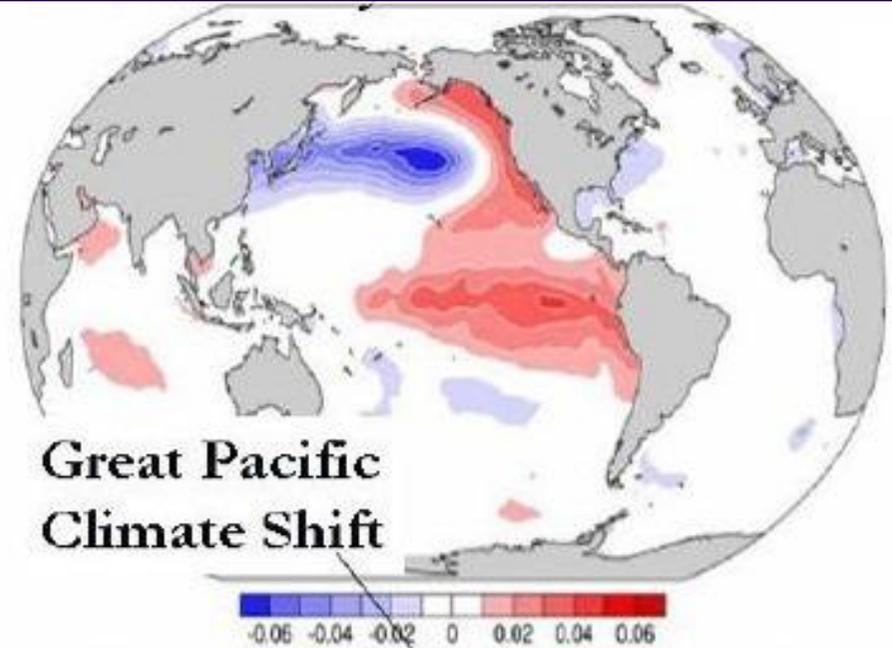
# PDO COLD MODE (1945-77)



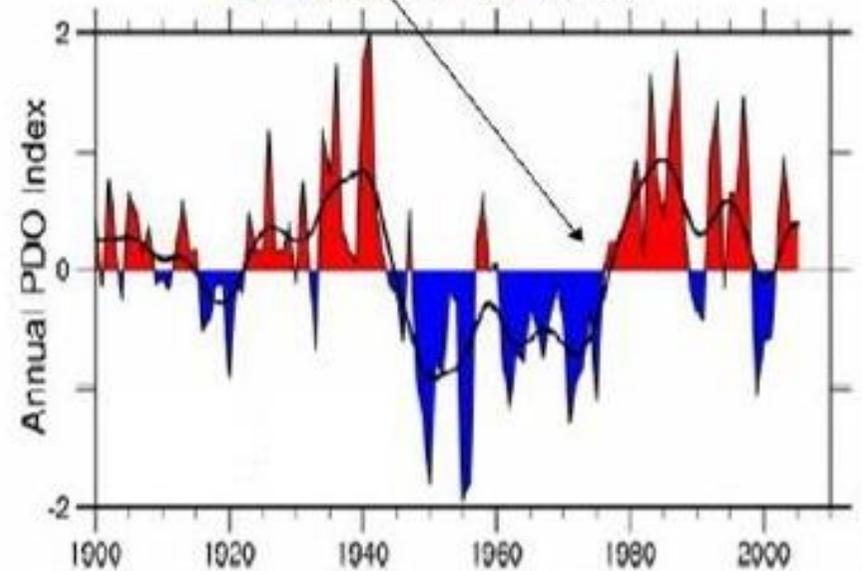
PDO index: 1900–January 2008



# PDO WARM MODE (1977-98)

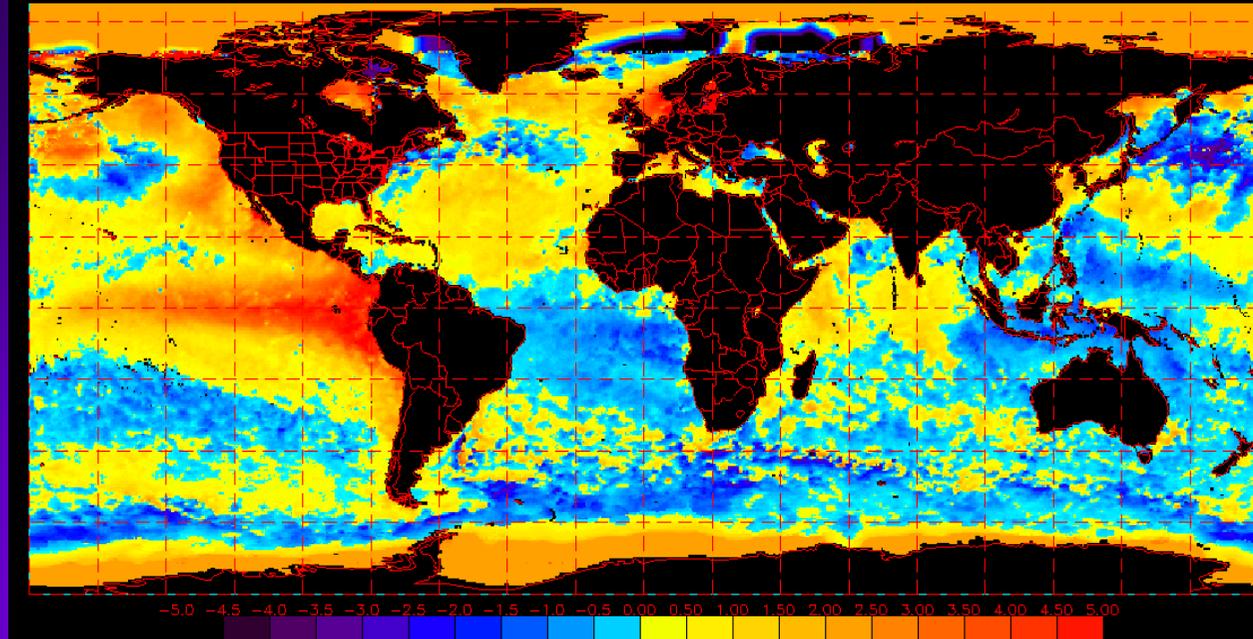


Great Pacific  
Climate Shift



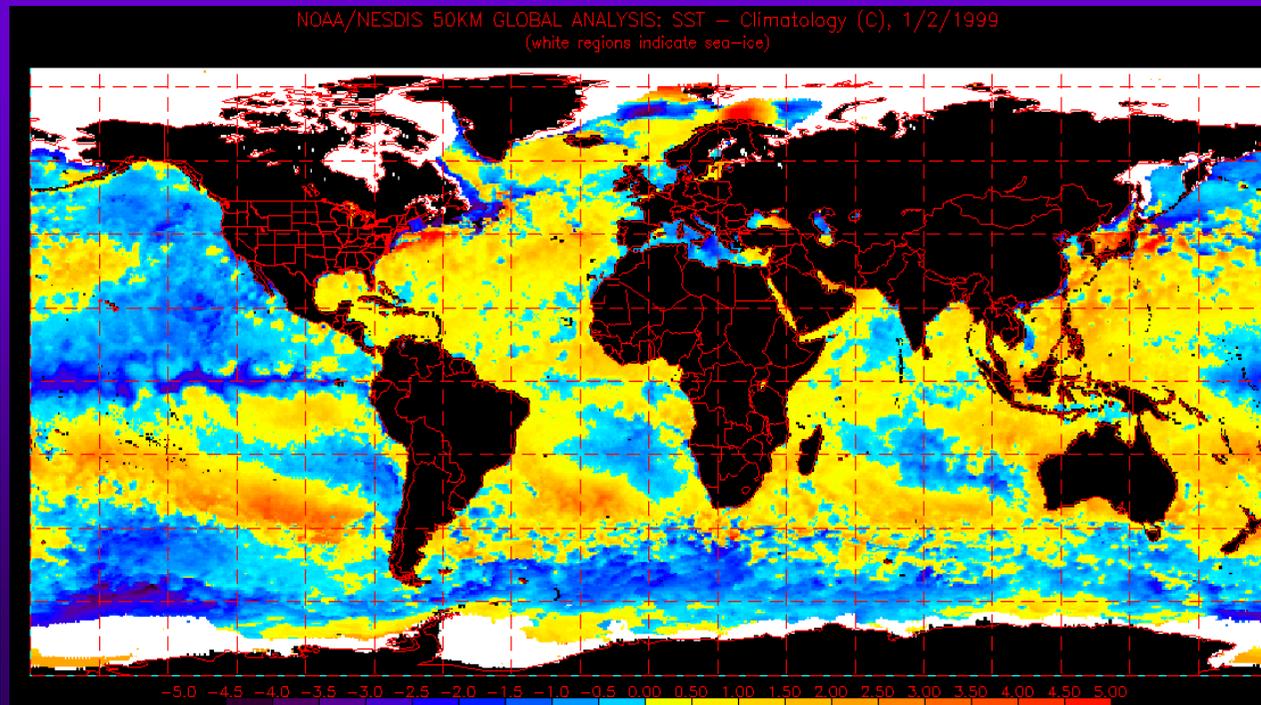
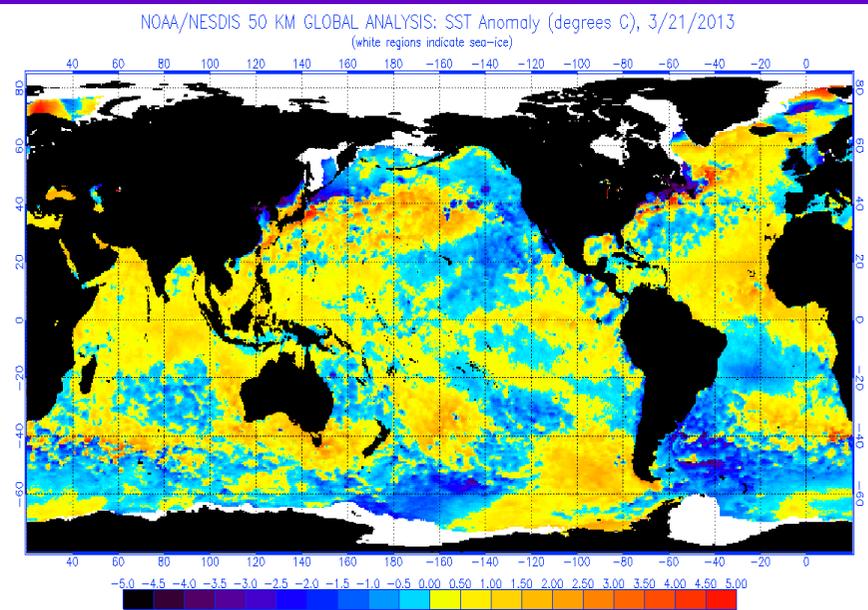
# Sea surface temperatures

1997

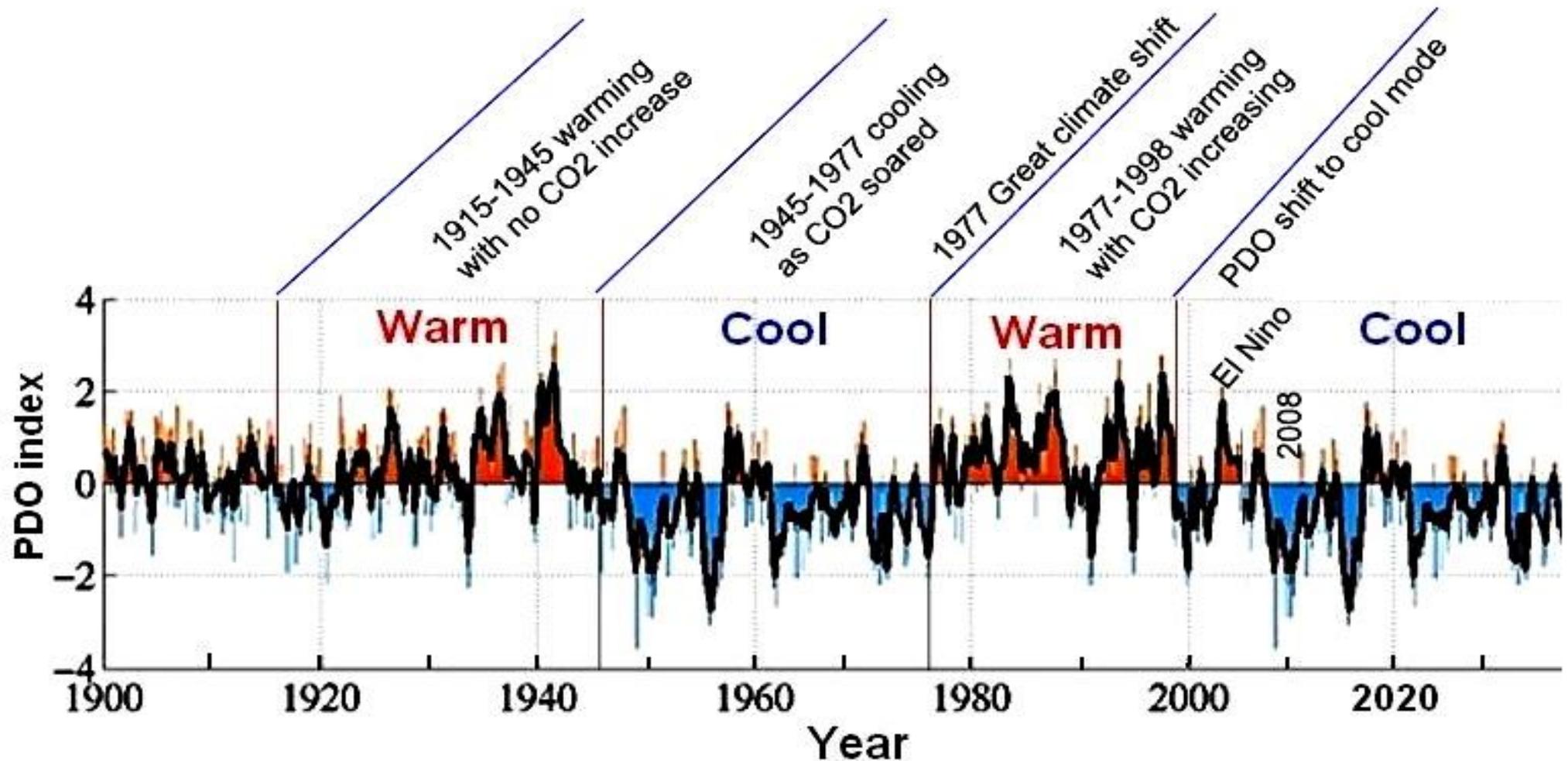


Mar 21, 2013

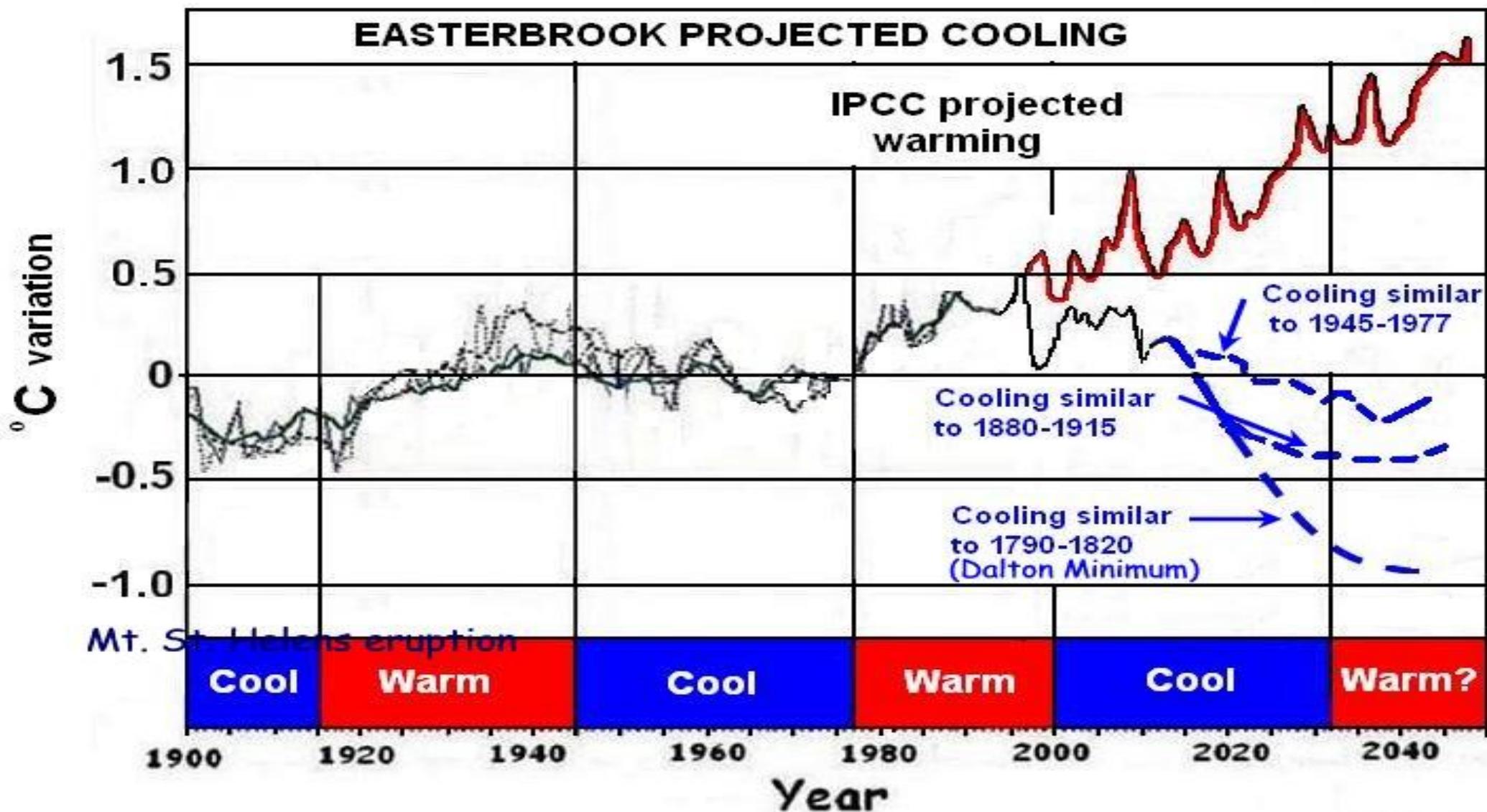
1999



The PDO (Pacific sea surface temp.) has had a remarkably consistent pattern the past century, which allows projection into the future

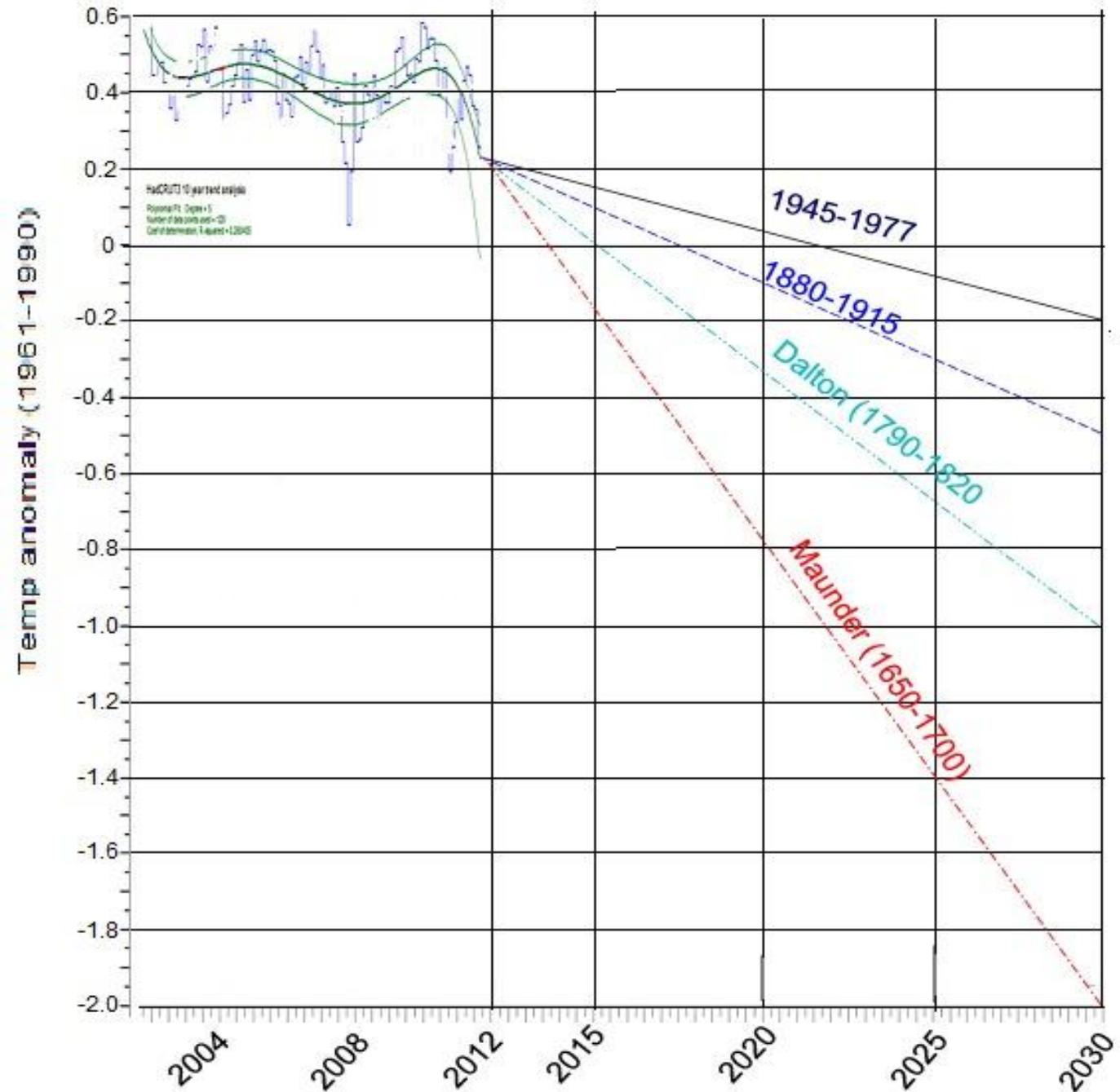


# How cold will it get?



How cool will it get?

1. Like 1945-1977
2. Like 1880-1915
3. Like 1790-1820  
Dalton Minimum
4. Like 1650-1700  
Maunder Minimum



- ❖ "Global warming is over" (Easterbrook, 2000, 2010)
- ❖ "The current warm cycle should end in the next few years, and global warming should abate, rather than increase, in the coming decades." (Easterbrook, 2000)
- ❖ "The current warm cycle should end soon and global temperatures should cool." (Easterbrook, 2006)

GLOBAL COOLING IS A FAR GREATER THREAT THAN GLOBAL WARMING EVER WAS.



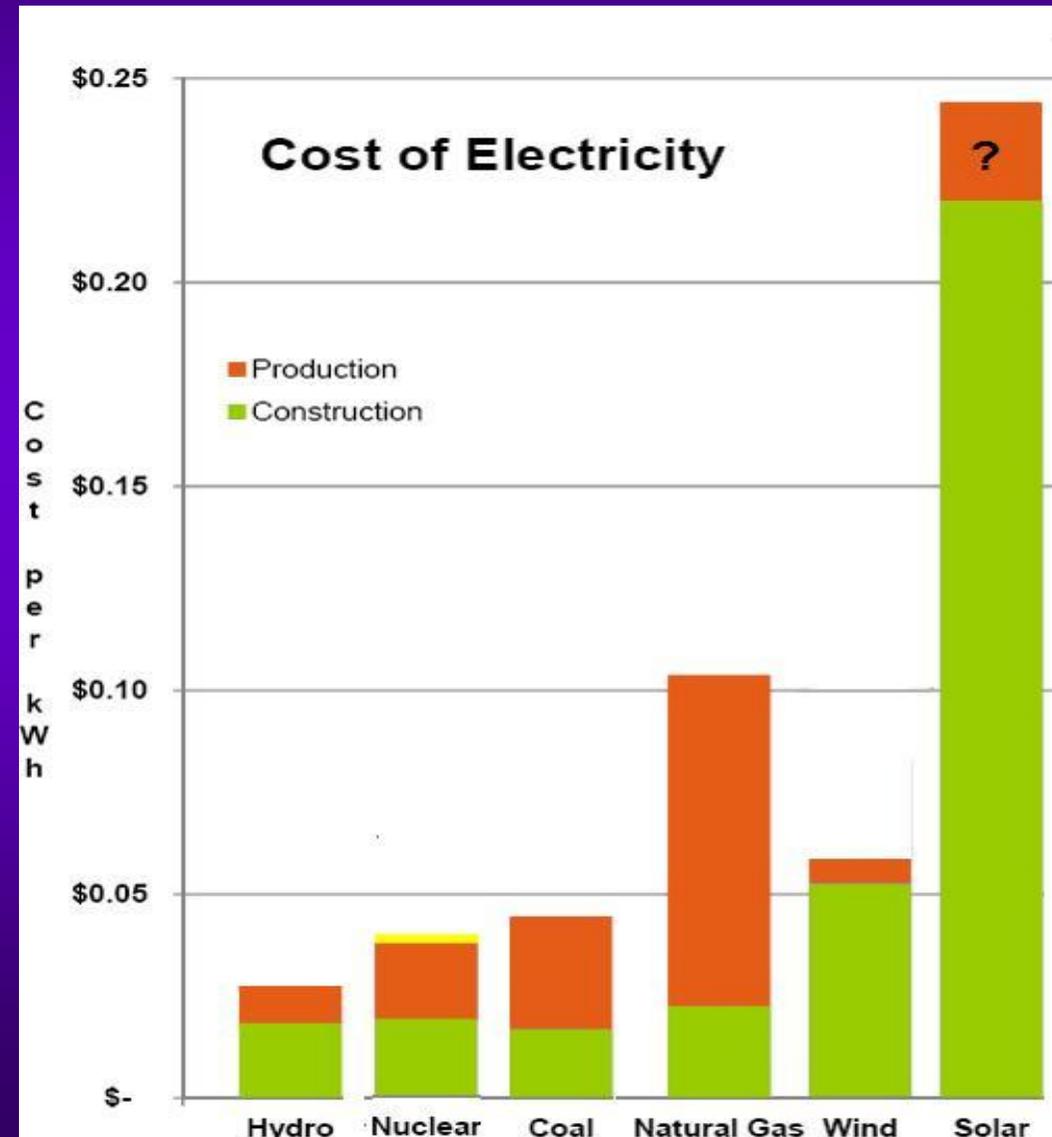
## SPECIFIC ISSUES IN SENATE BILL 58

6. Produce more electricity from renewable energy while phasing out coal-powered electricity generation.

<u>Power source</u>	% of annual production
<b>COAL</b>	<b>41.9</b>
NATURAL GAS	24.8
NUCLEAR	19.1
HYDRO	7.7
<b>WIND</b>	<b>2.9</b>
GEOHERMAL	0.37
<b>SOLAR</b>	<b>0.04</b>

# Cost of abandoning coal-generated electricity and replacing it with solar and wind generation

- ❖ Coal provides 42% of electricity at a cost of \$0.04/kwh.
- ❖ Solar provides 0.04% of electricity at ~\$0.25/kwh.
- ❖ Replacing coal-generated electricity (42%) with solar-generated (0.04%) isn't practical and would increase the cost of electricity by ~500%



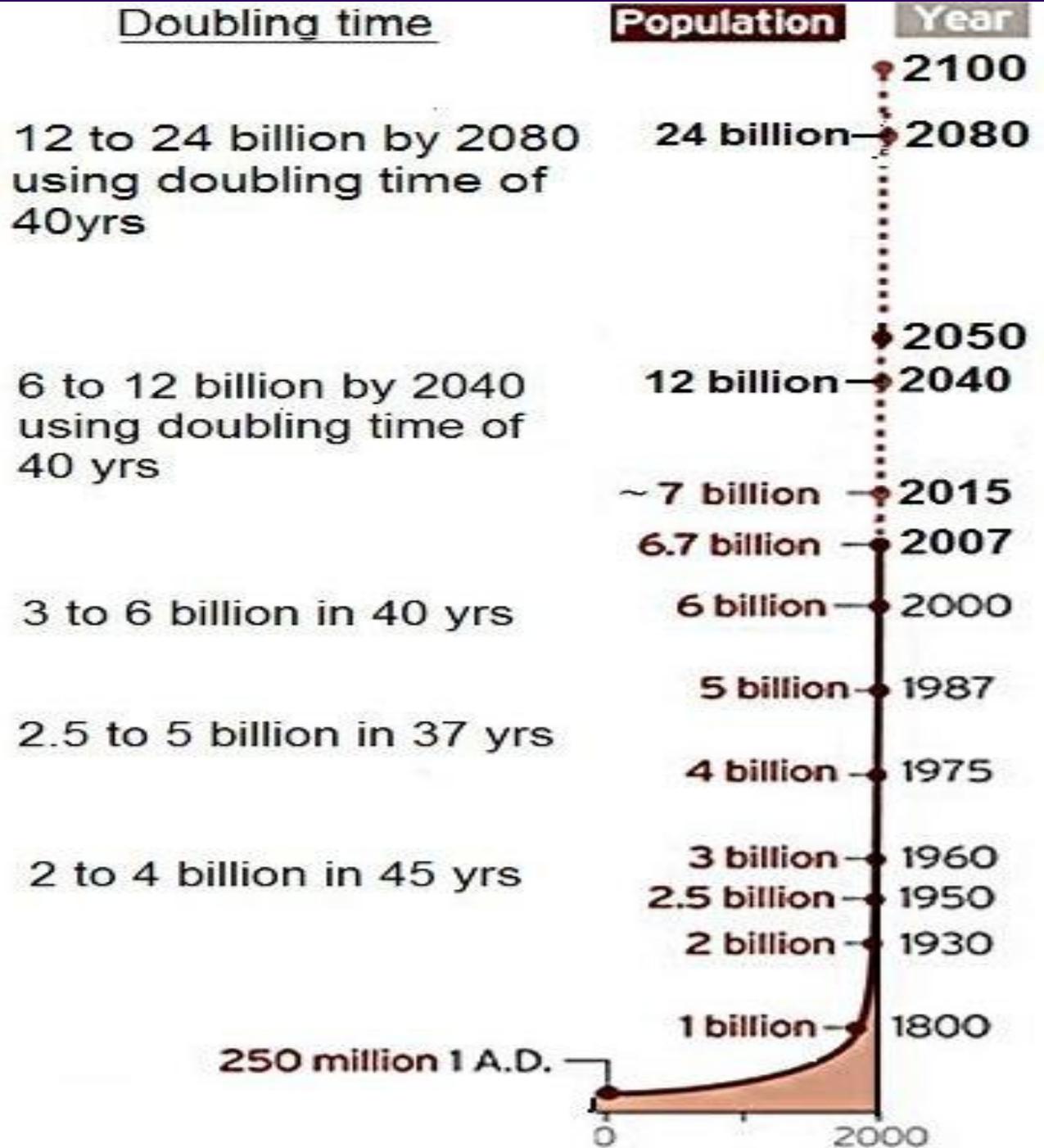
# Environmental impacts of solar and wind generated electricity

- ❖ Would need to cover vast areas with solar panels or wind mills, virtually destroying the environment and displacing all wildlife.
- ❖ Windmill farms kill hundreds of thousands of birds each year.

By 2040, (in 28 yrs),  
the population will be  
twice what it is today

By 2080 (in 68 yrs),  
the population will be  
4 times what it I now

Global cooling, will  
reduce food  
production and the  
demand for energy  
will increase  
dramatically



*Dogma is an impediment to the free exercise of thought. It paralyses the intelligence.*

*Conclusions based upon preconceived ideas are valueless. It is only the open mind that really thinks. Patricia Wentworth, 1949*

*For data and information go to: [Bing.com](http://Bing.com) or [Google.com](http://Google.com) and enter [Don Easterbrook global warming](#)*

