

*Al Gore's An Inconvenient Truth:  
A Skeptical Tour*

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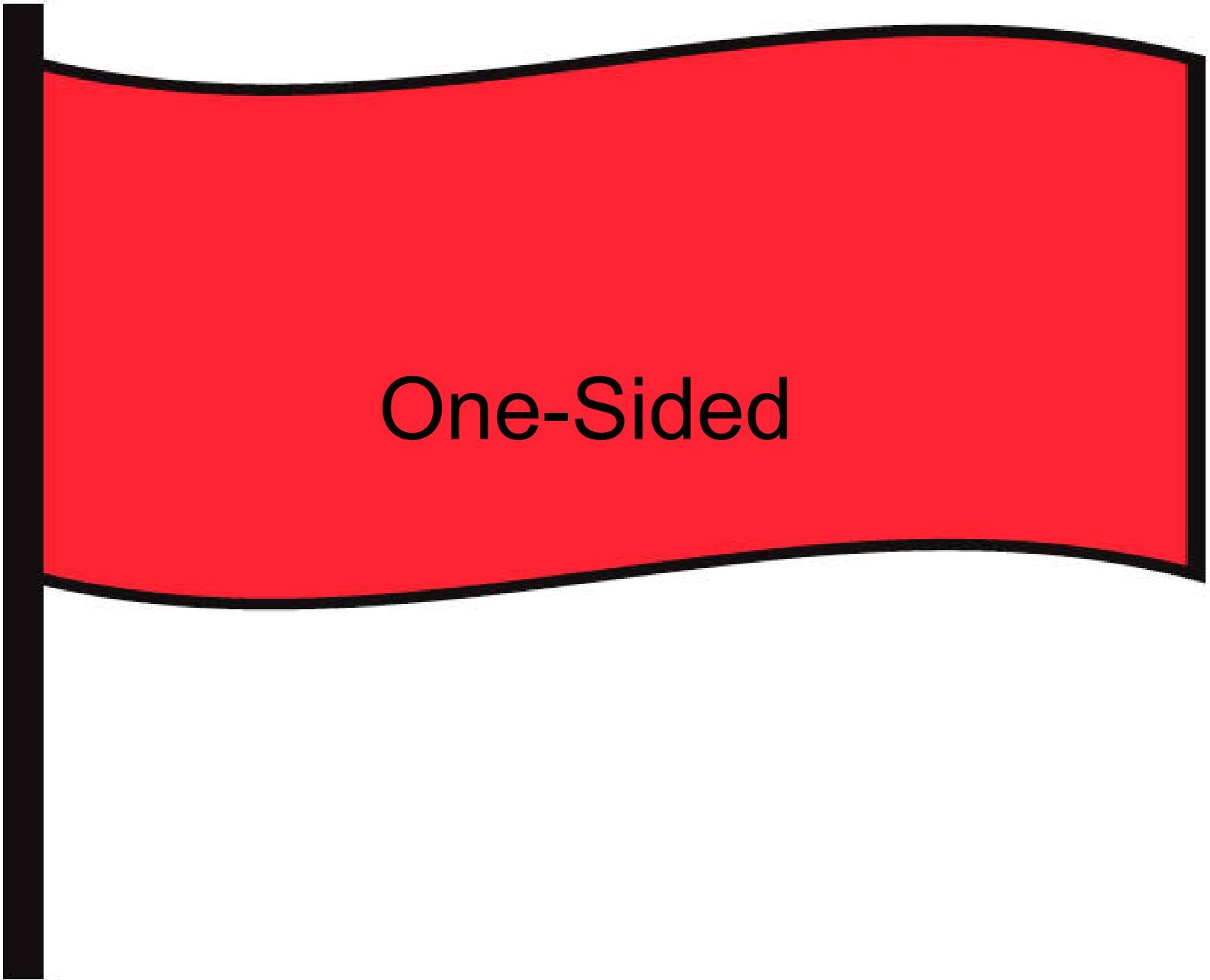
“By far the most terrifying movie you will ever see.”



“The whole aim of practical politics is to keep the populace alarmed, and hence clamorous to be led to safety, by menacing it with an endless series of hobgoblins, all of them imaginary.” – H.L. Mencken

# What *An Inconvenient Truth* (AIT) is...and is not

- *An Inconvenient Truth* (AIT) purports to be a non-partisan, non-ideological presentation of climate science and moral common-sense—a meditation on “what matters.”
- In reality, AIT is a CGI-enhanced lawyer’s brief for climate alarmism and energy rationing.
- The only facts and studies considered are those convenient to Gore’s political agenda, and he often distorts the evidence he cites.



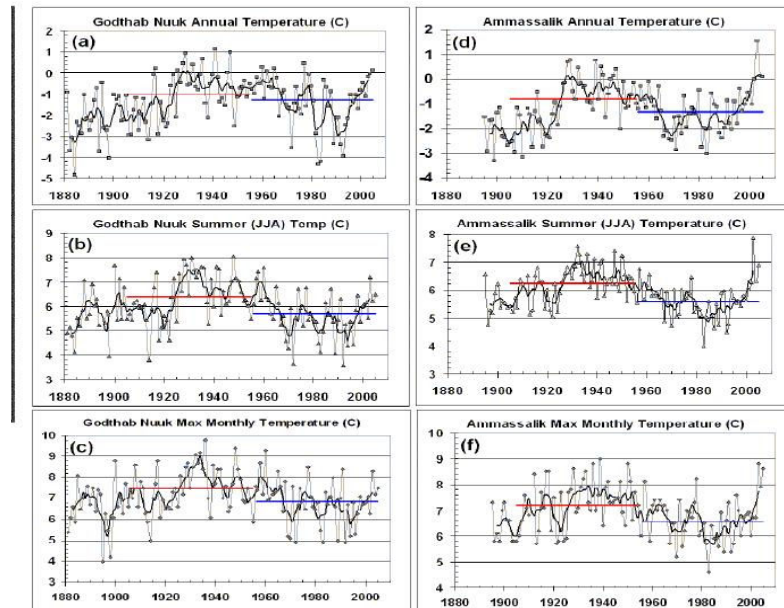
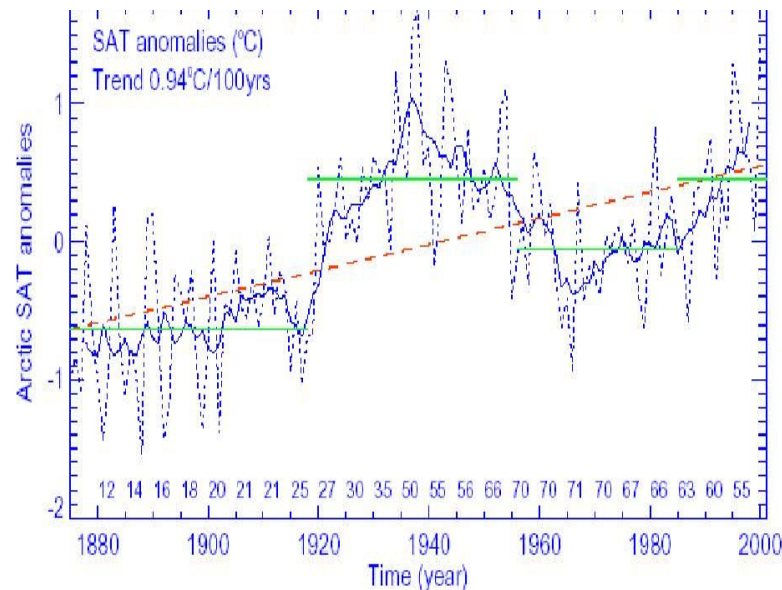
One-Sided

# No mention of...

- The health and welfare benefits of affordable energy from fossil fuels
- The ecological benefits of a CO<sub>2</sub> enriched atmosphere
- The high degree of natural variability in Arctic climate
- The large role of natural variability in shrinking mountain glaciers, especially Gore's Exhibit A: Mount Kilimanjaro

# No mention that Arctic climate is naturally variable

- The Arctic was as warm as or warmer in the late 1930s than it was at the end of the 20<sup>th</sup> century. Source: Polyakov et al. (2003)
- Greenland was warmer in the 1930s-1940s. Source: Chylek et al. (2006)



Polyakov et al. (2003) *Journal of Climate*, vol. 16, 2067-2077 (figures courtesy of Igor Polyakov, International Arctic Research Center)  
[p. 2068 of Polyakov et al. (2003) specifically noted that their composite Arctic temperature used data from stations northward of 62°N only and Polyakov's Arctic-wide temperature contains data from coastal land stations, Russian drifting stations around North Pole and drifting buoys from International Arctic Buoy Programme]

# Arctic natural variability—evidence from paleo-climatology

- Briner et al. (2006): 10,000 to 8,500 years ago, Canada's Baffin Bay was  $\sim 5^{\circ}\text{C}$  warmer than it is today.
- Kaufman et al. (2004): 9,000-7,000 years ago, northern Russia (including Siberia) was  $2\text{-}7.5^{\circ}\text{C}$  warmer than it is today.
- Darby et al. (2001): 5,000 years ago, Western Arctic sea surface temperature in August was  $3\text{-}7^{\circ}\text{C}$  warmer than it is today.
- Caseldine et al. (2006):  $\sim 8,000$  to 6,700 years ago, July surface air temperatures in northern Iceland were at least  $1.5^{\circ}\text{C}$  warmer than the 1961-1990 average and possibly  $2\text{-}3^{\circ}\text{C}$  warmer.

For reviews of these studies, see [CO2Science.Org](http://CO2Science.Org) and [World Climate Report.Com](http://WorldClimateReport.Com).

# Kilimanjaro: a victim of global warming, or natural variability?

- AIT “blames” CO<sub>2</sub>-induced warming for the disappearing Snows of Kilimanjaro (pp. 42-43).
- But snows have been disappearing since 1880 due to a sudden shift from moist to dry conditions. There was “no evidence of a sudden change in temperature at the end of the 19<sup>th</sup> century.”
- 20<sup>th</sup> century temperature records “do not exhibit a uniform warming signal.”

Source: Molg et al. (2003)





We see scenes of devastation from hurricanes, floods, droughts, etc., but AIT never mentions...

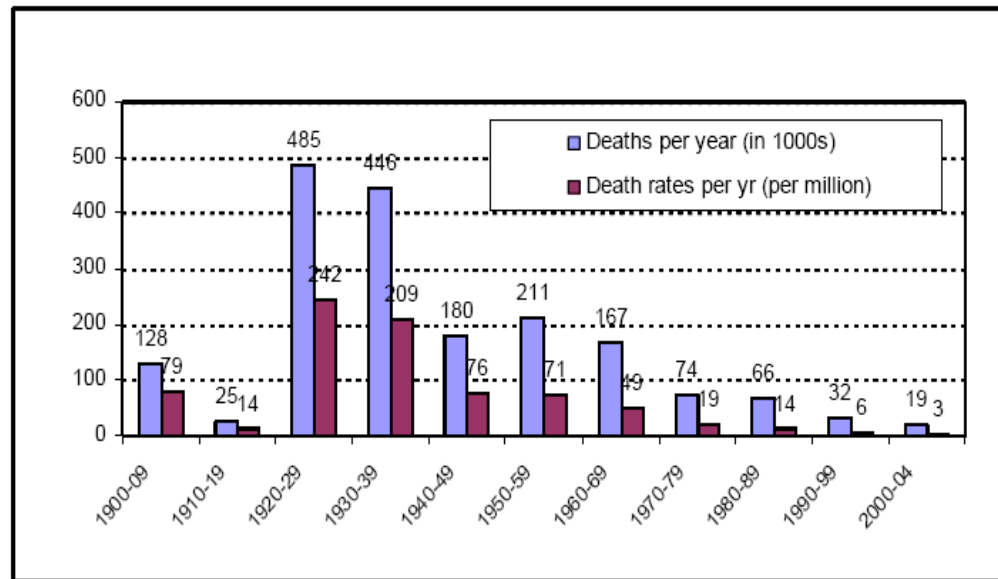
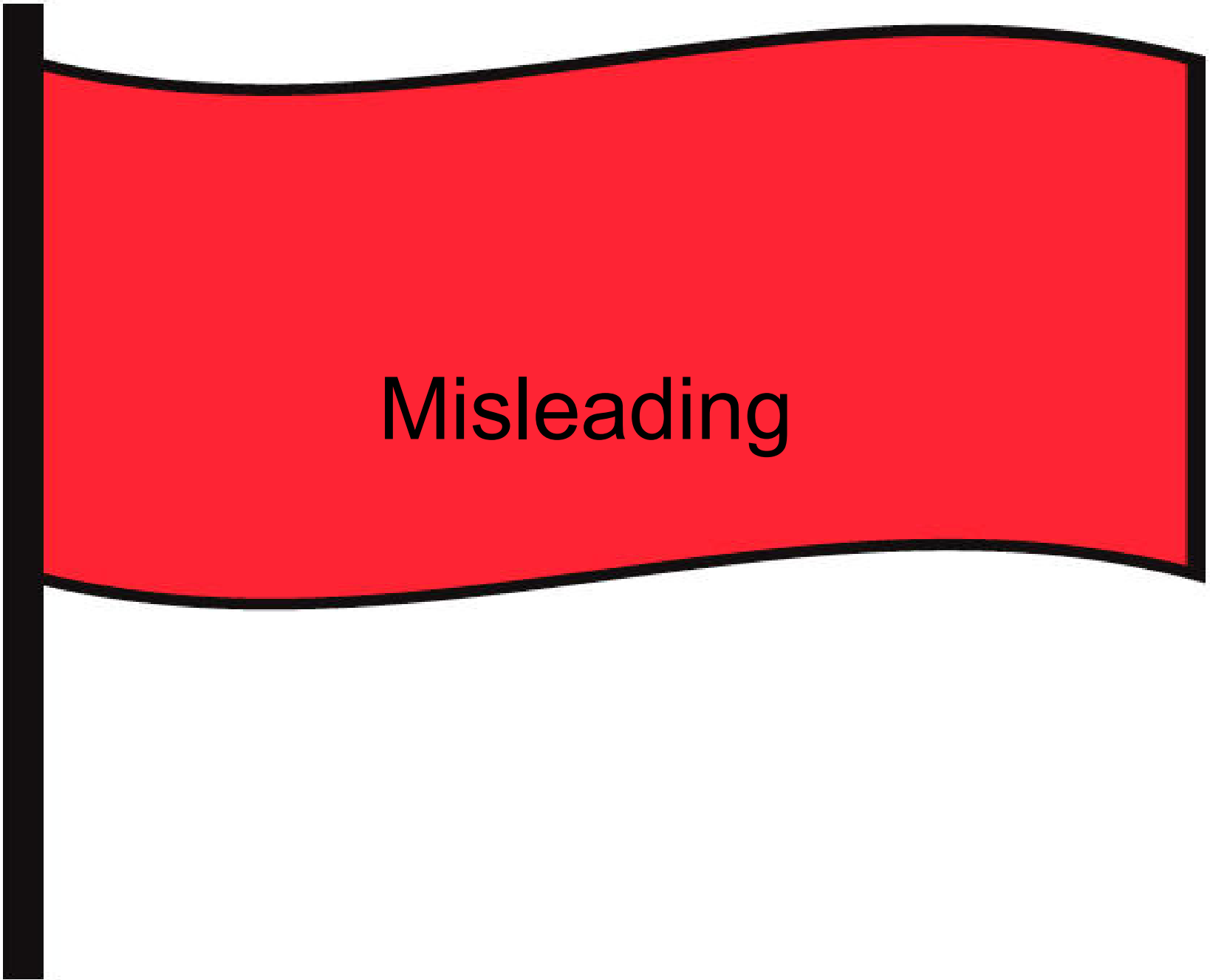


Figure 1: Global Death and Death Rates Due to Extreme Events, 1900-2004. Note that data for the last period are averaged over five years worth of data. Sources: EM-DAT (2005); McEvedy and Jones (1978); WRI (2005).

- Mortality rates and aggregate mortality declined dramatically since the 1920s.



Misleading

“It’s a complicated relationship, but the most important part of it is this: When there is more CO<sub>2</sub> in the atmosphere, the temperature increases because more heat from the Sun is strapped inside.” (AIT, p. 67)

Temperature changes preceded CO<sub>2</sub> level changes by hundreds to thousands of years.

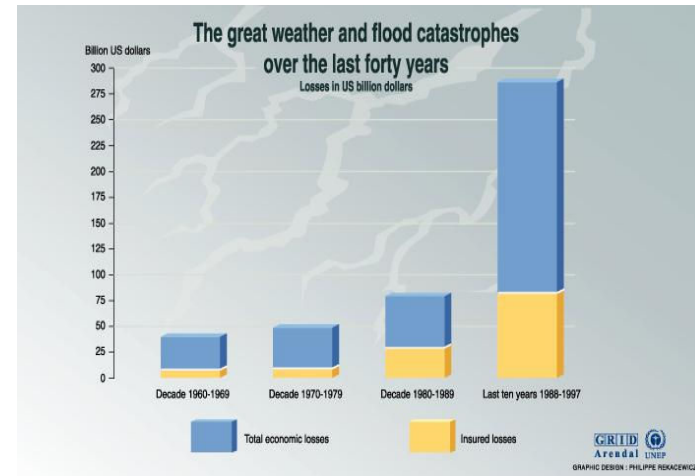
Source: Fischer et al. (1999)

Ironically, Gore’s graph shows that each of the past three interglacials were warmer than the present one, even though CO<sub>2</sub> levels were lower.



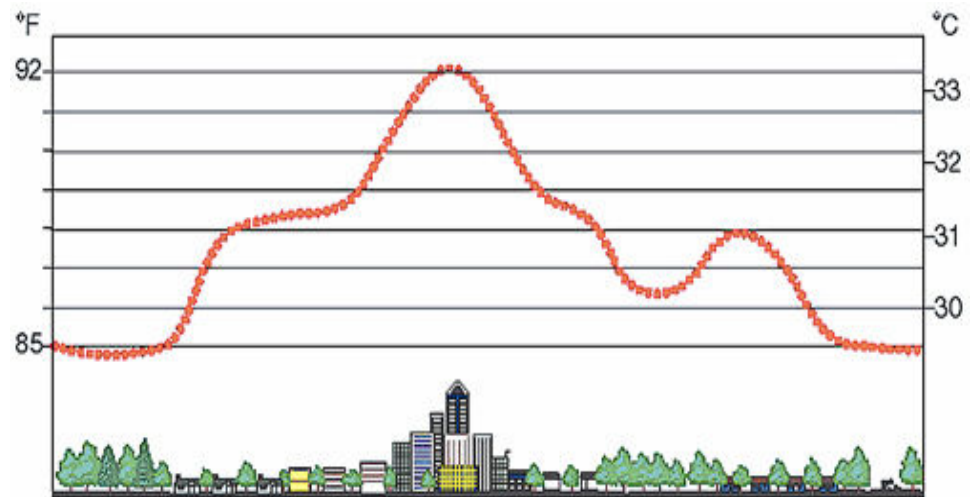
“Over the last three decades, insurance companies have seen a 15-fold increase in the amount of money paid to victims of extreme weather.” (AIT, p. 101)

- AIT presents a graph similar to the one at right.
- The losses are not adjusted for changes in population, wealth, and the consumer price index. Example: FL coastal population grew 75% between 1980 and 2003.
- Once losses are adjusted, there is no evidence of an increase in the severity or frequency of extreme weather. [Source: Kunkel et al. \(1999\); Pielke, Jr. et al. \(2006\)](#)



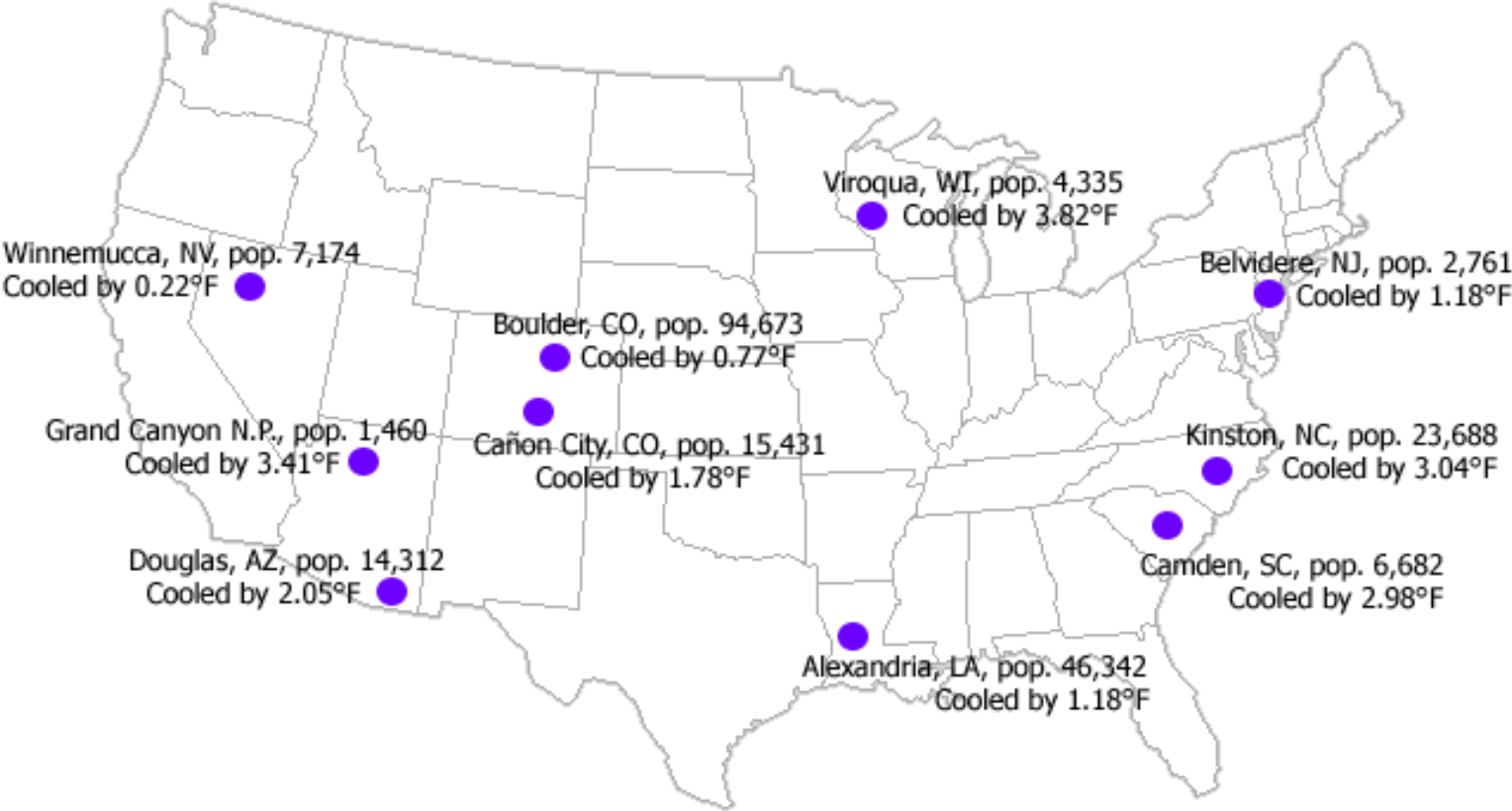
“In the summer of 2005 many cities in the American West broke all-time records for high temperatures and for the number of consecutive days with temperatures of 100°F or more.” (AIT, 76)

- Yes, but urban areas produce local heat islands that grow with population.
- Consequently: Cities will continually break their record high temperatures as they grow.



The 1930-2000 temperature change for several *rural* locations shows significant cooling in contrast to the record warming experienced at nearby *urban* city centers depicted by Gore.

### 1930-2000 Temperature Trends (Latest available publically-released data)



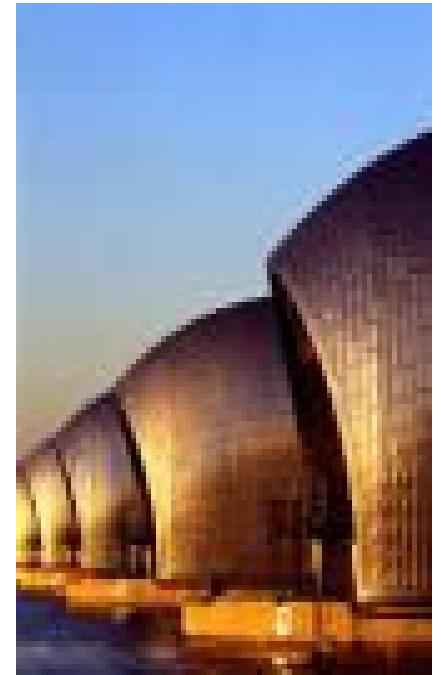
AIT presents a graph showing that annual Thames River Barrier closings increased during the 1990s (AIT, 189)

- Annual barrier closings are not a useful flood risk indicator, because the barrier “is now closed to retain water in the Thames River as well as to lessen the risk of flooding.”

Source: T.J. Marsh, *Indicators of Climate Change in the UK*, “The Risk of Tidal Flooding in London,” <http://www.edinburgh.ceh.ac.uk/iccuk/>

- Due to land settlement and post-glacial tilt, London tide levels are rising relative to the land by 60 cm/century—3 to 6 times faster than global sea levels are rising.

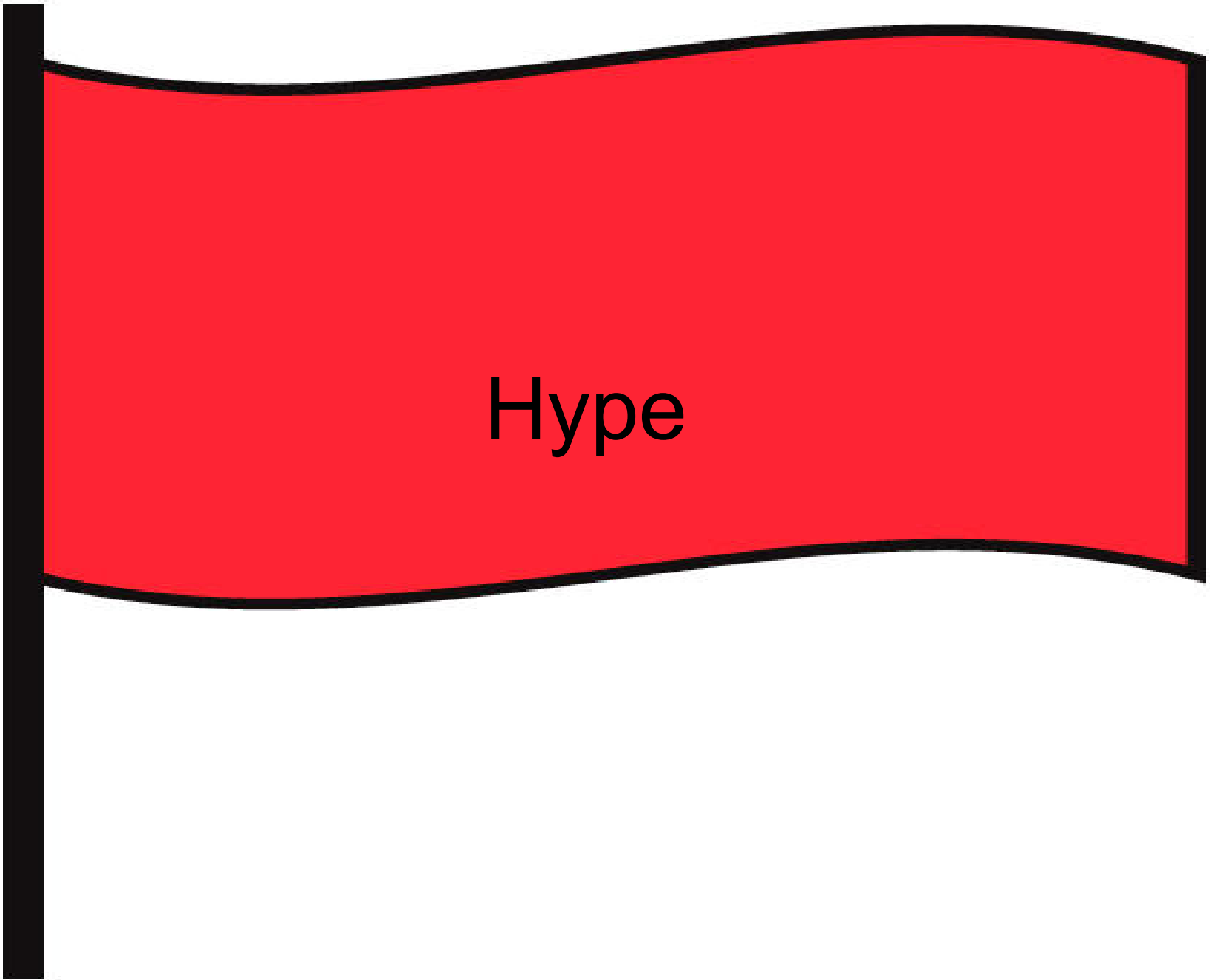
Sources: UK Environment Agency; IPCC TAR, p. 641.



“Of the three quarters [of the 928 abstracts examined by UCSD Prof. Naomi Oreskes] that did address these main points, the percentage that disagreed with the consensus? Zero.” (AIT, p. 262)

- None of the abstracts Oreskes examined disputed the IPCC’s conclusion that, “Most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations.”
- Gore inflates the “consensus” to include the belief that global warming’s “consequences are so dangerous as to warrant immediate action.”
- The IPCC money quote doesn’t tell us how dangerous GW is, or what is the best way to address it.





Hype

“A new scientific study shows that, for the first time, polar bears have been drowning in significant numbers.” (AIT, p. 146)

- “Have been drowning” suggests an ongoing problem. “Significant numbers” suggests lots of dead bears—enough to affect population dynamics.
- Actually, the study reports that four polar bears were seen floating offshore in Sep. 04, apparently drowned after “an abrupt windstorm.”

Source: [Monnett et al. \(2005\)](#)

- “Of the 13 populations of polar bears in Canada, 11 are stable or increasing in number. They are not going extinct, or even appear to be affected at present.” – Mitchell Taylor

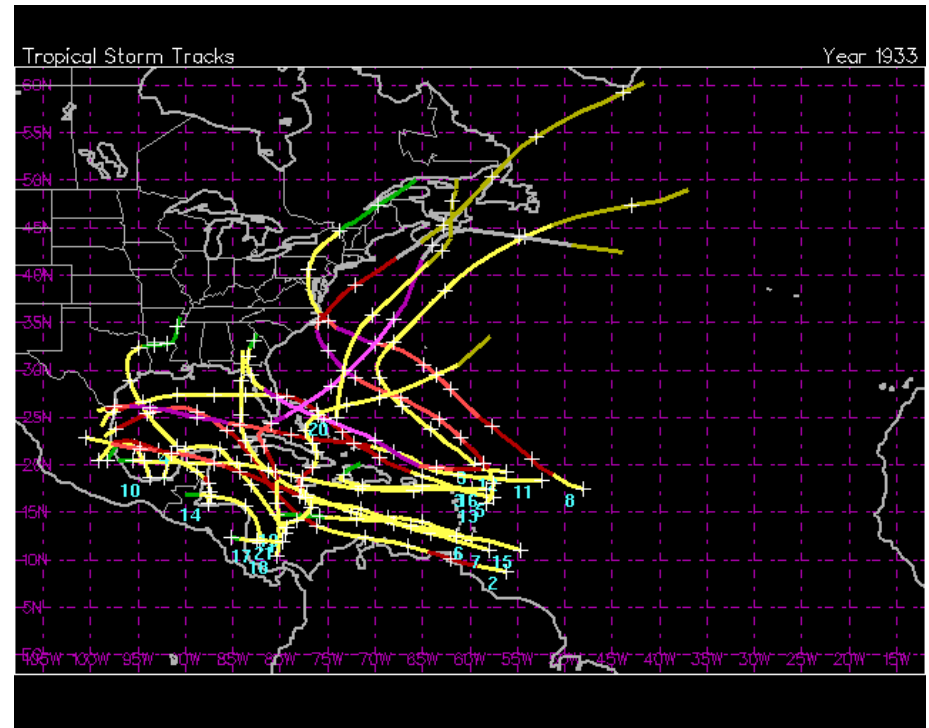
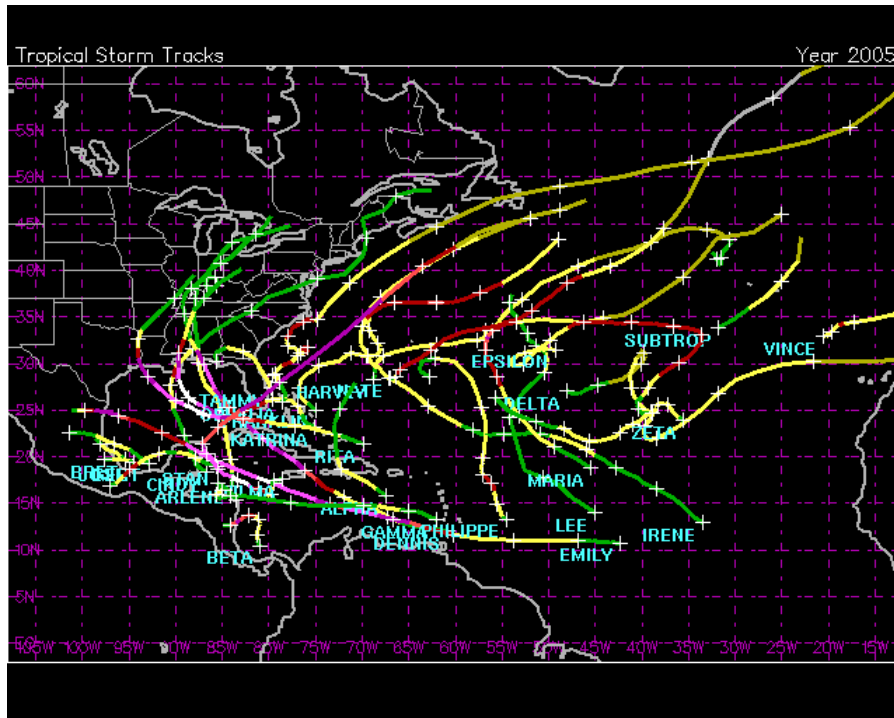


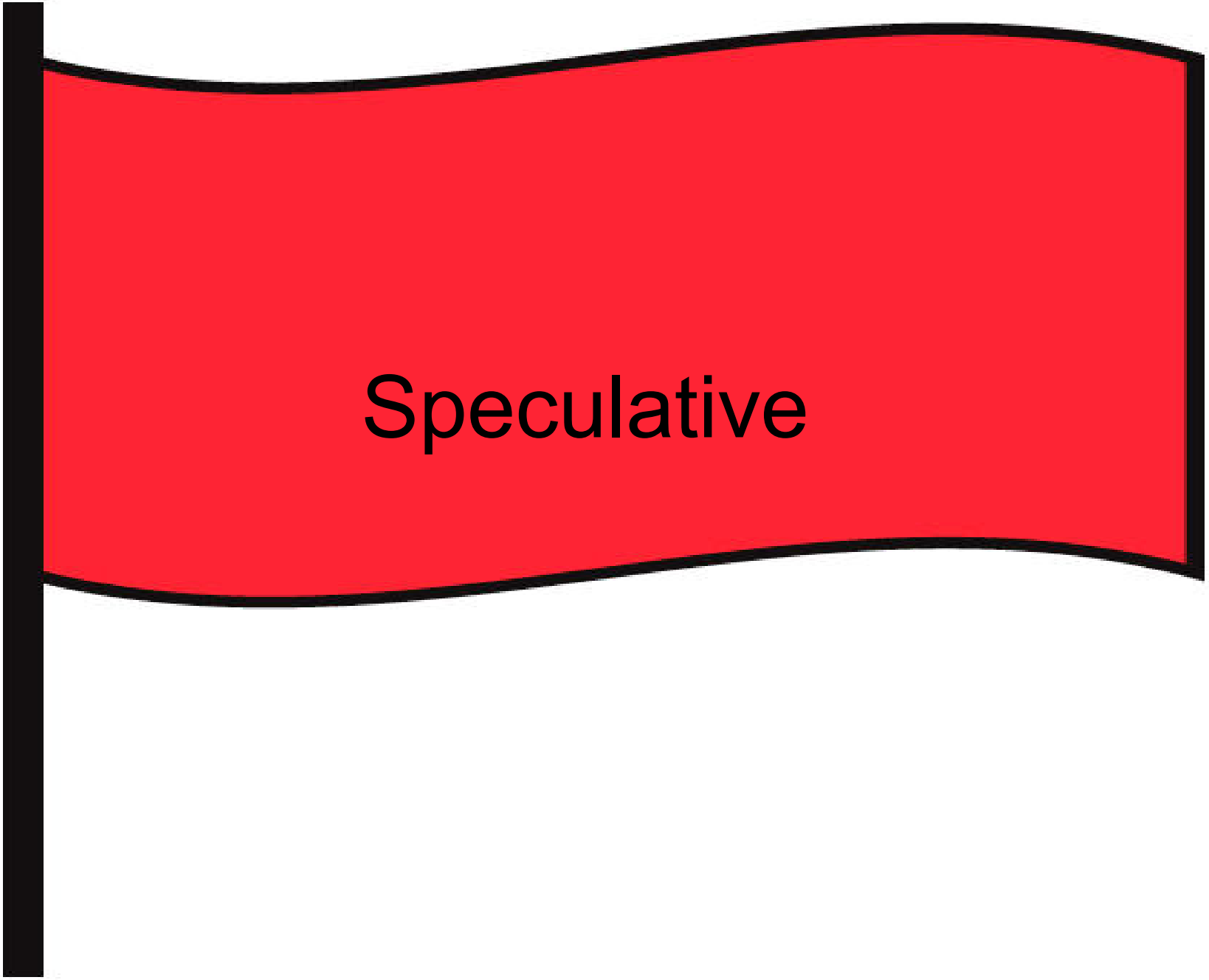
# “We ran out of names.” AIT, p. 103

The 28 Atlantic tropical storms and hurricanes in 2005 broke the previous record of 21 set in 1933—but notice the lack of storms in the eastern and central Atlantic in 1933. No ships were there to take observations. In 2005, satellites covered the entire basin. Were some storms missed in 1933? [Source: Weather.Unisys.com](http://Weather.Unisys.com)

2005 tracks

1933 tracks

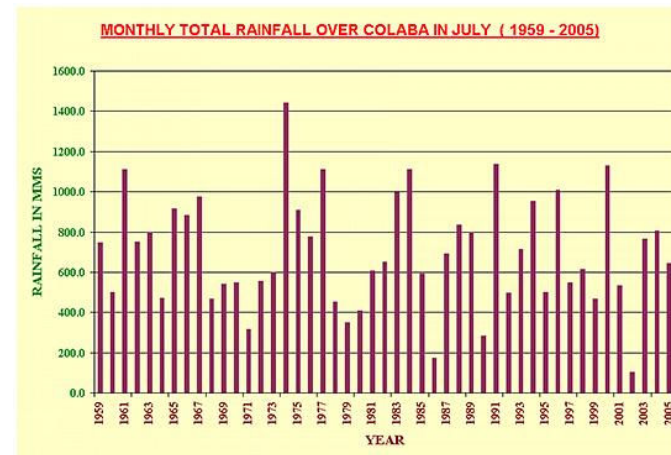
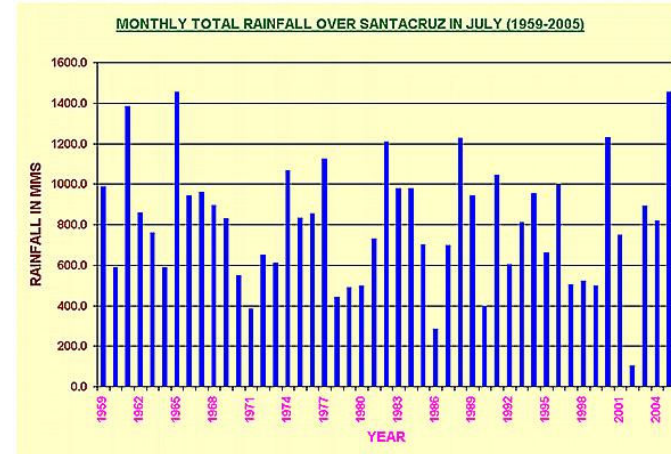




Speculative

“In July 2005, Mumbai [Bombay], India, received 37 inches of rain in 24 hours—the largest downpour any Indian city has received in one day.” (AIT, p. 110)

- It is scientifically illegitimate to link any particular rainfall event to a gradual increase in global CO2 levels.
- If global warming were affecting rainfall in Mumbai, we would expect to see it in long-term precipitation records.
- Data from two Mumbai weather stations show no trend in July rainfall over the past 45 years.



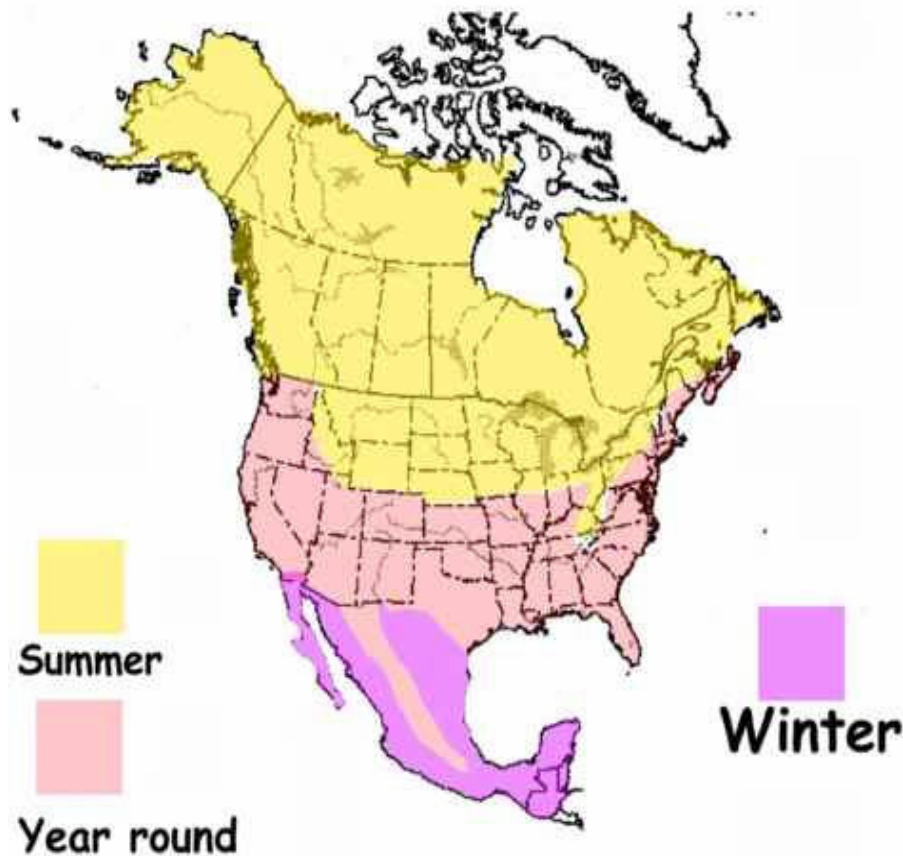
“Global warming is disrupting millions of delicately balanced ecological relationships among species in just this way.” (AIT, p. 153)

- AIT cites a study showing that, in the Netherlands, caterpillar hatching season now arrives two weeks earlier than it did 25 years ago, making it harder for migratory birds to find food for their chicks.
- “As a result,” says Gore, “the chicks are in trouble.”
- But, the study says: “The gap between the schedules of the caterpillars and the birds has had no demonstrable effect so far on [bird] numbers.”

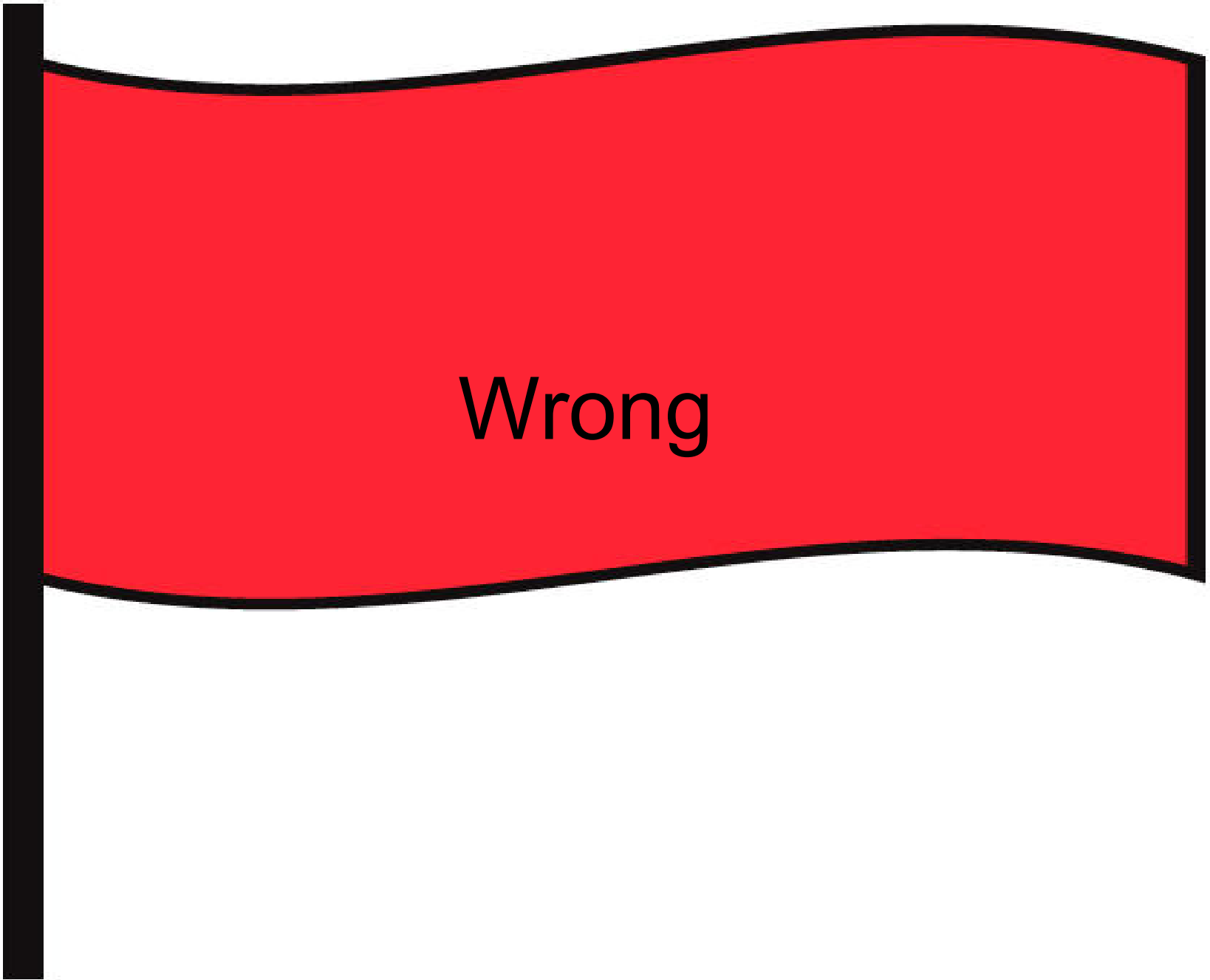
Source: D. Grossman, “Spring Forward,” *Scientific American*, January 2004.

“Global warming is disrupting millions of delicately balanced ecological relationships among species in just this way.” (AIT, p. 153)

### American Robin



- Robins today are thriving in areas of Alaska and Canada where no robins were seen only a few decades ago.
- Note that Robins have not been driven out of the heat-limited southern boundary of their range.
- Global warming has made it possible for them to live in areas that were previously too cold.
- In the case of Robins, Global warming is for the birds!

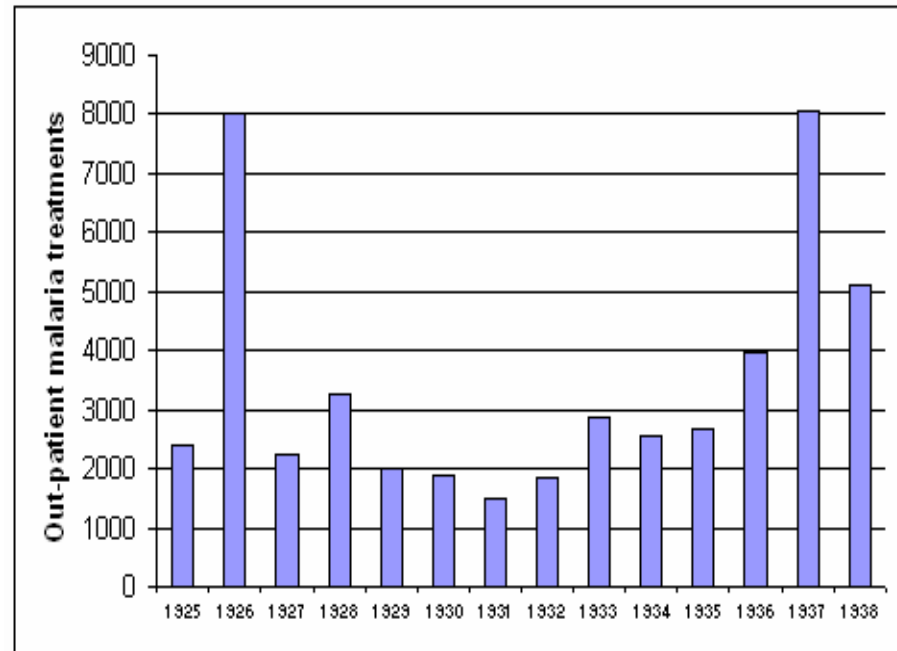


Wrong



“In Kenya...I heard growing concerns about the increased threat from mosquitoes and the diseases they can transmit in higher altitudes that were formerly too cold for them to inhabit.” (AIT, p. 141)

- In other words, Gore gives the impression that malaria is new to Nairobi, which was previously above the “mosquito line” because it was too cold.
- In fact, malaria was common in Nairobi in the 1920s and 1930s.



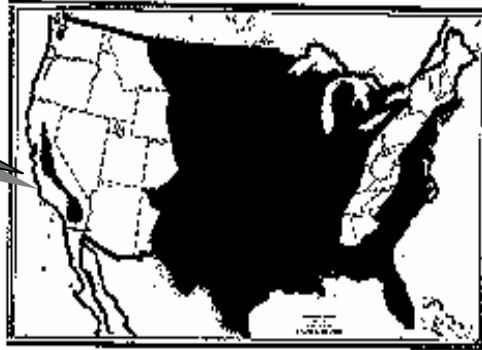
**Outpatient treatments for Malaria at two Nairobi medical facilities during the 1920s and 1930s**

Source: WHO

# Malaria in the United States

1882

MALARIOUS AREA OF THE UNITED STATES  
1882



MAP 1. Probable endemic area.

MALARIOUS AREA OF THE UNITED STATES  
1932



MAP 3. Endemic area.

1932

1912

MALARIOUS AREA OF THE UNITED STATES  
1912



MAP 2. Endemic area.

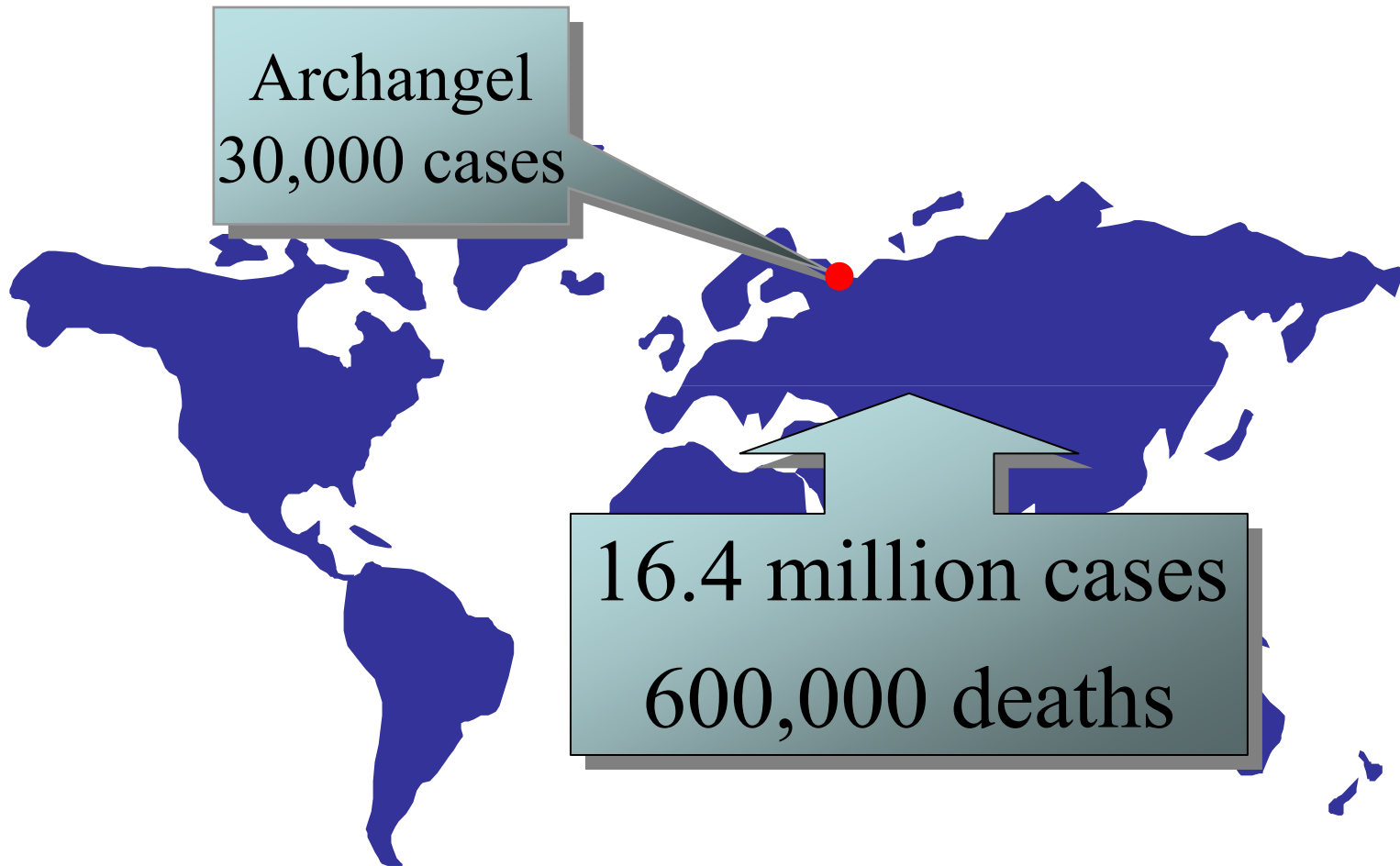
MALARIOUS AREA OF THE UNITED STATES  
1934-5



MAP 4. Endemic area.

1934-5

# Malaria, Soviet Union, 1923-1925

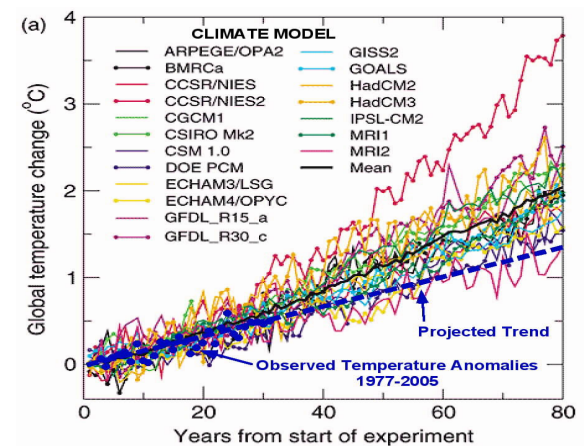
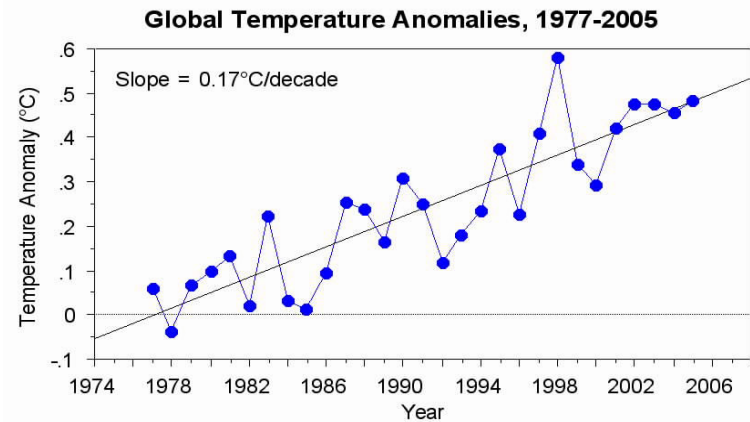


“And in recent years the rate of increase has been increasing. In fact, if you look at the 21 hottest years measured, 20 of the 21 have occurred within the last 25 years.” (AIT, p. 72)

- There has been no increase in the rate of warming since the mid-1970s, when the second 20<sup>th</sup> century warming period began.
- For the past 30 years, the planet has warmed at a remarkably constant rate of 0.17°C (or 0.31°F) per decade.

Source: [World Climate Report](#).

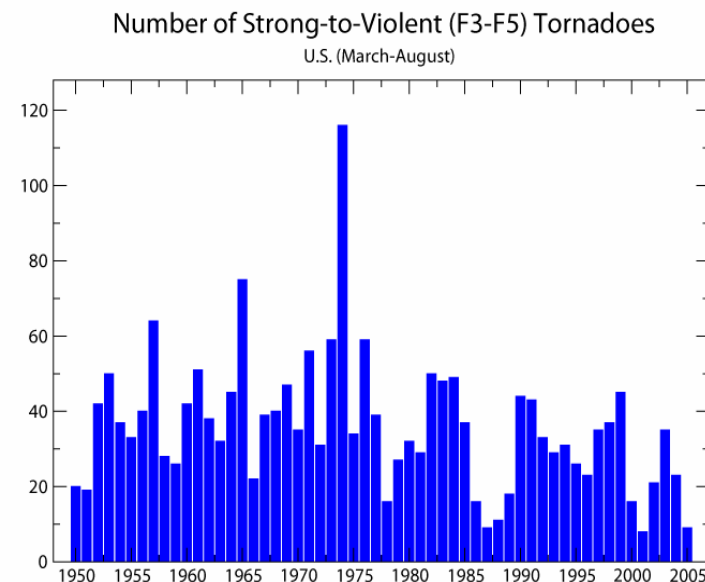
- Most models predict a constant warming rate. We can reasonably expect ~1.7°C of warming in the 21<sup>st</sup> century.

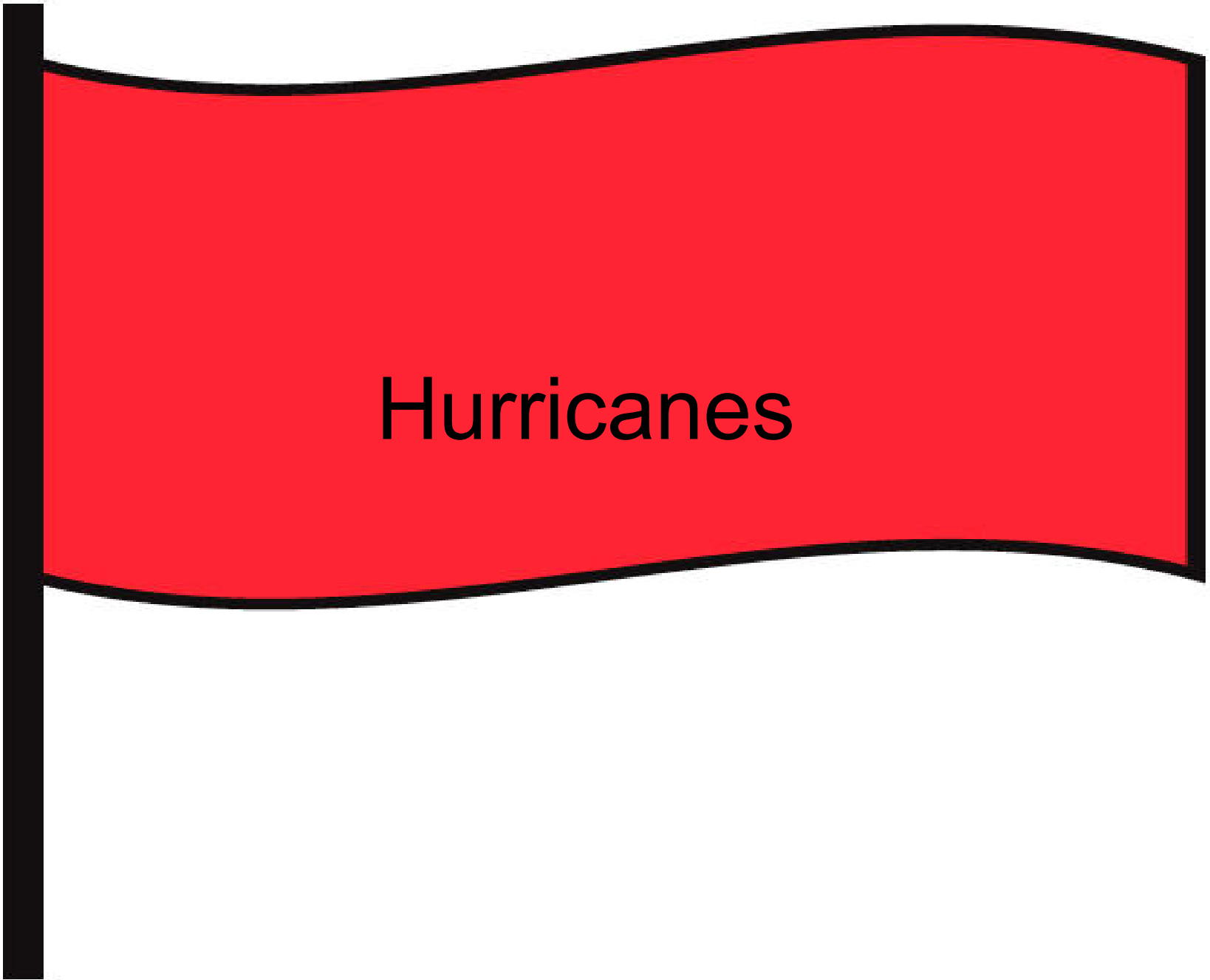


“Also in 2004, the all-time record for tornadoes in the United States was broken.” (AIT, p. 87)

- Tornado frequency has not increased; rather, the detection of smaller tornadoes has increased.
- If we consider the tornadoes that have been detectable for many decades (i.e. F-3 or greater), there is actually a slight downward trend since 1950.

Source: National Climate Data Center





Hurricanes

“There is now a strong, new consensus emerging that global warming is indeed linked to a significant increase in both the duration and intensity of hurricanes.” (AIT, p. 81)

- “The possibility that greenhouse gas induced global warming may have already caused a substantial increase in some tropical cyclone indices has been raised (e.g. Mann and Emanuel, 2006), but **no consensus has been reached** on this issue.”
- Consensus statement of 120 climate scientists at the November 2006 meeting of the World Meteorological Organization.

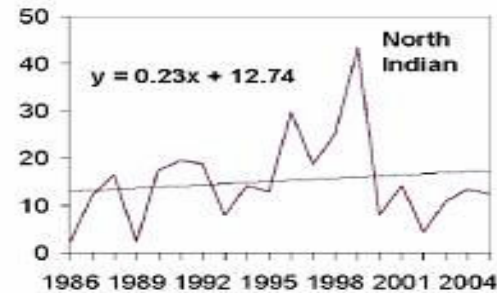
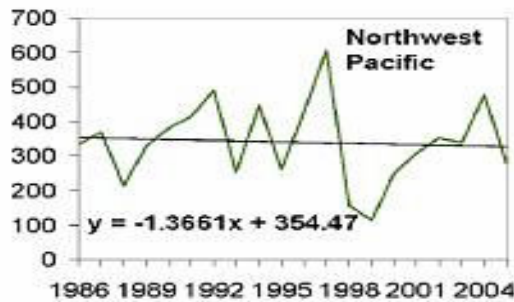
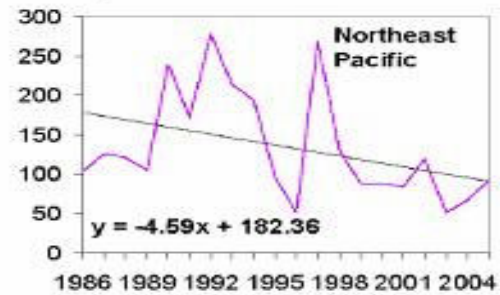
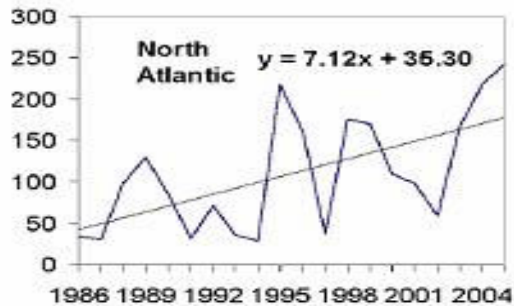
## Strong debate, no strong consensus

- [Emanuel \(2006\)](#) found a 50% increase in the Power Dissipation Index (PDI, a measure of hurricane intensity and duration) since the mid-1970s strongly correlated with sea surface temperatures.
- [Landsea](#) found no PDI increase for land-falling U.S. hurricanes, suggesting Emanuel's finding may be an artifact of the data.
- [Klotzbach \(2006\)](#) found Accumulated Cyclone Energy (another measure of storm strength and duration) increased in the North Atlantic, decreased in the Northeast Pacific, and changed little elsewhere.
- [Kossin et al. \(2007\)](#) found an increase in Atlantic basin hurricane intensity during the past 23 years but not in any of the other five basins.

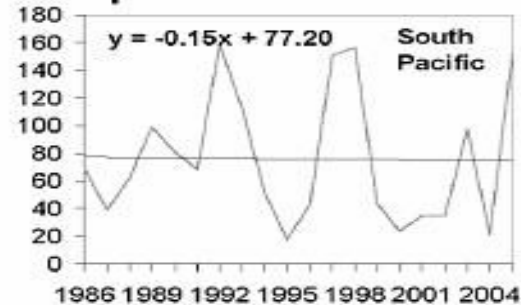
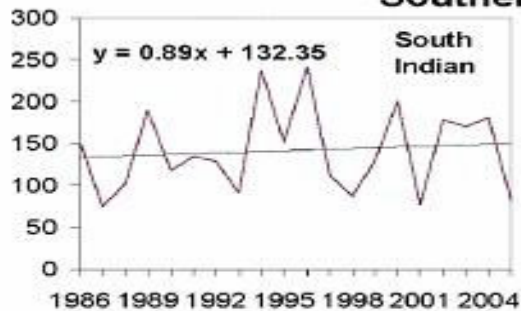


# Klotzbach's study: no overall increase in hurricane power

## Northern Hemisphere

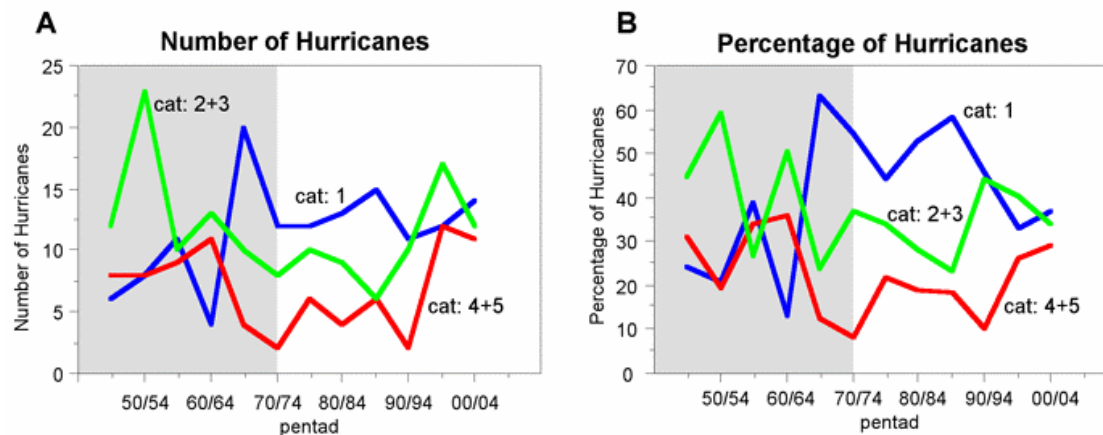


## Southern Hemisphere



“The emerging consensus linking global warming to the increasingly destructive power of hurricanes has been based in part on research showing a significant increase in the number of category 4 and 5 hurricanes.” (AIT, p. 89)

- Gore refers to [Webster et al. \(2005\)](#), who found a significant increase in the number of major hurricanes during 1970-2004.
- Pat Michaels found that, in the Atlantic basin, Webster’s trend disappears once data going back to 1940 are included. See graphs below.



“And then came Katrina...The consequences were horrendous. There are no words to describe them.” AIT, 94-95

- “So, of course, it’s tempting. We have had this very active last ten years, along the U.S. and gulf coasts to blame that on global warming, but looking at it statistically, that’s a very difficult connection to make. I think what you are seeing mostly is a natural cycle in this case.” – Kerry Emanuel
- Katrina was the worst natural disaster in U.S. history not because the hurricane was so powerful—it was a category 3 storm by the time it made landfall—but because the federal government had failed to build adequate flood defenses for New Orleans. My colleague, John Berlau, chronicles this sad tale in an important new book.

Galveston, TX, September 1900  
6,000 to 8,000 deaths  
(from NOAA Photo Library)



# Scientists' "Statement on the Hurricane Problem"

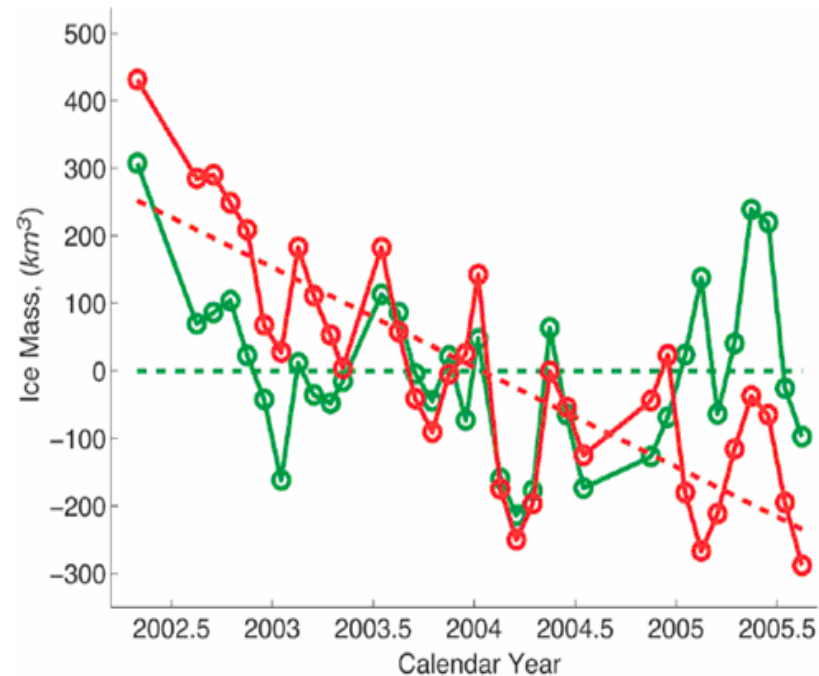
- Ten hurricane scientists including Kerry Emanuel and Peter Webster issued this statement, available at [http://wind.mit.edu/~emanuel/Hurricane\\_threat.htm](http://wind.mit.edu/~emanuel/Hurricane_threat.htm). Key points:
  - Don't let debate over the "possible" influence of global warming on hurricanes distract us from the "main" problem: subsidized development in high risk areas.
  - Policymakers should reform building practices, land use policies, and insurance and disaster relief policies that promote "lemming like" behavior.
- This science-based perspective is absent from AIT.



Will sea levels rise by 20  
feet?

“Two new studies in 2006 showed overall **volumes** of ice in Antarctica appear to be declining...”(AIT, p. 190)

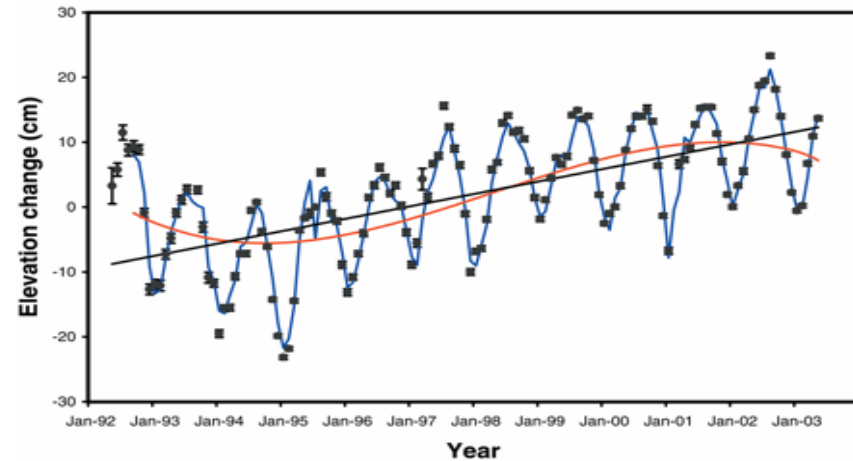
- Gore alludes to **Velicogna and Wahr (2006)**.
- Found declining ice mass only in West Antarctic Ice Sheet, not East Antarctic Ice Sheet.
- Study period covered only 3 years (2002-2005).



Ice mass variations over the West Antarctic Ice Sheet (red) and the East Antarctic Ice Sheet (green).

## Other studies find a positive Antarctic ice mass balance over a longer time period

- Davis et al. (2005) and Wingham et al. (2006) found overall gain during 1992 to 2003.
- Chen et al. (2006), found an overall gain during 1992-2005.
- Van den Broeke et al. (2006) found no change in size of Antarctic ablation zones during 1980-2004, and none in rate of ice mass loss in those areas.



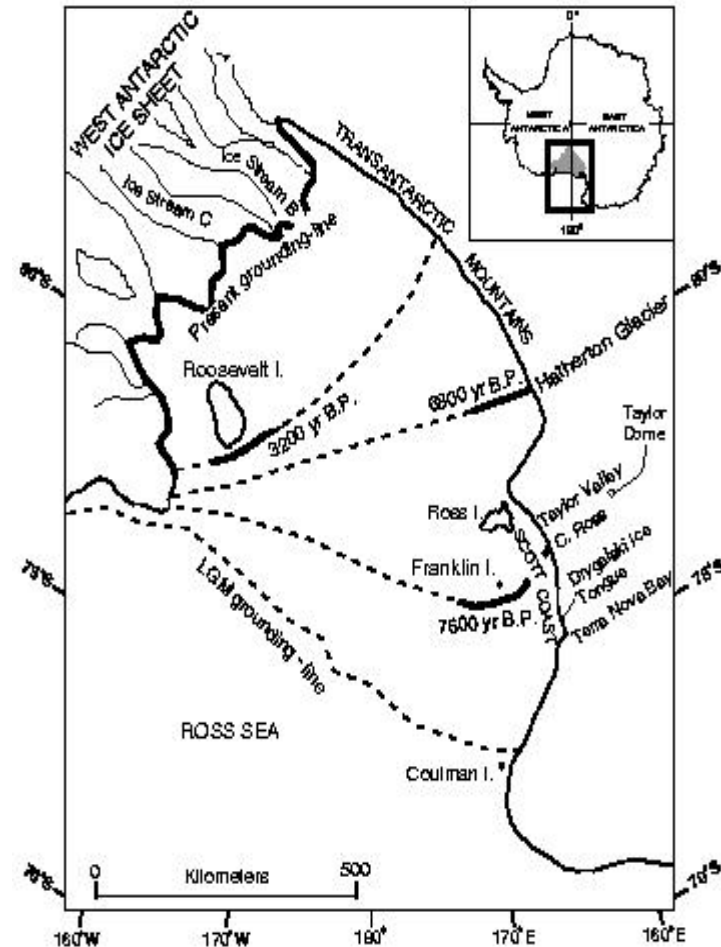
Elevation change in East Antarctic Ice sheet observed by Davis et al. Note that Velicogna and Wahr study period begins in mid-2002--the peak accumulation in the Davis et al. study.



“If [the West Antarctic Ice Sheet—WAIS] melted or slipped off its moorings into the sea, it would raise sea levels worldwide by 20 feet... scientists have documented significant and alarming structural changes on the underside of the ice shelf.” (AIT, p. 190)

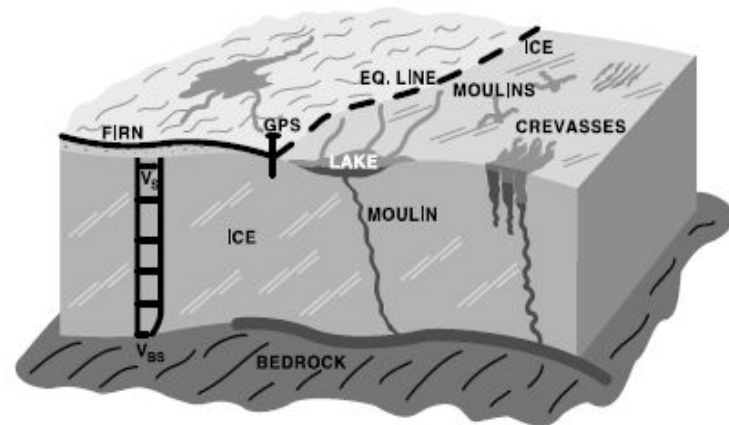
- Gore doesn't tell us what those structural changes are, or why they are significant or alarming.
- “Most recession occurred in the middle to late Holocene in the absence of substantial sea level or climate forcing.” Ross Ice Shelf today is about 1/3 original size.
- At the rate observed in the 1990s, “complete deglaciation will take about 7,000 years.”

Conway et al. 1999. Holocene grounding line recession in the Ross Sea Embayment.



“When the [melt-]water reaches the bottom of the ice, it lubricates the surface of the bedrock and destabilizes the ice mass, raising fears that the ice mass will slide more quickly toward the ocean.” (AIT, p. 192)

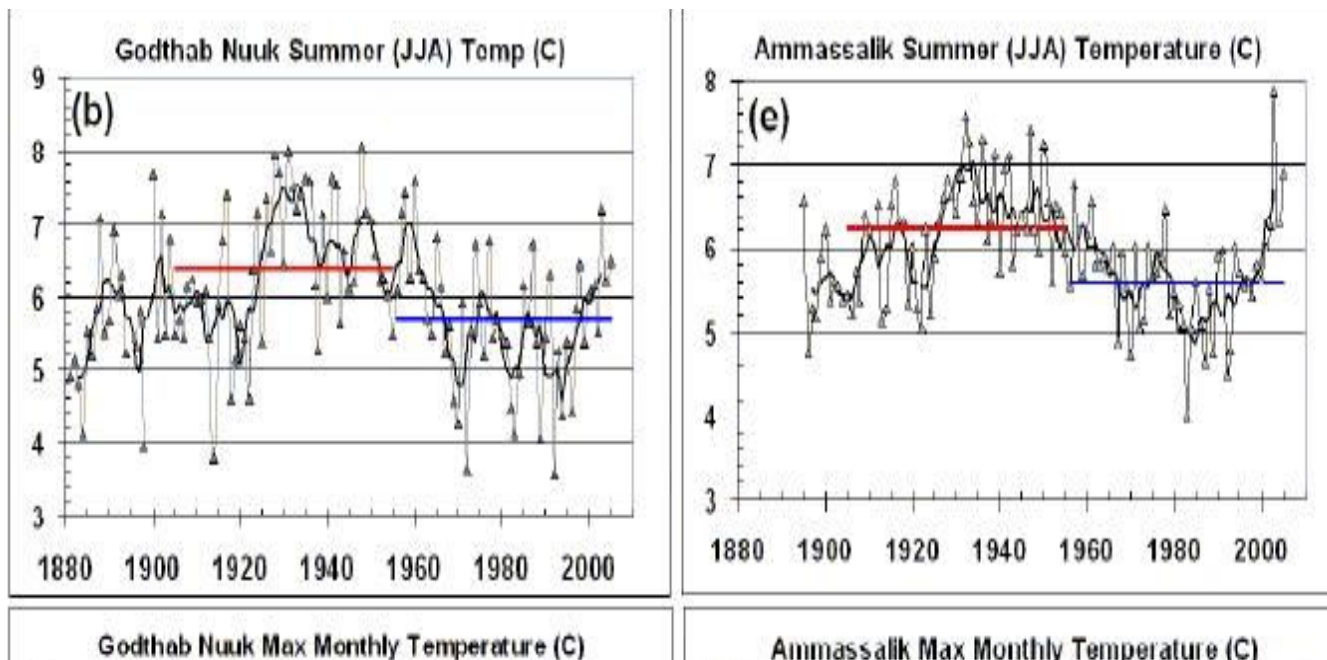
- “Penetration of surface meltwater to the glacial bed in Greenland can lead to seasonal flow acceleration, but the annually averaged increase in speed is only a few percent.” [Bindshadler \(2006\)](#)
- Example: Glacial flow in 1998 increased from 31.3 cm/day in winter to 40.1cm/day in July, falling back to 29.8 cm/day in August, adding a total displacement of 4.7 m. [Zwally et al. \(2002\)](#) Apocalypse not!



# Moulins: nothing new under the sun

- The Greenland summer was warmer during the early 20<sup>th</sup> century. There were probably more vertical water tunnels (“moulins”), greater glacier acceleration, and more rapid ice loss. Apocalypse not!

Source: Chylek et al. (2006)



“If Greenland melted or broke up and slipped into the sea—or if half of Greenland and half of Antarctica melted or broke up and slipped into the sea, sea levels worldwide would increase by between 18 and 20 feet.” (AIT, p. 196)

- To melt half the Greenland ice sheet and raise sea level by 3 meters, would require additional “sustained” warmth of 5.5°C “over a thousand years.”

Source: IPCC, *Climate Change 2001: The Scientific Basis*, p. 678.

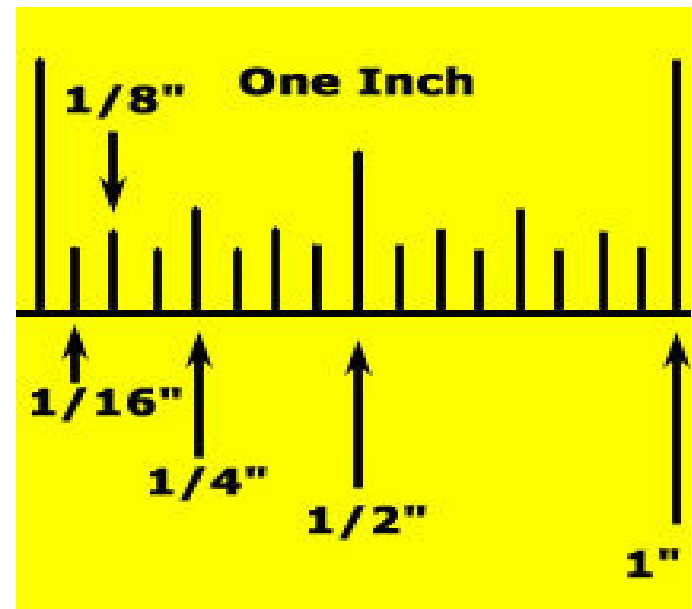
# How alarming is the current ice loss rate in Greenland?

- Greenland's glaciers are thickening in the interior and thinning at the edges.

Luthcke et al. (2006) estimate:

- Greenland lost ~ 101 Gt/yr of ice during 2003-2005, contributing ~0.28 mm/yr of sea level rise—a little more than 1 inch per century.

Apocalypse Not!

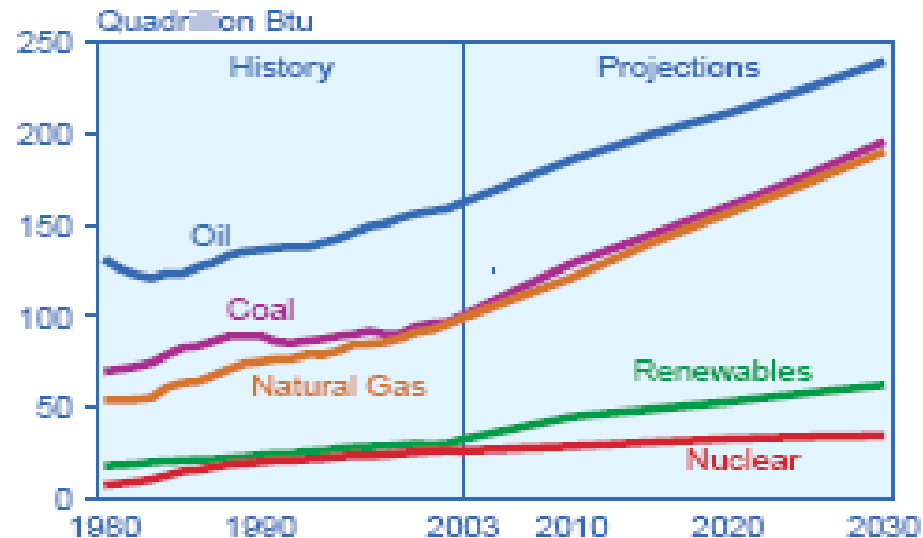




**“I believe this is a  
moral issue.”**

# Demand for fossil energy is growing

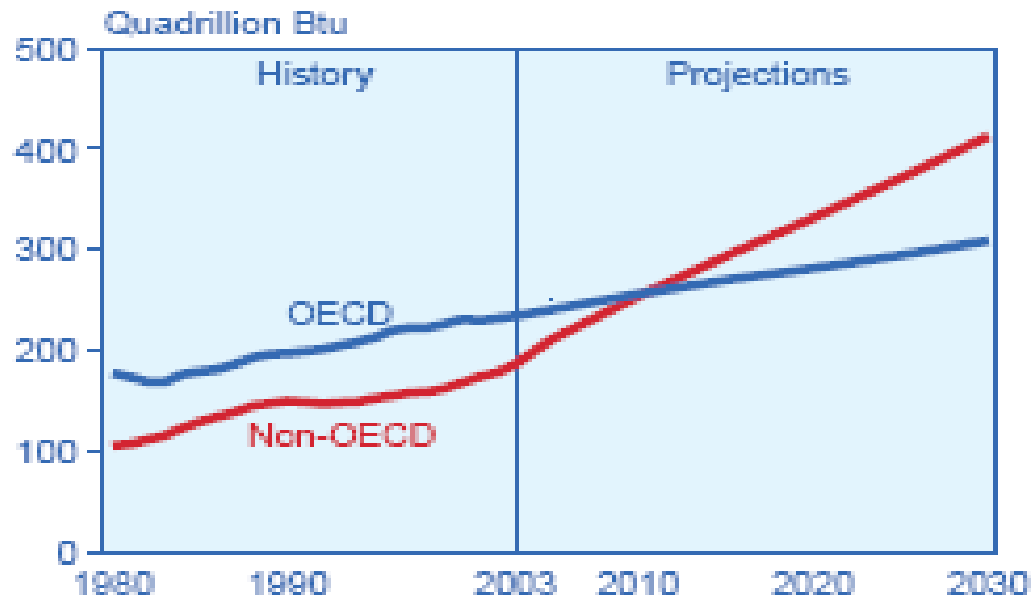
Figure 10. World Marketed Energy Use by Fuel Type, 1980-2030



Sources: History: Energy Information Administration (EIA), *International Energy Annual 2003* (May-July 2005), web site [www.eia.doe.gov/iea/](http://www.eia.doe.gov/iea/). Projections: EIA, *System for the Analysis of Global Energy Markets* (2006).

# Most of the demand growth is in energy poor countries

Figure 8. World Marketed Energy Use: OECD and Non-OECD, 1980-2030



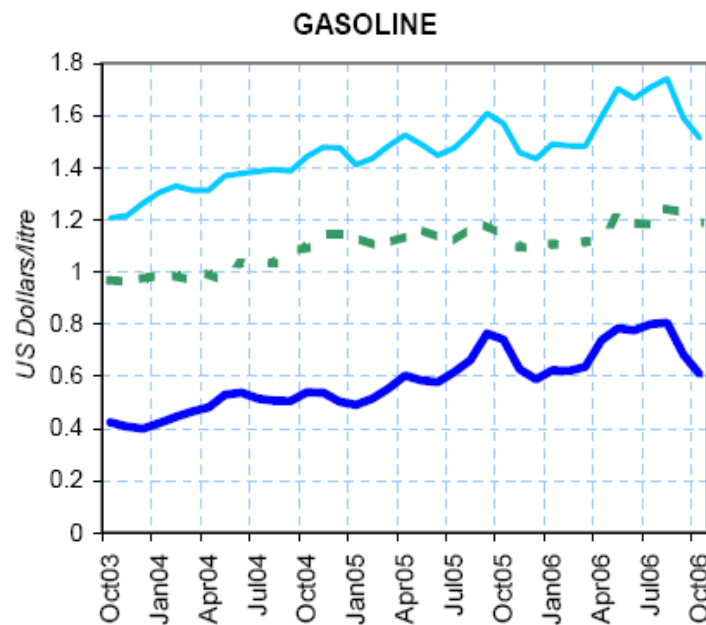
Sources: History: Energy Information Administration (EIA), *International Energy Annual 2003* (May-July 2005), web site [www.eia.doe.gov/iea/](http://www.eia.doe.gov/iea/). Projections: EIA, *System for the Analysis of Global Energy Markets* (2006).



# Kenya's Energy System



# Despite high gas taxes (and prices), EU transport-sector CO2 emissions are growing rapidly

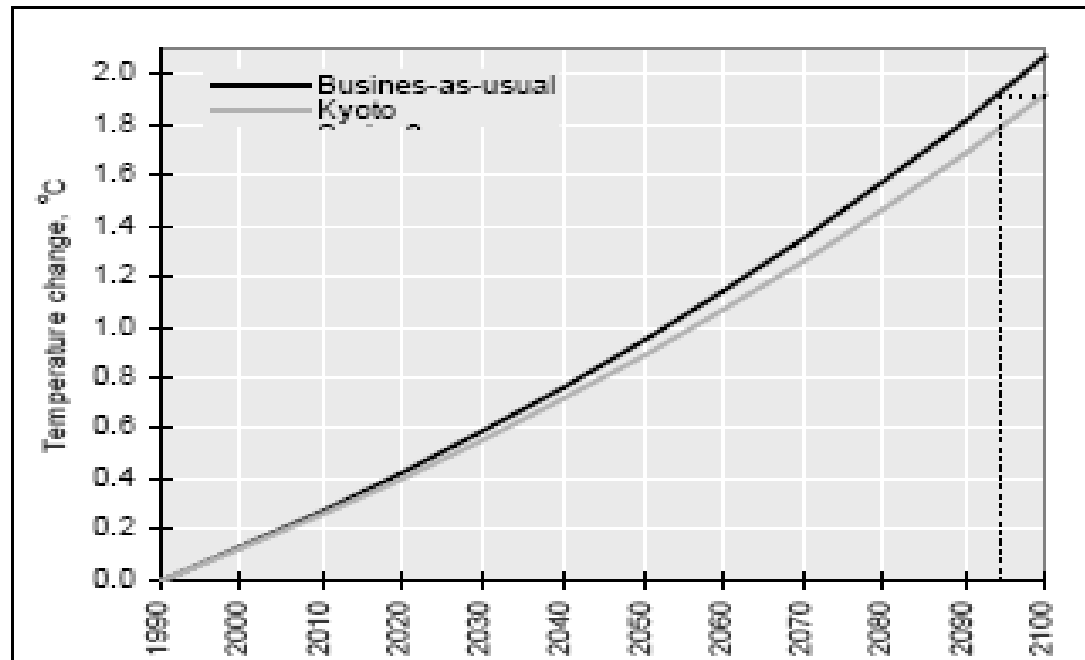


■ Japan      — Europe      — North America

- EU-15 transport CO2 emissions increased by nearly 26% from 1990 to 2004, and are projected to be 35% above 1990 levels by 2010 under current policies.
- How much higher than EU-level gasoline should Americans pay?

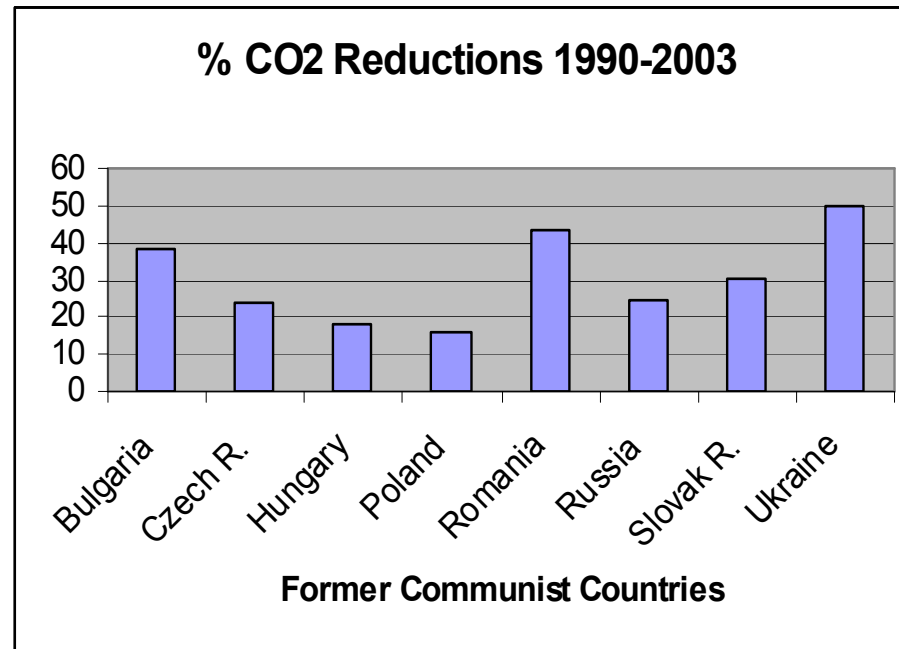
Sources: IEA, End-User Petroleum Product Prices, Oct. 2006;  
European Environment Agency

# Kyoto: All Pain for No Gain



- Kyoto would not discernibly reduce global warming but would cost tens to hundreds of billions of dollars in higher energy prices, lost jobs, and reduced GDP. All pain for no gain.

# The only proven “method” for making deep emission cuts...



- The only proven “method” for making deep emission cuts is that of the former Soviet Union and Eastern Europe: economic collapse.
- Policies tough enough to measurably affect climate would likely be a cure worse than the alleged disease.

“The United States is responsible for more greenhouse gas pollution than South America, Africa, the Middle East, Australia, Japan, and Asia—all put together.” (AIT, pp. 250-251)

The U.S., with less than 5% of global population, produces 28.3%\* of global GDP, including:

- Agricultural products and research (we feed people)
- Medical advances on every front (we fix people)
- Consumer products (we fulfill people)
- Global investment (we fund people)
- Defense of democracy (we free people)

Without our CO2 emissions, the world would be poorer, sicker, and less free.

\*2004 World total = \$ 41.2B  
U.S. total = \$ 11.7B  
World Development Indicators, World Bank