

The Integrity of Science and Climate Change: Logical Fallacies and Abuse of Science

SkeptiCal 2011

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**PACIFIC
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Research for People and the Planet

What is the role of science in policy?

- ◆ Good policy without good science and analysis is ... unlikely.
- ◆ Good policy with *bad* science is even more unlikely.
- ◆ There is a long history of abuse or misuse of science.
- ◆ The argument about climate change is largely policy debate hiding behind a scientific debate.

Categories of Challenges to the Integrity of Science

- ◆ Logical fallacies
- ◆ Abuse of the scientific process
- ◆ Uncertainty, skepticism, and public policy

www.integrityofscience.org

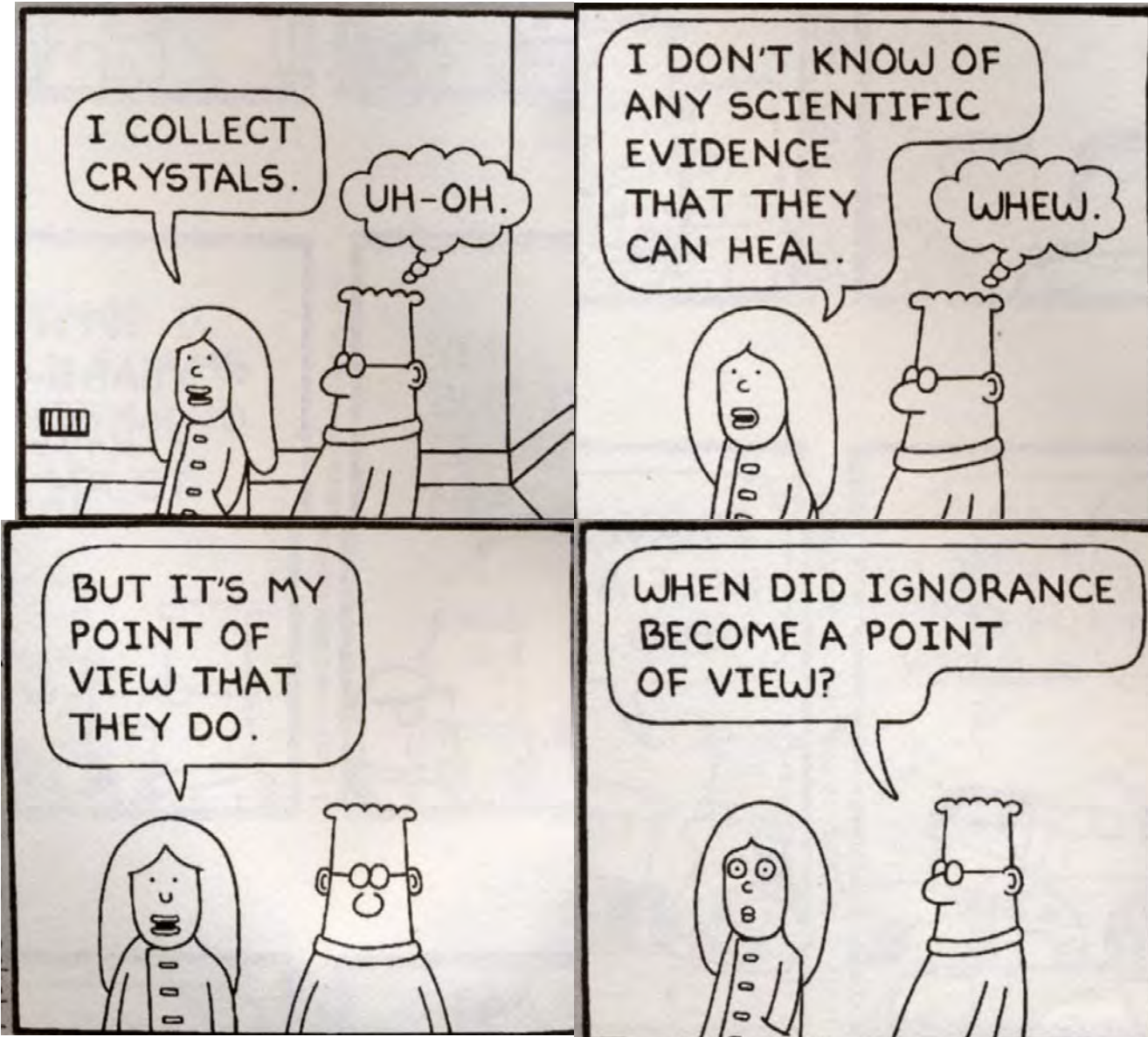
Logical Fallacies

- ◆ A pattern of reasoning that is always -- or at least commonly -- wrong due to a flaw in the structure of the argument that renders the argument invalid.

Common Logical Fallacies

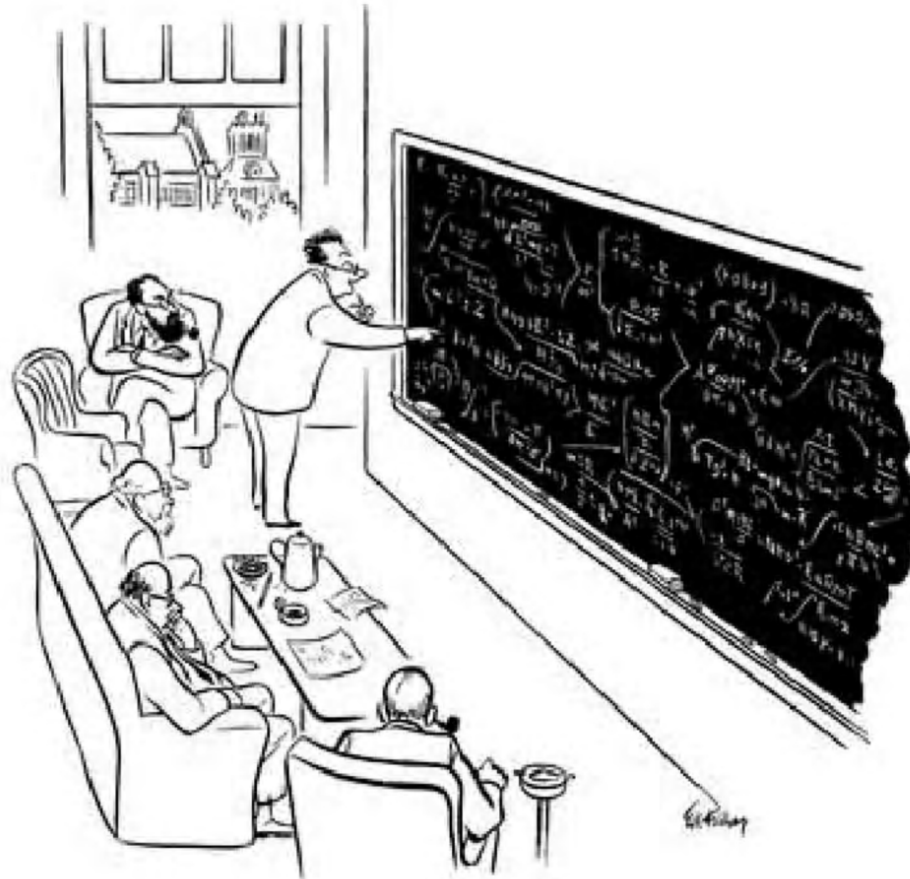
- ◆ Arguments from Ignorance
- ◆ Arguments from Error
- ◆ Arguments from Misinterpretation
- ◆ Arguments from Ideology
 - Personal Belief
 - Personal Incredulity
 - Tradition
- ◆ Arguments from Consensus
- ◆ Arguments from Appeal to Authority
- ◆ ...Many more

Argument from Ignorance



United Features
Syndicate 2000;
Scott Adams

Argument from Error



“Say, I think I see where we went off. Isn’t eight times seven fifty-six?”

The New Yorker, Ed Fisher, January 16, 1954

Arguments from Ideology

- ◆ Very common.
- ◆ Often rooted in religion or political ideology.
 - Galileo v. the Church
 - Modern literalists
 - Creationism
 - Intelligent design
 - Lysenkoism



Arguments *from* Consensus

The argument that something is right *just* because a large group believes it to be right.

- ◆ Is climate change a very serious problem because the *vast majority* of climate scientists believe that it is? *No, this is backwards...*
- ◆ Climate change is a very serious problem because the *evidence* has convinced the vast majority of climate scientists that it is. *...and it could still be wrong: The consensus is not what gives power to the conclusion; the science leads to the consensus.*

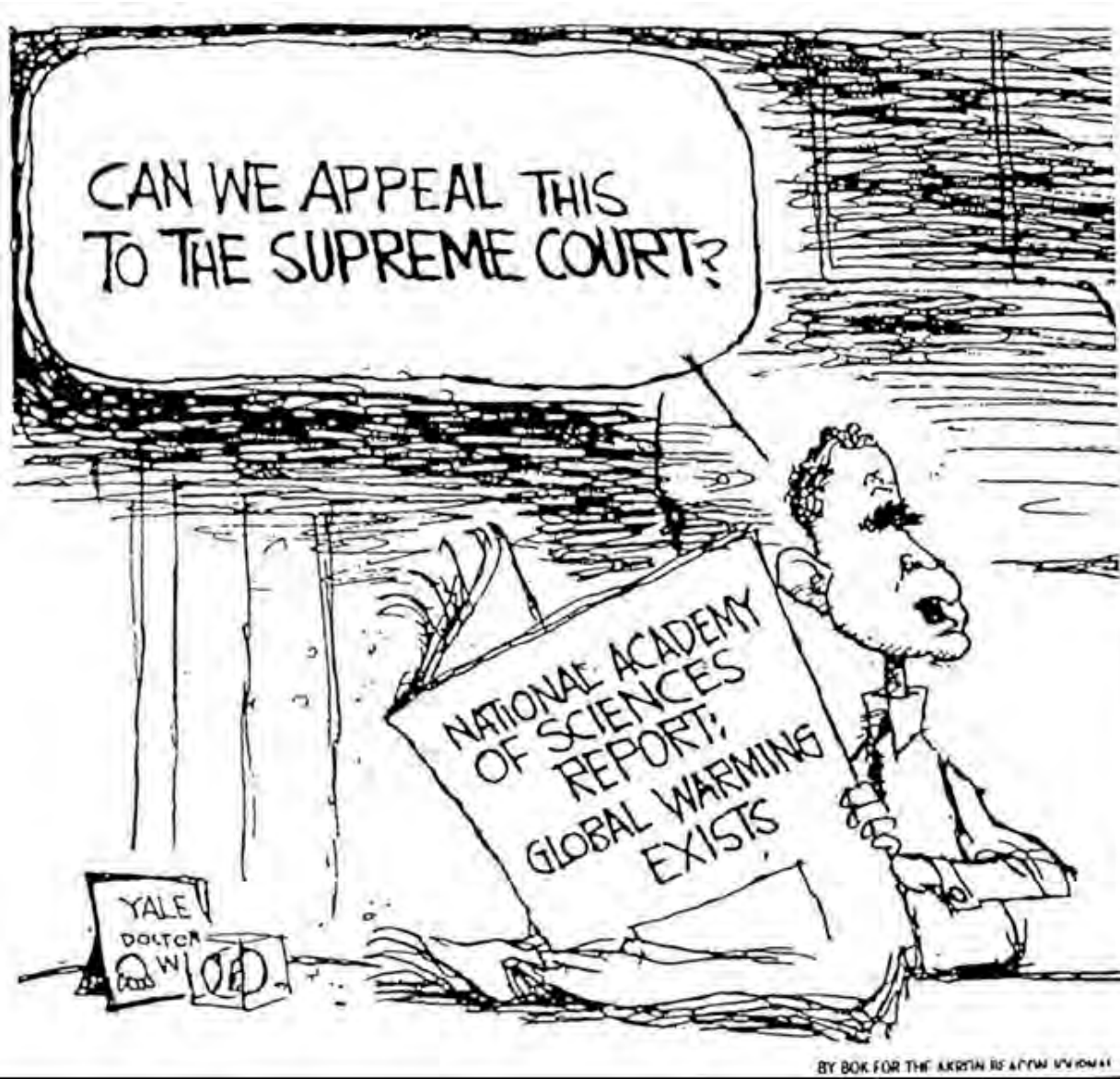
Argument *against* Consensus

- ◆ “Extraordinary claims require extraordinary evidence.” *Carl Sagan*
- ◆ "The weight of evidence for an extraordinary claim must be proportioned to its strangeness." *Laplace*
- ◆ “A wise man, therefore, proportions his belief to the evidence" *David Hume*

Every scientific body of international standing accepts the findings of human-induced effects on climate

- ◆ American Academy of Pediatrics
- ◆ American Association for the Advancement of Science (AAAS)
- ◆ American Chemical Society
- ◆ American College of Preventive Medicine
- ◆ American Geophysical Union
- ◆ American Institute of Biological Sciences
- ◆ American Institute of Physics
- ◆ American Medical Association
- ◆ American Meteorological Society
- ◆ American Physical Society
- ◆ American Public Health Association
- ◆ American Quaternary Association
- ◆ American Society for Microbiology
- ◆ Australian Coral Reef Society
- ◆ Australian Medical Association
- ◆ Australian Meteorological and Oceanographic Society
- ◆ Canadian Foundation for Climate and Atmospheric Sciences
- ◆ Canadian Meteorological and Oceanographic Society
- ◆ Ecological Society of America
- ◆ European Academy of Sciences and Arts
- ◆ European Federation of Geologists
- ◆ European Geosciences Union
- ◆ European Physical Society
- ◆ European Science Foundation
- ◆ Federation of Australian Scientific and Technological Societies
- ◆ Geological Society of America
- ◆ Geological Society of Australia
- ◆ Geological Society of London
- ◆ Institute of Biology (UK)
- ◆ Institute of Professional Engineers New Zealand
- ◆ Institution of Engineers Australia
- ◆ InterAcademy Council
- ◆ International Association for Great Lakes Research
- ◆ International Council of Academies of Engineering and Technological Sciences
- ◆ International Union for Quaternary Research
- ◆ International Union of Geodesy and Geophysics
- ◆ National Academies of Science of: Australia, Belgium, Brazil, Cameroon Royal Society of Canada, the Caribbean, China, Institut de France, Ghana, Leopoldina of Germany, of Indonesia, Ireland, Accademia nazionale delle scienze of Italy, India, Japan, Kenya, Madagascar, Malaysia, Mexico, Nigeria, Poland, Royal Society of New Zealand, Russian Academy of Sciences, Senegal, South Africa, Sudan, Royal Swedish Academy of Sciences, Tanzania, Turkey, Uganda, The Royal Society of the United Kingdom, the United States, Zambia, and Zimbabwe.
- ◆ National Association of Geoscience Teachers
- ◆ Network of African Science Academies (The science academies of Cameroon, Ghana, Kenya, Madagascar, Nigeria, Senegal, South Africa, Sudan, Tanzania, Uganda, Zambia, Zimbabwe, as well as the African Academy of Sciences)
- ◆ Royal Meteorological Society (UK)
- ◆ World Federation of Public Health Associations
- ◆ World Meteorological Organization

Appeal to Authority Not Competent to Address Issue



Types of Abuses of Science

- ◆ Appeal to emotion
- ◆ Personal/ad hominem attacks
- ◆ Straw man arguments
- ◆ Misuse of facts; Selective use of facts
- ◆ Misuse of uncertainty
- ◆ Inappropriate generalizations
- ◆ Falsification/suppression of facts
- ◆ Manipulation of the scientific process
- ◆ Bullying of scientists

Appeal to Emotion; Ad Hominem and Personal Attacks

- ◆ Global warming is "unproven, at best, and liberal claptrap, at worst." **Congressman D. Rohrabacher (1995)**
- ◆ Global warming is "the greatest hoax ever perpetrated on the American people." **Senator J. Inhofe (2005)**
- ◆ Al Gore can't be trusted on climate change because he lives an energy-intensive lifestyle. **The National Center for Public Policy Research (2006)**
- ◆ "Scientists have ideologies. They are politicized." **Peggy Noonan, Wall Street Journal (2006)**

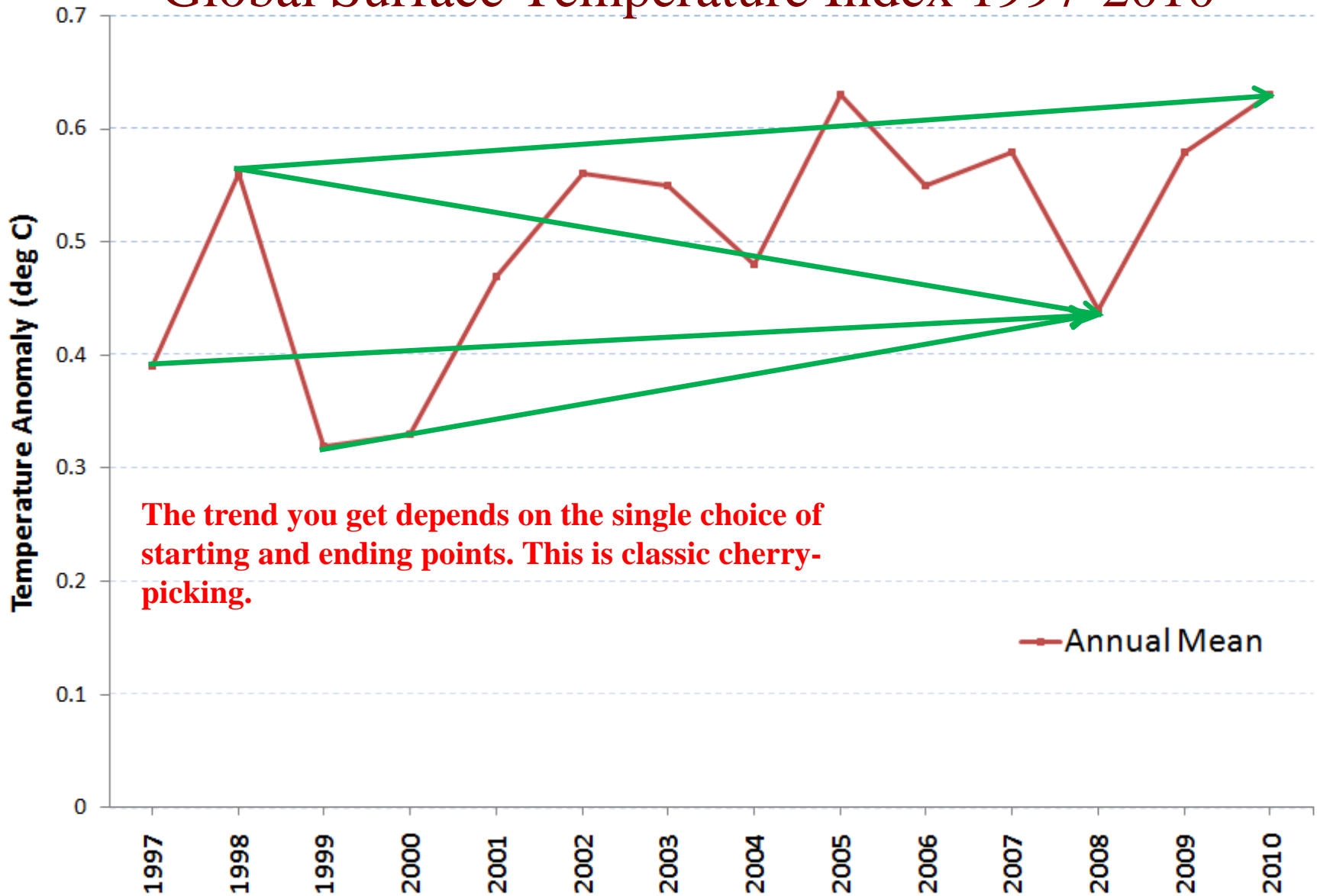
Suppression of Information, Selective Choice of Data (or “Cherry-picking”)

“...I’m so disappointed to see my local skeptic organization **committing** on the global warming issue **prematurely**. Any objective review of the actual scientific data makes clear that **CAGW** proponents have not made their case that CO₂ caused a **meaningful** portion of the **mild** warming seen 1900-1998 (but has since **stopped** as CO₂ continues to grow)...”

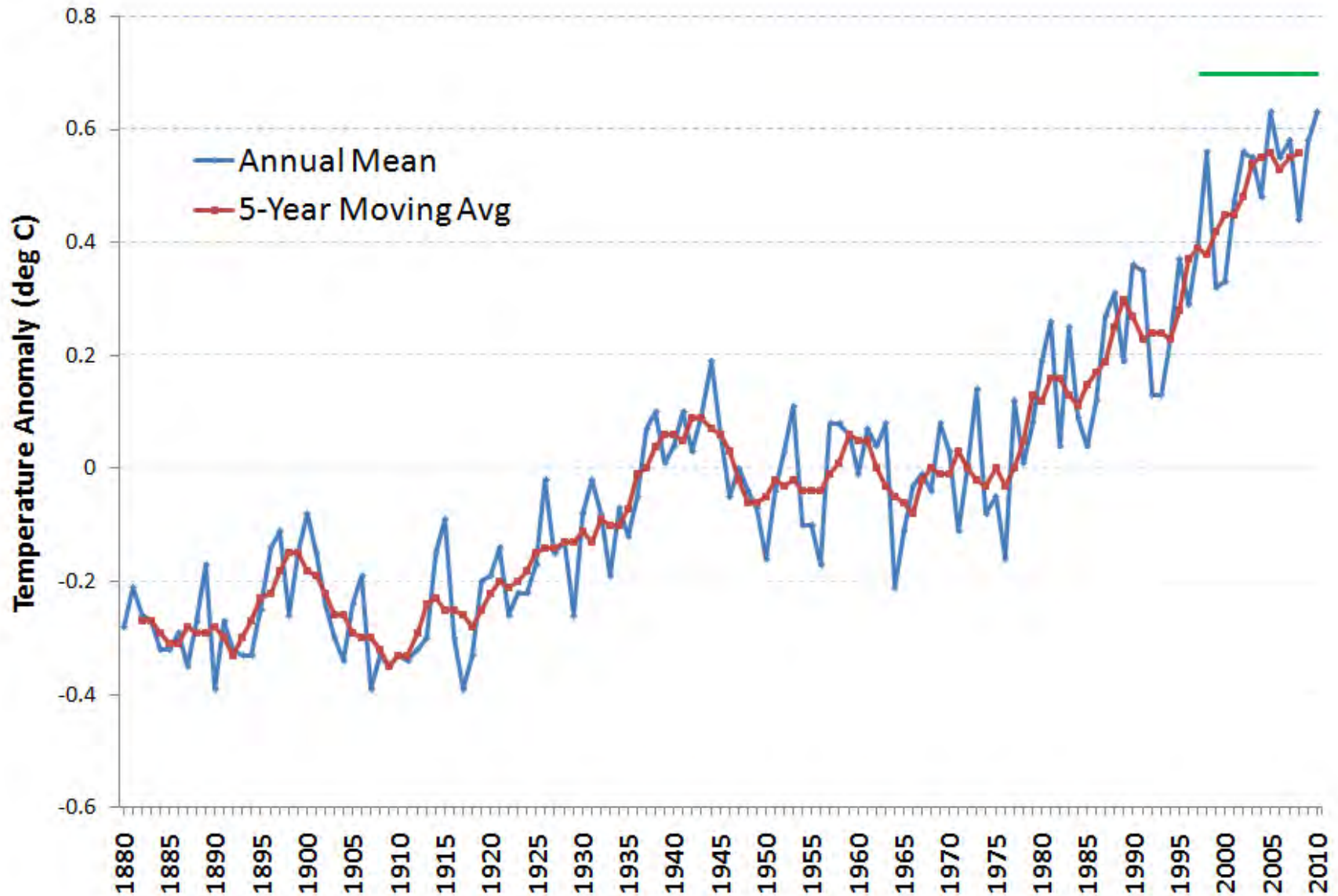
Science questions?

1. CO₂ not responsible for meaningful portion of warming; or, the warming is natural.
(#1,18,29,59...) (see www.skepticalscience.com)
2. Warming stopped in 1998. (#9, 22, 93...)

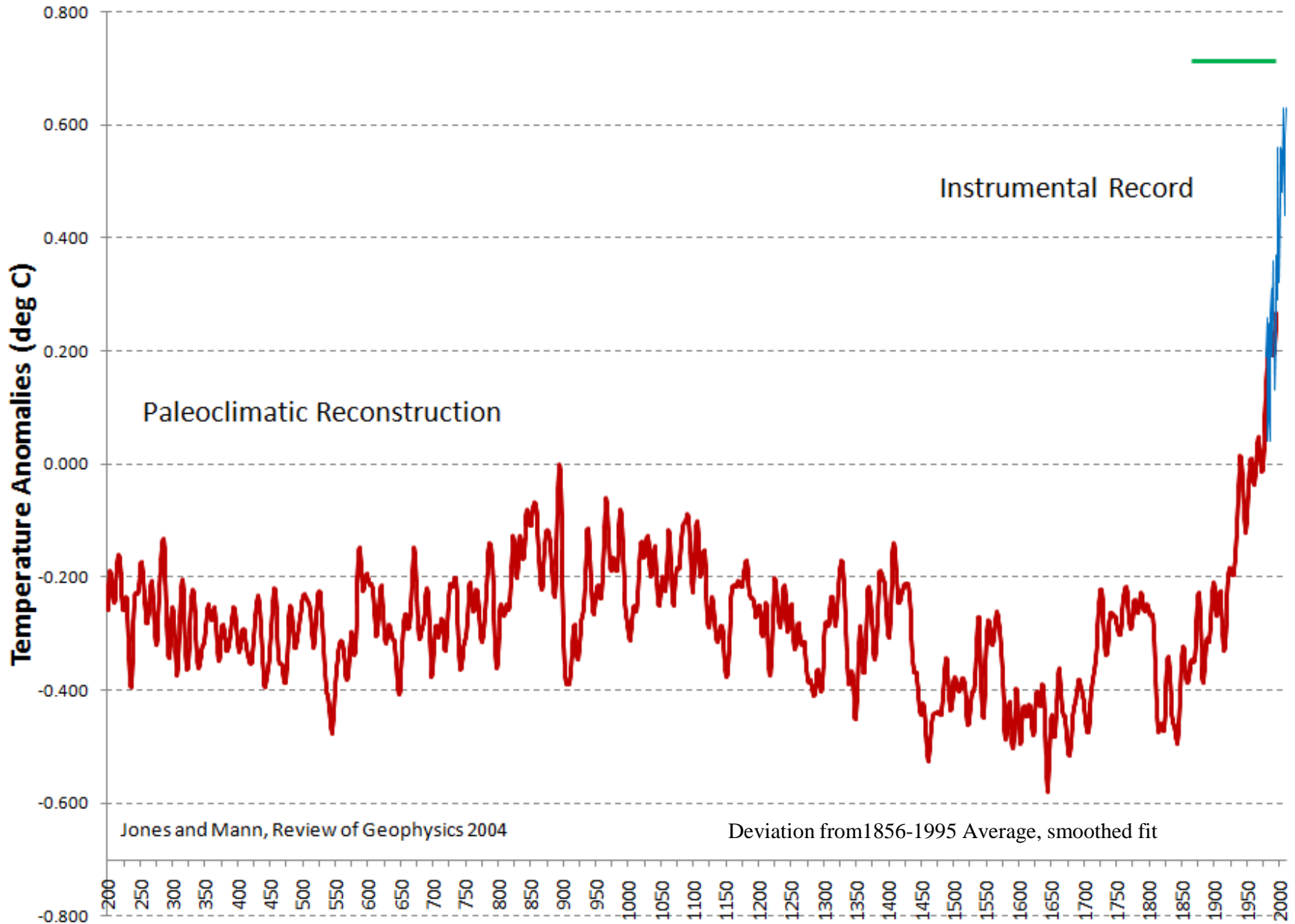
Global Surface Temperature Index 1997-2010



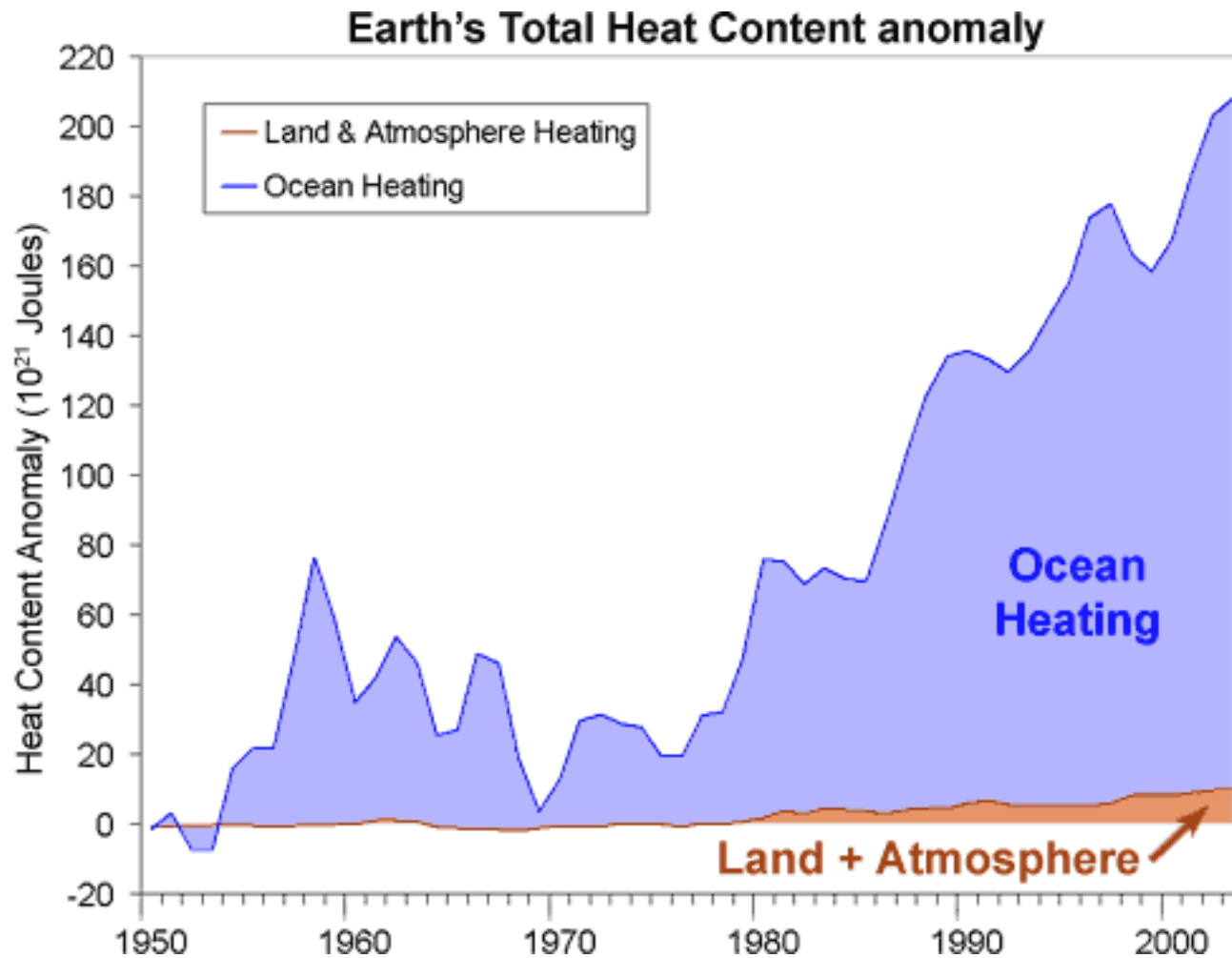
Global Surface Temperature Index 1880 to 2010



Paleoclimatic Temperature Reconstruction 200 - 2010



Surface temperatures are an incomplete measure of global warming



Being skeptical requires looking at all the data.

Climate change is more than “warming”

- ◆ We just experienced the hottest decade on record.
- ◆ Ice sheets and glaciers are losing mass at an accelerating rate. Permafrost is receding.
- ◆ Intense rainfall events are increasing.
- ◆ Sea level rise is accelerating.
- ◆ Oceans are building up heat.
- ◆ Birds and butterflies are migrating earlier.
- ◆ Flowers are blooming earlier and plants are photosynthesizing longer.
- ◆ Pest ranges are expanding into regions...

This is a key to “skepticism.” It is not enough to question. Science requires that alternative hypotheses be offered that satisfy:

1. What we know about physical laws.
2. What we observe around us.
3. What our mathematical and computer models say.
4. What our experiments reveal.

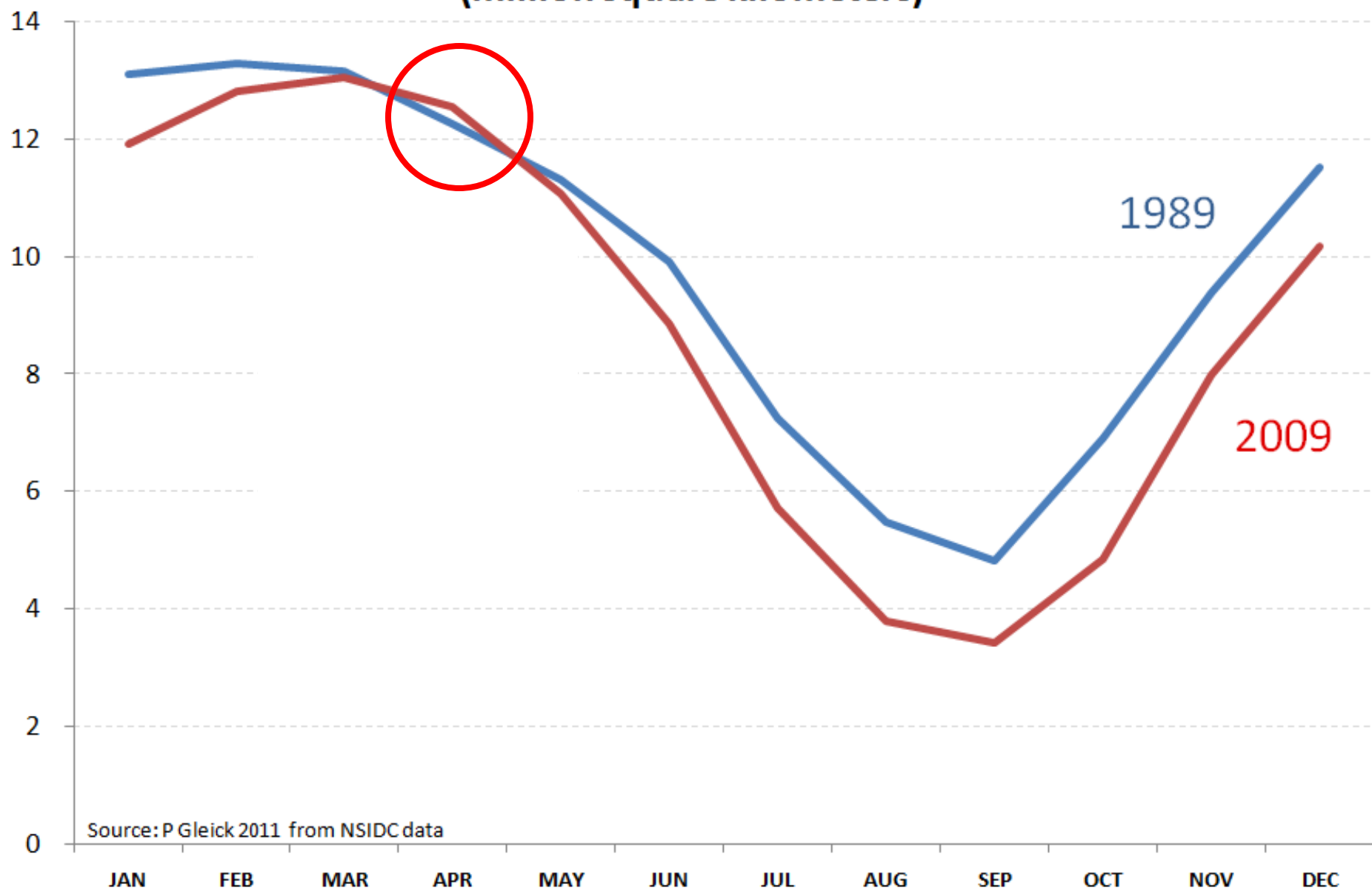
More Cherry-Picking

“National Snow and Ice Data Center records show conclusively that in April 2009, Arctic sea ice extent had indeed returned to and surpassed 1989 levels.”

Joseph Bast, President, Heartland Institute (January 31, 2011, Santa Fe New Mexican)

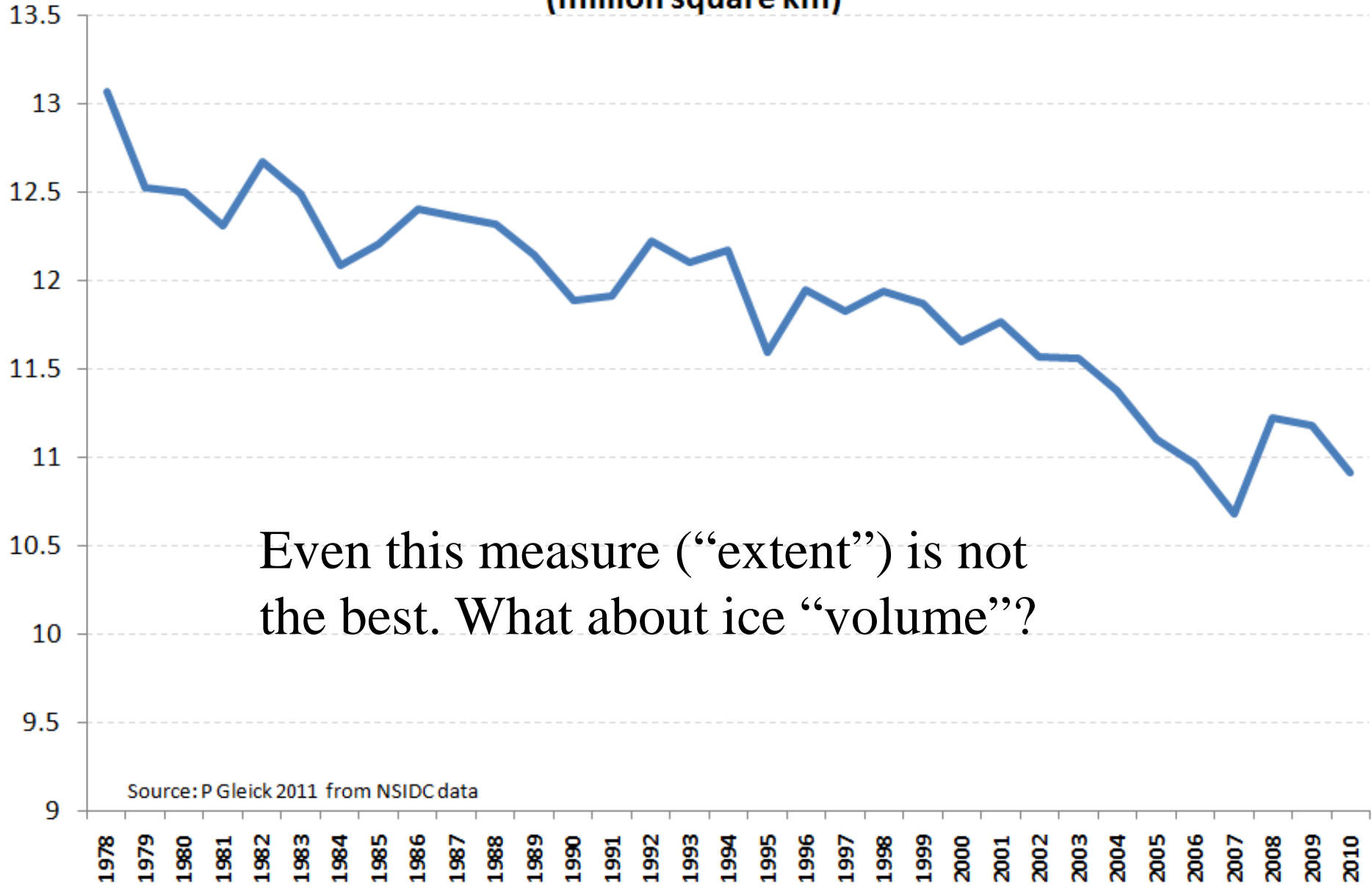
A skeptic would dig into this claim... The Pacific Institute did: http://www.huffingtonpost.com/peter-h-gleick/misrepresenting-climate-s_b_819367.html.

Arctic Ice Area 1989 and 2009 by Month (million square kilometers)



Source: P Gleick 2011 from NSIDC data

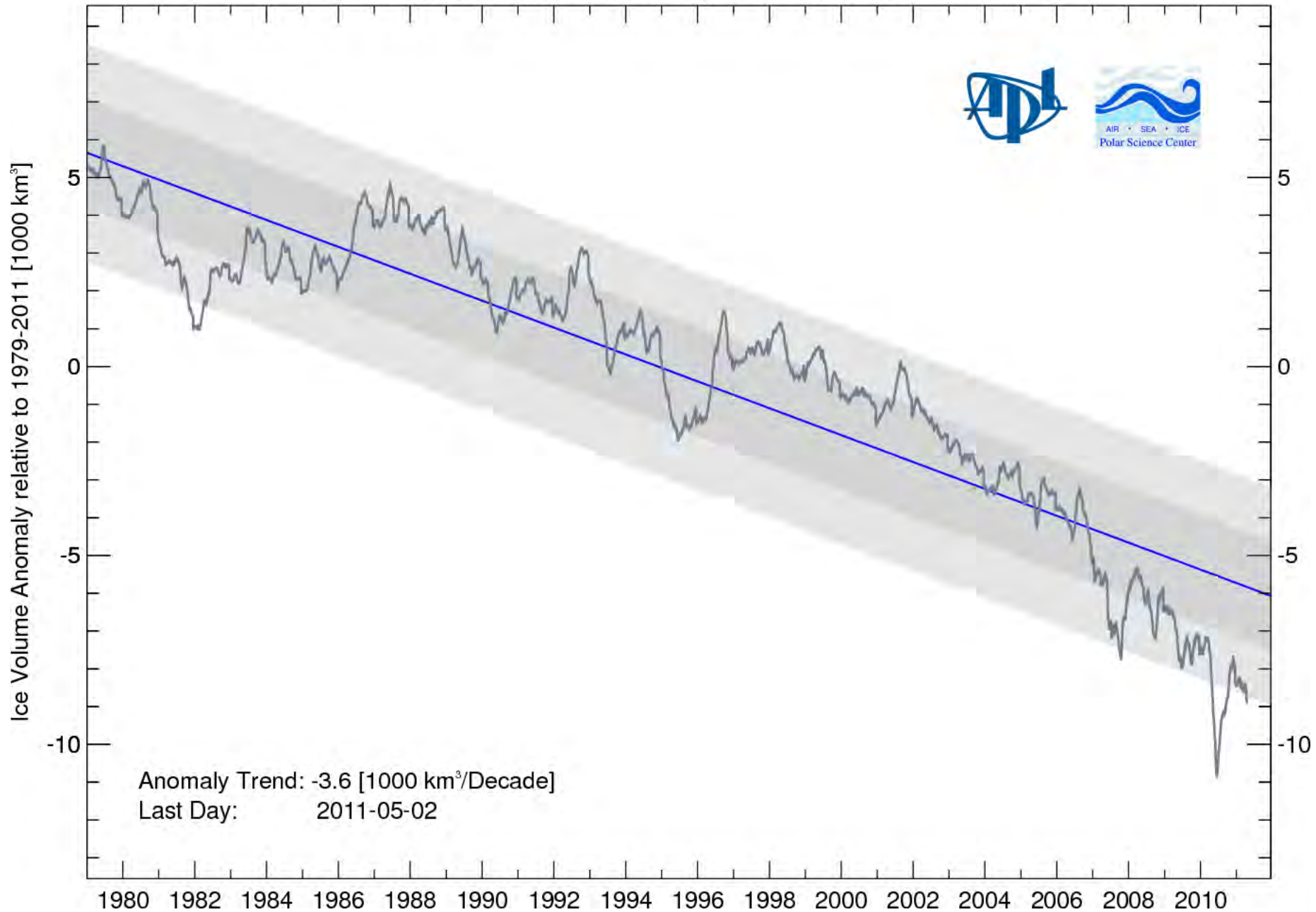
Annual Average Arctic Ice Extent (million square km)



Even this measure (“extent”) is not the best. What about ice “volume”?

Source: P Gleick 2011 from NSIDC data

Arctic Sea Ice Volume Anomaly and Trend from PIOMAS



Misuse of Uncertainty

- ◆ “Should the public come to believe that the scientific issues are settled, their views about global warming will change accordingly. Therefore, *you need to continue to make the lack of scientific certainty a primary issue in the debate*”

“Winning the Global Warming Debate: An Overview”
2002 Memo for GOP Congressional Candidates,
Luntz Research Companies.

Certainty vs. Uncertainty: What is a “Fact?”

- ◆ “In science, 'fact' can only mean 'confirmed to such a degree that it would be perverse to withhold provisional assent.' I suppose that apples might start to rise tomorrow, but the possibility does not merit equal time in physics classrooms.” Stephen Jay Gould (1941 - 2002)

Lead Letter in Science, May 7, 2010

“Climate change and the integrity of science”

signed by 255 members of the US National
Academy of Sciences

At What Point Does Science Become Sufficient for Policymaking? Tobacco and Cancer

- ◆ “Cigarette smoking is the chief, single, avoidable cause of death in our society, and the most important public health issue of our time.”

A Report of the U.S. Surgeon-General. 1982. The Health Consequences of Smoking: Cancer, US Department of Health, and Human Service, p. xi.

Tobacco: Argument from Ideology; Misuse of Uncertainty; Misuse of Facts;...

- ◆ “The view that smoking causes specific diseases remains an opinion or a judgement, and not an established scientific fact.” *Tobacco Institute of Hong Kong, 1989*
- ◆ “We don't believe it's ever been established that smoking is the cause of disease.” *M. Walker, Tobacco Institute, 1996.*
- ◆ “I'm unclear in my own mind whether anyone dies of cigarette smoking-related diseases.” *Testimony of G. Bible, CEO Philip Morris, 1996.*

Science Policy Misconduct

- ◆ Packing or eliminating advisory boards
 - Abolishment of NNSA Advisory Board
- ◆ Imposing litmus tests
 - Demanding political affiliations, voting and donor records from scientists before appointments
- ◆ Suppression of information
 - CEI suit against the 2000 National Assessment on climate (dismissed in 2003 by court “with prejudice”)
- ◆ Bullying of scientists
 - Galileo by the Church
 - Misplaced Congressional hearings
 - Virginia Attorney General suit against Mann

Political or Ideological Bullying of Scientists

- ◆ Galileo is ordered to:

“relinquish altogether the said opinion, namely, that the sun is the centre of the universe and immovable, and that the earth moves; nor henceforth to hold, teach, or defend it anyway, either verbally or in writing.”

Cardinal Bellarmine in the name of Pope Paul V (1550-1621)

Moving Forward? Integrity of Science

- ◆ Scientists and the public must resist attempts to misuse science and to intimidate scientists who produce results not consistent with an ideology.
- ◆ The scientific community needs to be aware of internal problems and fix them. Real skepticism must be encouraged.
- ◆ Scientists and scientific organizations must be able and willing to speak out against pseudo-skepticism and abuse of science.

Moving Forward, continued.

- ◆ Governmental and academic policies must ensure the independence of science advising.
- ◆ Funding must be transparent.
- ◆ Scientific results must be independent of funding.
- ◆ The more we understand about “logical fallacies,” the better able we are to argue logically, fairly, and productively.



THE WORLD'S WATER

2008–2009

The Biennial Report on Freshwater Resources

Peter H. Gleick

Heather Cooley

Michael J. Cohen

Mari Morikawa

Jason Morrison

Meena Palaniappan

- Water and Climate Change
- Water in China
- Status of the Millennium Development Goals for Water
- Peak Water
- Efficient Urban Water Use
- Business Reporting on Water

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www.worldwater.org

Skeptical Science's numbered list of questions and responses (plus 145 more!)

1. Climate's changed before
2. It's the sun
3. It's not bad
4. There is no consensus
5. It's cooling
6. Models are unreliable
7. Temp record is unreliable
8. Animals and plants can adapt
9. It hasn't warmed since 1998
10. Antarctica is gaining ice
11. Ice age predicted in the 70s
12. CO2 lags temperature
13. We're heading into an ice age
14. Ocean acidification isn't serious
15. Hockey stick is broken
16. Hurricanes aren't linked to global warming
17. Glaciers are growing
18. Climate sensitivity is low
19. Al Gore got it wrong
20. 1934 - hottest year on record
21. It's cosmic rays
22. It's freaking cold!....