

*"Life is too short to occupy oneself
with the slaying of the slain more
than once."*

-- Thomas Huxley

*"The plural of anecdote is not
data."*

-- pace Raymond Wolfinger
(who actually said the opposite)

The Properties of Pseudoscience

Supplementary Material for
CFB3333/KNW2333/PHY3333

Professors John Cotton, Randy Scalise, and Stephen Sekula

The Scientific Method

- Observation of a phenomenon
- Formulation of a testable, falsifiable explanatory mechanism (a hypothesis)
 - this requires going from *specific* (observation) to *general* (explanatory mechanism) – inductive reasoning
- Proposition of an experiment to test the hypothesis
 - this requires going from *general* (the explanatory mechanism) to *specific* (the outcome of an experiment) – this is deductive reasoning
- Performance of experiment and assessment of hypothesis; dissemination of results (whether positive or negative for the hypothesis)

Pseudoscience

- Ignores one of the steps
 - avoid making observations, or forming testable and falsifiable explanation, or performing experiments, or reporting the outcome of the test.
- Perverts one of the steps
 - Employs poor-quality evidence, e.g. authority, testimony, logical and reasoning fallacies, etc.

THE PROPERTIES OF PSEUDOSCIENCE

Heavy reliance
on authority

About



About Gillian McKeith

Gillian McKeith is the internationally acclaimed Holistic Nutritionist and presenter of You Are What You Eat hit Channel 4 series that took the nation by storm ([view Gillian McKeith's credentials](#)). The show is now regularly watched by many millions of viewers in more than 34 different countries around the world, and a new series has recently just started called You Are What You Eat: Gillian Moves In!



This is Dr. Gillian McKeith, Ph.D. She is a member of the American Association of Nutritional Consultants, a professional organization. She is a TV health guru in the United Kingdom. She gives all kinds of advice about eating and wellness. *Should you trust her?*

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What matters is not her title or degrees, but why she believes what she believes. The "Dr." in her title doesn't mean "Medical Doctor" - it derives from her Ph.D. She claimed twice (it turns out falsely) to have a Ph.D. from the American College of Nutrition. Her AANC membership was obtained merely by paying the membership fee. Ben Goldacre, physician and science writer, got the same membership for his dead cat, Hettie.

Heavy reliance on
testimonies or anecdotal
evidence

Supporters Of Gillian McKeith

Gillian and McKeith Research Ltd would like to take this opportunity to express the utmost gratitude to the public for all their support. We receive so many wonderful emails from the public and health organizations. If you would like to view some of the testimonials and support Gillian McKeith has received, please click on the links below. The testimonials are particularly heart warming:

Gillian McKeith Testimonials

Craig Sams – Organic Pioneer, Chair of the Soil Association and author of ‘The Little Food Book’

... Gillian's [Gillian McKeith] TV series has dramatically raised awareness among the most hapless victims of junk food: adopting a diet based on grains, pulses, vegetables, salads and wholesome foods can be interesting, healthful and lead to dramatic weight loss that gives them a whole new lease on life. Never once has Dr Ben Goldacre, in all his repetitive attacks in The Guardian, been able to mention the beneficial 'Gillian McKeith effect' (as health stores call it) on the nation's eating habits. Yet this is the heart of the matter.

He completely overlooks the reasons for her [Gillian McKeith] massive popular success in his pettifogging quest for whether she has the qualifications that he and his fellow doctors flaunt as their passport to being a monopoly gateway between pharmaceutical companies and prescription drug addicts. Those addicts got their first dose of a painkiller, tranquiliser or steroid from a qualified doctor, all based on impeccable research from eminent scientists. Once hooked, they are condemned to a lifetime of repeat visits to their doctor/dealer.

Dr Ben Goldacre's current beef is with Gillian's claim to scientific accuracy because her references are not from, what he calls, "proper academic journals". Funny, isn't it, how Dr Ben Goldacre has never written about the fact that the world's leading medical journals banded together in 2005 to tell Big Pharma that they wouldn't publish any more crap research unless the drug companies also owned up about who funded the research.

After mustering courage for that challenge, they had to do it again, this time to curtail the practice of doing research

Testimonials

“

Just wanted to share that my husband and I have been on Gillian's plan for four..

”

Testimonial for Losing Weight..

“

Dear Gillian, My partner and I started watching your show and it is changing ..

”

Testimonial for healthy eating..

Fred, meet Jason

Fred lost 175 pounds by following advice in a book called "Power Aging." Jason halted his migraines by following advice in a book called "The Gluten Connection." Way to go, guy(s).

From human whale to **WOW!** What A Body!

Dr. Gary Null's revolutionary "non-diet" sheds up to 175 pounds in a matter of months and *keeps it off!*

the Whale...

-Fred, movie actor, case history #1. You think it's tough losing 20 pounds, just imagine how desperate Fred felt. "Nobody wanted to hire me because of my size," he said. "Although I did get a job in a movie with DeNiro..."

Quick news for starving dieters!

Instead of depriving you, Dr. Gary Null's **NON-DIET** lets you eat with lots of taste, appetite and muscle. These "metals that last" not only decrease dangerous toxins, but make your body surge with satisfaction. Here's one of the many delicious, appetizing recipes he'll include in your FREE Preview copy of **Bottom Line's POWER AGING**. All were developed in cooperation with master chef Marisa Galliano.

CHOCOLATE WALNUT SHAKE

- 1 cup unsweetened apple juice (or 4 apples)
 - 2 bananas, sliced
 - 1/2 cup organic whole or almond milk (or almond milk)
 - 1 cup unsweetened soy milk
 - 1/2 cup walnuts (you can ground them for smooth powder)
 - 1 teaspoon pure almond extract
- 1 recipe:
In a blender or food processor, combine the juice with the remaining ingredients, and



"I played Jojo the Whale..."

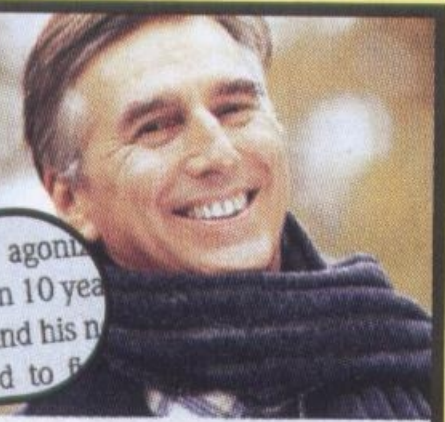
-Fred made actor case history #1/2/3/4. Audiences may have laughed, but there was nothing funny about it. Fred was 175 pounds overweight and it was literally crushing the life out of him. "I was unable to stop from snoring," he says. "I had cognitive brain failure. I was sweating water, vomiting blood."
"I couldn't lie down anymore because of water crashing my lungs."
"I tried every kind of diet you could name, [but] I never could stick to it!"
"It thanks to Dr. Gary Null, Fred's entire life turned around in a flash."

In 9 months, Fred lost 175 pounds without counting calories, carbs or fat...

And so now as YOU learn Fred's secret, you'll never have to "diet" again. **REALLY?** And you'll learn what Fred did, starting on page 170 of your FREE Preview copy of **Bottom Line's POWER AGING**. Dr. Gary Null calls it a **NON-DIET**, because it's not about deprivation. You simply avoid some toxic foods that collapse your tissues and create

10 Years

Jason suffered from agonizing migraines for more than 10 years. Drugs were no help. And his neurologists were mystified to find a



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Three headaches a week escalated into one nonstop headache. It had gotten so bad, he considered early retirement.

Finally, Jason tried the natural program recommended by Dr. Shari Lieberman. Within a few short months, he was 98% headache-free. Ten years of suffering was over.

Banish the Pain Trigger

For many people, gluten is a major trigger for headaches

relieve them once and for all.

Clinically PROVEN Relief!

In **THE GLUTEN CONNECTION** you'll learn about breakthrough medical research on headaches. A medical study examined gluten-sensitive patients who suffered from severe headaches. When patients were put on the program Dr. Lieberman recommends...

90% of Patients Found Relief from Headaches

Dr. Lieberman's program works naturally. And it's better than drugs because it doesn't just treat the symptoms

Non-falsifiable hypotheses

Placing the burden of proof on the existing, successful scientific explanation rather than on their new idea.

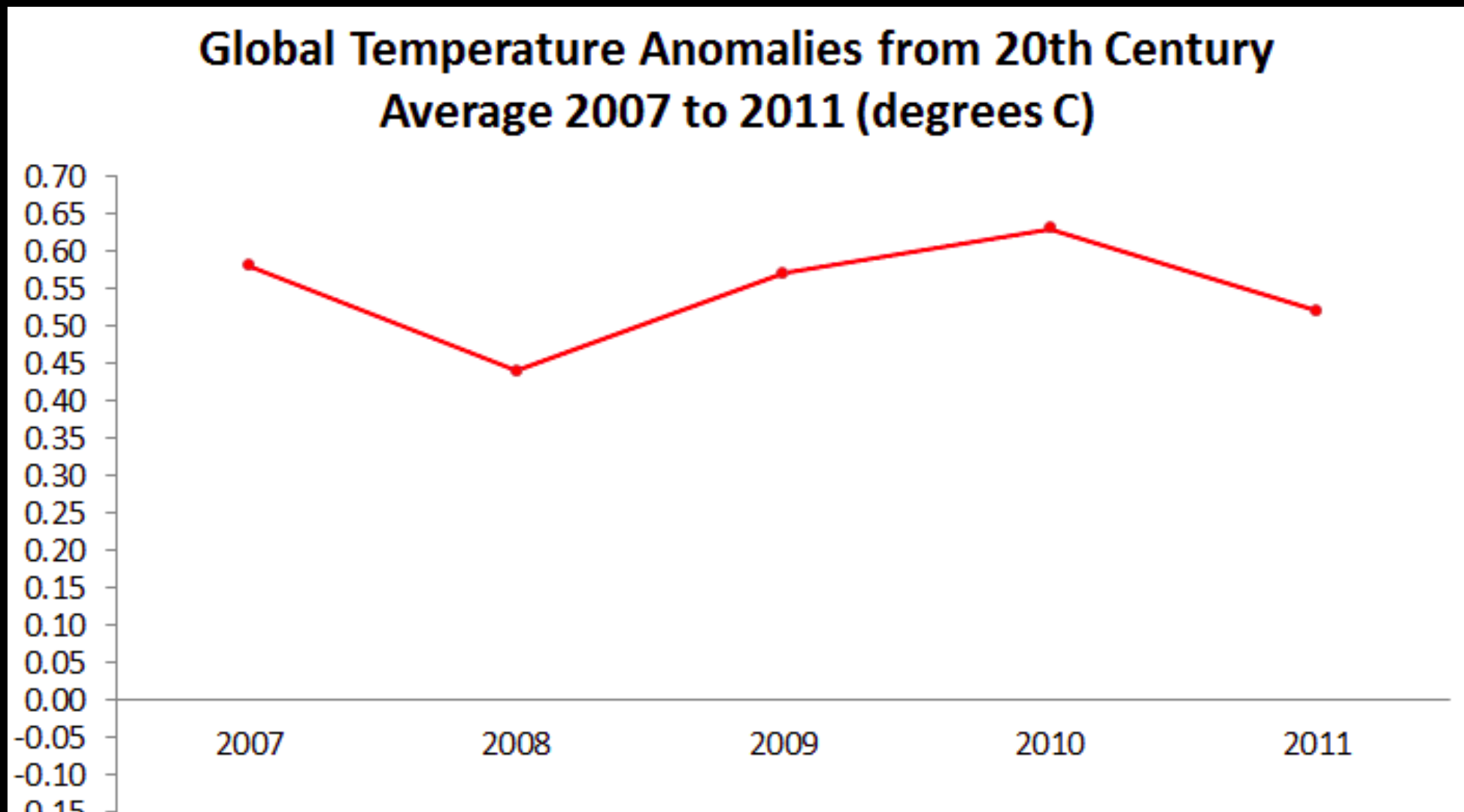
Attacks on existing
explanations without
offering a scientific
alternative

Claims are made such
as, “It cannot be, so it
isn’t so.”

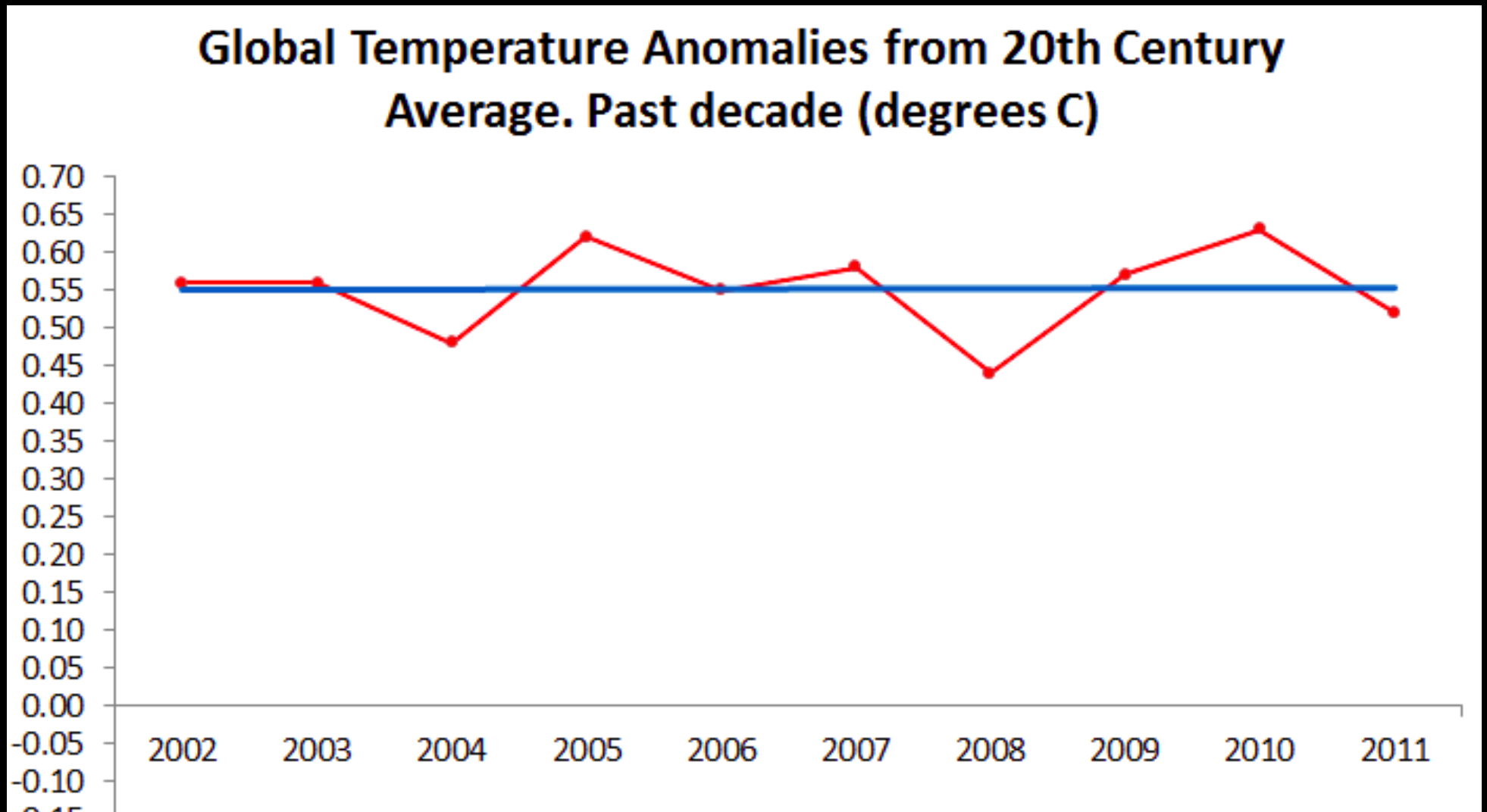
No serious attempt to
disprove the hypothesis

Using patents as evidence

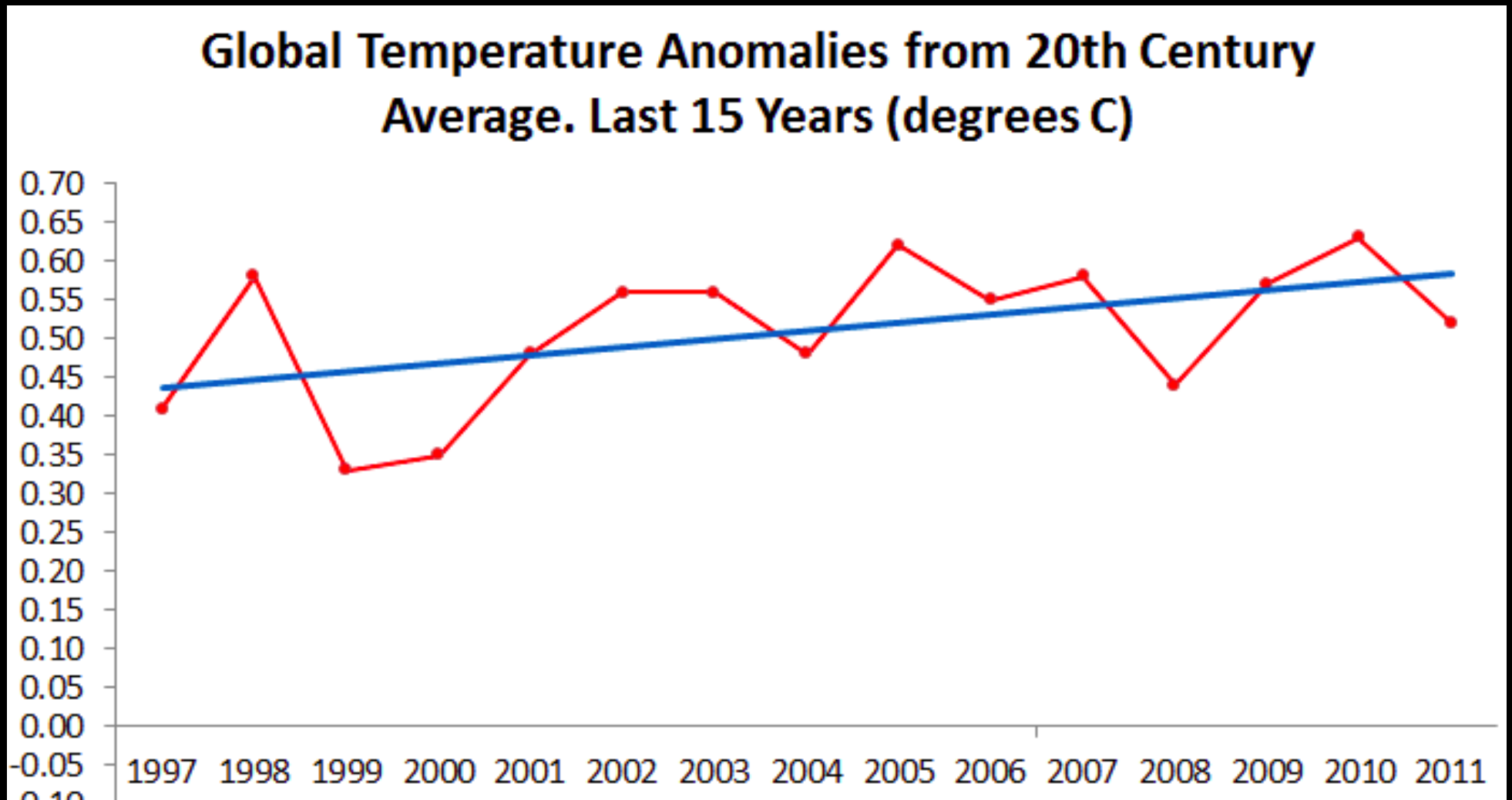
Evidence, though
gathered correctly, is
used selectively –
disconfirming evidence
is ignored.
("cherry picking")



Graphs like this (from “Has Global Warming Stopped?” by Peter Gleick, published in “Forbes”), are often used to make the claim that the atmosphere is no longer heating up. What critical questions do you ask at this point?

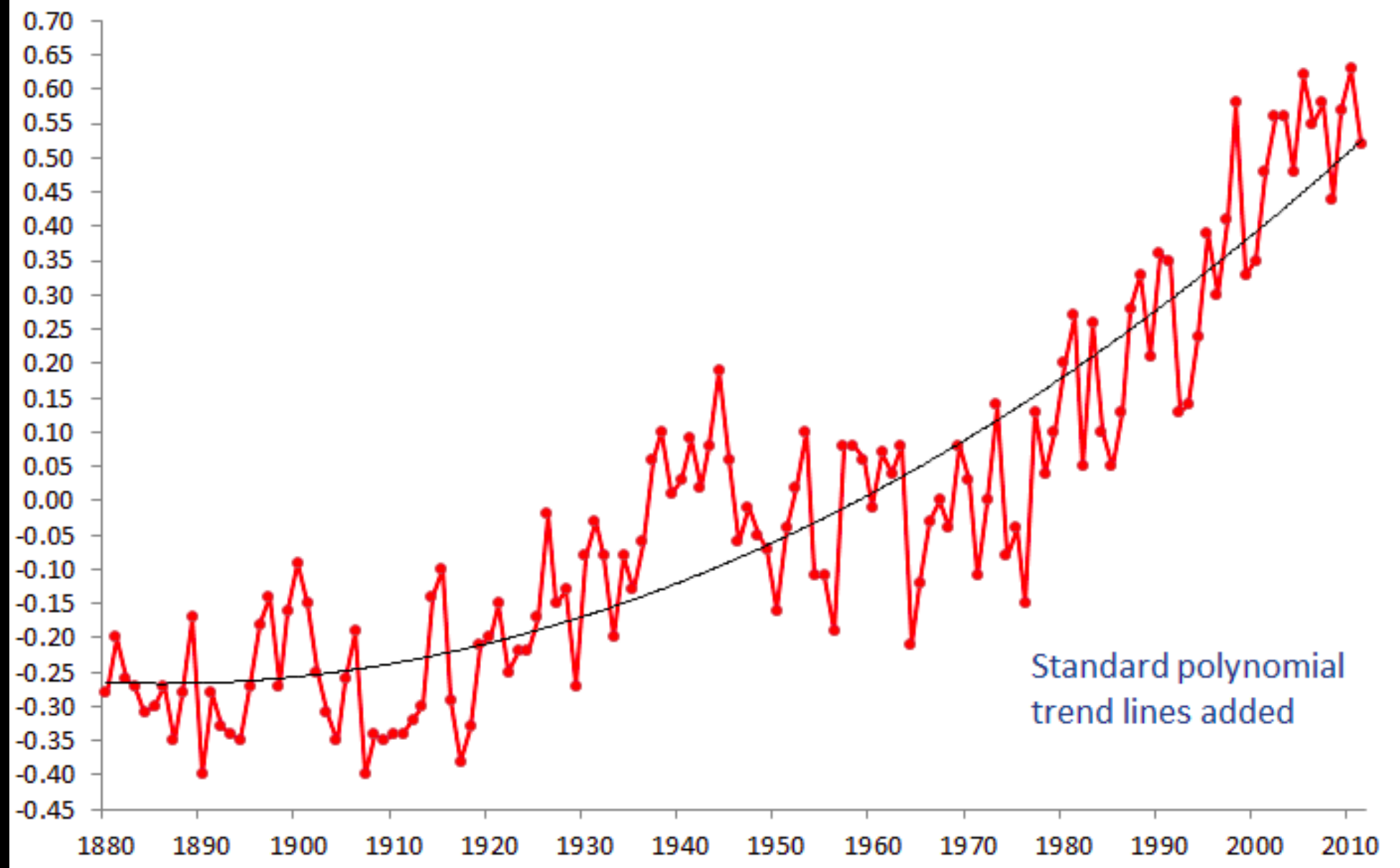


Fitting a line (ala Excel Spreadsheet) to the last decade.





Fitting a line (ala Excel Spreadsheet) to the last 15 years.

Global Surface Temperature Changes from the 20th Century Average (degrees C)



Change in Earth's Total Heat Content

-  Ocean Heating
-  Land + Atmosphere + Ice Heating

Change in Total Heat Content since 1961 (10^{21} Joules)

1960

1970

1980

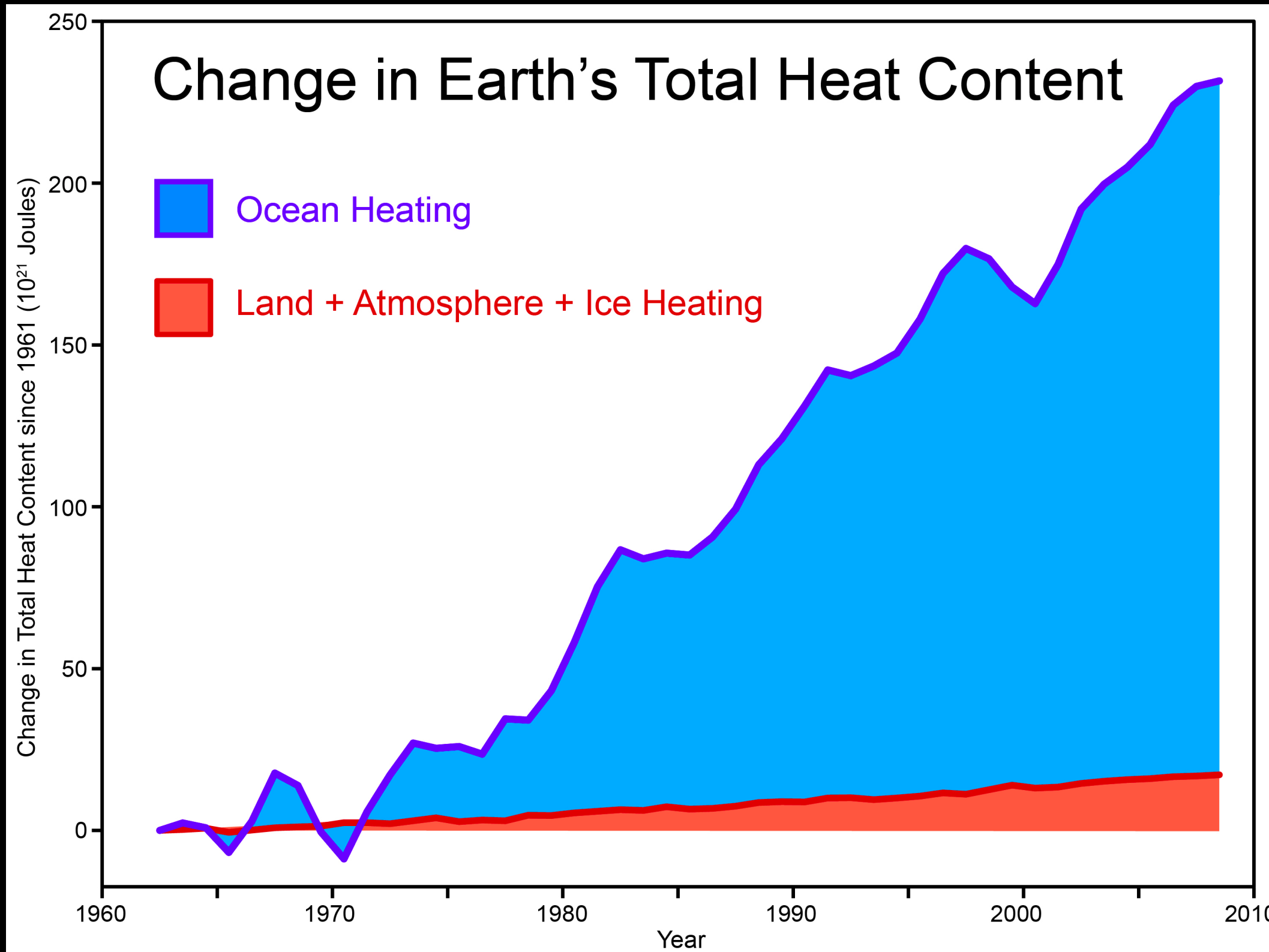
1990

2000

2010

Year

250
200
150
100
50
0



Think about it this way:
*If I have a coin, and I flip the coin
100 times but am allowed to
withhold 75% of the outcomes
from you, I can convince you I
have a coin with two heads or
two tails.*

(example care of Ben Goldacre)

Misrepresenting real
scientific work.

Built-in or “ad hoc”
excuses for failure

The ideas make no progress and generate no new knowledge, even given decades of time.

Claims of forces and
effects are never
measured, or even
observed.

Claims of impossible
precision of
measurement are made

Tests employ very small sample sizes, and are statistically meaningless.

For example, the entire hypothesis behind “Chiropractic medicine” is based on a single experiment, done in 1895 on a single person. Thousands of claims about the ability of chiropractic to heal colds and even polio (!), sprang from this.

No reliable scientific tests were conducted until the late 1990s and early 2000s, and only a few of the claims are yet tested. None of those tests has yielded a positive result over a fake treatment meant to look like chiropractic. Only when comparing chiropractic to massage for relieving certain kinds of back pain is it as good as the best treatment.

Oops.

Etc. Etc. Etc.

Properties of Pseudoscience

- The list is by **NO MEANS** exhaustive
- You need a good baloney detection kit, and these properties are among the many that, when detected, should make your skepto-meter in your brain start to twitch.