WHY I'M AFRAID OF GLOBAL WARMING

John Parejko

2008.05.23

PGSA Friday Talk
YES, EARTH’S CLIMATE IS WARMING.

Now, you’re probably asking yourself...
HOW CAN HE BE SO CERTAIN?

The scientific consensus is very, very solid.
HOW CAN HE BE SO CERTAIN?

No, I haven’t seen An Inconvenient Truth.

The scientific consensus is very, very solid.
THE STANDARD OBJECTIONS

For now, I’ll just have to assert these points.
1. I don’t think I really need to reply to this one, but see Oreskes, 2004.
2. The plural of anecdote is not data.
3. IPCC 2007: “[studies say that] any urban-related trend is an order of magnitude smaller than decadal and longer time-scale trends evident in the series”.
4. Ice in a few locations may be growing, but overall ice sheets are shrinking.
5. One original statistical analysis flawed, but trend correct and verified in many subsequent papers.
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• Global Warming is a Hoax!

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- Global Warming is a Hoax!
- It was cold in Wisconsin this year!

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• Ice at _____ is growing.
• The Hockey Stick is broken!

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YES, HUMAN PRODUCED CO$_2$ IS THE PRIMARY CAUSE.

The previous one is agreed on by roughly everyone. But, again, you’re probably asking yourself...
HOW CAN HE BE SO CERTAIN?

The scientific consensus is, again very, very solid.
HOW CAN HE BE SO CERTAIN?

No, I haven’t received payments from Greenpeace.

The scientific consensus is, again very, very solid.
Again, I just have to assert these.
1. No known mechanism. CO2 up 35% => basic radiative transfer => warming!
2. No increase in sun’s output. Stratospheric cooling. Other planets not warming!
3. Warming/CO2 feedback. But CO2 has increased first this time.
4. Interesting idea, but no.
THE STANDARD OBJECTIONS

- It’s just natural cycles.

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• It’s just natural cycles.
• It’s the sun, stupid! “Mars is too!”

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- Warming leads CO$_2$

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• Warming leads CO₂
• Cosmic Rays

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HOW UNCERTAIN ARE THE MODELS?
How big are the uncertainties in the models? Red bar is IPCC uncertainty, green is additional due to reanalysis. Remember: ~3–4° is the difference between an ice age and now.
HOW CERTAIN ARE THEY?
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You wanna bet?
THE BET


How much would you bet?
That’s like a million dollars!
THE BET


1. Will 2000-2010 be cooler than 1994-2004?

How much would you bet?
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1. Will 2000-2010 be cooler than 1994-2004?
   €2500 for each period

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SENSITIVITY TRAINING
WHAT IS CLIMATE SENSITIVITY?

$T_i(X)$ where $X$ is CO$_2$ concentration

$\Delta T = T_f(2^X) - T_i(X)$


Roe and Baker, 2007: “Climate sensitivity is defined as the equilibrium change in global and annual mean surface air temperature, $\Delta T$, due to an increment in downward radiative flux, $\Delta R_f$, that would result from sustained doubling of atmospheric CO2 over its preindustrial value (2 x CO2).”
2578 simulations, each with slightly tweaked parameters. Double digits are a possibility (this is one example). No simulations < 2°, most near 3.5°, a few ~11°
Sanderson: ~5700 runs from climateprediction.net
Breadth of the distribution is insensitive to decreases in uncertainty.
Fit is empirical distribution function.
Various studies with different analysis methods. Same basic result. Very low sensitivities are ruled out, very high sensitivities are unlikely, but not ruled out. Just talking about the mean or median of this distribution can be misleading: it’s not symmetric!
Where is the “standard” warming scenario?
Baker & Roe: On the basis of the values ... compiled from our analysis of a large number of published results, it is evident that the climate system is operating in a regime in which small uncertainties in feedbacks are highly amplified in the resulting climate sensitivity. We are constrained by the inevitable: the more likely a large warming is for a given forcing (i.e., the greater the positive feedbacks), the greater the uncertainty will be in the magnitude of that warming.
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of that warming.
What can we do?

Big changes are *necessary* if we want to avoid the worst.
What can we do?

Buy organic Levis?

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What can we do?

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Real solutions are not so palatable.

Big changes are *necessary* if we want to avoid the worst.
Climate Change for beginners


GET THE CLIMATE MODEL DATA:
HTTP://WWW-PCMDI.LLNLS.GOV/