

WHY I'M AFRAID OF GLOBAL WARMING

John Parejko

2008.05.23



PGSA Friday Talk

Ai thotz u had keez!

ICANHASCHEEZBURGER.COM

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



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YES, HUMAN
PRODUCED CO₂
IS THE
PRIMARY CAUSE.

The previous one is agreed on by roughly everyone.
But, again, you're probably asking yourself...

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The scientific consensus is, again very, very solid.

HOW CAN HE BE
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No, I haven't received payments from Greenpeace.

The scientific consensus is, again very, very solid.

THE STANDARD OBJECTIONS

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.

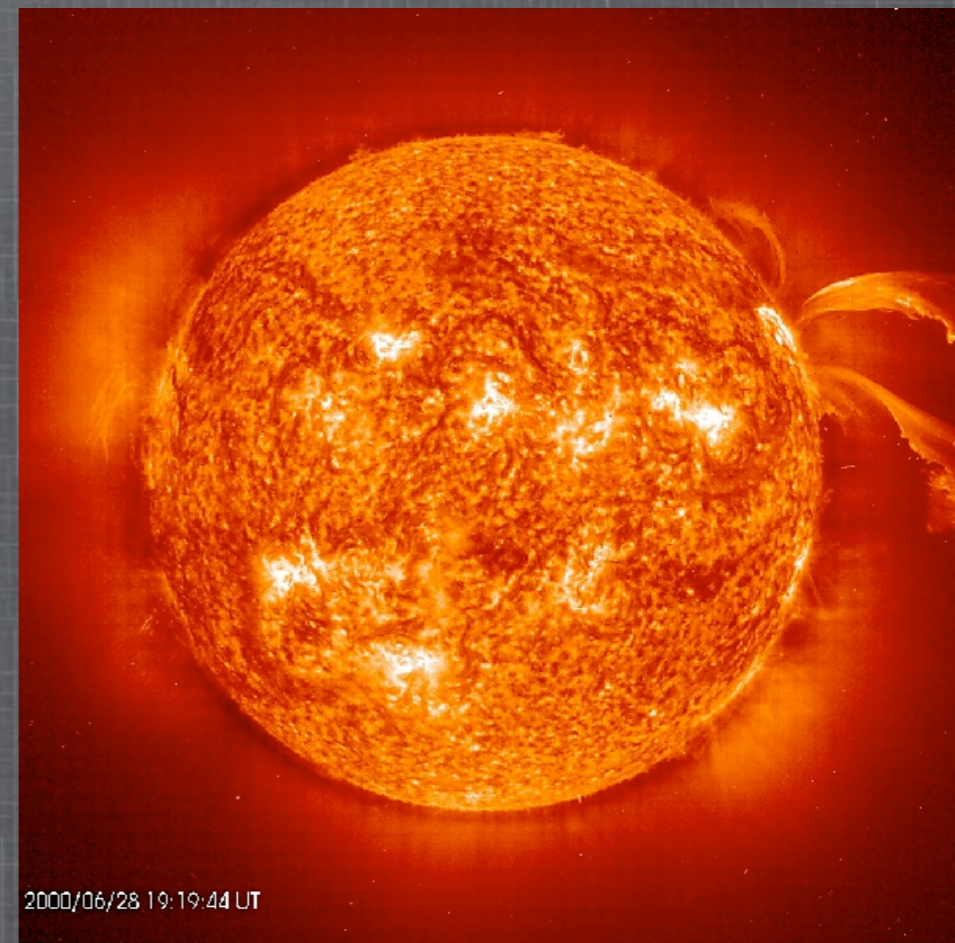


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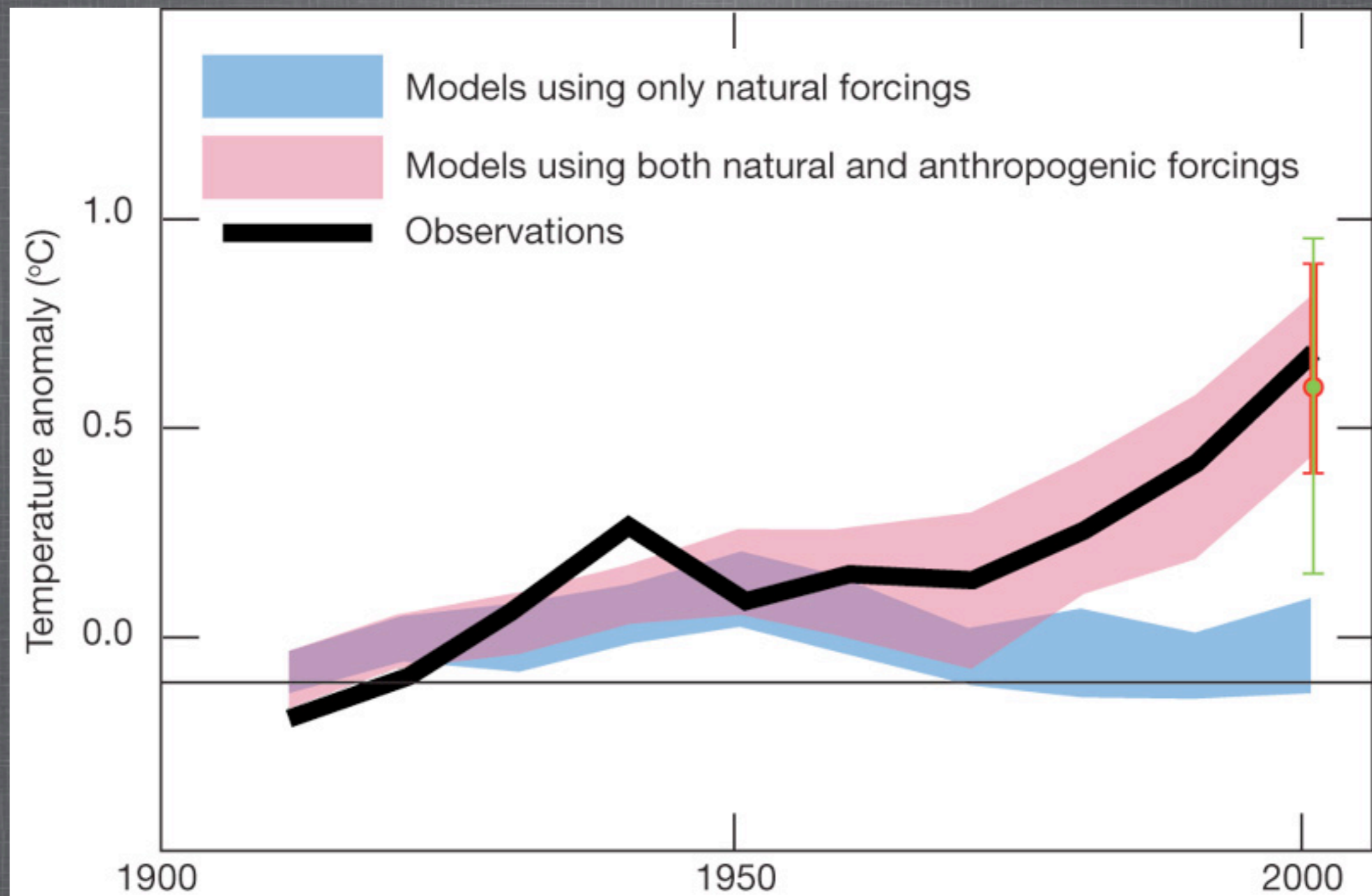
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- Warming leads CO₂
- Cosmic Rays



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HOW
UNCERTAIN
ARE THE
MODELS?



Scharwitz, Carlson & Rhodes, Nature Reports, 2007

How big are the uncertainties in the models?

Red bar is IPCC uncertainty, green is additional due to reanalysis.

Remember: $\sim 3-4^\circ$ is the difference between an ice age and now.

HOW CERTAIN
ARE THEY?

HOW CERTAIN
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You wanna bet?

THE BET

<http://www.realclimate.org/index.php/archives/2008/05/global-cooling-wanna-bet/>

How much would you bet?
That's like a million dollars!

THE BET

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Realclimate.org vs.

Keenlyside et al., Nature, 2008

1. Will 2000-2010 be cooler than 1994-2004?
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1. Will 2000-2010 be cooler than 1994-2004?
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€2500 for *each* period

How much would you bet?
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SENSITIVITY TRAINING

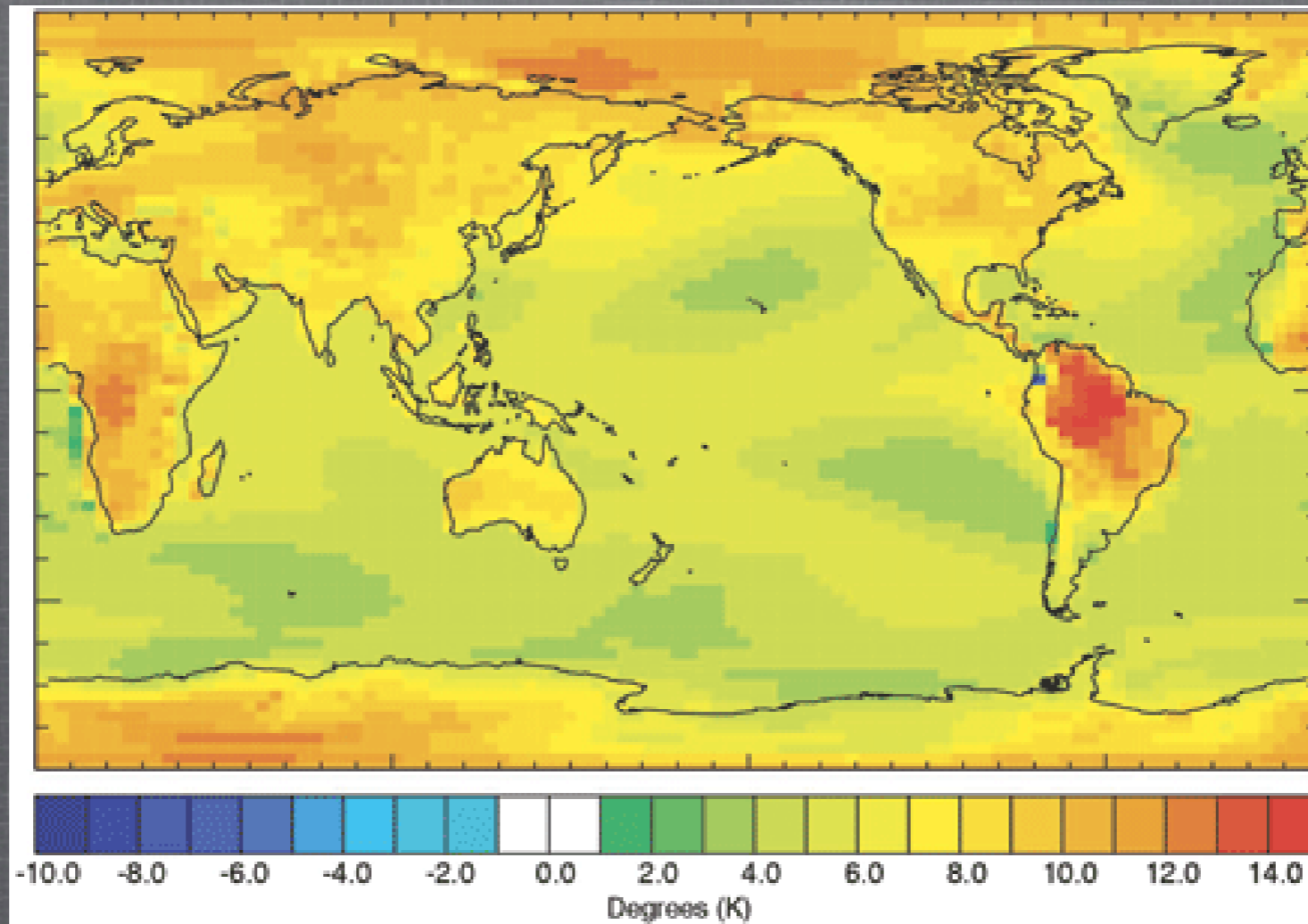
WHAT IS CLIMATE SENSITIVITY?

$T_i(X)$ where X is CO_2 concentration

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

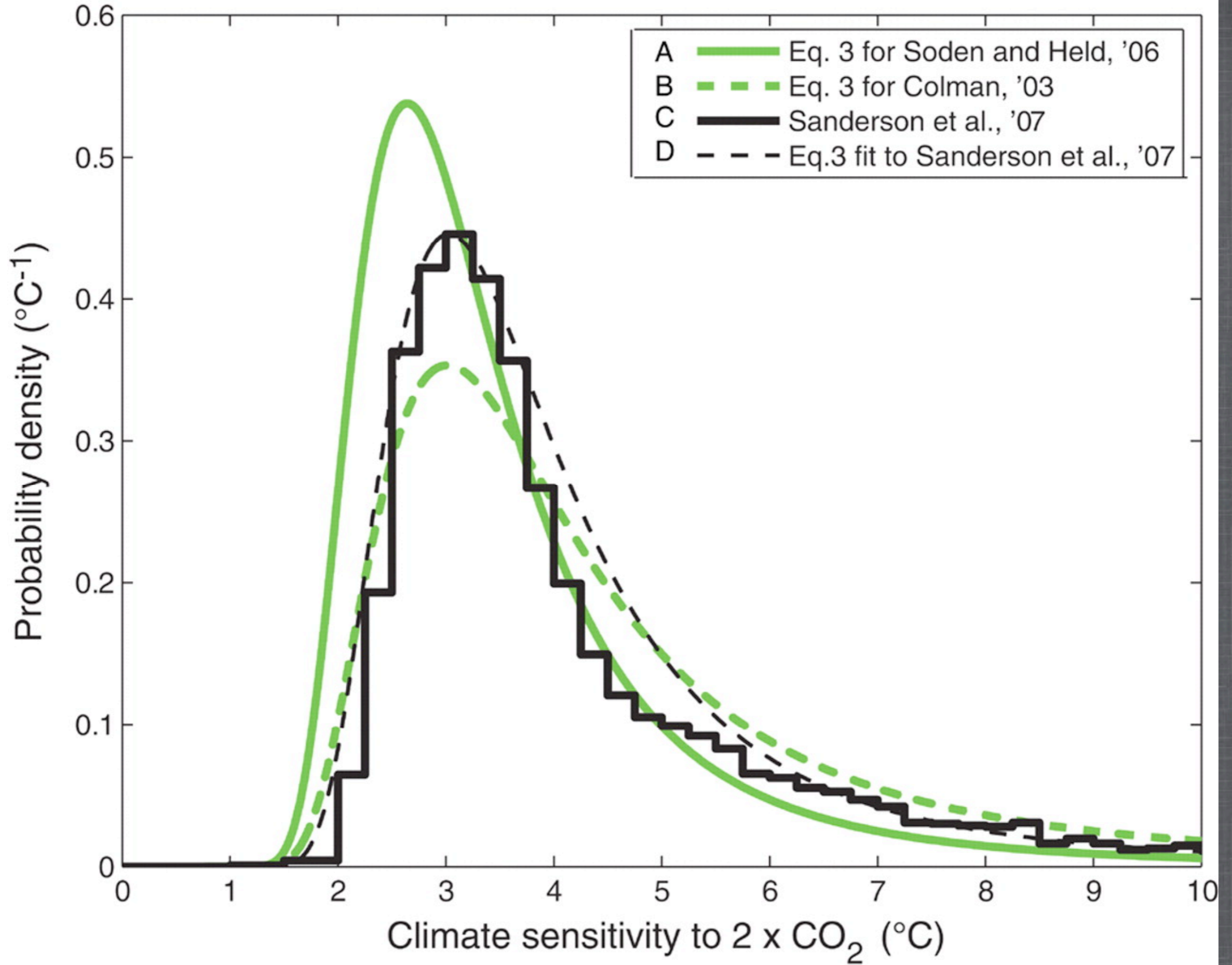
Roe & Baker, *Science*, 2007

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 CO_2 over its preindustrial value ($2 \times \text{CO}_2$)."



Climateprediction.net, Nature, 2005

2578 simulations, each with slightly tweaked parameters.
Double digits are a possibility (this is one example).
No simulations $< 2^\circ$, most near 3.5° , a few $\sim 11^\circ$

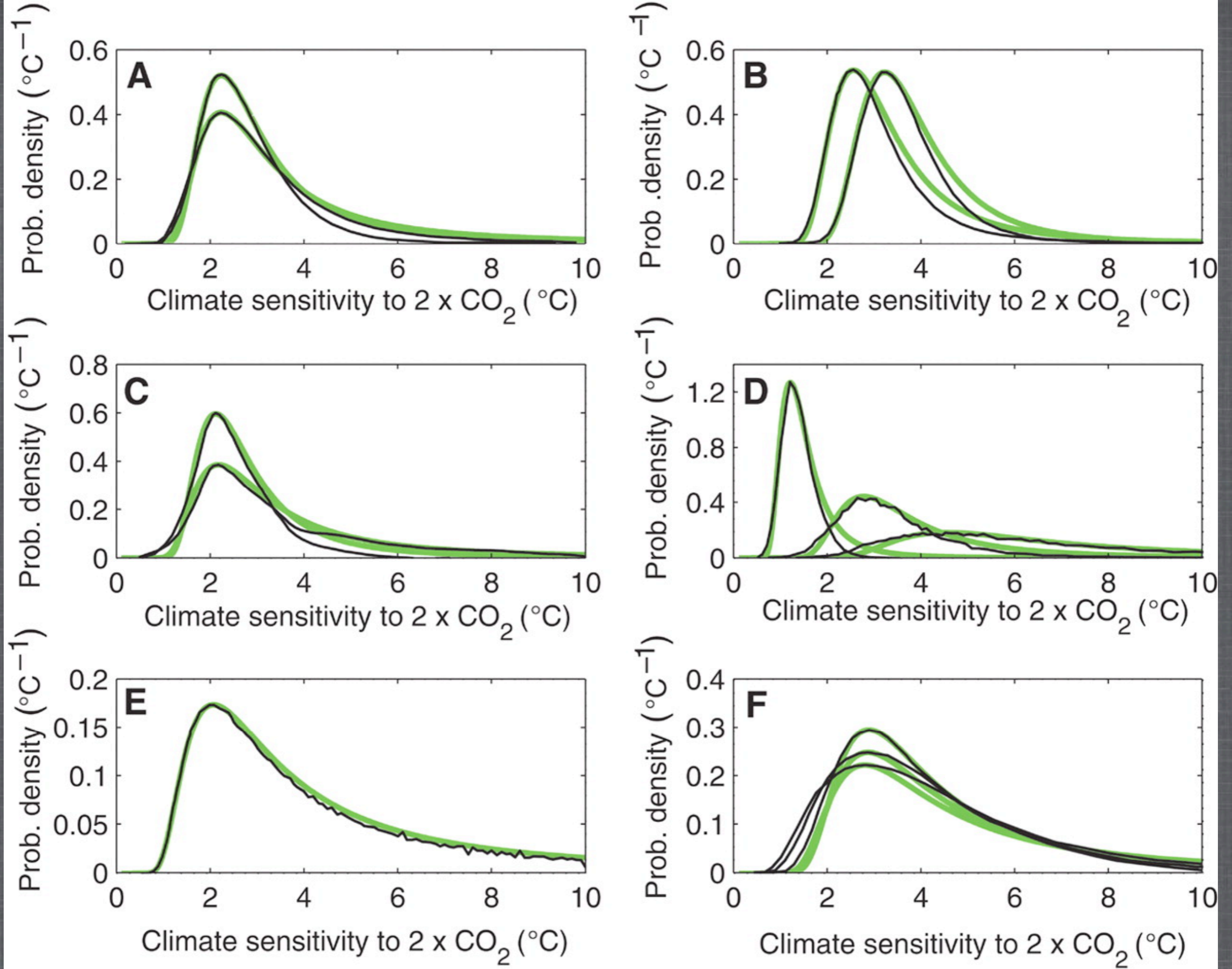


Roe & Baker, *Science*, 2007

Sanderson: ~5700 runs from climateprediction.net

Breadth of the distribution is insensitive to decreases in uncertainty.

Fit is empirical distribution function.

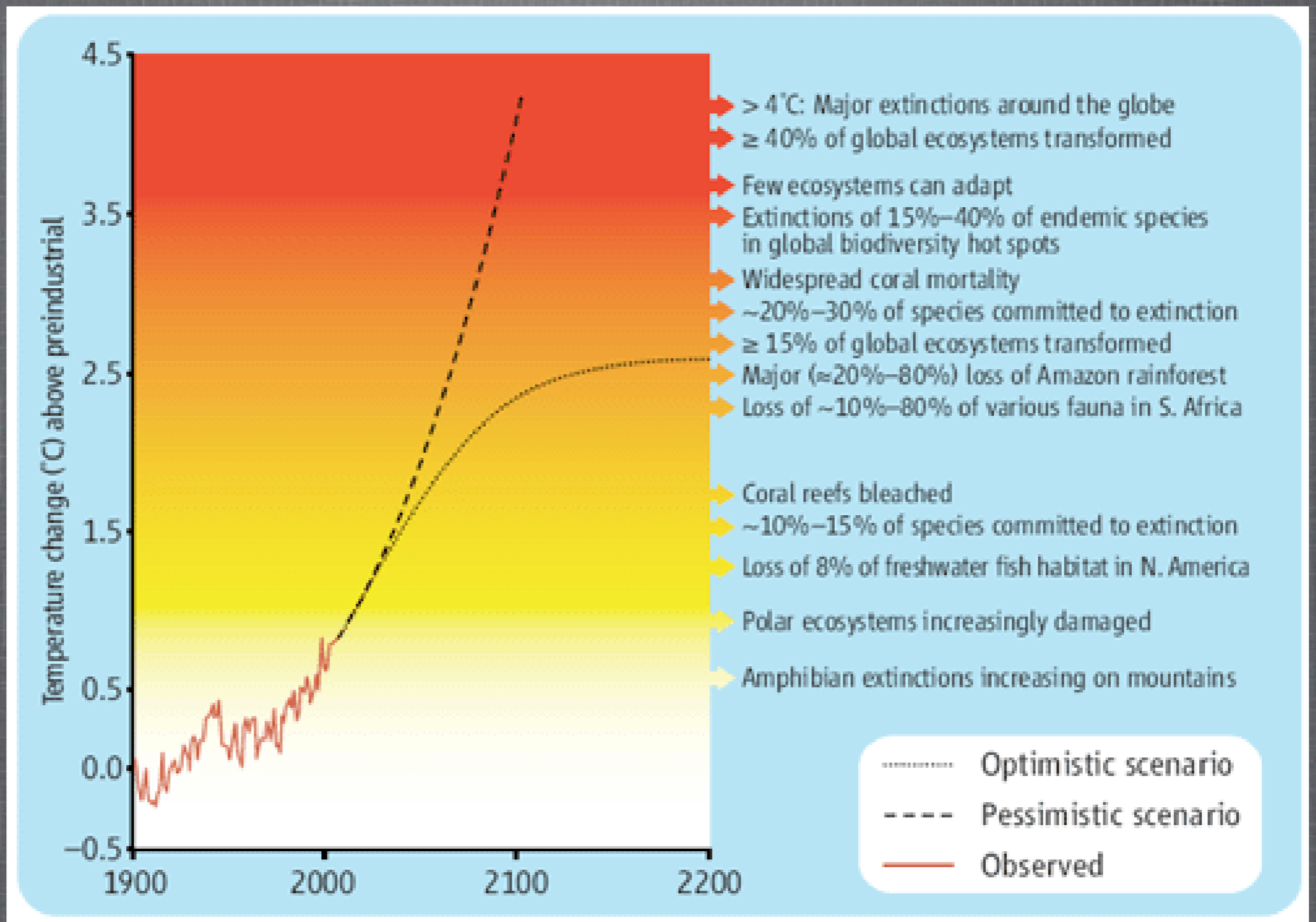


Roe & Baker, *Science*, 2007

Various studies with different analysis methods. Same basic result.

Very low sensitivities are ruled out, very high sensitivities are unlikely, but not ruled out.

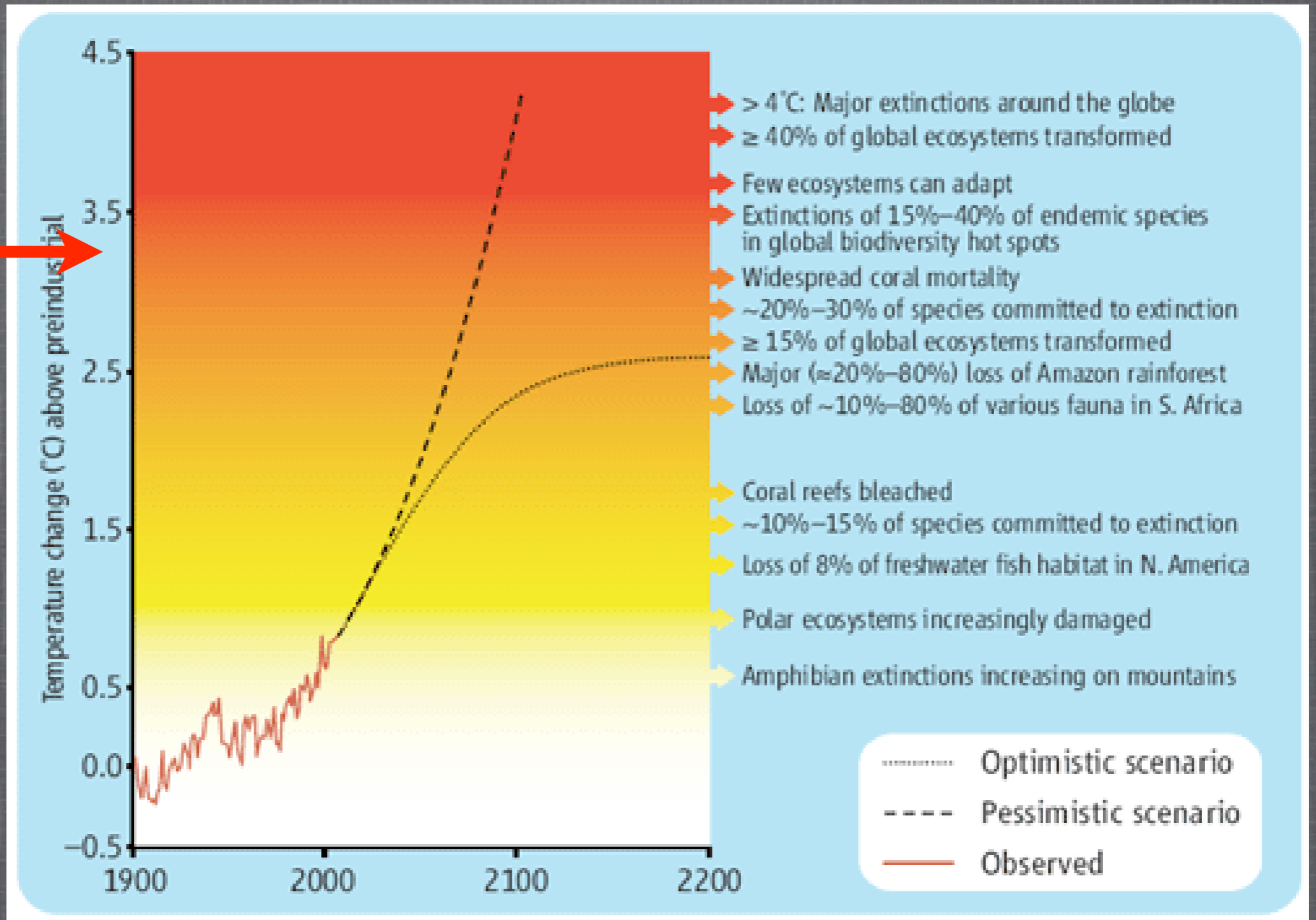
Just talking about the mean or median of this distribution can be misleading: it's not symmetric!



IPCC 2007 Technical Summary Printed in Kerr, Science, 2007

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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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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Real solutions are not so palatable.

Big changes are *necessary* if we want to avoid the worst.

REALCLIMATE.ORG

SCIENCEMAG.ORG

Climate Change for beginners

<http://www.realclimate.org/index.php/archives/2007/05/start-here/>

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