

# **Current Climate Models for Forecasting: Weaknesses**

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*“We must . . . stop tolerating the rejection and distortion of science.”*

Al Gore, *The Assault on Reason*, 2007

# Conclusions

1. Current climate models (GCM) do not provide forecasts – they provide modelers' speculations.
2. Given the complexity & uncertainty of the situation, it is unlikely that climate models could be adapted to provide useful forecasts.
3. The key issue is the process, not the facts.  
*How are facts used to prepare a forecast?*
4. Forecasting audits provide a tool for assessing the process.

# Am I qualified?

I have been doing research on forecasting for nearly half a century.

A founder of:

- *Journal of Forecasting*
- *International Journal of Forecasting*
- forecastingprinciples.com

Author of *Long-range Forecasting* (1978; 1985) and over 70 papers on forecasting.

Editor of the *Principles of Forecasting* handbook.

*I am not and never have been an expert in climate. Nor do I intend to be, as I will explain.*

# **Am I biased?**

I have received sponsorship from the International Institute of Forecasters for [publicpolicyforecasting.com](http://publicpolicyforecasting.com) and for [theclimatebet.com](http://theclimatebet.com)

I was part of a small consulting project with the State of Alaska in 2007.

# What are scientific forecasts?

- “Forecasts derived from evidence-based methods”
- Evidence from over half a century of research in
  - Economics
  - Finance
  - Weather
  - Sociology
  - Medicine
  - etc.
  - Psychology
  - Marketing
  - Production and inventory
  - Engineering
  - Demography
- Summarized as principles
  - [forecastingprinciples.com](http://forecastingprinciples.com)  
(first in Google search for “Forecasting”)
  - *Principles of Forecasting* (Armstrong 2001)  
(39 authors and 123 reviewers)

# **Examples of forecasting principles**

Avoid experts' unaided\* judgments

Avoid complex models

Be conservative when uncertainty is high

\* Unaided by scientific forecasting principles

# **Is climate change immune from forecasting principles?**

People who assert “yes” have been unable to provide any supporting evidence.

# The Forecasting Problem

For policy recommendations based on global warming, forecasts must be accurate for each of the following areas:

1. Long-term temperature change
2. Effects of temperature changes
3. Effects of feasible policy changes

# Forecasts from climate modelers

Some climate modelers claim that *their models do not make forecasts*.

- However, many climate modelers *claim* to make forecasts:
  - “forecast” and derivatives occurred 37 times, and “predict” and derivatives 90 times in Chapter 8 of the 2007 IPCC report.
- Climate experts use models to express their judgments—the assumptions that go in and adjustments to what comes out. That is, they make “expert forecasts.”

“Today’s scientists have substituted mathematics for experiments, and they wander off through equation after equation and eventually build a structure which has no relation to reality.”

– (Nikola Tesla, inventor and electrical engineer, 1934).

# Can experts make useful forecasts of climate change?

Armstrong (1978, *Long-range Forecasting*) summarized studies to date: people with much expertise are no better at forecasting than those with little expertise.

Tetlock (2005, *Expert Political Judgment*) evaluated 82,361 forecasts made by 284 professionals (whose job involves “commenting or offering advice on political and economic trends”) over 20 years: expertise did not produce better forecasts.

Fortunately for experts, the Seer-sucker theory offers hope:

“No matter how much evidence exists that seers do not exist, seers will find suckers.” (Armstrong 1978)

# **Experts *cannot* make useful forecasts in complex and uncertain situations**

Higher expertise *harms* accuracy to the extent that there is new and valid information.

Additional information does not help experts to make better forecasts.

...

Think about that. It is an astounding finding.

# **Implications of findings on unaided expert judgment**

1. Collecting and reporting facts:  
*Not useful for experts' forecasts*
2. Arguing about the meaning of facts:  
*Not useful for experts' forecasts*
3. How facts are processed (forecasting):  
*Vital. This is where science is lacking.*

# Use of scientific literature

Google searches in April 2007 revealed no citations of scientific literature *on forecasting* in global warming literature.

In other words, no obvious attempt to *forecast* in a scientific manner.

# Identifying key papers on forecasting climate change

Sent requests to 240 climate experts (70% were IPCC authors or reviewers),

“We want to know which forecasts people regard as the most credible and how those forecasts were derived...

- In your opinion, which scientific article is the source of the most credible forecasts of global average temperatures over the rest of this century?”

51 (21%) responded, of which

42 included references, of which

30 referred to latest IPCC report

## **Scientific literature in IPCC chapter 8**

Of the roughly 650 references cited in IPCC 8, none had any obvious relationship to scientific forecasting methods.

# Forecasting audit process

All elements of the forecasting process were examined independently by two people to:

- identify relevant principles
- assess whether proper procedures were used.

# Audit of IPCC Chapter 8

127 of the 140 principles in *Forecasting Audit* were relevant.

Authors rated the forecasting procedures independently, then resolved differences via email.

- 89 principles rateable.
- 72 principles contravened.
- 13% of principles properly applied.

# Some contraventions

Use simple forecasting methods: **x**

Test on out-of-sample data: **x**

Provide easy access to data: **x**

# **Full disclosure & open peer review**

This audit is fully-disclosed at  
[publicpolicyforecasting.com](http://publicpolicyforecasting.com)

Invitations to apply the *Forecasting Audit*  
to Ch. 8—or to another climate  
forecasting paper and publish on  
[publicpolicyforecasting.com](http://publicpolicyforecasting.com)

We welcome commentary and continuing  
peer review of our paper.

# No scientific forecasts to date

Climate is complex.

Much uncertainty:

- causes of changes are disputed,
- causal factors are difficult to forecast,
- data are subject to error.

In such conditions, climate models, *even if properly developed as forecasting models*, might be inferior to the simple naïve model, which assumes complete ignorance about climate.

This led to the Global Warming Challenge.

# The Global Warming Challenge

*Predict global mean temp over 10 years.*

- Al Gore selects any current climate model
- Scott Armstrong will forecast *no change*

Each deposits \$10,000 in a trust fund in Dec. 2007. Value to winner's charity in 2018.

1. Proposed June 19, 2007 with Dec. 1, 2007 deadline
2. Mr. Gore replied -- too busy.
3. Armstrong simplified – check one box & sign name -- & extended deadline to March 26, 2008.
4. Mr. Gore replied – he does not make financial bets.
5. Armstrong dropped the financial part and suggested that the challenge be done simply in the interests of science.
6. Waiting . . . again

# Purpose of the Challenge

I expect the naïve method to be more accurate -  
-and in a nonscientific Internet poll, 82%  
expected that Armstrong would win  
\_\_\_ only 12% expected Gore would win  
(theclimatebet.com August 2, 2007)

Winning is not important. In contrast to the  
current approach, based on anecdotes and  
emotion, a Gore/Armstrong collaboration could  
foster the use of science in forecasting:

Updates on challenge provided at  
[theclimatebet.com](http://theclimatebet.com)

along with full-text copies of Green  
& Armstrong's paper,

"Global Warming: Forecasts by  
Scientists versus Scientific Forecasts"

# **A failure in any of three problems negates public policy recommendations**

1. Long-term temperature change\*
2. Effects of changes
3. Effects of feasible policy changes

# **Public policy should be based on scientific forecasting**

Experts' judgmental forecasts are of no value.

Forecasting processes should be judged against scientific principles.

# **Standards for publicpolicyforecasting.com**

Researchers can publish audits.

Content

- Full or partial evidence-based audits
- Full disclosure of the audit

Moderated to avoid

- “advertisements”
- ad hominem arguments

Attributed contributions with contact, bio,  
and potential bias.

# Conclusions

We have been unable to find a single scientific forecast to support global warming

Forecasts by climate experts are of no value.

Climate will change in the future, but...

- To date, the most sensible forecast is for "no change"  
We are unsure of the direction of change.
- Scientific forecasting methods can be tested to see if any are more accurate than the "no change" forecast.

So where should we go from here?

## **A scientific approach to forecasting climate change**

1. Avoid, and report potential sources of, bias.
2. Consider alternative explanations.
3. Examine comparative empirical evidence.
4. Use valid methods.
5. Provide full disclosure.
6. Present findings clearly.
7. Obtain peer review to improve studies (not to censor).
8. Avoid non-scientific practices (e.g., *ad hominem* arguments; propaganda).

How many scientists do you know who meet these scientific standards with respect to *forecasting* climate change:

a) among the global warmers? \_\_\_\_\_

b) among the skeptics? \_\_\_\_\_

If you are not clear on this, see the many excellent summaries (e.g., by Christopher Monckton)

# **Discussion should focus on scientific methods**

Scientists who warn of dangerous man-made global warming pick facts to support their beliefs.

Skeptics produce facts to refute warmers.

But, as shown, facts are of no value for experts' forecasts.

*Discussion should focus on how the data are used to develop forecasts.*