GREENPEACE
702 H Street, NW, Suite 300, Washington, DC 20001
Tel: 202-462-1177 • Fax: 202-462-4507

20 February, 2015

Mr. John Koskin
Commissioner
Internal Revenue Service
1111 Constitution Avenue Northwest
Washington, DC 20224

Dear Mr. Koskin:

I am writing to you with concern that grants that the Charles G. Koch Foundation awarded to the Smithsonian Institution (Harvard-Smithsonian Center for Astrophysics) from 2010 to 2012, earmarked to fund scientific studies by Dr. Willie Soon, may have been used in violation of the law. Specifically, it appears that these grants may have been used to influence legislation, in apparent violation of Section 170(c)(2)(B) of the Internal Revenue Code.

I will outline these concerns in greater detail, below.

According to documents made public by the Harvard-Smithsonian Center for Astrophysics under the Freedom of Information Act, the Charles G. Koch Foundation sent a letter to the Harvard-Smithsonian Center on September 21, 2009, confirming an award of $65,000 to support research by Dr. Willie Soon. [SEE ATTACHMENT A.]

The Koch Foundation letter states in pertinent part:

> You have previously agreed that the grant will be expended only for an educational, scientific, literary, or other charitable purpose described in Section 170(c)(2)(B) of the Internal Revenue Code ("Code"), and that **the grant will not be used to influence legislation**, to influence the outcome of any election, for a political campaign or intervention, or to carry on any voter registration drive. [emphasis added]

Attached to the Koch Foundation letter is a copy of Dr. Soon's proposal. According to the proposal, Dr. Soon would use the Koch money to study "Solar Variability and Climate Change: Signals from the Temperature Records of the United States."

Smithsonian documents reveal that the Charles Koch Foundation funded Dr. Soon's work from 2010 to 2012 with at least two separate grants listed by Smithsonian as "Understanding Solar Variability and Climate Change" ($65,000 in 2010 and $55,000 for Fiscal Years 2010-2012). [SEE ATTACHMENT B.]

In 2013, just after the Charles Koch Foundation provided this funding to Dr. Soon, he appeared before the House Energy and Environment Committee in the Kansas State Capitol. The Kansas Legislature was debating a bill to delay or modify mandates established by the

Kansas Renewable Energy Standards Act.[1] Dr. Soon testified in order to influence the outcome of that vote. The minutes of that meeting state:

> Dr. Willie Soon gave a slide presentation (Attachment 2). To summarize his remarks: 1) no experimental data exist that support the view that the earth's climate is changing in a dangerous manner; 2) carbon dioxide, CO2, is merely a bit player in climate change, and rising CO2 is largely beneficial to plant and human life; 3) the sun is a primary driver of climate change, and has a greater impact than changes in CO2; and 4) climate models cannot be trusted because of their poor representation of water—solid, liquid, and gas. [SEE ATTACHMENT C.]

During his presentation, Dr. Soon presented a set of slides. One of those slides is titled "Solar Modulation of the Daytime High Temperature of the USA." [SEE ATTACHMENT D.]

The scientific data used by Dr. Soon to influence the Kansas State Legislature seems remarkably similar to the scientific research funded by Koch. The use of any Koch funded research to "influence legislation" being considered by Kansas State Legislature appears, according to the Koch Foundation's own letter, to violate Section 170(c)(2)(B) of the Internal Revenue Code.

Furthermore, on November 8, 2011, an official with the Smithsonian Astrophysical Observatory sent the Koch Foundation an emailed letter. That email asks for an extension of the deadline for completing the goals of Dr. Soon's project through January 2012. In the email, the Smithsonian official lists several work products that Dr. Soon had accomplished with the Koch Foundation grant. These products are listed under the heading "Progress thus far is summarized below."

One of these products reads:

> Preparation of the scientific report "Research to date on forecasting for the manmade global warming alarm" by Scott Armstrong, Kesten Green, and Willie Soon (as supporting document for the Testimony of Scott Armstrong to the Subcommittee on Energy and Environment on March 31, 2011). [SEE ATTACHMENT E.]

This testimony was given before a subcommittee of the House Committee on Science and Technology by Dr. J Scott Armstrong of the University of Pennsylvania. When we read a copy of that testimony, there was no mention that Dr. Soon's contribution to the testimony was funded by the Charles Koch Foundation. [SEE ATTACHMENT F.] With regards to Dr. Soon's contribution, the testimony states "all views expressed are strictly his own." And the testimony argues, "government funding should not be provided for climate-change forecasting." Oddly enough, this Koch-supported testimony also said that the "government should instead rely on independent forecasters."

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[1] Nikki Wentling, "Legislature considering delays in renewable energy standards," *Lawrence Journal World*, Feb 5, 2013, accessed online February 3, 2015. See also: http://www2.ljworld.com/news/2013/feb/05/legislature-considering-delays-renewable-energy-st/

We are concerned that the Smithsonian Astrophysical Observatory (which is part of the Harvard Smithsonian Center for Astrophysics) allowed Koch Foundation funds to be used to support Dr. Soon in preparing testimony to influence the United States Congress on potential legislation regarding government appropriations for climate change research. And we share the Koch Foundation's concerns that Dr. Soon should not use his Koch funded research to "influence legislation" in violation of Section 170(c)(2)(B) of the Internal Revenue Code.

In order to clear up these matters, we are also providing this information to the House Committee on Science, Space and Technology; the Senate Committee on Finance; and the House Committee on Ways and Means. In addition, because Dr. Armstrong has given similar testimony at other congressional committees, we are providing copies to the United States Senate Committee on Environment and Public Works.

Thank you for your attention to this matter.

Sincerely,

Ann Leonard
Executive Director
Greenpeace US

cc: United States House Committee on Science, Space and Technology
United States Senate Committee on Finance
Unites States House Committee on Ways and Means
United States Senate Committee on Environment and Public Works
Mr. Richard Fink, Charles G. Koch Foundation

# ATTACHMENT A

Charles G. Koch
CHARITABLE FOUNDATION

September 21, 2009

Charles Alcock
Director
Harvard-Smithsonian Center for Astrophysics
60 Garden Street
Cambridge, MA 02138-1516

Dear Mr. Alcock:

Pursuant to the request of the Smithsonian Institution, we are happy to enclose our check in the amount of $65,000 in support of research to be conducted under the direction of Dr. Willie Soon at the Harvard-Smithsonian Center for Astrophysics.

You have previously agreed that the grant will be expended only for an educational, scientific, literary, or other charitable purpose described in Section 170(c)(2)(B) of the Internal Revenue Code ("Code"), and that the grant will not be used to influence legislation, to influence the outcome of any election, for a political campaign or intervention, or to carry on any voter registration drive.

The terms and conditions contained in this letter agreement supersede all prior oral or written agreements and understandings between the parties and shall constitute the entire agreement between the parties with respect to the matters contained herein. This letter agreement shall not be modified or amended except by a writing duly executed by parties hereto.

According to the information that was furnished to us, your organization is qualified to be exempt under Code section 501(c)(3) and is still classified as a public charity pursuant to Code section 509(a)(1). Please inform us if there has been a change in your tax status since then.

Finally, we must ask that any funds not expended for the purposes described in Code section 170(c)(2)(B), which the grant is being made, be returned to us. Please indicate your agreement with these conditions by returning a signed copy of this letter to the Foundation, attention Grants Coordinator.

Sincerely,

Richard H. Fink
President

cc: Dr. Willie Soon

Acknowledged and Agreed to by the Smithsonian Institution
By: Thomas G. Bonnenfant
Print Name & Title: Thomas G. Bonnenfant, Contracting Officer
Date: 12/01/09

Courthouse Tower • 1515 N. Courthouse Road Suite 200 • Arlington, VA 22201 • Phone: 703 875 1600 • Fax: 703 875 1601

P7422-11-09

Smithsonian Astrophysical Observatory

# Understanding Solar Variability and Climate Change: Signals from Temperature Records of the United States

*A Proposal for $65K Support to Charles G. Koch Charitable Foundation*

Dr. Willie Soon, Principal Investigator
Smithsonian Astrophysical Observatory
Solar, Stellar and Planetary Sciences Division
(617-495-7488; wsoon@cfa.harvard.edu)
July, 2008

**Research Target and Proposal:**
This proposal seeks $65,000 from The Charles G. Koch Charitable Foundation for year one of this two-year project, "*Understanding Solar Variability and Climate Change: Signals from Temperature Records of the United States.*" I propose to conduct an intensive up-to-date science review of solar variability and climate change (see e.g., Soon 2007a), with emphasis on the signals from temperature records of the U.S., that will be a clear improvement of previous studies. The goals for the first year are to collect and assess the scientific quality of the available temperature records from the United States, aggregated into four inter-related spatial domains: 1) a rural city (i.e., a city that is minimally disturbed by urban development), 2) an individual state, 3) regional U.S. area, and 4) the whole conterminous U.S. The goals for the second year are to study any plausible connection of these U.S. temperature records with estimated solar irradiance history for the past 112 years from 1895 to 2006.

The previously published research paper by Soon (2005) identifies both the multidecadal variation in total solar irradiance and the 11-year solar UV irradiance forcings to be important in explaining the observed Arctic surface air temperature change over the past 130 years or so. The overall goal for this 2-year program is to extend our basic understanding on how the variable solar irradiance outputs could be physically connected to the Earth climate system. The ability to confirm or reject the statistical correlations shown in Figure 1 will be of enormous scientific importance. The ultimate physical understanding will arise from detailed assessments on how the solar irradiance is related to the cloud field as well as how the solar irradiance may systematically and persistently modulate the land surface heat fluxes (i.e., sensible and latent heats) on multidecadal to centennial time scales. A parallel hypothesis regarding the role of rising atmospheric carbon dioxide (see e.g., Soon 2007b) in warming the surface temperatures of the United States on these 4 spatial scales will also be evaluated.



SI-000060

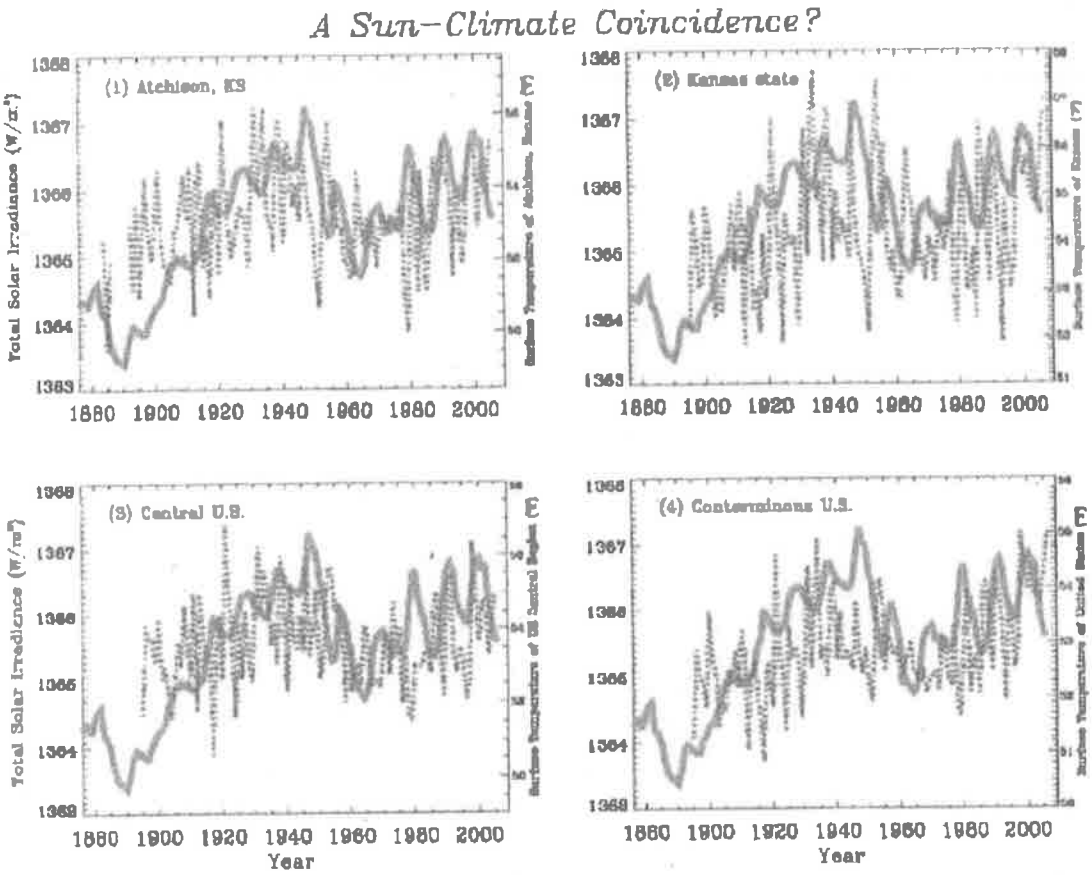



**Figure 1:** A plausible connection of the solar irradiance (red curves in all four plots; based on Hoyt and Schatten 1993-rescaled to the mean absolute value[1] measured by the ACRIM radiometers) compared with U.S. temperature records in 4 spatial domains (the blue dotted curves are for 1) Atchinson, KS, 2) state of Kansas, 3) Central region of the U.S., and 4) conterminous U.S.). These results extend the previous relation found for the Arctic shown in Soon (2005). The scientific hypothesis for this sun-climate relation will be carefully formulated and examined in the proposed project.
[Temperature Data Source: U.S. National Climatic Data Center.
http://lwf.ncdc.noaa.gov/oa/climate/research/cag3/cag3.html]

[1] Soon (2007a) calls for the solar physics community to firmly establish this value emphasizing its great importance in establishing the mean climatology in climate models. The mean climatology in climate models can be subjected to a rather arbitrary tuning given that the absolute level of total solar irradiance is not determined to any level of confidence, with values ranging from 1372 to 1360 W/m²

**Expected Outcomes:**

(1) Publication of both original and review papers on solar variability and climate change and various environmental impacts of that related change in leading scientific journals for the advancement of climate and meteorological sciences.

(2) Development of tools, including power-point presentations and concise scientific essays, for unbiased and more accurate science accounting that will more powerfully serve informed public policy making.

(3) Better public education with active participations by the PI of this research proposal in all national and international forums interested in promoting the basic understanding of solar variability and climate change.

**Research Team:**
Dr. Willie Soon at the Smithsonian Astrophysical Observatory, which is part of the Harvard-Smithsonian Center for Astrophysics, will lead and direct this scientific research program. In addition, the PI *may* solicit interests for collaborative effort from interested colleagues at no additional cost to the proposal.

**Funding Request:**
The funding is primarily to support approximately 6 months of the full-time research work of Dr. Willie Soon at the Smithsonian Astrophysical Observatory and a small amount of travel to a scientific meeting or publication costs. This research proposal requests $65,000 from the Charles G. Koch Charitable Foundation for work to start January 1, 2009, extending for a duration of about one year.

**References**

Hoyt D. V and Schatten K. H. (1993) A discussion of plausible solar irradiance variations, 1700-1992. Journal of Geophysical Research 98 (A11), 18895-18906 [with updates from Dr. Nicola Scafetta, Duke University, private communication May 31, 2007].

Soon W (2005) Variable solar irradiance as a plausible agent for multidecadal variations in the Arctic-wide surface air temperature records of the past 130 years Geophysical Research Letters 32: L16712

Soon W. (2007a) Some Issues of Solar Irradiance Variability and Climatic Responses: A Brief Review. Invited Talk GC42A-05 at the American Geophysical Union Fall Meeting (December 10-14, 2007).

Soon W (2007b) Implications of the secondary role of carbon dioxide and methane forcing in climate change. Past, present, and future Physical Geography 28, 97-125

# ATTACHMENT B

# ATTACHMENT B

Smithsonian Institution

Office of General Counsel

VIA US MAIL

August 8, 2012

Mr. Kert Davies
Greenpeace
702 H Street NW, Suite 300
Washington, DC 20001

RE: Your Request for Smithsonian Records (request number 37627)

Dear Mr. Davies:

This responds to your e-mail dated and received in this Office on March 13, 2012 in which you (1) requested a list of grants received by Dr. Willie Soon from February 2010 through the present, (2) inquired about the identity of the individual or corporation associated with the Donors Trust grants, and (3) inquired about "Heartland Institute funding received (or not received) by Dr. Soon." The Smithsonian responds to requests for records in accordance with Smithsonian Directive 807 - Requests for Smithsonian Institution Information (SD 807) and applies a presumption of disclosure when processing such requests. SD 807 does not require that we perform research for requesters, answer written questions, or create a record in response to a request. The policy is posted on our website at www.si.edu/about/FOIA.

The Office of General Counsel contacted the Smithsonian Astrophysical Observatory (SAO) as well as the Office of Advancement to conduct a search for Smithsonian records responsive to your request. In response to item 1 of your e-mail, SAO compiled the enclosed list of grants received by Dr. Soon from February 2010 through June 2012. With respect to items 2 of your e-mail, I am enclosing a copy of Smithsonian Directive 318 (Externally Funded Grants and Sponsored-Project Contracts). No additional responsive records were located. With respect to item 3 of your e-mail, I am providing you with a copy of Smithsonian Directive 103 (Smithsonian Institution Standards of Conduct). No additional responsive records were located.

This concludes the Smithsonian's response to your request. Thank you for your interest in the Smithsonian.

Sincerely,

Jessica Sanet
Assistant General Counsel

Enclosures

Office of General Counsel
Smithsonian Institution
Mail: P.O. Box 37012, MRC 012 • Washington DC 20013-7012
Street: 1000 Jefferson Drive SW • Washington DC 20560-0012
Telephone: 202.633.5115 • Fax: 202.357.4310

**FEBRUARY 2010 - JUNE 2012**

| Employee | Designated Code | Funding Agency/Institution | Title/Description | Allotment | Fiscal Year |
|---|---|---|---|---|---|
| | | | | | |
| Soon, Wei Hock (Willie) | 501558 | Koch Foundation | Understanding Solar Variability and Climate Change | $65,000 | 2010 |
| | 501631 | Southern Company | Understanding Solar Radiation and Climate Change | $60,003 | 2011 |
| | 501670 | Koch Foundation | Understanding Solar Radiation and Climate Change | $55,000 | 2010-2012 |
| | 501685 | Donors Trust | Understanding Solar Radiation and Climate Change | $50,000 | 2011 |
| | 504336 | Southern Company | Southco_11: Solar Modulation of Equator-To-Pole | $59,942 | 2011-2012 |
| | 504364 | Donors Trust | A Circum-global Teleconnection View of Regional Sun-Climate Connections | $64,935 | 2011-2012 |

# ATTACHMENT C

Approved: 3/01/13
Date

# MINUTES OF THE HOUSE ENERGY AND ENVIRONMENT COMMITTEE

The meeting was called to order by Chairman Dennis Hedke at 9:00 a.m. on January 31, 2013 in Room 582-N of the Capitol.

All members were present except Rep. Joshua Powell and he was excused.

Committee staff present:
Cindy Lash, Legislative Research Department
Matt Sterling, Office of the Revisor of Statutes
Erica Haas, Legislative Research Department
Linda Herrick, Committee Assistant

Conferees appearing before the Committee:
Dr. Johannes Feddema, Department of Geography, University of Kansas
Dr. Willie Soon, Harvard-Smithsonian Center for Astrophysics
Dr. John Christy, Alabama State Climatologist, University of Alabama
Rabbi Moti Rieber, Director, Kansas Interfaith Power & Light (written only presentation)

Others attending:
See attached list.

Chair Hedke noted that during the last couple of weeks, the Committee has been hearing presentations on energy production, delivery, and rate paying in the state. Those presentations have been greatly appreciated. Now, we are changing gears, and today have several speakers from out-of-state on climate science. Chair Hedke expressed appreciation to the three scientists making presentations today.

Dr. Feddema presented a slide presentation on climate science (Attachment 1), the basic knowledge that we have and what most climate scientists believe may be happening with the earth's climate today. Several of his points were: 1) There is accumulated evidence that greenhouse gases (GHG) (including CO2) are increasing and are likely the cause of climate changes over the last few decades. The primary cause is from GHG emissions from fossil fuel burning. 2) The global temperature is warming at the rate of 0.2C per decade, which is evident by the increased heat being absorbed by the ocean. Also, sea ice is melting. Kansas will be one of the states most affected by climate change because of its location and projections of drying out. 3) The choice of energy production in the future will have consequences on climate and our economy. Different energy mixes will affect our GHG emissions and developing alternative methods can provide new business opportunities.

Dr. Willie Soon gave a slide presentation (Attachment 2). To summarize his remarks: 1) no experimental data exist that support the view that the earth's climate is changing in a dangerous manner; 2) carbon dioxide, CO2, is merely a bit player in climate change, and rising CO2 is largely beneficial to plant and human life; 3) the sun is a primary driver of climate change, and has a greater impact than changes in CO2; and 4) climate models cannot be trusted because of their poor representation of water—solid, liquid, and gas.

Unless specifically noted, the individual remarks recorded herein have not been transcribed verbatim. Individual remarks as reported herein have not been submitted to the individuals appearing before the committee for editing or corrections.

Dr. John Christy gave a presentation (Attachment 3) noting this past year was the warmest in Kansas in history. Even though it was very warm, it was only about the fifth warmest in Kansas history. Information since 1885 indicates there have been constant increases and decreases in record high daily temperatures. Precipitation has gone up and down. Going back 800 years, globally, there were 100-year droughts, so the last couple of years have not been that bad. Evidence shows extreme events are not becoming more frequent or intense. Evidence also shows the climate models on which the alarm is based are overly sensitive to greenhouse gases. In summary, CO2 is a non-toxic gas that increases food production. Dr. Christy added that he has pretty strong evidence that CO2 has a small impact on climate. When you have access to affordable energy, you have a better life. The presenters stood for questions. In response to a question, Dr. Christy noted that the sea ice in Antarctica is expanding.

Chair Hedke added a comment on impact. The Intergovernmental Panel on Climate Change has a similar graph to that presented by Dr. Christy, and using their data, the change in sea level by year 2100 is less than six inches, and the possible change in temperature is less than ½ of one degree. This Panel is the purportedly the "gold standard" for climate change evaluation.

Rabbi Moti Rieber, Director, Kansas Interfaith Power & Light, had provided a written presentation (Attachment 4).

Chair Hedke thanked the presenters and they stood for questions.

There being no other business, the meeting was adjourned at 10:50 a.m.

Unless specifically noted, the individual remarks recorded herein have not been transcribed verbatim. Individual remarks as reported herein have not been submitted to the individuals appearing before the committee for editing or corrections.

# ATTACHMENT D

# Where is the direct evidence for $CO_2$-dominated global+ regional climate change?

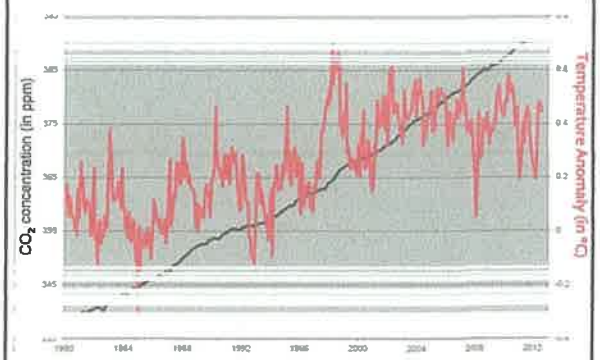
Willie Soon[1]
Independent Scientist

January 31, 2013

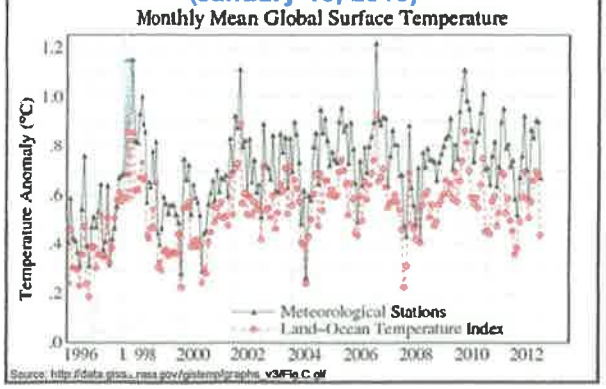
Topeka, Kansas

[1]All Views Expressed Are Strictly My Own and Do Not Reflect Those of Any Institution

## If $CO_2$-global warming causation is so sure and so strong, why would the persistent warming not continue?

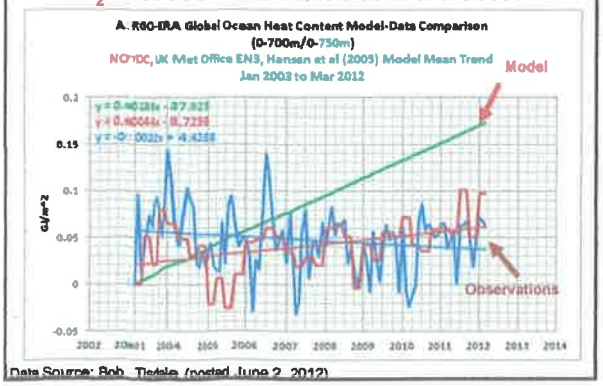



## Take it from Hansen/NASA GISS (January 15, 2013)




## Volumetric sampling of the world oceans: ARGO project since 2003

## Where is all the predicted accumulation of $CO_2$-induced heat if it is not in the ocean?

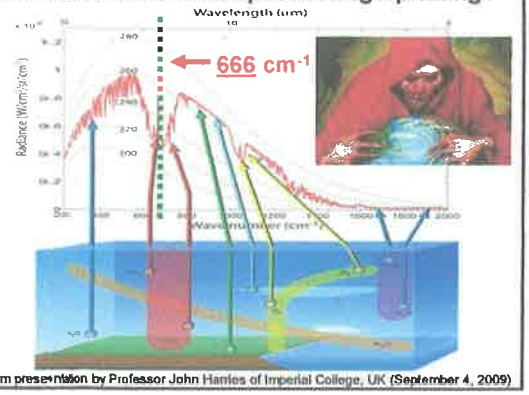



# Spectral Fingerprinting of the $CO_2$ Monster:

# Just exactly where is IT?

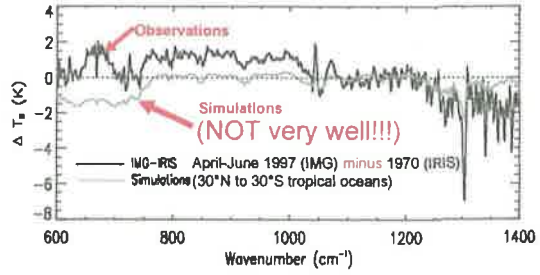
## But I thought scientists were able to confirm the $CO_2$ greenhouse effects from spectral fingerprinting?

The Satanic Gas – $CO_2$!



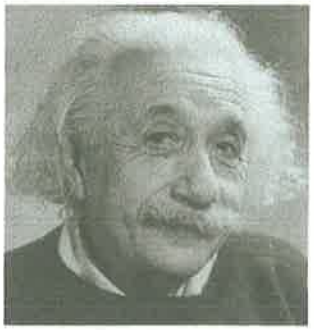

Adopted from presentation by Professor John Harries of Imperial College, UK (September 4, 2009)

## How well can simulations replicate the real-world observations?

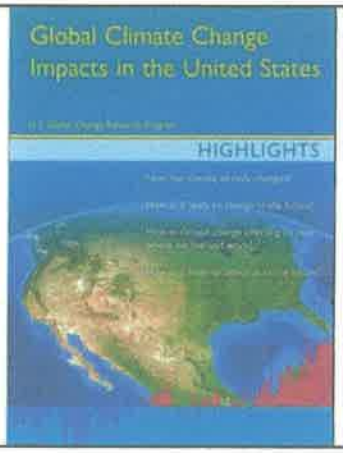



Briggs and Allan (2003) Quarterly Journal of the Royal Meteorological Society, vol. 129, 2971-2988

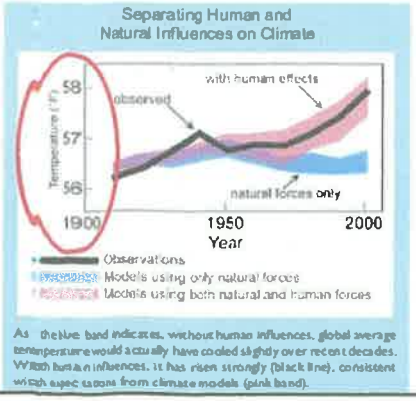
"No amount of experimentation can ever prove me right; a single experiment can prove me wrong."



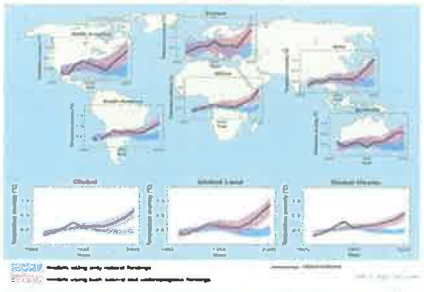
**Albert Einstein**




## Serious mis-representations in USGCRP 2009 report!

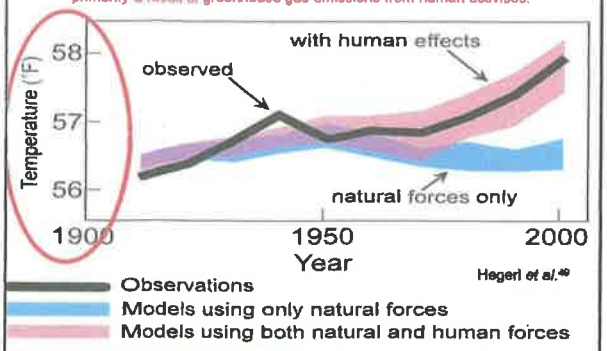



## How USGCRP authors mistakenly re-transformed global temperature from "anomalies" units to absolute units!



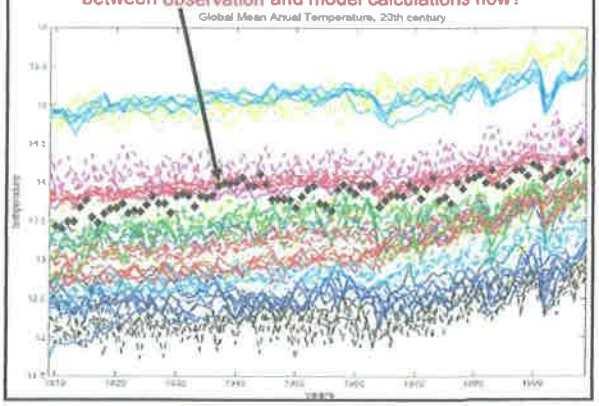
## Damaging side-effect: Persisting error in US EPA webpage!

"This figure illustrates one piece of evidence that shows that recent global warming is primarily a result of greenhouse gas emissions from human activities."




http://www.epa.gov/climatechange/facts.html

## Reality: Does this looks like reasonable agreement between observation and model calculations now?



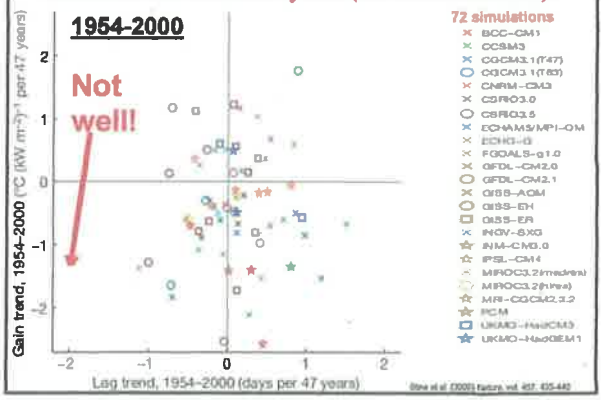
## Where is the peer-review checking?

## Important public science-education-policy questions:

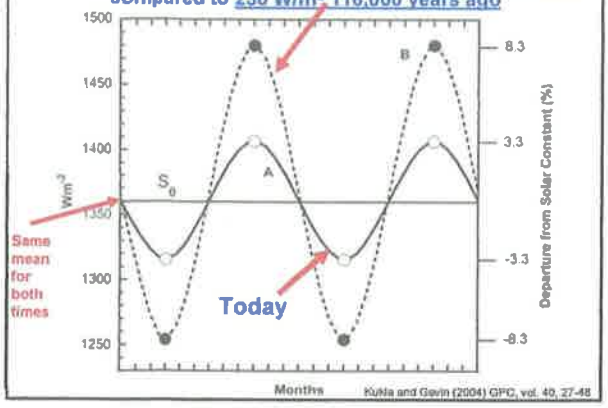
**If $CO_2$ control on the climate is so self-apparent and scientifically correct, then why the graphical "confusion"?**

**Will climate scientists stand up and condemn the USGCRP+USEPA?**

## How well can 24 climate models simulate seasonal and annual cycles (on land surfaces)?



Seasonal solar radiation has amplitude of 90 W/m² today compared to 230 W/m² 116,000 years ago




Misunderstanding of climate models:
Averaging flawed models does not make it better!

**"These sobering conclusions about future warming are projections based upon elaborate models of the Earth. It is usually wise to be suspicious of computer models of complex situations. But we are not talking about one scientist's model; a number of programs give similar results."**

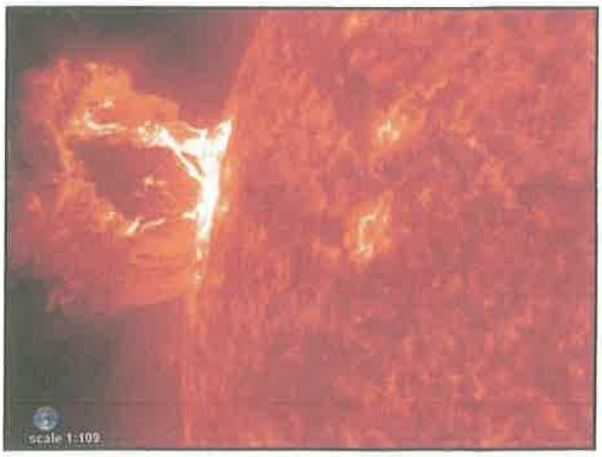
— (Robert Curl, 1996 Nobel Laureate in Chemistry; August 20, 2010's article "The best science indicates humans are causing warming" in Houston Chronicle; http://www.chron.com/disp/story.mpl/editorial/outlook/7162619.html)

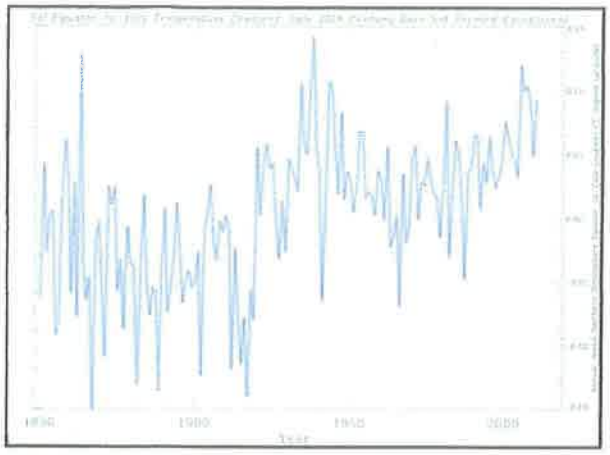
What does the 'Average' Passenger Jet look like?

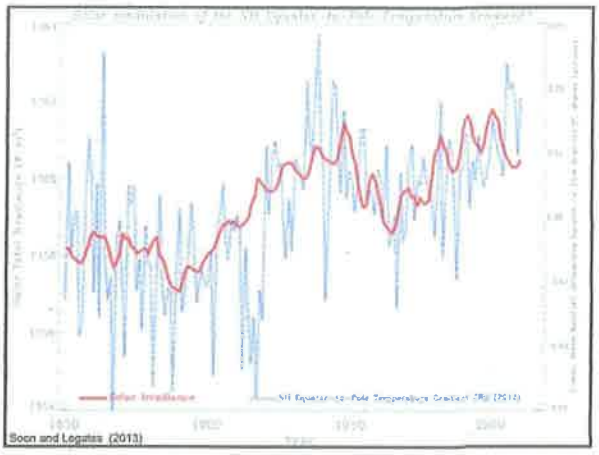
Give me a faster computer and I will give you the wrong result sooner.

(Malcolm Ross upon reading that the UK Met Office claimed that it failed to predict cold December 2010 and January 2011 in Britain because its new computer was too slow)—The Week That Was by SEPP (February 27, 2011)

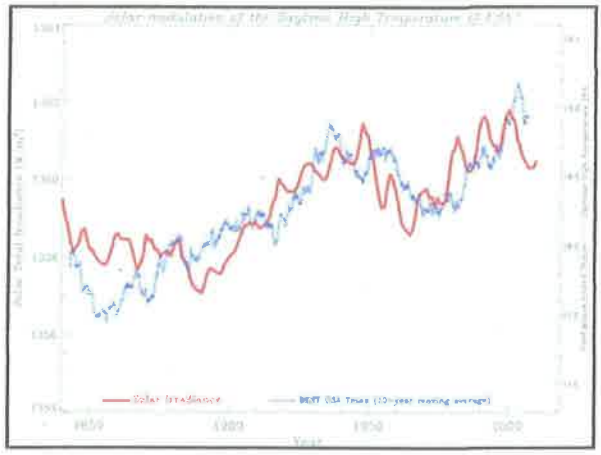
Exciting new evidence connecting the Sun to climate








We have empirical evidence for a Sun-Climate relationship not only through modulation of the large-scale dynamics, but also through direct modulation of the day-time high temperatures on local and regional spatial domains



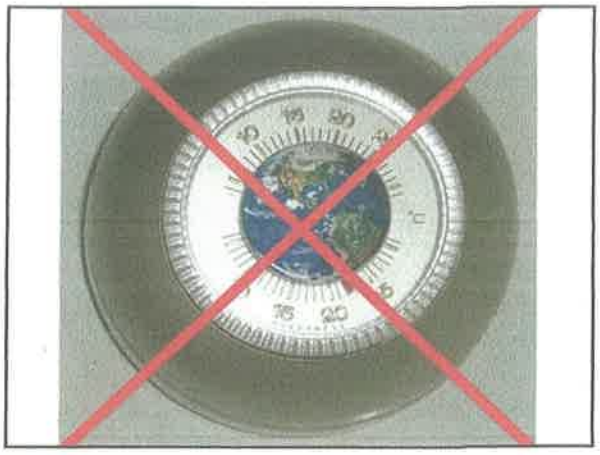
## Take-away Messages

**1.No experimental data exist that support the view that the Earth's climate is anomalous or changing in a dangerous manner.**

## Take-away Messages

**2.Carbon Dioxide, $CO_2$, is merely a bit player in climate change.**

**Rising $CO_2$ is largely beneficial to plant and human life.**

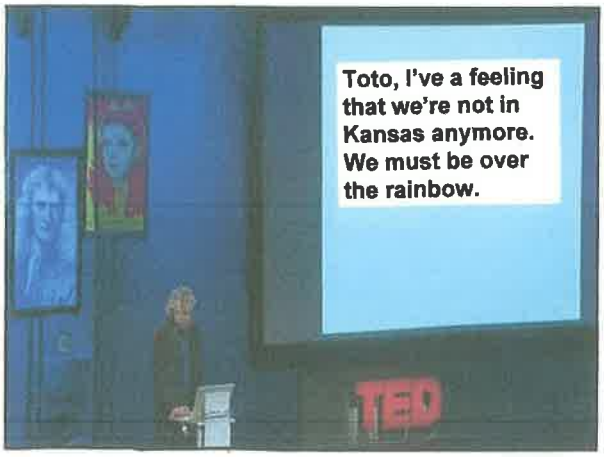


## Take-away Messages

**3. The Sun is a primary driver of climate change – and has a far greater impact than changes in $CO_2$.**

## Take-away Messages

**4. Climate models cannot be trusted, in large part, because of their poor representation of water – solid, liquid, and gas.**



# ATTACHMENT E

logged in PS:
rcvd 7/22
sent 7/28

**Christine McNeil <cmcneil@cfa.harvard.edu>**

From: Christine McNeil <cmcneil@cfa harvard.edu>
Sent: Thursday, July 28, 2011 1:29 PM
To: Exemption 6 [redacted]
Cc: Thomas Bonnenfant <tbonnenfant@cfa.harvard.edu>
Subject: Request for No-Cost Extension - Charles G. Koch Charitable Foundation Award Letter dated November 8, 2011

Smithsonian Astrophysical Observatory

Mr. Logan Moore Exemption 6 [redacted]
Charles G. Koch Charitable Foundation
Courthouse Tower
1515 N. Courthouse Road, Suite 200
Arlington, VA 22201

Dear Mr. Moore:

The period of performance of the above referenced Grant will expire on 31 July 2011. It is requested that the completion date be extended to 31 January 2012 with no increase in the total amount of the Award.

We are hereby requesting a six-month no-cost extension of this project owing to the primary reason that the Principal Investigator, Dr. Willie Soon, Exemption 6 [redacted] However, he shall complete the goals of the project by 31 January 2012.

Progress thus far is summarized below:

(1) Publication of the invited paper "Avoiding Carbon Myopia: Three Considerations for policy makers concerning man made carbon dioxide" by Willie Soon and David R. Legates (2010) in Ecology Law Currents, vol. 37, 1-9.

(2) Publication of the scientific manuscript "Sea Level Changes in Bangladesh: Observational Constraints on Human, Geologic and Weather-Climate Variability Related Factors" by David R. Legates and Willie Soon (2011) (as a book chapter) in Understanding Climate Change Issues in Bangladesh, Rafique Ahmed et al. (editors), in press.

(3) Acceptance of the scientific manuscript "Temporal derivative of total solar irradiance and anomalous Indian Summer Monsoon: An empirical evidence for a sun-climate connection" by Rajesh Agnihotri, Koushik Dutta and W. Soon (2011) in the peer-reviewed journal Journal of Atmospheric and Solar-Terrestrial Physics.

(4) Submission of the scientific manuscript "Variation in surface air temperature of China during the 20th century" by Willie Soon, Koushik Dutta, David Legates, Victor Velasco, WeiJia Zhang (2011) in the peer-reviewed journal Journal of Atmospheric and Solar-Terrestrial Physics.

(5) Preparation of the scientific report "Research to date on forecasting for the manmade global warming alarm" by Scott Armstrong, Kesten Green and Willie Soon (as a supporting document for the Testimony of Professor Scott Armstrong to the Subcommittee on Energy and Environment on March 31, 2011).

Your favorable consideration and timely response would be greatly appreciated. Should you have any questions, please do not hesitate to contact Mr. Thomas G. Bonnenfant, Contract Administrator, at (617) 495-7317 or e-mail tbonnenfant@cfa.harvard.edu.

Christine McNeil for Thomas G. Bonnenfant

Christine M. McNeil
Staff Assistant
Sponsored Programs and Procurement (SPP) Department
Smithsonian Astrophysical Observatory
Phone: 617 496-7923
Fax: 617 496-7692

# ATTACHMENT F

# Witnesses Highlight Flawed Processes Used to Generate Climate Change Science, Inform Policy

MAR 31, 2011

**Washington D.C.** – Today, the Science, Space, and Technology Committee heard from witnesses that there are significant flaws and bias reflected in the processes used to generate key climate change science, and to inform policy development and decision-making.

"The current Administration has been moving full speed ahead with regulations and policy initiatives that it justifies based on the available science," said **Chairman Ralph Hall (R-TX)**. "Since these actions have the potential to severely damage our economy, there should be extra care in making sure they are truly necessary and appropriate."

Hall continued, "The legitimate questions that have been raised about the

processes used to generate climate change science and policy have thus far been cast aside. The reluctance to engage in conversations with people who have doubts or question the veracity of climate science is at the heart of the wrong doing that undermines trust in climate change science."

The potentially monumental impact of climate change policy on the U.S. economy and nearly all aspects of daily life demand that not only are such policies grounded in science, but that the science itself is generated through processes and procedures that are universally accepted.

Members and witnesses today discussed the leaked "Climategate" emails from the University of East Anglia's Climate Research Unit in November of 2009. These emails—many of which involved world-leading scientists in positions of influence with respect to key scientific assessments relied upon by policymakers—revealed significant communications suggesting a lack of adherence to basic principles of scientific conduct, openness, and information sharing.

In his opening remarks, Chairman Hall said "For many of us here, these emails were evidence that the trust in the underlying process was misplaced. I may not be a scientist, but as a politician, I can tell when someone is trying to pull the wool over my eyes."

Also discussed at length was the EPA's 2009 "endangerment finding," paving the way under the Clean Air Act for EPA to regulate greenhouse gases (GHGs), and particularly, carbon dioxide. A majority of the scientific basis the Agency used for its determination came from the Intergovernmental Panel on Climate Change (IPCC) or from government reports that relied heavily on the IPCC as a resource.

Critical of the underpinning IPCC process, **Dr. John Christy**, Director of the Earth System Science Center at the University of Alabama in Huntsville, discussed his skepticism of how IPCC operates. "The committee should understand that the IPCC presents one version of climate change science

generated by an establishment that has evolved to largely reflect a particular point of view…this point of view attempts to dismiss information that questions the belief that greenhouse gases are the dominant cause of observed climate change."

Further questioning the lawful basis of the endangerment finding, **Mr. Peter Glaser**, a Partner at Troutman Sanders, LLP, discussed the lack of transparency by EPA in formulating this decision. "In my view, EPA failed to observe basic requirements set forth in applicable law as to how a regulatory determination such as the Endangerment Finding should be made." Glaser questioned the fundamental fairness and transparency of the way EPA arrived at its endangerment finding and the quality of the information on which EPA relied. "The procedures EPA failed to observe are designed to ensure the integrity both of the decisionmaking process and the ultimate result an agency reaches."

Witnesses also discussed potential data bias that can result from data selection, substandard temperature station quality, urban vs. rural effects, station moves, and changes in the methods and times of measurement.

Beyond concerns directly involving how scientific data is used, **Dr. W. David Montgomery** testified about the economic costs associated with proposed greenhouse gas regulations, and how those costs outweigh any possible benefits of such policies. Montgomery also rebuked the idea that regulating GHGs would drive an economically beneficial market in the U.S. for green technologies.

"Any claim that a regulation or standard will on balance save money should be regarded with a high degree of skepticism," Montgomery said. "Economic theory and the experience in Europe and the United States with renewable energy policies show the effect is the opposite of stimulus to clean technology industries. Clean energy equipment will be produced where it is least costly to do so, and domestic policies that raise energy costs can shift

that comparative advantage against the U.S."

The following witnesses testified today before the Committee:

**Dr. J. Scott Armstrong**, Professor of Marketing, the Wharton School, University of Pennsylvania.

**Dr. Richard Muller**, Professor of Physics, University of California, Berkeley and Faculty Senior Scientist, Lawrence Berkeley Laboratory

**Dr. John Christy**, Director, Earth System Science Center, University of Alabama in Huntsville

**Mr. Peter Glaser**, Partner, Troutman Sanders, LLP

**Dr. Kerry Emanuel**, Professor of Atmospheric Science, Massachusetts Institute of Technology

**Dr. W. David Montgomery**, Economist

# Research to date on Forecasting for the Manmade Global Warming Alarm

Testimony to Subcommittee on Energy and Environment
Committee on Science, Space and Technology – March 31, 2011

Professor J. Scott Armstrong, University of Pennsylvania,
with Kesten C. Green, University of South Australia,
and Willie Soon, Harvard-Smithsonian Center for Astrophysics

## Abstract

The validity of the manmade global warming alarm requires the support of scientific forecasts of (1) a substantive long-term rise in global mean temperatures in the absence of regulations, (2) serious net harmful effects due to global warming, and (3) cost-effective regulations that would produce net beneficial effects versus alternatives such as doing nothing.

Without scientific forecasts for all three aspects of the alarm, there is no scientific basis to enact regulations. In effect, it is a three-legged stool. Despite repeated appeals to global warming alarmists, we have been unable to find scientific forecasts for any of the three legs.

We drew upon scientific (evidence-based) forecasting principles to audit the forecasting procedures used to forecast global mean temperatures by the Intergovernmental Panel on Climate Change (IPCC) –leg "1" of the stool. This audit found that the procedures violated 81% of the 89 relevant forecasting principles

We also did an audit of the forecasting procedures used for two papers that were designed to support proposed regulation related to protecting polar bears – leg "3" of the stool. On average, these procedures violated 85% of the 90 relevant principles.

The warming alarmists have not demonstrated the predictive validity of their procedures. Instead, their argument for predictive validity is based on their claim that nearly all scientists agree with the forecasts. Such an appeal to "voting" is contrary to the scientific method. It is also incorrect.

We conducted a validation test of the IPCC forecasts based on the assumption that there would be no interventions. This test found that the errors for IPCC model long-term forecasts (91 to 100 years in the future) were 12.6 times larger than those from an evidence-based "no change" model.

Based on our analyses, we concluded that the global warming alarm is an anti-scientific political movement.

We then turned to the "structured analogies" method to forecast the likely outcomes of this movement. In this ongoing study, we have, to date, identified 26 historical alarmist movements. None of the forecasts for the analogous alarms proved correct. In the 25 alarms that called for government intervention, the government impost regulations in 23. None of the 23 interventions was effective and harm was caused by 20 of them.

Updated 3/29/11: VersionR16

## Introduction

The Earth's climate clearly varies as can be seen from plots of temperature proxy data over hundreds, thousands, and hundreds-of-thousands of years, so the existence of climate change is not a matter of dispute. Global warming alarmist analysis is concentrated on the years from 1850, a period of widespread direct temperature measurement, increasing industrialization, and increasing concentrations of carbon dioxide in the atmosphere. As with other periods, during this period one can retrospectively identify upward trends and downward trends, depending on the starting and ending dates one chooses. Over the whole period that we examined, 1850 through 2007, global annual temperature proxy series constructed for the Intergovernmental Panel on Climate Change (IPCC) show a small upward trend of about 0.004°C per year. There is some dispute over the veracity of the proxy temperature series (Christy, *et al.* 2010). For our analyses, however, we treat the data as if they were correct. In particular, we use the U.K. Hadley Centre's "best estimate" series, HadCRUt3[1] as described in Brohan et al. (2006).

We approach the issue of alarm over dangerous manmade global warming as a problem of forecasting temperatures over the long term. The global warming alarm is not based on what *has* happened, but on what *will* happen. In other words, it is a forecasting problem. And it is a very complex problem.

To address this forecasting problem we first describe the basis of the scientific principles behind forecasting. We then examine the processes that have been used to forecast that dangerous manmade global warming will occur and the validation procedures used to demonstrate predictive validity. We then summarize a validation study that we conducted.

We limit our discussion to forecasting. Those who are interested in the relevant aspects of climate science can find summaries in Robinson, Robinson and Soon (2007) and in Idso and Singer (2009).

Based on our analyses, especially with respect to the violations of the principles regarding objectivity and full disclosure, we conclude that the manmade global warming alarm is an anti-scientific political movement. In an ongoing study, we identified analogous situations and report on their forecasts and outcomes.

## The basis of scientific forecasting

Research on proper forecasting methods has been conducted for roughly a century. Progress increased over the past four decades due to an emphasis among researchers on experiments that were designed to test the effectiveness of alternative methods under varied conditions. Forecasting research has led to many surprising conclusions.

To make this knowledge useful to forecasters in all domains, I, along with an international and inter-disciplinary group of 39 co-authors and 123 reviewers, expert in various aspects of forecasting, summarized the evidence as a set of principles. A principle is a conditional action, such as "forecast conservatively in situations of uncertainty". There are now 140 forecasting principles. The principles are described and the evidence for them is fully disclosed in the *Principles of Forecasting* handbook (Armstrong 2001). The principles are also provided on the forecastingprinciples.com site (ForPrin.com), on which we invite researchers to contribute evidence either for or against the principles.

In practice, nearly everyone believes that their situation is different and that the principles do not apply. I suggest to such people that they conduct experiments for their own situation and publish their findings, especially if they contradict the principles, and by doing so advance the science of forecasting. There can never be enough situation-specific evidence for some people but, given the evidence that many common forecasting practices are invalid, it would be in unwise to reject the principles without strong evidence for doing so.

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[1] Obtained from http://hadobs.metoffice.com/hadcrut3/diagnostics/global/nh+sh/annual; notes on series at http://www.metoffice.gov.uk/hadobs/hadcrut3/

**Conditions that apply in forecasting climate change**

The global warming alarm is based on a chain of three linked elements, each depending on the preceding element and each element highly complex due to the number of variables and the types of relationships. It is much like a three-legged stool. Each leg involves much uncertainty (Idso and Singer 2009). The alarm requires:

1. a substantive long-term rise in global mean temperatures in the absence of regulations,
2. serious net harmful effects due to global warming, and
3. cost-effective regulations that would produce net beneficial effects versus alternatives such as doing nothing.

Effective policy-making requires scientific forecasts for all three elements. Without proper forecasts, there can be no sound basis for making policy decisions. Surprisingly, then, despite repeated appeals to global warming alarmists, we have been unable to find scientific forecasts for any of the three elements.

Of course, there have been many forecasts based on what we refer to as unaided expert judgment: judgments made without the use of evidence-based forecasting principles. For example, in 1896 the Swedish Nobel Prize winner in chemistry, Svante Arrhenius, speculated about the effect of increases in atmospheric carbon dioxide ($CO_2$) and concluded that higher concentrations would cause warming. His conclusion was drawn from an extrapolation of observational data[2]. Arrhenius's idea attracted little attention at the time, perhaps because he expected benefits from warming, rather than an impending disaster.

As noted, the forecasting principles provide advice about how to forecast given the conditions. Here the evidence yields a finding that is surprising to many researchers: use simple methods when forecasting in a complex uncertain situation. This was a central theme in my 1978 book on long-range forecasting. Those involved in the global warming alarm have violated the "simple methods" principle.

**Audit of methods used to forecast dangerous manmade global warming**

Kesten Green surveyed climate experts (many of whom were IPCC authors and editors) to find the most credible source for forecasts on climate change. Most respondents referred to the IPCC report and some specifically to Chapter 8, the key IPCC chapter on forecasting (Randall *et al.* 2007).

Kesten Green and I examined the references to determine whether the authors of Chapter 8 were familiar with the evidence-based literature on forecasting. We found that none of their 788 references related to that body of literature. We could find no references that validated their choice of forecasting procedures. In other words, the IPCC report contained no evidence that the forecasting procedures they used were based on evidence of their predictive validity.

We then conducted an audit of the forecasting procedures using Forecasting Audit Software, which is freely available on forprin.com. Kesten Green and I independently coded the IPCC procedures against the 140 forecasting principles, and then we discussed differences in order to reach agreement. We also invited comments and suggestions from the authors of the IPCC report that we were able to contact in the hope of filling in missing information. None of them replied with suggestions and one threatened to lodge a complaint if he received any further correspondence. We described the coding procedures we used for our audit in Green and Armstrong (2007).

We concluded from our audit that invalid procedures were used for forecasting global mean temperatures. Our findings, described in Green and Armstrong (2007), are summarized in Exhibit 1. Based on the available information, 81% of the 89 relevant principles were violated. There were an additional 38 relevant principles, but the IPCC chapter provided insufficient information for coding and the IPCC authors did not supply the information that we requested.

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[2] See description on Wikipedia and original paper at globalwarmingart.com/images/1/18/Arrhenius.pdf.

**Exhibit 1: Audit of the IPCC forecasting procedures**

| Principles were: | IPCC Chapter 8 |
|---|---|
| Violated | 60 |
| Apparently violated | 12 |
| Properly applied | 17 |
| Insufficient information | 38 |
| **Total relevant principles** | **127** |

Much of the problem revolves around the use of computer modelers' scenarios as a forecasting method. As stated correctly by Trenberth (2007), a leading spokesperson for the IPCC researchers, the IPCC provides scenarios, not forecasts. Scenarios are not a valid forecasting method (Gregory & Duran 2001), but simply descriptions of their authors' speculations about what might happen in the future.

*Warming forecasts and polar bears*

We also examined two forecasts that were developed to support proposed policy changes. The reports assumed that there would be global warming as predicted by the IPCC. We examined the two reports that presented forecasts in line with the stated goal, mentioned on the first page of the report "to support US Fish and Wildlife Service Polar Bear Listing decision"—which we coded as a violation of objectivity. Our procedures were similar to those in our audit of the IPCC forecasts except that we also obtained coding by a climate scientist who has published papers on climate change in the Arctic. On average, these two reports violated 85% of the 90 relevant principles. For example, long-term forecasts were made using only five years of selected data. (Armstrong, Green & Soon 2008)

**Exhibit 2: Audit of forecasting procedures used in two papers on polar bear populations**

| Principles were: | Amstrup (2007) | Hunter (2007) |
|---|---|---|
| Violated | 41 | 61 |
| Apparently violated | 32 | 19 |
| Properly applied | 17 | 10 |
| Insufficient information | 26 | 15 |
| **Totals** | **116** | **105** |

One key violation was that they did not provide full disclosure of the data in their paper, and they refused our requests for the data. They also refused to answer our questions about key aspects of their procedures that were not fully described in their papers. They refused to provide peer review of our paper prior to publication. At our request, the editor of the journal invited them to provide commentary. They missed the deadline and our paper was published with commentary by other authors and with our replies to the commentary. We were surprised when their commentary appeared in the journal some months later without us having being offered an opportunity to respond. In their commentary, the polar bear scientists claimed "every major point in Armstrong *et al.* (2008) was wrong or misleading." You can read their commentary in Amstrup, et al. (2009) and form your own opinion.

**Tests of predictive validity by global warming alarmists**

For important problems, it is important to test the predictive validity of the forecasting methods used. Validation tests are normally done by simulating the conditions involved in making actual forecasts (called *ex ante* forecasts) by, for example, withholding some data and forecasting what that data will be. Thus, if one wanted to test the accuracy of a method for forecasting 50 years from now, one would make a series of 50-year-ahead forecasts using the method and one or more competitive alternative methods in order to compare the accuracy of the forecasts from the different methods.

We were unable to find any *ex ante* comparisons of forecasts by the alarmists.

In the spirit of doing a systematic evaluation of forecasts, in 2007 I invited former Vice President Gore to join with me in a test as to the whether forecasts by manmade global warming alarmists would be more accurate than forecasts from a no-change model. Each of us would contribute $10,000 to go to the winner's favorite charity. The period of the bet was to be 10 years so that I would be around to see the outcome. Note that this is a short time period, such that the probability of my winning is only about 70%, based on our simulations. Had we used 100 years for the term of the bet, I would have been almost certain to win. Mr. Gore eventually refused to take the bet (the correspondence is provided on theclimatebet.com). So we proceeded to track the bet on the basis of "What if Mr. Gore had taken the bet" by using the IPCC 0.03°C per-year projection as his forecast and the global average temperature in 2007 as mine. The status of this bet is being reported on theclimatebet.com.

**Claims of predictive validity by alarmists**

The claim by alarmists that nearly all scientists agree with the dangerous manmade global warming forecasts is not a scientific way to validate forecasts. In addition, the alarmists are either misrepresenting the facts or they are unaware of the literature. International surveys of climate scientists from 27 countries, obtained by Bray and von Storch in 1996 and 2003, summarized by Bast and Taylor (2007), found that many scientists were skeptical about the predictive validity of climate models. Of more than 1,060 respondents, 35% agreed with the statement "Climate models can accurately predict future climates," while 47% percent disagreed. More recently, nearly 32,000 scientists have disputed the claim of "scientific consensus" by signing the "Oregon Petition"[3].

Perhaps in recognition that alarmist claims of predictive validity cannot sustain scrutiny, expressions of doubt about the alarm are often parried with an appeal to the so-called precautionary principle. The precautionary principle is an anti-scientific principle designed to silence people who have reached different conclusions. Alarmists, such as James Hansen of NASA, have even suggested publicly that people who reach different conclusions about global warming have committed crimes against the state (reported in Revkin 2008). Such attempts to suppress contrary evidence were ridiculed by George Orwell in his book *1984*: The Ministry of Truth building was inscribed with the motto "Ignorance is truth." For a closer examination of the precautionary principle from a forecasting perspective, see Green and Armstrong (2009).

Experts' opinions about what will happen have repeatedly been shown by research to be of no value in situations that are complex and uncertain. In 1980 I surveyed the evidence on the accuracy of experts' judgmental forecasts and found that experts were no better at forecasting about complex and uncertain situations than were novices (Armstrong 1980). Bemused at the resistance to this evidence, I proposed my Seer-sucker theory: "No matter how much evidence exists that seers do not exist, seers will find suckers." More recently, Tetlock (2005) presented the findings of 20 years of research over the course of which he obtained over 82,000 forecasts from 284 experts on "commenting or offering advice on political and economic trends," which represented complex and uncertain problems. Consistent with earlier research, he found that the experts' forecasts were no more accurate than novices' and naïve model forecasts.

**Our validation test of IPCC forecasting model**

We conducted a validation test of the IPCC forecast of 0.03°C per-year increase in global mean temperatures. We did this starting roughly with the date used for the start of the Industrial Revolution, 1850. As it happens, that was also the start of the collecting of temperature from weather stations around the world. We used the U.K. Met Office Hadley Centre's annual average thermometer data from 1850 through 2007. Note that the IPCC forecast had the benefit of using these data in preparing the forecasts. Thus, it had an advantage over the no-change model.

To simulate the forecasting situation, we needed unconditional (ex ante) forecasts. These were obtained through 100-year forecasts for the years from 1850 through 2007. The period was one of exponentially increasing atmospheric $CO_2$ concentrations, which is what the IPCC modelers assumed for their "business as usual" model forecasts of 0.03°C per-year increase in global mean temperatures. Relative forecasting errors are provided in Exhibit 3.

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[3] See petitionproject.org for details.

**Exhibit 3**

**Ratio of errors in IPCC (2007) forecasts to errors in "no change" model forecast from 1850 through 2007**

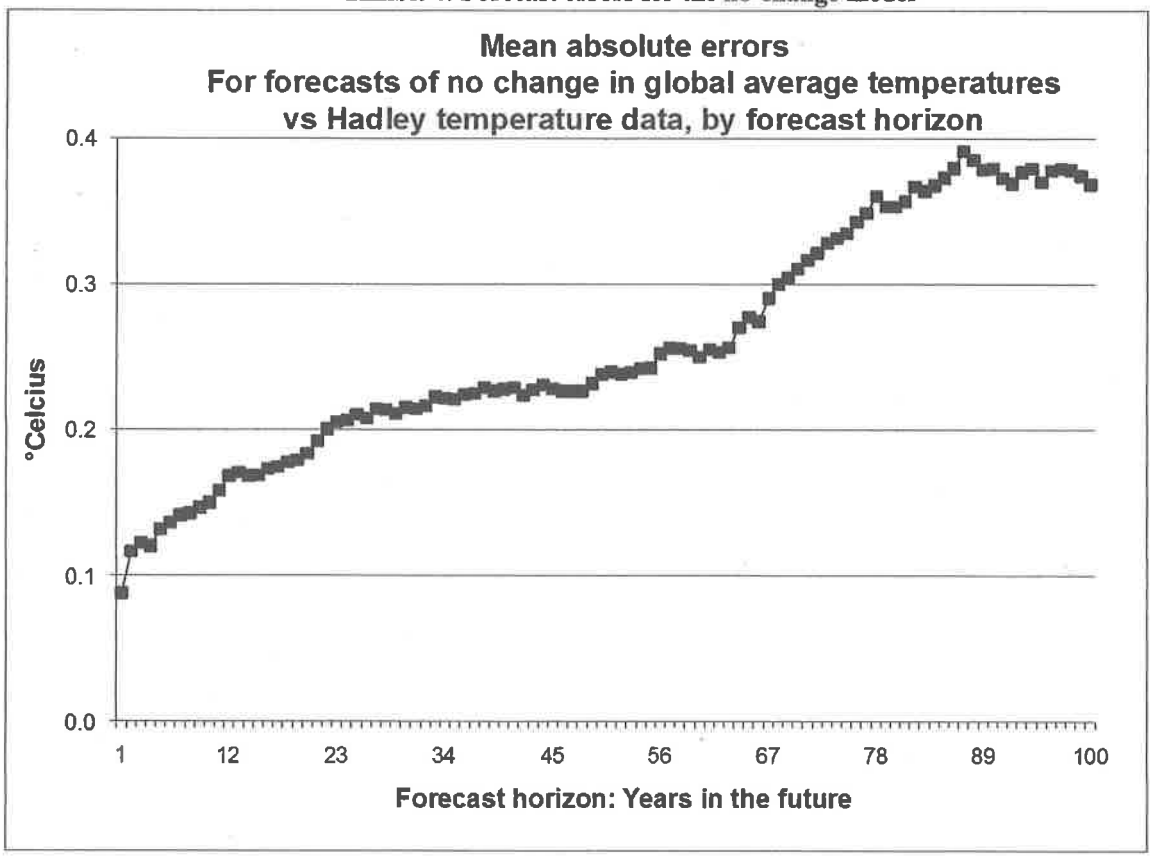
| Forecast horizon | Error Ratio | # of Forecasts |
|---|---|---|
| Rolling (1-100 years) | 7.7 | 10,750 |
| 1-10 years | 1.5 | 1,205 |
| 91-100 years | 12.6 | 305 |

Note that the errors do not differ substantially in the short term (e.g., forecasting horizons from 1 through 10 years). As a consequence, the chances that I will win my 10-year bet with former Vice President Gore are not overwhelming. The IPCC model forecast errors for forecasts 91 to 100 years in the future, however, were 12.6 times larger than those for our evidence-based "no change" model forecasts. In an extension, we also examined a no-change model that used ten-year periods (instead of annual data) to forecast subsequent ten-year periods, updating this to make a forecast each year. The results were quite similar to those in exhibit 3.

Exhibit 3 shows relative errors, but it is also important for policy makers to look at absolute errors. Absolute errors for the no-change model are presented in Exhibit 4. The accuracy of forecasts from the no-change model are such that even perfectly accurate forecasts of global mean temperatures would not provide much help to policymakers. For example, the mean absolute errors for 50-year ahead no-change forecasts averaged only 0.24°C.

The alarmists claim that validation tests cannot be done because things have changed. Such claims are commonly, but illogically, made by people who believe that their situation is new or so different from other situations that they cannot learn from the past or from other domains.

**Exhibit 4: Forecast errors for the no-change model**



**Conclusions from our analysis of the procedures used to forecast alarming manmade global warming**

Global warming alarmists have used improper procedures and, most importantly, have violated the general scientific principles of objectivity and full disclosure. They also fail to correct errors or to cite relevant literature that reaches conclusion that are unfavorable. They also have been deleting information from Wikipedia that is unfavorable to the alarmists' viewpoint[4] (e.g., my entry has been frequently revised by them). These departures from the scientific method are apparently intentional. Some alarmists claim that there is no need for them to follow scientific principles. For example, the late Stanford University biology professor Stephen Schneider said, "each of us has to decide what is the right balance between being effective and being honest." He also said "we have to offer up scary scenarios" (October 1989, *Discover Magazine* interview). Interestingly, Schneider had been a leader in the 1970s movement to get the government to take action to prevent global cooling. ClimateGate also documented many violations of objectivity and full disclosure committed by some of the climate experts that were in one way or another associated with the IPCC.

The alarmists' lack of interest in scientific forecasting procedures[5] and the evidence from opinion polls (Pew Research Center 2008) have led us to conclude that global warming is a political movement in the U.S. and elsewhere (Klaus 2009). It is a product of advocacy, rather than of the scientific testing of multiple hypotheses.

**Forecasts of outcomes of the manmade global warming alarmist movement**

Using a process known as "structured analogies," we predicted the likely outcome of the global warming movement. Our validation test of structured analogies method was provided in (Green and Armstrong 2009).

Global warming alarmism has the characteristics of a political movement. In an ongoing study, we have been searching for situations that are "alarms over predictions of serious environmental harm that could only be averted at great cost." We have searched the literature, contacted various researchers -- especially those who believe in the global warming alarm. We have also posted appeals on email lists and on websites such as publicpolicyforecasting.com. We repeat this appeal here.

To date, we have identified 26 analogous alarmist situations in the past. Kesten Green and I independently coded the alarms. We coded them for:

1. Forecasting method.
2. Did the proposed action involve substantive government intervention?
3. Accuracy of forecasts was rated on a -1 to +1 scale
   (-1 =wrong direction, 0=no, or minor, effect; +1=accurate)
4. Did substantive government intervention take place, or not?
5. Outcome of government policies to date on the value of their net benefit on a -1 to +1 scale
6. Persistence of government policies, to-date, on a 0 to 2 scale
   (0=reversed; 1=no or little change; 2=strengthened)

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[4] http://network.nationalpost.com/np/blogs/fullcomment/archive/2009/12/18/370719.aspx

[5] http://blogs.telegraph.co.uk/news/jamesdelingpole/100017393/climategate-the-final-nail-in-the-coffin-of-anthropogenic-global-warming/ and http://wattsupwiththat.com/2010/10/15/another-wikipedia-editor-has-been-climate-topic-banned/

The descriptions include the following elements and references to sources of information:

1. Forecasts of impending catastrophe
2. Methods used to forecast the catastrophe
3. Actions called for (actions by government or by others)
4. Salient endorsements of the forecast by scientists and politicians
5. Challenges to the forecast
6. Outcomes of each conflict over the alarming forecast and calls for action, including forecast accuracy

We have posted full disclosure of our procedures at publicpolicyforecasting.com, and have sent announcements to websites and individual requests to people to comment. Thumbnail descriptions are available for nine of the 26 situations (indicated by italics in Exhibit 5) at publicpolicyforecasting.com.

**Exhibit 5: Analogies to the alarm over dangerous manmade global warming**
*(Thumbnail descriptions available for italicized analogies)*

| | Analogy | Year |
|---|---|---|
| 1 | Population growth and famine (Malthus) | 1798 |
| 2 | Timber famine economic threat | 1865 |
| 3 | Uncontrolled reproduction and degeneration (Eugenics) | 1883 |
| 4 | *Lead in petrol and brain and organ damage* | 1928 |
| 5 | Soil erosion agricultural production threat | 1934 |
| 6 | *Asbestos and lung disease* | 1939 |
| 7 | Fluoride in drinking water health effects | 1945 |
| 8 | *DDT and cancer* | 1962 |
| 9 | Population growth and famine (Ehrlich) | 1968 |
| 10 | Global cooling; through to 1975 | 1970 |
| 11 | Supersonic airliners, the ozone hole, and skin cancer, etc. | 1970 |
| 12 | Environmental tobacco smoke health effects | 1971 |
| 13 | *Population growth and famine (Meadows)* | 1972 |
| 14 | *Industrial production and acid rain* | 1974 |
| 15 | *Organophosphate pesticide poisoning* | 1976 |
| 16 | *Electrical wiring and cancer, etc.* | 1979 |
| 17 | CFCs, the ozone hole, and skin cancer, etc. | 1985 |
| 18 | Listeria in cheese | 1985 |
| 19 | Radon in homes and lung cancer | 1985 |
| 20 | Salmonella in eggs | 1988 |
| 21 | *Environmental toxins and breast cancer* | 1990 |
| 22 | Mad cow disease (BSE) | 1996 |
| 23 | Dioxin in Belgian poultry | 1999 |
| 24 | *Mercury in fish effect on nervous system development* | 2004 |
| 25 | Mercury in childhood inoculations and autism | 2005 |
| 26 | Cell phone towers and cancer, etc. | 2008 |

Exhibit 6 provides an example:

**Exhibit 6: Example of a thumbnail description of an analogy to the global warming alarm**

*Title:* DDT and cancer

*Date*: Started in 1962

*Forecast of impending disaster:* Based on a book, Rachel Carson's *Silent Spring*, DDT was claimed to be a dangerous cancer-causing chemical. Publication of the book was followed by what some called a national hysteria. The alarm over forecasts of DDT's harmful effects combined concerns about the health and wellbeing of people with concerns about other species. Papers by scientists purported to demonstrate harmful effects on people from DDT exposure.

*Forecasting method:* A scenario based on the author's speculations from various pieces of information about the effects of DDT. There was no direct evidence that DDT harmed people.

*Actions called for:* Governments were asked to ban exports of DDT and World Bank loans would be banned to countries that used DDT.

*Endorsements of and challenges to the forecast*: Leading scientists from institutions (such as Stanford University), politicians (such as Senator Al Gore,) and a report by a commission appointed by President Carter. The reports of the dangers were widely covered by the mass media.

*Outcomes of the conflict:* The U.S. Environmental Protection Agency (EPA) banned the use of DDT following an 80-day hearing in 1972. Europe and Africa, under pressure from international agencies, did too. No actual harmful effects on humans have been found to result from DDT. Millions of people have died from mosquito-born diseases such as malaria. The EPA decision was based on two studies of animals: the first could not be replicated and the second used a flawed experimental design.

*Sources*: Edwards (2004); Waite (1994)

Here are our preliminary findings. None of these alarming forecasts were correct. Twenty-five of them called for government intervention. In the 23 cases where interventions occurred, none were effective. The policy changes caused harm in 20 of the cases.

The findings will change as the project progresses and as we identify new analogies, provide more and better description of the analogies, and obtain codings from others, especially from experts in the various areas.

We were not surprised by the outcomes, as none of the alarms were based on scientific forecasts. They typically began with stories and progressed from there with appeals to scientific support. Another reason that we were not surprised is that our findings had been anticipated by others. For example, after compiling a list of analogous situations (source), Julian Simon said, in 1990,"As soon as one predicted disaster doesn't occur, the doomsayers skip to another... why don't [they] see that, in the aggregate, things are getting better? Why do they always think we're at a turning point—or at the end of the road?" And considerably earlier, in 1830, Thomas Babington Macaulay concluded, "On what principle is it that when we see nothing but improvement behind us, we are to expect nothing but deterioration before us?"

As with our other publications related to climate change, we have received no funding, so we expect this study to drag on. The good news is that it will allow an opportunity for researchers to provide peer review and to suggest further improvements in our study – or, better, to conduct independent studies of analogies.

**Recommendations**

Efforts to forecast climate change should include those who have expertise in evidence-based forecasting methods. After all, public policy changes are avowedly implemented in the expectation that they will make things better in the future than they would otherwise have been.

To help ensure objectivity, government funding should *not* be provided for climate-change forecasting. Kealey (1996) summarized evidence on the dangers of bias in government-funded research. The government should instead rely on independent forecasters.

As we have noted, simple methods are appropriate for forecasting for climate change. Large budgets are therefore not necessary. Private individuals have been willing to invest much time and effort in examining the global warming alarm without external rewards. In fact, a number of them have engaged in research on the global warming alarm at great personal cost. The cost has been at least in part because governments have almost universally sponsored scientists who have supported the manmade global warming alarm and these scientists have, as a consequence, attained considerable power over learned societies, journals, funding, and universities. With the power has come influence over the news media that, by their nature, are attracted to stories such as environmentalist alarms that grab the attention of audiences

The burden of proof should be on government to provide convincing scientific proof before increasing the burden of laws and regulations. It is not defensible to use anti-scientific procedures such as asking scientists or scientific organizations to "vote" on policy recommendations, even when the experts are provided with excellent information. This is especially so given the evidence that that expert opinions are useless for complex problems such as climate change.

Instead government should look for strict standards of objectivity in the evidence. Thus we suggest that government should address each of the legs on the three-legged stool involving climate change, effects of climate change, and outcomes of alternative proposed policy changes, including "don't just do something, stand there!" The following should be included for each leg:

1. evidence, rather than experts' opinions,
2. research from scientists with diverse views,
3. research that involves testing of multiple reasonable hypotheses,
4. use of scientific (evidence-based) forecasting methods
4. full disclosure of data and research methods,
5. criticism, replications, and extensions, and
6. testimony from scientists who have nothing to gain from the acceptance of their evidence.

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