

Global Warming: Witnesses for the Defense of the Skeptical Perspective: Physicists

By Gerald T. Westbrook*

Introduction

I have written on this subject of Witnesses before.¹ That report highlighted:

- Selected authors, primarily non scientists, but authors with some unique perspective on the issue;
- Distinguished Veterans (DVs), mostly scientists, mostly retired, with incredible accomplishments;
- Others including brief inputs from active scientists, TV Meteorologists and State Climatologists.

Two of the selected authors were Michael Crichton a former medical researcher, writer and movie maker, and Alex Kozinski, a judge on the U. S. Court of Appeals for the Ninth Circuit.

I have also written on the Distinguished Veterans before.² These are individuals with incredible credentials. Many of them are retired scientists, some with the word emeritus, in their title. These individuals do not have to play the game of chasing after grant money. These are scientists that do not have to curry favor with the department chair-person, or other university/institute/agency brass. They are free to state their convictions, and to speak their mind. The careers and convictions of eleven DVs were reported on. These DVs were presented as individuals that understand the sciences involved. And they were presented in the spirit that the odds that they will deal in hype or propoganda or lies on this issue, are much lower than with any other group.

These key authors and distinguished veterans are all agreed that the big picture on global warming (GW) and anthropogenic GW (AGW), as painted by the climate alarmists, is seriously flawed. Some of these witnesses further argue that the Greenhouse Gases (GHGs)³ may not be the cause of any warming.

There is a minor overlap between this paper and the above two papers. However, this essay will focus, almost exclusively, on the physicists/mathematicians inputs in much greater detail than before.

The Importance of Physics

When I, or others, have written or talked about physicists, climate alarmists frequently point out that physicists are not climatologists and hence their views are simply invalid and can be ignored. However, the exact opposite is more likely the truth. To argue that such scientists cannot possibly understand climatology and contribute to resolving the current bottleneck on this subject is spurious at best.

It has been felt for sometime, by this writer and others, that the science of physics offers an excellent window into the forces that drive our climate. Indeed this may be the very best window. Such scientists have been interested in forces over their entire career. What causes things to move, to attract, to repel and so forth? They have been equally interested in processes. And they have been equally interested in equations that couple the variables.

More specifically physicists have been interested in the energy budget of the Earth. High on their list has been radiation. This includes solar radiation and the way it penetrates down to the surface, along with the phenomenon of thermal radiation and IR rays. An analogous problem⁴ is how energy moves through the “interiors and atmospheres” of stars. Physicists have been heavily involved in the study of the sun and solar radiation, including UV rays that are emitted by the sun. And they have been heavily involved in the study of astrophysics and such subjects as the “solar wind” and Galactic Cosmic rays.

This examination of forces and processes and equations inevitably uses the highest of mathematics. Indeed mathematicians are frequently involved in this field, either assisting or even in leading the investigation. A few of these will, therefore, be included in the following listing of key scientists.

This assessment on the importance of physics on this issue is not limited to the skeptics side. For example a recent news story⁵ in the Houston Chronicle reported on an interview with a Dr. C. Rapley, of the British Antarctic Service. He asked: “If carbon is increasing, how can you really deny there’s going to be warming?” Rapley challenged the readers: if you really knew how physics worked, you would essentially stop arguing on the AGW issue and get on board our band-wagon. Hence this essay, which will review how selected scientists in physics/mathematics see the AGW issue.

Three DVs that are also Experts in Physics

The previous report² on DVs included three physicists.

- Robert Jastrow, Columbia PhD, ultimately formed the Goddard Institute

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See end of text for references and notes.

for Space Studies;

- William Nierenberg (1919 - 2000), a former director of the Scripps Institute of Oceanography;
- Frederick Seitz (1911-2008), Princeton PhD in solid state physics, later president of Rockefeller University.

The UN, through the Intergovernmental Panel on Climate Change (IPCC), in their 1990 and 1995 reports, provided inputs on the potential GW for the next century at 1.5 to 4.5°C. A rather simplified analysis of the 1990 IPCC assessment was used⁶ to assess this range by the above scientists. These physicists viewed the GW of 1.5 to 4.5°C for the next century, as alarmist. They charged, in 1990, that the UN range for the next century, of 1.5 to 4.5°C, was far too pessimistic.

They based their analysis only on *observational data, e.g., no computer modeling*. It included:

- (1) *assuming* the temperature increase—from pre-industrial levels ~1880 to 1990—was 0.3 to 0.6°C;
- (2) *assuming* this rise was all due to a 50% increase in GHGs from pre-industrial levels;
- (3) *assuming* a 100% increase in GHGs, from 1990 to 2100;
- (4) as openers, one could then see twice the warming, or 0.6 to 1.2°C (That would seem logical—double the increase in GHGs gives double the warming. However, there is a well known logarithmic relationship on warming—successive additions of GHGs will have a lower impact versus the preceding addition. However, these three scientists did not incorporate that into their analysis.);
- (5) *assuming* a correction of 0.2°C for ocean thermal lag, would give a revised range of 0.8 to 1.4°C;
- (6) *finally assuming* an allowance of $\pm 0.4^\circ\text{C}$ for natural climate variability, would give 0.4 to 1.8°C.

This simple analysis was the basis for their conclusion that the IPCC was far too pessimistic, and represented a major exaggeration of the actual physical situation. These three physicists don't deny there is going to be a warming, but no where as big as the IPCC would like the public to believe.

However, the IPCC ignored their critique, as the 2001 IPCC report changed the range to 1.4 – 5.8°C.

An Overview of Selected Physicists/Mathematicians

There are a great number of candidates that could be listed, even after selected pruning. However, the general public is particularly uneducated on this community. Albert Einstein and perhaps Richard Feynman and John Forbes Nash might represent the spectrum of familiar names. Further, many of the scientists reviewed here are Europeans, which makes the identity problem even worse. Hence their inclusion on this listing will not be based on their name, but on a broad assessment of their career: their educational, scientific and other accomplishments. Some of these witnesses express their concerns on the GW issue in a relatively professional and dignified manner. Others are much less polite. In any event, the fact that there are a large number of highly qualified physicists/mathematicians who are skeptical on this issue is surely food for thought. These testimonies will be listed in alphabetical order.

• **Abdussamatov** Dr. Habibullo Abdussamatov obtained his undergrad education at Samarkand University in physics and mathematics and his doctorate from the University of Leningrad. He is the head of the space research laboratory at Saint Petersburg's Pulkova Astronomical Observatory and of the International Space Station's Astrometria project. Abdussamatov argues "the common view that man's industrial activity is a deciding factor in global warming has emerged from a misinterpretation of cause and effect relations."

Dr. Dan Luss, Cullen Professor of Engineering at the University of Houston, Department of Chemical Engineering, was the first to draw my attention to Abdussamatov. He sent me an email that contained two references:

- (1) An editorial⁷ by Lawrence Solomon: *Look to Mars for the Truth on Global Warming*. This editorial is Part IX of a series that is part of the referenced book.
- (2) A commentary⁸ by Dr. Oleg Sorokhtin for RIA Novosti entitled *A cold spell soon to replace global warming*.

Solomon wrote that the climate of Mars is the warmest it has been in decades, even centuries. He quoted a NASA scientist, William Fieldman, to the effect that Mars could be just coming out of an ice age. "With each passing year more and more evidence arises of the dramatic changes occurring on the only planet.....apart from Earth, to give up its climate secrets."

He quotes Abdussamatov: "Mars has global warming, but without a greenhouse and without the participation of Martians." He went on: "These parallel global warmings—observed simultaneously on Mars and Earth—can only be a straight-line consequence of the effect of the one same factor: a long term

change in solar irradiance.”

“The Sun’s increased irradiance over the last century, not CO₂ emissions, is responsible for the global warming we are seeing”, says the celebrated scientist.

Sorokhtin noted that two specific solar cycles are involved, one of 11 and another of 200 years. This scientist cited data from Abdussamatov’s lab, that reports Earth has passed the peak of it’s warmer period and a fairly cold spell will set in quite soon.

Today, Abdussamatov believes that solar irradiation has hits its peak, and has begun to fall, and that ocean surface temperatures are also starting to fall. He expects protracted cooling by 2012 and deep cooling around 2041 that will last for 50 to 60 years.

Abdussamatov, and the Russian and Ukranian space agencies will build and install special equipment in a space station module, to be installed in 2009, to permit a regular survey of the sun, to monitor and verify this cooling phenomenon.

- **Baliunas** Dr Sallie Baliunas has an MA and PhD from Harvard in Astrophysics. She has worked primarily at the Harvard-Smithsonian Center for Astrophysics and has served as Deputy Director of the Mount Wilson Institute and has over 200 scientific papers to her credit. She has been recognized via the Newton Lacy Pierce Prize in Astronomy from the American Astronomical Society in 1998 and the Derek Bok Public Service Prize from Harvard. In 1991, *Discover* magazine profiled her as one of America’s outstanding woman scientists.

Her research interests have focused on the visible and UV spectroscopy of stars and solar variability. She has studied the variability in sun-like stars, and argues our sun is currently in an unusually stable phase. In contrast, the total radiative variability for sun-like stars, in her sample, exceeded the currently observed solar variations by a factor of four. She has argued that the output of our sun has changed in the past and could change in the future.

She is a very strong and outspoken skeptic of the AGW hypothesis. She has been frequently attacked as a “stooge” of the oil and coal industries.

- **Friis-Christensen** Dr. Eigils Friis-Christensen is director of the Danish National Space Centre and vice-president of the International Association of Geomagnetism and Aeronomy. He argues that changes in the Sun’s behavior could account for most of the warming attributed by the UN to man-made CO₂.

- **Gerlich** Dr. Gerhard Gerlich is a physicist at the Institute of Mathematical Physics at the Technical University Carolo-Wilhelmina in Braunschweig, Germany. Gerlich obtained his undergraduate degree in physics at the Christian-Albrechts University in Kiel and his doctorate at the Technical University Carolo-Wilhelmina. His research has included such fields as statistical optics, imaging, kinetic theory and quantum theory. His publications include numerous scientific articles critical of the greenhouse hypothesis. His latest work⁹ is titled *Falsification of the Atmospheric CO₂ Greenhouse Effects within the Frame of Physics*. The full paper (114 pages) is based on rather advanced mathematics. While this paper looks rather impressive it probably should be filed under a “work in progress” status.

- **Gould** Dr. Laurence Gould obtained his doctorate from Temple University and is a Professor of Physics at the University of Hartford. He has also served as chair of this department and as a visiting fellow at Yale. He has been very active in the American Physical Society including the New England Section. He writes extensively on GW in their newsletter. In particular, the fall 2007 issue¹⁰ provides a detailed and strong critique of the handling of the AGW debate. More specifically this editorial is a very strong critique of the mishandling, of the “debate” on the AGW issue. This mishandling is by the media (publishers, editors, journalists, etc.), and by the physics and other scientific associations. Gould argues this “debate” needs to be “aired”, regardless of what is being presented to scientists and to the public as the “truth” about AGW.

- **Idso** Dr. Sherwood Idso was reported on in the past publication² on DVs.. While a holder of a PhD in physics, Idso was included in the Agriculture/ Botany & Food Production group, reflecting his support for increase photosynthesis due to the higher CO₂ levels. His web site: www.co2science.org provides a highly useful, weekly, set of situation reviews, editorials and journal reviews, on a wide array of issues on climate change, including increased plant production.

Idso spent much of his early career on solar radiation and the sensitivity of our climate. However, he was attacked ruthlessly by many warmers for his views. One of his inputs was his reaction to the point that GW will lead to more H₂O_v which will lead to more warming etc., etc. Idso argued if one started at 15 °C, and had an initial GW of 0.25 °C, this would increase vapor pressure by 0.2 millibars, which in turn would add a further warming of 0.07 °C, and that warming would add a little more moisture, which would add a further warming of 0.01 °C. In total this would end up with an overall warming less than 0.3 °C.

• **Lindzen** Dr. Richard Lindzen is an atmospheric physicist and the Alfred P. Sloan Professor of Meteorology at MIT. He is, perhaps, the leading academician in the GW debate. Lindzen is a member of the National Academy of Sciences. He is a recipient of the AMS Meisinger, and Charney Awards, and AGU Macelwane Medal. He is a member of the National Research Council Board on Atmospheric Sciences and Climate. Yet he has been attacked as a shill of the oil industry and incapable of having his own views. He has over 229 publications on such subjects as Hadley circulation, monsoons, planetary atmospheres, hydrodynamic instability, mid-latitude weather, global heat transport, the water cycle and ice ages. Lindzen is skeptical on the GW issue. He noted that the existence of skepticism on this issue has only recently been recognized. He also noted: there is an unusual level of extremism associated with this issue. While environmental scares are not new, few have been accompanied by recommendations that skepticism be stifled.

Three of his reports are noted below:

1990: *Some Uncertainties with respect to water vapors role in climate sensitivity*.¹¹ Here Lindzen argues that it is futile to talk about climate change without a deep understanding of the behavior of H_2O_v , and our present knowledge of the behavior of H_2O_v is inadequate to this task. H_2O_v has the dominant role in the radiative budget of the troposphere through its impacts on short and long wave radiation and its ability to form stratiform clouds. Clouds are not only important in the IR, but are also the key determinant of the Earth's albedo. He addresses two areas of uncertainty in this paper: (1) heat transport to higher latitudes and altitudes; and (2) the response of H_2O_v in the upper troposphere to climate forcing. This property is now unmeasured and the parameterizations used in large models, are clearly wrong on physical grounds.

1993: In a National Geographic paper¹², Lindzen notes that model predictions of a large GW depend on large increases in CO_2 , and mechanisms within the models that greatly amplify the climatic response to increasing CO_2 . These mechanisms (positive feedbacks) depend on what is likely a severe misrepresentation of the key physical processes: moisturization of the atmosphere and cloud formation. Indeed these processes may be acting in a manner opposite to what current models produce. Lindzen notes, that while the possibility that a large GW has not been disproved, it is without a meaningful scientific basis.

2006: A rather broad editorial¹³ by Lindzen in the WSJ was titled *Climate of Fear*. The secondary headline noted the GW alarmists intimidate dissenting scientists into silence. In this editorial:

- Lindzen asks “how can a barely discernable, one-degree [°F] increase since the late 19th century possibly gain acceptance as the source of recent weather catastrophes?” His answer is that “ambiguous scientific statements about climate are hyped by those with a vested interest in alarm” He asks who puts money into science where there is nothing really alarming? He notes that “scientists who dissent from the alarmism have seen their grant funds disappear, and their work derided and themselves libeled as industry stooges.”
- Lindzen noted how the process of new papers, letters by critics and letters in response by the original author all in the same journal was changed. He noted several hastily prepared papers appeared, claiming errors in our study, with our response delayed months or longer, allowing it to be noted as “discredited”.
- He also noted that alarm, rather than genuine scientific curiosity, “is essential to maintaining funding. And only the most senior scientists today can stand up against this alarmist gale, and defy the iron triangle of climate scientists, advocates and policy makers.”

• **Simpson** Dr. Joanne Simpson obtained her Bachelors, Masters and PhD degrees from the University of Chicago, in Meteorology, in 1949. She was the first women to achieve this degree, but her early career was somewhat comparable to the reception that Rachael Carson received. However, she persevered. She focused her 50 year career on the study of clouds and violent storms. It took about half her career, but recognition finally came for her efforts, starting in the '80s. For example, Roger Pielke, Sr., called Simpson among the most preeminent scientists of the last 100 years.

Some of her comments on GW follow.

- Since I am no longer affiliated with any organization, nor receive any funding, I can speak quite frankly.
- The main basis of the claim that society's release of GHGs is the cause of the warming is based almost entirely upon climate models. We all know the frailty of models concerning the air-surface system. We only need to watch the weather forecasts.
- Even the term “global warming” itself is very vague. Where and what scales of response are measurable?

- One distinguished scientist has shown that many aspects of climate change are regional, and some of the most harmful impacts are caused by changes in human land use. No one seems to have properly factored in population growth and land use, particularly in tropical and coastal areas.
- As a scientist I remain skeptical. I decided to keep quiet in this controversy until I had a positive contribution to make. Both sides (of climate debate) are now hurling personal epithets at each other, a very bad development in Earth sciences.

• **Singer** Fred Singer did his undergraduate work in electrical engineering at Ohio State University and holds a PhD in physics from Princeton University. Singer is an atmospheric physicist and professor emeritus of environmental sciences at the University of Virginia.

He is perhaps the first skeptic on the GW issue.

Honors include: U.S. Department of Commerce Gold Medal Award for the development and management of weather satellites; (First) Science Medal from the British Interplanetary Society and Honorary Doctorate of Science from Ohio State University, 1970. He has been elected Fellow at the: American Association for the Advancement of Science; American Geophysical Union; American Physical Society and the American Institute for Aeronautics and Astronautics.

A pioneer in the development of rocket and satellite technology, he devised the basic instrument for measuring stratospheric ozone and was principal investigator on a satellite experiment retrieved by the space shuttle in 1990. He was the first scientist to predict that population growth would increase atmospheric methane—an important greenhouse gas.

Singer is president of The Science & Environmental Policy Project, a non-profit policy research group he founded in 1990, Singer is also Distinguished Research Professor at George Mason University. He was first Director of the National Weather Satellite Service (1962-64); and Director of the Center for Atmospheric and Space Physics, University of Maryland (1953-62).

Singer has a web site, “The Week that Was”, and prepares and presents many essays each month. He is the author or editor of more than a dozen books and monographs, and has published more than 400 technical papers in scientific, economic, and public policy journals, as well as numerous editorial essays and articles in such papers as *The Wall Street Journal*, *New York Times* and the *Washington Post*.

An example of his concerns on GW is his 1999 commentary¹⁴ where he noted “the observational evidence suggests that any warming from the growth of greenhouse gases is likely to be minor, difficult to detect above the natural fluctuations of the climate, and therefore in-consequential.”

• **Solanki** Dr. Sami Solanki is the director and a scientific member at the Max Planck Institute for Solar System Research in Germany. He argues that changes in the Sun’s state, not human activity, may be the principal cause of global warming: “The Sun has been at its strongest over the past 60 years and may now be affecting global temperatures.”

• **Tennekes** Dr. Hendrick Tennekes is the former director of research at the Royal Dutch Meteorological Institute and currently a professor of aeronautical engineering at Penn State. He has written two books on aeronautics including one on turbulence, a field of importance in fluid mechanics and boundary layer considerations. As such he is a strong proponent of scientific modeling. However, he is an equally strong opponent of climate modeling. The major models used in the climate field are called General Circulation Models (GCMs). Tennekes was forced out of his Dutch post due to his very strong comments on climate science in general, and the GCMs in particular.

I first came upon Tennekes’s work in an essay¹⁵ posted on the Roger Pielke Sr. Web site. Pielke is a scientist that I have come to respect and admire and as such I periodically peruse his site. The essay by Tennekes is: *A Personal Call For Modesty, Integrity and Balance*. Although posted in 2007, Tennekes’ plea goes back 17 years. Today, Tennekes’ concerns and anger seems more focused on the IPCC. This falls in two areas:

- their CO₂ fixation and their pre-occupation with CO₂ emissions.
- the monopoly position that GCMs have achieved in climate research. He sees this as strategy, not science. He notes there are many other areas demanding more research, but not necessarily by more, or bigger GCMs. He notes that GCMs have been running for 20 years now, but that they can’t be made to agree on anything except a possible relation between GHGs and a slight increase in globally averaged temperature, and a likely link to fossil fuels use. But that is the end of the consensus.

Tennekes notes one example, out of many, of a major short-coming: the GCMs do not include feedbacks between changing farming and forest practices and the atmospheric circulation. For this and other reasons they can’t agree on precipitation patterns. But precipitation is far more relevant to global food

production than a slight increase in temperature.

Tennekes states “there exists no sound theoretical framework for climate predictability studies” used for global warming forecasts. Solomon wrote, in *The Deniers Part VIII*, an editorial entitled *The Limits of Predictability*, that Hendrik Tennekes, more than any other critic, has challenged the GCMs that climate scientists have, and are still constructing. He argues what is needed is a different approach to this science, an approach that recognizes inherent limits in such scientific tools. Perhaps his most famous statement is: “No Forecast Is Complete Without A Forecast of Forecast Skill.”

Modeling is the basis of forecasts of climate change. Tennekes argues this modeling has little utility. He states: “There exists no sound theoretical framework for climate predictability studies.” He concluded: “We only understand 10% of the climate issue.”

Tennekes concludes his critique on the monopoly position that GCMs have achieved. He sees this as strategy, not science. He notes there are many other areas demanding more research, but not necessarily by more, or bigger GCMs.

All of the above is food for thought on the GW and AGW issues and on the role of the huge GCMs. It paints a markedly different view than that generally expressed earlier. Further comments on the GCMs will be reported later. Now it is time to move on to other inputs.

• **Wallace** John M. Wallace is a Professor of Atmospheric Sciences at the University of Washington. He also has been Co-Director of the Program on the Environment at this university. He has been a Member of the Committee on the Science of Climate Change for the National Research Council/National Academy of Sciences.

As a related item, Tennekes has commented on such phenomena as the jet stream, the Polar Vortex and the Arctic Oscillation (AO). He has quoted Wallace that “there is not a beginning of a consensus on a theory of the AO.” Without an established relationship between rising GHGs and systematic changes in the AO it is impossible to make inferences in changing precipitation patterns. As a result, Tennekes went on, “we do not know, and for the time being cannot know anything about changing patterns of clouds, storms and rain.”

• **Wegman** Dr. Edward Wegman obtained a BS Degree at Saint Louis University in mathematics and an MS and PhD degrees at the University of Iowa in mathematical statistics. He was on the faculty at the University of North Carolina for ten years and at George Mason University since 1986. He is the author of over 160 papers and five books. He is the former chairman of the Committee on Applied and Theoretical Statistics of the National Academy of Sciences

In 2006 he was asked to present a report¹⁶ to the House on the statistical validity of the Hockey Stick temperature reconstruction. There are literally thousands of papers, commentaries and so forth on this subject, both for and against the Hockey Stick. This temperature profile is, perhaps, the most highly controversial subject on the GW issue.

- It was named for the Northern Hemisphere temperature profile, developed in 1998, that claimed a fairly linear period from ~ 1000 to ~ 1900 AD (the stick), then a dramatic and rapid temperature jump from ~ 1900 to ~ 1995 AD (the blade).
- It was presented at that time as a replacement for an earlier graph, that was similar to a sine wave, with three key periods included: The Medieval Warming Period (MWP, ~ 800 to 1325AD), The Little Ice Age (LIA, ~ 1325 to 1850 AD) and the Modern Warming Period (~ 1850 up to the present). This chart was included in the 1990 and 1995 IPCC reports, and was the conventional wisdom up to ~ 1998. Then the *Hockey Stick* came out of nowhere. Backers of this work unilaterally declared it was the correct profile and sought to flush the MWP and the LIA from any further discussion.

While the *Hockey Stick* was featured prominently in the IPCC 2000 report, it was conspicuously absent in the IPCC 2007 report. In short the IPCC had literally and figuratively withdrawn all support for this work. As such we might choose to ignore it in this report. However, since this subject dominated the scene from 1998 to early 2007, and since the conclusions of this work by Mann et al have generated such a highly polarized debate over the nature of GW and AGW, it deserves reporting here.

Proponents of the *Stick*. This profile was developed by a Dr. Michael Mann in 1998, along with Raymond Bradley and Malcolm Hughes. They developed the *Hockey Stick*, through the use of the Principal Component Analysis (PCA) statistical technique, to meld together a variety of highly diverse temperature proxies. These included time series for: tree rings, ice cores, lake sediments, marine sediments, pollen and coral reefs. The contemporary instrumental based temperature data was also included in this analysis. Their key papers (see references 17 and 18) will not be addressed directly here.

The supporters of the AGW issue state the degree of warming of the 20th century is larger than any other period over the past millennium. And they state the degree of warming over the 1990s is likely to have produced the warmest decade over these 1000 years.

Opponents of the Stick. The opponents, of the AGW issue, believe the proponents of the *Hockey Stick* are guilty of high sticking and playing with a broken stick. Two Canadians have led this fight:

- Ross McKittrick, Associate Professor, Economics, University of Guelph; and
- Stephen McIntyre, retired mining engineer and expert on statistics, Toronto.

McKittrick and McIntyre have written many papers on this subject. (See references 19, 20 and 21 for their key papers). In addition, the individual paper by McKittrick, *What is the Hockey Stick Debate About?*²², is recommended. Their work will not be addressed directly here.

In particular McKittrick and McIntyre challenged the way in which PCA was used, based on rather subtle mathematical nuances.

Finally a book, *Taken by Storm*²³, by McKittrick and a third Canadian, Christopher Essex, Professor of Applied Mathematics, University of Western Ontario, is recommended.

Conclusions of the Wegman Report

- The Mann, Bradley and Hughes 1998 and 1998 reports (references 17 and 18) are somewhat obscure and incomplete and the criticisms of McKittrick and McIntyre in their papers are valid and compelling.
 - Mann, Bradley and Hughes are major participants in the paleoclimate community, but a community in isolation. Even though they rely on advanced and subtle statistical techniques they do not seem to be interacting with the statistical community.
 - The sharing of research materials, data and results was haphazardly and grudgingly done.
 - There was too much reliance by Mann, Bradley and Hughes on peer review, but this peer review may not have been sufficiently independent.
 - Mann, Bradley and Hughes's assessments that the 1990s was the hottest decade of the millennium and that 1998 was the hottest year of the millennium cannot be supported by their analysis.
 - Temperature reconstructions do not provide insight and understanding of the physical mechanisms of climate change. What is needed is deeper understanding of such mechanisms.
- **Zichichi** Dr. Antonino Zichichi is one of the world's foremost physicists and former president of the European Physical Society. He is credited with the discovery of nuclear antimatter. He calls global warming models "incoherent and invalid."

Conclusions

The views of 17 physicists/mathematicians have been noted directly and several others indirectly. Some of these are also Distinguished Veterans. All are skeptical on the GW issue. Their lifetime publications, speeches and comments give the nature of this groups views on this issue. Their views are more proof that a serious and valid debate exists on the GW issue.

While not absolute proof that the GW issue is heading down the wrong highway, their views are food for thought. It suggests it is time to stop and get off this speedway, and double check one's directions.

It is proof that the claim that "all scientists agree" is rather juvenile at best, fraudulent at worst.

It is time for all scientists to reconsider the position of Thomas Huxley. He stated that for him, skepticism is the highest of duties for scientists and blind faith the one unpardonable sin.

Our country needs to improve the way it supports such research. As Richard Lindzen has noted, alarm, rather than genuine scientific curiosity, is essential today to maintaining funding. This has to change.

The claim that we face an imminent catastrophe is unfounded and inappropriate. The extensive use of alarmism in general, by the supporters of the warming position, do their case a major disservice.

Today there is a huge problem in getting to learn both sides of the AGW debate. There is a lack of transparency on a variety of issues. This debate needs to be aired.

Today, only the most senior scientists can stand up against this alarmist gale, and defy the establishment of climate scientists, advocates and policy makers. This needs to be changed.

In closing one might return to the teaching, or is it preaching, of Dr. C. Rapley, of the British Antarctic Service. He asked: "If carbon is increasing, how can you really deny there's going to be warming?" And "if you really knew how physics worked, you would stop arguing on the AGW issue and get on board our band-wagon. Well, the witnesses presented here, Dr. Rapley, know their physics, and their answer is while there may be some minor warming, there is nothing pending that can't be handled by minor