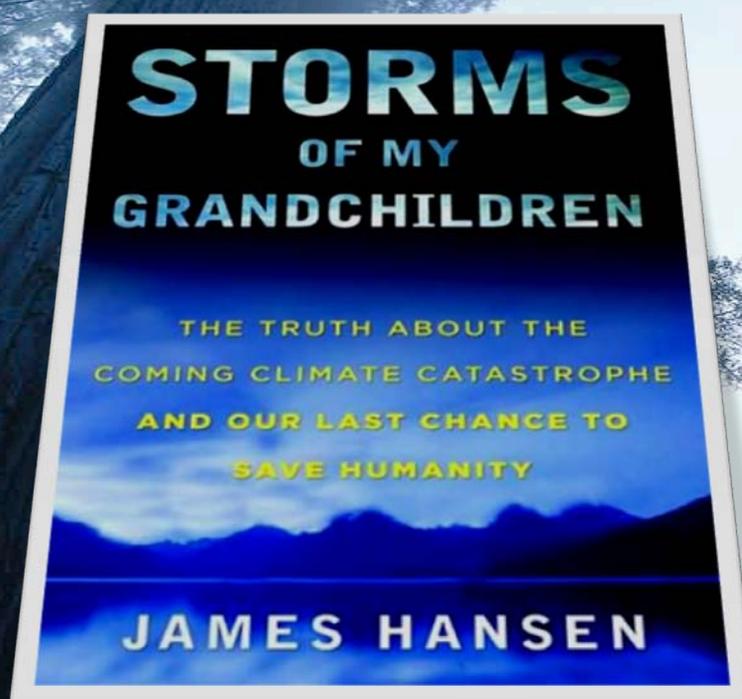


A REVIEW OF JAMES HANSEN'S BOOK: “STORMS OF MY GRAND- CHILDREN...”

by Jim Hollingsworth



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INTRODUCTION

While scientists the world over continue to study and debate what part man has played (if any) in the gentle warming that took place mainly in the latter half of the last century, Dr. James Hansen is absolutely certain. The purpose of his book is to scare us into taking immediate and drastic action to control greenhouse gases, mainly carbon dioxide. Although Dr. Hansen is a scientist, his work is more political than scientific. He makes an emotional appeal and he does it by attempting to build fear that there will be no world left for our grandchildren to live in.

Few people are really concerned about global warming. Most know that change is the one constant you can expect with any climate. When doing surveys of what is important to people global warming is generally listed dead last. Those who believe that our world is headed for disaster will welcome Dr. Hansen's book: He may also catch a few gullible. But, most of the rest of the world are more concerned about raising their standard of living, and even having things like clean water, and safe sanitary facilities, than they are about global warming. Having cheap and universally available energy, especially electricity, has saved many lives the world over.

Because of the fact that climate change is recognized as just a normal part of the history of the earth most people are simply not convinced by the kinds of arguments put forth by Dr. Hansen and other global warming alarmists. The alarmists are like Chicken Little who ran around saying: "The sky is falling; I must go and tell the king". But there is no more substance in their predictions than there was in Chicken Little's.

Dr. Hansen's view depends on two things. First, that man, through burning fossil fuels (coal, petroleum, natural gas), is producing huge quantities of carbon dioxide, and this increase in carbon dioxide, through the "greenhouse effect", is causing the earth to warm.

There is, however, considerable evidence that gentle warming and increased carbon dioxide are beneficial to plants. Also, more people die in winter than in summer. The present level of carbon dioxide is about 390 ppm (parts per million). All plants need carbon dioxide; that is what plants use to grow: The more carbon dioxide the faster they grow.

But, there is a remarkable similarity between the historical temperatures and the level of carbon dioxide. What we think we know about temperature in the distant past (before

thermometers) comes from proxy data like tree rings, sedimentary deposits, and more recently ice core samples, especially from Antarctica and Greenland. In Antarctica the Russians have drilled down to a depth representing about 800,000 years. (The ice over Antarctica averages about 7,000 feet, and in some places is over 15,000 ft thick.)

Detailed analysis of these ice cores has revealed that temperature rises first followed about 800 years later by an increase in carbon dioxide. Do keep in mind that Antarctica is mostly a desert, with very little snowfall (less than one inch a year at the pole), so it is very difficult to separate one year from another.

The second thing that Dr. Hansen has put forth to support his case is what he calls “tipping points”. Sure, he says, the earth is just warming mildly at the present, but through a mechanism he calls “positive feedbacks” and “forcings” a little warming is going to be multiplied until a tipping point is reached and there is a dramatic rise in temperature, causing the destruction of all life on the earth. The only problem with tipping points is that there is little historical evidence to support it. It is all based on computer models which are actually no better than the data that is put into them.

His idea about tipping points is no doubt based on the hockey stick graph developed by Michael E. Mann. This graph was popularized by Al Gore in his movie *An Inconvenient Truth* in which he mounts a man lift to reach the top of the graph. The only problem with the graph, of course, is that you have to exclude the *Medieval Warm Period* and the *Little Ice Age* and then project a short term tail of the graph out into the future to make it work. The graph has been discredited by Ross McKittrick and Stephen McIntyre and even the IPCC (Intergovernmental Panel on Climate Change) has stopped using it.

So, all things considered Dr. Hansen has no case: The science simply will not support any program requiring immediate and radical action to, not only control, but also reduce, carbon dioxide in the atmosphere. He knows that only by appealing to our emotions and not to science will he gain any adherents to his program: Thus, the thrust of his book.

ANALYSIS

Just a quick glance at the title of his book reveals that Dr. Hansen believes that we are headed for a world-wide disaster unless immediate and drastic action is taken.

Still, we have to ask two very basic questions:

1. Are we coming to a climate catastrophe?
2. Is this the last chance to save humanity?

Anyone who has made even a cursory study of natural history, and especially the history of man, must conclude that man has weathered many so-called catastrophes. In fact one of the most basic characteristics of civilized man is that he is not controlled by his environment, but he continues to have the ability to adapt to any changes. Man has nearly populated the whole earth; there are even people “living” at the South Pole, and very near the North Pole.

James Hansen is probably the foremost scientist who supports global warming alarmism. At its heart it is little more than “Chicken Little; the sky is falling” philosophy. And, even though much of what Dr. Hansen shares in his new book is good science, many of the conclusions he draws are simply not supported by the science he presents. Global Warming Alarmism has as its foundation historic weather reports, which reports seem to indicate that the earth is mildly warming. (The Alarmists would say “it is warming at an alarming rate”, but .5 degrees in 100 years is not an alarming rate.) However, as Anthony Watts has demonstrated, www.wattsupwiththat.com/ much of the information of temperatures is not accurate for various reasons, plus the fact that scientists have been unable to obtain original data so they can replicate the conclusions that Dr. Hansen and others have drawn.

We are told that there is a consensus, and that the science is settled. However science never depends on majority rule, but on repeatable experiments providing similar conclusions. But those who support global warming alarmism cling to what they believe with a faith as strong as any religious zealot.

Dr. Hansen begins his book with this statement:

Planet Earth, creation, the world in which civilization developed, the world with climate patterns that we know and stable shorelines, is in imminent peril. The urgency of the situation crystallized only in the past few years. We now have *clear evidence* of the crisis, provided by increasingly detailed information about how Earth responded to perturbing forces during its history (very sensitively, with some lag caused by the inertia of massive oceans) and by observations of changes that are beginning to occur around the globe in response to ongoing climate change. The startling conclusion is that continued exploitation of all fossil fuels on Earth threatens not only the other millions of species on the planet but also the survival of humanity itself—and the timetable is shorter than we thought. (Emphasis Added P. IX)

Now, it appears that the one thing Dr. Hansen is not going to share with us is the “clear evidence” that we need to draw the same conclusions that he has drawn.

He goes on to note:

How can we be on the precipice of such consequences while local climate change remains small compared with day-to-day weather fluctuations? The urgency derives from the nearness of climate tipping points, beyond which climate dynamics can cause rapid changes out of humanity’s control. Tipping points occur because of amplifying feedbacks—as when a microphone is placed too close to a speaker, which amplifies any little sound picked up by the microphone, which then picks up the amplification, which is again picked up by the speaker, until very quickly the noise becomes unbearable. Climate-related feedbacks include loss of Arctic sea ice, melting ice sheets and glaciers, and release of frozen methane as tundra melts. (Ibid)

So, it boils down to tipping points. Although Dr. Hansen mentions tipping points throughout his book, he never really develops them so that anyone can understand how they work. In fact, Earth's history would seem to indicate that Nature is able to compensate for most negative change.

Every credible scientist believes the earth is warming. (After all at one time in the past there was over a mile of ice right here in Idaho.) Most believe that man has some effect on the climate. Few believe that man is the chief cause of global warming or that changing his daily use of energy will in fact have a significant effect on the climate.

Dr. Hansen builds his case paragraph by paragraph. Listen to this:

During the past few years, however, *it has become clear* that 387 ppm (CO₂) is already in the dangerous range. It's crucial that we immediately recognize the need to reduce atmospheric carbon dioxide to at most 350 ppm in order to avoid disasters for coming generations. (Emphasis Added P. XI)

Now, it may have become "clear" to Dr. Hansen, but it is not clear to the rest of us. In fact experiments on plants indicate that plants do much better under warmer conditions and elevated levels of carbon dioxide, the basic building block of all life.

As if his title did not scare us enough he reiterates his theme by saying: "...but we need to acknowledge now that a change of direction is urgent. This is our last chance." (P. XII) And, just to be safe Dr. Hansen points out that global warming can cause droughts and heat waves, and forest fires, but because warm air can hold more water vapor it can also cause more extreme floods, tornadoes, and tropical storms. "I realized that I should have emphasized more strongly that both extremes increase with global warming." (P. XV)

Few of the Global Warming Alarmists seem to consider that water vapor is a greenhouse gas. Usually they list carbon dioxide, methane and a few other minor gases. But, actually water vapor has a lot more to do with our climate than any of these other minor gases. Water vapor is a tempering agent in that climates are always more mild where there is more water in the air. Because water can absorb lots of heat and hold it, where there is more water in the air the climate is generally warmer and more tempered. It is on the desert, where there is less water vapor that the temperatures go from very hot in the day time to very cold at night. In the tropics the temperature varies very little throughout the day.

So, why don't they consider water vapor? It is because they know that man has almost no affect on water vapor. At least they have not been able to figure out just what effect he may have.

Dr. Hansen was very concerned about the fact that President Bush had not planned to sign the Kyoto Protocol (treaty). He found that fact very discouraging.

That decision was a heavy blow to environmentalists and scientists who realized that Earth's climate was approaching a dangerous situation because of the buildup of atmospheric carbon dioxide. (P. 2)

Please note the loaded words that Dr. Hansen insists on using over and over again. Kind of makes you want to run and hide, but with no place to hide.

Dr. Hansen then goes on to discuss "forcings" in terms that only a physicist would understand. The energy from the Sun is measured in watts/sq meter, but he does not bother to explain how he knows how many watts/sq meter we are getting from the sun, since watts is a measure of electrical energy (volts X amps =watts). He seems to entirely discount changes in solar radiation as having any effect on climate. Neither does he spend much time talking about the role of the ocean. The ocean is a gigantic heat sink; the temperature of the ocean only changes very gradually. It is also a vast storage facility for carbon dioxide. The oceans hold about fifty times more carbon dioxide than does the atmosphere. Cold water holds more dissolved carbon dioxide than warm water, so as the ocean warms it gives off carbon dioxide.

On the other hand as the atmosphere becomes richer in carbon dioxide much is absorbed by the oceans, until a balance is reached. This tends to keep the amount of carbon dioxide from fluctuating radically.

One thing that stands out throughout Dr. Hansen's book is Dr. Hansen. There is a lot of Dr. Hansen in his book. It turns out that he knows better than Dr. Richard Lindzen of the Massachusetts Institute of Technology, many other scientists, and even Presidents George W. Bush or Barak Obama.

Speaking of a debate he had with Dr. Lindzen he said:

Lindzen used part of his presentation to show graphs of observed data such as temperature and precipitation, emphasizing the large fluctuations and possible measurement errors. *His aim seemed to be a conclusion that global warming is a very uncertain proposition.* (Emphasis Added P. 14)

Dr. Lindzen is one of the foremost climate scientists in the world. A professor of meteorology at Massachusetts Institute of Technology he has had a very distinguished career. (You can see this at: <http://www-eaps.mit.edu/faculty/lindzen.htm>, and also here: <http://www-eaps.mit.edu/faculty/lindzen/CV.pdf>) He was also a lead author of Chapter 7, *Physical Climate Processes and Feedbacks*, of the *IPCC Third Assessment Report on Climate Change*. Even the alarmists have to admit that he is well qualified to speak on the subject of climate change.

Writing in the *Washington Post*, Joel Achenbach wrote that "of all the skeptics, MIT's Richard Lindzen probably has the most credibility among mainstream scientists, who acknowledge that he's doing serious research on the subject." (Joel Achenbach, ["The Tempest"](#), *Washington Post*, May 28, 2006; Wo8.)

Dr. Lindzen is certainly a serious voice for reason in the climate debate. Still, Dr. Hansen is unable to accept any of what Dr. Lindzen is teaching on the subject. He continues to make public statements that “The public doesn’t understand that we have an emergency”. <http://www.stormsofmygrandchildren.com/>

It appears that Dr. Hansen felt betrayed by President Bush for he noted:

Recall that George W. Bush came into office carrying a pledge to treat carbon dioxide as a pollutant. When EPA administrator Christine Todd Whitman testified on February 27, 2001, to a Senate Committee on Environment and Public Works subcommittee, she advocated a plan for regulating carbon dioxide emissions under the Clean Air Act. At an international meeting the following week, Whitman said that she “assured [her] G8 counterparts that the president’s campaign commitment to seek a mandatory cap on carbon dioxide emissions was solid,” according to her book, *It’s My Party, Too*. (Editorial Insertion in the Original P. 30)

When faced with pressure from Senators Hagel, Helms, Roberts and Craig President Bush reversed his policy.

Bush responded with a March 13 letter to Senator Hagel in which the president reversed his position on carbon dioxide, stating that it was not a pollutant under the Clean Air Act. He claimed that important new information warranted the reevaluation, specifically a Department of Energy report concluding that caps on carbon dioxide emissions would reduce the use of coal and raise the price of electricity. (Ibid)

Dr. Hansen continued to repeat the need for strong measures to combat this perceived threat to our civilization.

The theme...was that paleoclimate information provides precise knowledge of how sensitive climate is to changes of climate forcings. Human-made forcings are beginning to warm the world at a predicted rate. The limit on permitted global warming, if we wish to preserve the great ice sheets on Antarctica and Greenland, and thus preserve the coastlines that have existed for the past seven thousand years, is much less than has generally been assumed. Halting global warming is still feasible—but **requires international cooperation in taking urgent, unprecedented actions**, which would have additional benefits for human health, agriculture, and the environment. (Emphasis Added P. 34)

It is very hard for any objective observer to see what these additional benefits may be seeing that any international legislation will require that people living in poverty continue to live without electricity, running water, or suitable waste disposal, and developed countries will be forced back into an economy not known for over 100 years.

Further, Dr. Hansen seems to have no faith in the ability of the Earth to heal itself.

Climate history is our best source of information about how sensitive the climate system is, and, it turns out, the climate is remarkably sensitive—large climate changes can occur in response to even small forcings. (P. 35)

This is a key point with Dr. Hansen. He wants you to understand the “science” as he understands it. Climate history would seem to indicate that the Earth warms and cools, it gets wetter and dryer, but time moves on, and there is no long term damage. Hansen believes that some small factors can have a huge effect and he also used the term “tipping points” to indicate when things reach a certain point it will tip over and we will not be able to go back, something like children on a teeter totter. Here is what he says:

I mentioned in the preface to this book that understanding climate forcings, imposed perturbations of the planet’s energy balance, would be the most difficult science you would need to deal with.

If you prefer to remain in the land of the blissfully ignorant, you will have lots of company. Even some scientists, seeing Al Gore mount an elevator contraption and point to paleoclimate carbon dioxide and temperature records in the movie *An Inconvenient Truth*, assert: “He has the science all wrong!” Actually, Gore understands the science well enough, and he had the implications right—he just failed to explain the science. (PP 35, 36)

(Perturbations means “confusion, irregularities, disorder, disarrange, or deviations”. A lot of what he is sharing depends on the meaning of perturbations.)

What Dr. Hansen shares about the graph in Al Gore’s film is the famed hockey stick graph produced by Michael E. Mann, professor of meteorology at Penn State. What this graph attempts to demonstrate is that the earth has cooled and warmed in some measure over the time that we have kept temperature records but the day is rapidly approaching in which it will warm at an alarming rate (after the tipping point is reached) and there won’t be anything we can do about it. This supposed radical warming will have a disastrous affect on all earth life.

It is amazing that Dr. Hansen is still using this graph. Scientists Ross McKittrick and Steven McIntyre spent the time to review the data and concluded that there was no basis in fact for the graph (<http://climateaudit.org/2005/04/08/mckittrick-what-the-hockey-stick-debate-is-about/>).

While it was used in the past by the IPCC, it was removed from the last report. By now we ought to be in that part of the graph where the temperature is rapidly rising, yet there has been no measureable or statistical rise in world temperatures since about 1998.

Understanding this key element of “science” is necessary if one is going to accept what Dr. Hansen (and Al Gore) are saying. He goes on to say:

But if you are willing to expend a modicum of effort you can take a big step toward appreciating the degree to which we are living on a planet in peril. Additional steps will be needed, but this first one—learning about *climate sensitivity and*

paleoclimate—is essential to developing a *realistic understanding* of the potential implications of climate change for your children and grandchildren. (Emphasis Added P. 36)

Here is the problem in a nutshell: gaining a “realistic understanding” of “climate sensitivity and paleoclimate”. Whatever your present understanding happens to be it is just not “realistic”. No matter what your science background or your ability to think logically and critically, your understanding is just not “realistic” if it does not agree with Al Gore and James Hansen. (Environmentalists have taken the position that they are right and those who happen to disagree with them are wrong. If those who disagree are scientists they are not credible simply because they do not agree with those in the environmental movement.)

At this point in the book Dr. Hansen attempts to make the science clear to us. But he seems to have some difficulty explaining exactly what the science is telling us. First he insists that temperature rises first, then there is an increase in carbon dioxide. (Don’t forget that he is trying to demonstrate that an increase in carbon dioxide is causing the earth to warm through the greenhouse effect, and that this warming will reach a critical state which will destroy all life on the earth.) But, he truly does want us to understand what he believes: In fact he just wants to be our teacher in this matter.

If you will stick with it, I will be your docent [*a teacher or lecturer*] on a short excursion through the remarkable world of climate change. You will be able to understand, for example, how in natural climate oscillations, *the temperature change must precede the carbon dioxide change*. You will also gain a quantitative appreciation of implications for human-made climate change. In return, I hope you will help spread the knowledge. Remember that the fate of our grandchildren depends on a better public appreciation of the situation. (Emphasis Added Ibid)

Of course this is for “natural climate oscillations” and man-caused climate change could be something else entirely. Dr. Hansen also seems to have a motto that not a page shall be written without reminding the reader that the earth is in imminent peril.

Dr. Hansen next talks about ice ages, especially the most recent one that ended about 10,000 years ago. He points out that as recently as 20,000 years ago Canada and even some northern parts of the United States were under two miles of ice. He talks about the potential devastation the next ice age could have on civilization but reassures us by saying:

But not to worry—even though we sometimes hear geoscientists talk as if ice ages will occur again it won’t happen—unless humans go extinct. Forces instigating ice ages, as we shall see, are so small and slow that a single chlorofluorocarbon factory would be more than sufficient to overcome any natural tendency toward an ice age. Ice sheets will not descend over North America and Europe again as long as we are around to stop them. (PP. 36-37)

While there is considerable discussion in the literature about a possible link between chlorine compounds, such as chlorofluorocarbon compounds, and the ozone layer, or an ozone hole, especially at the South Pole, it is not clear how this also affects temperature, as

Dr. Hansen suggests. Here is one article on the subject including additional links: <http://www.ciesin.org/TG/OZ/cfcozn.html>.

However, there could be a weak link between ozone depletion and temperature, but one wonders how Dr. Hansen can be so certain about the relationship between chlorofluorocarbons and temperature.

This is also a remarkable statement that totally misses the huge dynamic of historic climate change. The factors that affect climate are so many and varied that it is very difficult to predict with absolute certainty what is coming a month from now, let alone a generation later. Not only that, the science behind atmospheric chlorofluorocarbon (Freon refrigeration used in refrigerators, freezers and spray cans) was strong enough to force these products off the market, yet that science is still being debated today.

Next Dr. Hansen mentions the part that oceans play in climate change especially as a buffer on temperature, and as a sink for carbon dioxide.

The same ice cores that yield the Antarctic temperature allow us to measure atmospheric composition from bubbles of air trapped when the snow compressed into ice. The amount of carbon dioxide, shown in the middle curve in figure 3, is larger during the warm periods. This is as expected, because a warmer ocean releases carbon dioxide into the air. Part of the carbon dioxide release is due to decreased solubility as temperature rises (just as warm soda releases its fizz) and part is due to other mechanisms including reduced storage of biological carbon in the deep ocean as ocean circulation speeds up in interglacial periods. (P. 38)

We are told that the oceans hold about fifty times more carbon dioxide than does the atmosphere. We also need to keep in mind that sea shells are composed of calcium carbonate, and the carbonate comes from the dissolved carbon dioxide. There seems to be little disagreement on this point. Where the disagreement comes is in the question of cause and effect: Is an increase in atmospheric carbon dioxide causing the temperature to rise through the greenhouse effect leading to release of carbon dioxide from the oceans, or is there another mechanism warming the oceans causing a release of carbon dioxide to the atmosphere and thus causing the level of atmospheric carbon dioxide to rise?

There is something else to keep in mind at this point. When you study a carbon dioxide graph you see that it has a saw tooth appearance as it rises. This is no doubt due to the fact that most of the land is in the Northern Hemisphere and during the winter few plants are growing, so the carbon dioxide rises, but in the spring and summer there is lots of green vegetation which absorbs huge quantities of carbon dioxide. Here is just one graph of that phenomenon: <http://www.esrl.noaa.gov/gmd/ccgg/trends/>.

Dr. Hansen continues to talk about the historical relationship between carbon dioxide and temperature:

Close examination shows that temperature changes precede the carbon dioxide changes by several hundred years... But note here that the sequence (carbon dioxide

change following temperature change) and the delay (several hundred years) are as expected for these natural climate changes. The length of the delay of the carbon dioxide response to temperature change is due to the ocean turnover time, which is several centuries. (Ibid)

He is still talking about “natural climate changes”. Does he demonstrate that man-caused changes operate in a different manner?

He also mentions the delay which is due, he says, to “ocean turnover time, which is several centuries.” The principle that Dr. Hansen mentions above is pretty universally accepted by scientists. What is rarely mentioned is the average temperature of the ocean. The temperature at the surface is about 62.6° F but at the bottom it is only about 32-37° F. Of course this is an average and it is colder at the poles and warmer in the mid latitudes. What seems reasonable to conclude is that the ocean is very gradually warming, ultimately bringing the temperature of the deep ocean and atmosphere into balance. Remember, now, that a warming ocean releases carbon dioxide to the atmosphere. Could this explain, at least in part, the increases in carbon dioxide levels over time? <http://www.windows2universe.org/earth/Water/temp.html>.

Dr. Hansen next turns his attention to the relationship between land ice and sea levels. He points out that at one time in the past the sea level was 350 ft lower than it is today. He says:

The rate of sea level rise can be rapid once ice sheets begin to disintegrate. About 14,000 years ago, sea level increased 4-5 meters per century for several consecutive centuries—an average rate of 1 meter every 20 or 25 years. (Ibid)

That is probably a fairly accurate statement, yet the implication is not. He implies that if we are not careful we will get that kind of sea level rise again. But that would seem unlikely for two reasons. First, we are probably nearing the end of a long interglacial cycle and the Earth will start to cool again (these run to thousands of years, so don't worry ☺). Second, and more to the point, is that 14,000 years ago was near the end of the last ice age. After the end of the last glacial cycle the earth warmed rather rapidly (in geologic terms) and the glaciers melted back to their approximate positions today. There was a lot of water locked up in ice at that time and it is now in the oceans. Although there are still massive glaciers in Greenland and Antarctica they are where it is usually very cold and can therefore melt very slowly. We do not have nearly as much ice on land today as we did at the end of the last ice age.

So what is the relationship between temperature, carbon dioxide and sea level?

The strong correlation of temperature, carbon dioxide, and sea level is obvious in figure 3. But what are cause and effect? Presumably you would like to know: What causes the huge climate changes? After all, Central Park in summer today is not covered by a kilometer of ice. The culprits, slight perturbations in Earth's orbit around the sun and a tiny tilt of Earth's spin axis, may be surprising if you have not trafficked in this topic. But first I need to clarify the topic of climate sensitivity. (P. 40)

Dr. Hansen tells us that climate sensitivity was first investigated seriously in 1979 under President Carter, who sponsored the *Global 2000 Report* covering concerns about the future. He says that Carter was a worrier; in fact he referred to him as “the worrier in chief”. He goes on to tell us:

Considering that Carter initiated and approved projects aimed at extracting oil and gas from coal, as well as cooking the Rocky Mountains to squeeze oil from tar shale, he had very good reason to worry. Those projects, if they had been carried to full fruition and spread to other nations, *had the potential to exterminate all life on Earth.* (Emphasis Added Ibid)

So how could those projects, if completed, cause the extermination of all life? He does not tell us, neither does he tell us how oil and gas from coal, when burned, would be any different than that taken from wells.

Dr. Hansen talks about the report that President Jimmy Carter requested of the National Academy of Sciences which was to cover “...the potential climate threat posed by increasing atmospheric carbon dioxide.” (Ibid) The man chosen to lead the study group was Professor Jule Charney of MIT. He seems to feel that the work of Charney is paramount in understanding climate science, especially his approach to the problem. While he says a lesser scientist would have gone into great detail about climate complexities Professor Charney placed the focus on important physical mechanisms.

Thirty years later, Charney’s thought experiment has become even more powerful, indeed, an essential element in climate change analysis.

Charney’s thought experiment was this: Assume that the amount of carbon dioxide in the air is instantly doubled. How much will global temperature increase? (P. 41)

In his examination he specified that many properties of the Earth would be fixed. “Only the atmosphere and ocean would be allowed to change in response to the carbon dioxide doubling.” (Ibid)

He goes on to say:

Charney realized, of course, that some of these “fixed” quantities may start to vary on time scales of practical importance. But humans were beginning to burn fossil fuels so rapidly that a doubling of carbon dioxide could be expected in less than a century, which is almost instantaneous on geologic time scales. (Ibid)

Okay, let us try to understand what Dr. Hansen is saying here. First he told us (above) that carbon dioxide change followed temperature change (P. 38) implying that a rise in temperature *preceded* a rise in carbon dioxide. Now he tells us, through Professor Charney’s “thought experiment”, that an increase in carbon dioxide will cause an increase in temperature. This is just the opposite of what he had been saying in the previous few pages. Furthermore he gives no evidence of his statement that: “... humans were beginning to burn

fossil fuels so rapidly that a doubling of carbon dioxide could be expected in less than a century.” **This is not a minor point but his whole theses, that man is the cause of global warming.**

Dr. Hansen says that if carbon dioxide were doubled it would reduce the heat radiation from Earth to space. He said that “Charney was seeking the equilibrium global warming, the warming after the atmosphere and ocean have come to a new final temperature in response to increased carbon dioxide.” (Ibid)

So how long would it take to double carbon dioxide at the present rate of increase? We know that in 1884 carbon dioxide was at about 284 ppm. Today in 2010 it is about 390 ppm. That is a difference of 106 ppm in 178 years, an average of 0.6 ppm/year. Doubling the carbon dioxide level would be an increase of 390 ppm. Dividing that by 0.6 ppm/yr means 650 years to double carbon dioxide. But, wait. Dr. Hansen says that because of man the carbon dioxide level can be expected to double in less than a century. How can he be so sure?

He also notes that water vapor “causes a positive feedback, because water vapor is a powerful greenhouse gas.” (P. 43) He talks about clouds and says that though a lot of effort has gone into understanding clouds we really do not know what affect clouds will have on climate change. Cloud feedback could be “amplifying or diminishing”. (Ibid The reason it is so difficult to model clouds is that clouds act like a blanket that keeps heat in, but clouds also reflect energy coming from the sun, making it colder on cloudy days. It is nearly impossible to understand which effect will be greater as the earth warms.)

Dr. Hansen does not explain what he is getting at. He goes on to even further undermine his own case for anthropogenic (man-caused) global warming.

Yet when Jule Charney used existing climate models to estimate climate sensitivity for doubled carbon dioxide, he could say only that it was probably between 1.5 and 4.5 degrees Celsius. And by “probably,” he meant that there was only a 65% chance that it was in that range.

Thirty years later, models alone still cannot do much better. Here is another killer: Even as our understanding of some feedbacks improves, we don’t know what we don’t know—there may be other feedbacks. Climate sensitivity will never be defined accurately by models. (P. 44)

Earlier Dr. Hansen had told us: “Forcings drive climate change. Feedbacks determine the magnitude of the climate change.” (P. 42) Yet there seems to be considerable doubt as to the magnitude of the change. How, then, can Dr. Hansen be so positive we are headed for imminent disaster? The most logical answer is that he cannot.

He continues on this theme by saying:

The mechanisms immediately responsible for the entire global temperature change, as we have seen, are changes in the amount of greenhouse gas and surface

reflectivity. But both these mechanisms are slow feedbacks, not the instigating forcing. (PP. 46-47)

So what are the “instigating forcings” if not “greenhouse gas and surface reflectivity”? According to Dr. Hansen “Instigation is provided by small changes in Earth’s tilt and orbit around the sun.” (P. 47) He says that earth tilt takes about 41,000 years to run through a cycle of from a maximum of 24.5 degrees to a minimum of 22.1 degrees, with today’s tilt being about 23.5 degrees. He says we are headed to the minimum (in about 8,000 years) but that *increased tilt* causes the poles to get more sun in summer.

Both the latitudinal and seasonal radiation changes work in the sense of causing high-latitude ice sheets to melt when the tilt increases. Thus if tilt were the only factor, we would expect Earth to be headed now toward growth of high-latitude ice sheets, possibly toward an ice age, because the spin axis is straightening up. (P. 48)

He also mentions that the orbit of the earth is somewhat eccentric (not round), varying on a scale of from near zero to almost 6 percent. This is based on a theory developed by a Serbian engineer Milutin Milankovitch during World War One. http://en.wikipedia.org/wiki/Milankovitch_cycles.

Presently the Earth is closest to the sun in January and farthest from the sun in July. He points out that this moves through the calendar year during a period of about 20,000 years.

Being closest to the sun in January is favorable to building ice sheets in the northern hemisphere, because it makes winter warmer and summer cooler. This second insolation effect works opposite in the two hemispheres, because January is midsummer in the southern hemisphere—so the present situation tends to melt ice in the southern hemisphere. At present the eccentricity is quite small, about 1.7 percent, so the second insolation effect is quite weak. (Ibid)

Dr. Hansen continues:

Both insolation effects presently are pushing Earth toward building ice sheets in the northern hemisphere, and thus toward the next natural ice age. (P. 48)

But, remember that he told us on page 37 not to worry because, although it is going to take immediate and drastic action to cool or stop the warming of the planet, it will take very little human action to prevent the next ice age. So, what is the net result?

Although both insolation effects [tilt and eccentricity] now favor ice growth in the northern hemisphere, ice is actually melting rapidly. Human-made climate forcings are now in total dominance over the natural forcings. (P. 49)

Insulation is the quality that keeps heat in (or out) and insolation is the amount of energy received from the sun. It is not clear where he is getting his data on melting ice, for he insists that “ice is actually melting rapidly”. What does he mean by rapidly: More rapid than at any time in the past? The only real clue would be rising sea levels. We do have satellite

data showing some melting in the Arctic Ocean, but any melting of sea ice does not change ocean level. There is some melting in a small area in Antarctica, but most of Antarctica is actually gaining ice. The seas are rising, and have been doing so at a fairly constant rate since the run off after the end of the last ice age.

There are at least two factors affecting sea level rise: Melting land ice and temperature change. (Changing wind patterns can also cause local sea levels to rise or fall.) For the latter remember that warm water is lighter, or put another way it takes up more space. So if the sea warms slightly, it will cause sea level to rise. Changes in the sea basins could also cause the sea to rise, but little research has been done on that possibility.

Now, don't be worried about the coming of the next ice age for Dr. Hansen tells us:

Thus any thought that natural processes can still somehow move Earth toward the next ice age is utter nonsense. Humans, by rapidly burning fossil fuels, have caused global warming that overwhelms the natural tendency toward the next ice age...human-made climate forcing is now so large that decadal-mean climate will continue to warm for at least the next few decades. Indeed, as we shall see, because of slow feedbacks, global temperature will continue to rise for decades and millennia unless we reduce human-made climate forcings. (PP. 49-50)

So, if you somehow believe all that he has said about natural processes and feel that these override what man may be doing, well you are simply wrong, because this is “utter nonsense”. Note again that after giving us an extensive lesson on the natural processes he gives little or no basis for insisting that man, by burning fossil fuels, is the dominating factor in climate change.

The belief that we are headed for a climate catastrophe depends, Dr. Hansen says, on climate sensitivity, something on which there is little agreement.

I realized that climate sensitivity was in the process of being nailed down—rigorously and accurately defined by the paleoclimate information discussed in this chapter. Of course, even today it is possible to find scientists and published papers concluding that climate sensitivity is quite uncertain. (P. 54)

Even though Dr. Hansen notes that other scientists see climate sensitivity as “quite uncertain” he, himself, is quite sure. Also, as noted earlier in this analysis Dr. Hansen rejects the work of Dr. Richard Lindzen of MIT, one of the world's greatest atmospheric scientists. I attach this extended quote so you can get some of the flavor of how Dr. Hansen feels. He says that Dr. Lindzen has a “theological or philosophical perspective that he doggedly adheres to” yet he cannot see that his own views are more religious than scientific.

Jule Charney, [MIT professor appointed by President Carter to lead a study group on carbon dioxide as part of the National Academy of Science about 1979—see p. 40 ff] were he alive today, would be thrilled by the paleoclimate information on climate sensitivity. Undoubtedly he would stand up and say, “Great, now let's move ahead.” Dick Lindzen is a whole different kettle of fish. He has made numerous scientific

contributions, received significant honors, and suggested interesting ideas. But as for an overview and insight about how climate works, he is no Jule Charney by any means. Lindzen's perspective on climate sensitivity, as he told Richard Kerr, stems from an idea of a theological or philosophical perspective that he doggedly adheres to. Lindzen is convinced that nature will find ways to cool itself, that negative feedbacks will diminish the effect of climate forcings. This notion spurred Lindzen to propose a specific mechanism for how the atmosphere takes care of itself: He suggests that columns of tropical cumulus convection intensify if carbon dioxide increases, piping energy high into the atmosphere, where the heat would be radiated to space. This mechanism, he suggests, is nature's thermostat, which keeps global warming at a few tenths of a degree for doubled carbon dioxide, rather than a few degrees. (P. 55)

I do recognize that this could simply be a case of one scientific theory competing with another. But, I have listened to and read enough of Dr. Lindzen's work to believe that what he is proposing is at least worthy of serious consideration. In fact the more you read Dr. Hansen the more you have to conclude that, from his perspective, anyone who does not happen to agree with him is simply wrong. Although he has to admit that Dr. Lindzen is a well-qualified and world honored atmospheric scientist, he still has to use derogatory terms such as "a whole different kettle of fish" in talking about him. Because what Dr. Hansen shares in the above quoted chapter is so critical to what he is trying to teach us it would be well to recap just what he has said.

- 1. We were first told that changes in greenhouse gases (water vapor, carbon dioxide, methane and others) and reflectivity were responsible for global climate change, but were not the instigating forces. (PP. 46-47)**
- 2. Instigation is caused by small changes in the tilt of the Earth and the orbit around the Sun. (P. 47)**
- 3. But, these forces would cause the Earth to be headed for an ice age at the present time. (P. 48)**
- 4. Now he tells us that human-made climate forcings are in total control. (P. 49)**

If you got lost in the science you have to wonder if Dr. Hansen also got lost in his own presentation. You simply cannot have it both ways: You cannot have natural forces, such as tilt and orbit, as well as cloud insulation and reflectivity, controlling the climate, and at the same time make man responsible for any significant negative changes. It is very apparent that Dr. Hansen's predictions of gloom and doom are based on a number of false premises and conclusions.

In Chapter 4 *Time Warp* Dr. Hansen goes into some of the science of climate, and the part played by the sun and other factors.

How the real world works is an almost infinitely complex puzzle. A scientist's task is to try to figure out a valid description of some part of the puzzle. (P. 60)

He concludes the chapter by saying:

I do not care much whether you try to understand polarimeters [which measure reflected sunlight] or interferometers [which measure thermal emissions]. But I care a lot whether you understand policy discussions that are going on in Washington and other capitals around the world. If we let special interests rule, my grandchildren and yours will pay the price. (P. 69)

So what is the “price”? Catastrophic destruction of the entire world as we know it! Again, note that his concern is more political than scientific.

Chapter 5 is titled: *Dangerous Reticence: A Slippery Slope*. His opening paragraph sets the tone of the chapter.

HUMANITY TREADS TODAY ON A SLIPPERY slope. As we continue to pump greenhouse gases into the air, we move onto a steeper, even more slippery incline. We seem oblivious to the danger—unaware how close we may be to a situation in which a catastrophic slip becomes practically unavoidable, a slip where we suddenly lose all control and are pulled into a torrential stream that hurls us over a precipice to our demise. (Emphasis in Original P. 70)

He goes on to say:

You may say, “Surely you are joking, Mr. Hansen!” Would that I were. Human-made climate change is, indeed, the greatest threat civilization faces. (Ibid)

The greatest threats are no longer disease or poverty, hunger or lack of good drinking water, but the destruction of the Earth and all the inhabitants because of global warming. Never mind that the Earth has continued to warm and cool for thousands of years without any serious consequences, this time we are simply in for a world ending disaster unless we listen to men like Dr. Hansen, the IPCC and Al Gore.

In this chapter he talks about the relationship between the ocean and the atmosphere and how man-caused global warming is causing the oceans to warm. He notes that for the ocean and the atmosphere to fully achieve equilibrium takes centuries. Yet he does not seem to really consider that there could be any other factors that are, or potentially could be, affecting both atmospheric and ocean temperatures.

He talks about “Three big sources of inertia [that] affect global warming and its consequences: the ocean, the ice sheets, and world energy systems.” (P. 72) He says further: “If we continue burning fossil fuels at current rates, ice sheet collapse and sea level rise of at least several meters is a dead certainty.” (PP. 72-73) He notes that in one instance, about 14,000 years ago at the end of the last ice age, sea level rose at the rate of one meter every 20-25 years. What he neglects to note is that there was a lot of ice on the earth, especially in the Northern Hemisphere by the end of the last ice age. It appears that much of the ice melted off rather quickly. Now, that ice is gone, having melted and run into the oceans. You cannot melt it again. Under present conditions there is much less ice left to melt; mainly in

Greenland and in Antarctica. While at the end of the last ice age there was ice in places that were traditionally warmer, now almost all the ice is in locations that have been mainly below freezing for thousands of years. It is highly unlikely that the ice in Greenland and on Antarctica will ever melt rapidly as it did at the end of the last ice age. This is something that Dr. Hansen is unwilling or unable to consider.

One of the things that makes climate science so controversial is that there is no experimental evidence that can predict the future. Therefore the future climate is based mainly on climate models. Models can be very useful, especially when all else fails. But, a model is no more accurate than the information entered into the model. Leave out any important factors and the model becomes less accurate.

Here is one statement about models:

Well, I had been working with climate models for decades, and I knew that some of the most recent models predicted ice sheets would grow with global warming, causing sea level to fall, defying common sense and empirical evidence. Models are no better than the representations of processes that are put into them—and even if you put in a good description of a process, another deficient part of the model may completely screw up the result. In the case of ice sheets, some of the most important processes were not even included in the climate models. (P. 75)

Thus, climate models depend on some sort of value judgment as to what “factors” are important and what ones are not. As he noted something put in or left out can “screw up the result”. Why, then do climate alarmists depend so heavily on climate models if there are so many factors that can lead to wrong conclusions? It is primarily because models can be made to agree with the conclusions they have already drawn.

Dr. Hansen did not always agree with the conclusions of the IPCC for he said:

What upset me the most was the insertion, by the editor, of the approach and perspectives of the IPCC. My aim was to give a *different* perspective on climate change. [In an article written for publication.] I was implicitly critical of IPCC (Emphasis in Original P. 76)

Here is another, more extended, statement:

But IPCC sea level change estimates did not include any contribution from Greenland or Antarctica. Its rationale: Global warming might speed melting at the edges of ice sheets, but warmer atmosphere would also increase winter snowfall, which would thus make the central part of the ice sheets thicker. Indeed, as I wrote the “Slippery Slope” paper in 2003, the most recent global climate model results—from one of the best models in the world, with the highest resolution—were published in the *Journal of Geophysical Research*. They concluded that the ice sheets would grow as the world became warmer, thus tending to make sea level fall. (P. 81)

So, how does Dr. Hansen deal with a statement with which he disagrees, but made by those who generally support his conclusions? His response is that ice sheets could grow but only for a limited time. Then he makes another statement about climate models that causes you to wonder why he puts so much confidence in certain models for he says: “Models, at best, produce answers consistent with the assumptions put into them.” (Ibid) So, if we just happen to assume that man is producing carbon dioxide which is causing the temperatures to rise, then we just might get a model to confirm that conclusion.

What follows is a rather lengthy discussion on ice sheet formation in which he makes this interesting statement: “Sea level rise at a rate of a few meters per century is not uncommon in the paleoclimate record.”(P. 84) He further notes that: “Earth in recent millennia was warm enough to prevent an ice sheet from forming in Canada but cool enough to keep the Greenland and Antarctic ice sheets stable.” (Ibid)

So, if we are in a period of relative stability why does he insist so strongly on coming disaster? Having noted that over a billion people live within 25 meters of sea level he concludes that given the gigantic expense of re-locating expensive buildings and cites it would be far better to take action to stabilize climate than to simply adapt to changing conditions.

But the ability of the world’s populations to adapt to changing conditions are far greater than Dr. Hansen is willing to admit. There are even numerous places throughout the world where large cities or regional areas are totally below sea level, yet they do not seem to be especially worried about their future. We have the technology to build huge sea walls, even several meters high, should it become necessary to protect existing real estate from rising sea levels.

Of course gradual changes in conditions give plenty of time to make adjustments. Where homes have fallen into the sea due to aggressive wave action residents have finally had to accept the fact and move farther from shore. Future changes in sea level will surely be little different.

Dr. Hansen concludes this chapter on *Dangerous Reticence: A Slippery Slope* with the question of how to communicate these severe dangers to humanity as a whole.

In a nutshell, a problem has emerged. Climate inertia and climate amplifying feedbacks, as humans rapidly increase atmospheric greenhouse gases, spell danger for future generations—big danger. Yet the public is largely unaware of an impending crisis. The obliviousness of the public is not surprising—global warming, as yet, is slight compared to day-to-day weather fluctuations. How in the world can a situation like this be communicated? (P. 89)

Dr. Hansen is also prone to make statements without any supporting evidence. Here is one example:

Then because greenhouse gases remain in the air for centuries and aerosols fall out within days after aerosol emission stops, the payment—via rapid increase of global warming—will come due. (P. 99)

Aerosols are a cloud of solid or liquid particles in a gas. These include many things like carbon black and other pollutants. These aerosols, Hansen says, compensate by cooling the climate, but the day will come when we will no longer put up with air pollution and will work to remove these aerosol pollutants from the atmosphere and the result will be the warming he mentions in the above quote.

Further, how does he know that greenhouse gases will remain in the air for centuries? He does not say. Water vapor, the major greenhouse gas, is constantly increasing and decreasing depending on the temperature and other factors. Carbon dioxide is also taken up by the oceans and by plants, so there would appear to be a cycle of any particular molecule in the atmosphere. How does one know how long a particular carbon dioxide molecule will be held in the atmosphere?

Dr. Hansen brings in a lot of supposition and tries to calculate the effect of aerosols versus the effect of greenhouse gas warming. He can only guess, but if the aerosol forcing is great enough, masking any warming from greenhouse gas, when “we” finally clean up the environment the result will be no negative forcing and all positive forcing and the atmosphere will warm considerably.

Here is how he puts the matter:

On the other hand, if the net forcing is only 1 watt, that is, if aerosol forcing is -2 watts, [while greenhouse forcing is +3 watts, he posits] that means aerosols have been masking most of the greenhouse warming. In that case, if humanity [that’s us, you and I] reduces particulate pollution by even half, the net climate forcing would be double. That increased forcing, combined with a continued greenhouse gas increase, might push the planet beyond tipping points with disastrous consequences. (P. 99)

Again, it is not the natural climate cycles, or even any carbon dioxide produced by humans but it is reaching “tipping points”. It is the tipping points that govern the Hansen theory, and tipping points are not subject to examination or analysis.

He goes on to say:

The current smaller net climate forcing already is causing a notable recession of mountain glaciers around the world, affecting freshwater availability, shifting climate zones, increasing fires and flooding, promoting the loss of Arctic sea ice and vulnerable coral reefs, accelerating mass loss from the Greenland and Antarctic ice sheets with rising sea level, and putting pressures on many species, leading to a danger of mass extinctions. (PP. 99-100)

The only difficulty with what Dr. Hansen shares here is that there is little agreement as to the facts of the matter in the climate causing the conditions he mentions. Those who wish to consider this further should look up articles on each subject mentioned. Just one small example, some glaciers are receding, while others are growing, so it is difficult to see a world trend. (Please note that statements made by the IPCC that glaciers in the Himalayas will be gone by 2035 have been shown to be false, based on pure supposition by a lone writer.)

Dr. Hansen calls the ocean a heat reservoir [or heat sink]. He says:

If we can measure how much the oceans are warming, we will know not only how much additional global warming is in the pipeline but also how much we must reduce the human-made [anthropogenic] climate forcing if we want to stabilize climate. (P. 101)

The difficulty, of course, is how exactly to determine which direction the heat gradient is going. Is the air warmer and this is warming the ocean, or is the ocean warmer and warming the atmosphere? The difficulty is increased due to the fact that while the temperature of the vast oceans changes very slowly, that of the atmosphere can change radically over short periods of time. What would happen, for instance, if something else is causing the oceans to warm, causing them to give up carbon dioxide? That appears to be something Dr. Hansen does not seriously consider.

After talking about the problem of getting good accurate temperature readings of the oceans of the world Dr. Hansen concludes by saying:

Until instrumental issues are resolved and good heat storage data is obtained for the entire ocean, it is not possible to infer the net climate forcing acting on Earth. (PP. 101-102)

Dr. Hansen is not unaware of the sun as the primary source of heat for the Earth; it is just that he discounts it as a controlling factor.

Indeed, there are many people, including scientists, who believe that the sun is the most important factor in climate change, the dominant climate forcing. It is easy to understand their suspicions. Earth gets its warmth from the sun. The sun is variable. Correlations of solar variability and climate change are well known. But what we need is an objective, quantitative comparison of solar and other climate forcings. (P. 103)

What follows is discussion about how to measure the effect of the sun compared to that caused by man. He concludes:

So there is no chance whatsoever that the sun can cause Earth to go into a new Little Ice Age—the numbers above confirm that human-made forcing now overwhelms the natural climate forcing. (P. 107)

Now, that settles the matter, right? Since all or nearly all the energy on the Earth has come from the sun it would seem that Dr. Hansen has stretched the point here. When he says “there is no chance” he is not talking as a scientist, but as a philosopher. Maybe it appears to be unlikely, but to argue that there is no chance is simple folly. But, he accounts for the present cooling trend (since about 2000) as actually a part of the El Niño, La Niña cycle. He says that we are entering an El Niño cycle and the Earth should begin to warm again. So, we shall see.

In Chapter 7: *Is There Still Time? A Tribute to Charles David Keeling*, Dr. Hansen takes quite a little time to talk about his relationship to NASA, public debate, trying to get information to political leaders and the public. He also talks about the issue of censoring science, but this is an issue for both sides of the climate change debate.

In the process he hearkens back to our founding with this dramatic statement:

Protection of our home planet, I suggest, is intimately related to protection of our democracy. The American Revolution launched the radical proposition that the commonest of men should have a vote equal to that of the richest, most powerful citizen. Our forefathers devised a remarkable Constitution, with checks and balances, to guard against the return of despotic governance and subversion of the democratic principle for the sake of the powerful few with special interests. They were well aware of the difficulties that would be faced, however, placing their hopes in the presumption of an educated and honestly informed citizenry. (P. 137)

Of course anyone who has read our Constitution knows that it did not create a democracy, but a Republic. The Founders knew from historical examples that democracy usually ends with some sort of collectivist society, and fails when the people understand they can vote themselves into prosperity.

The difficulty, however, lies in insuring an “educated and honestly informed citizenry”. Most people know little of science and so it is very difficult to convince them one way or the other concerning scientific matters. For that reason alone the debate about climate change has become more political than scientific and as time goes on more and more scientists are taking principled stands against what has been called the “consensus” as defined primarily by the IPCC.

Dr. Hansen carries the thought one step further in referring to Benjamin Franklin, a man of science and politics:

Yet Franklin, Jefferson, and the other revolutionaries would surely be distraught by recent tendencies in America, specifically the increasing power of special interests in our government, concerted efforts to deceive the public, and arbitrary actions of government executives that arise from increasing concentration of authority in a unitary executive, in defiance of the aims of our Constitution’s framers. (Ibid)

Still, any honest person has to ask the question if Dr. Hansen, himself, could not also be guilty of this same consideration. For the most part those who are climate alarmists have

been unwilling to hold any sort of open debate concerning the science with the climate realists (those who reject the view of the climate alarmists). Since science operates on observing nature and being able to repeat observations or experiments, when data is withheld, as it has been over the past many years, it is very hard for those who have serious questions about the science to reach similar conclusions.

In Chapter 8: *Target Carbon Dioxide: Where Should Humanity Aim?* Dr. Hansen explains that the target ought to be no higher than 450 ppm (parts per million). Today it is at about 390 ppm. He does not base his target on science, but on an analysis of historical levels of carbon dioxide. Those historical levels are based on a lot of proxy data, taken from tree rings, and geologic formations. Since there were no instruments to measure carbon dioxide or temperature in the distant past this is the best we can do, but these figures are only tentative. He shows that at a time when the Earth was 2-3 degrees warmer than today (about three million years ago, in the Middle Pliocene) sea level was about 80 feet higher and Florida and much of the coastlines were under water. What he does not do is demonstrate how rising carbon dioxide levels caused that temperature increase.

Dr. Hansen shows that sea levels were higher in the distant past, between the ice ages, but does not demonstrate that the higher sea level was caused by rising temperatures, or by carbon dioxide. He totally misses the possibility that the sea basins could have changed their configuration, making the seas slightly shallower, and thus causing a rise in sea level. He also neglects to note that warmer water takes up more room, and just warming the sea could cause it to rise. There is a lot of supposition in what he develops here and the serious science appears to be lacking.

Dr. Hansen then comes back to his major theme:

The period of stable sea level is almost surely over. But whether human-caused sea level rise will be a slow bump-up reaching a maximum only on the order of a meter or so, or whether it will be an eventual increase of tens of meters, with disintegrating ice sheets, continual havoc for coastal cities, and a redrawing of global coastlines, depends on policies adopted in the near term. I believe it is possible to keep sea level rise at a small bump-up, but that will require the amount of atmospheric carbon dioxide to peak soon and then begin at least a moderate decline. (PP. 143-144)

Dr. Hansen believes what he believes strongly, but from a scientific standpoint it includes a lot of supposition, unproven by the relevant science. He may persuade politicians and the general public, but not those who are interested in the science. As mentioned previously sea levels will rise dramatically at the end of an ice age because there is a large quantity of ice on land, especially in the Northern Hemisphere. At the present time the only places there is much ice are Greenland and Antarctica, locations that are traditionally quite cold. Any rise in sea level will be slight.

Not only will our coasts be flooded, causing loss of civilizations for a billion people, but also, according to Dr. Hansen, many species will be lost.

Now Human-made climate change, with an unnaturally rapid shifting of climatic zones, threatens to add a new overwhelming stress that could drive a large fraction of the species on the planet to extinction. *Our understanding* of this threat, as in the case of ice sheets and sea level, depends especially on information that we extract from Earth's history and observations of what is happening today. There is another analogy between sea level change and species extermination. Survival of ice sheets and species both present “nonlinear” problems—there is a danger that a *tipping point* can be passed, after which the dynamics of the system take over, with rapid changes that are out of humanity's control. (Emphasis Added P. 144)

You have to give Dr. Hansen credit: At least here he does not base what he says on hard science, but only on his own personal understanding. And, since geologic and climatic cycles change very slowly, the only mechanism he can bring in to support his own understanding is “tipping points”.

The difficulty with what he says is that there have been numerous studies which would seem to indicate as the climate warms species tend to move north in latitude, and up in elevation, while at the same time not giving up their traditional habitats. Is timberline (the elevation above which there are no trees) simply a function of temperature, or does it depend on other things like the amount of atmosphere? The point here is that as the climate warms there would be more habitat for species, not less.

Also, as far as species extinction is concerned there needs to be a hard definition of what constitutes a species. If we have a tendency to define a species very narrowly then we will be more apt to see many species extinctions. At the present time there are millions of species (mostly among the insects) and they have evidently gone through several ice ages, with warm interglacial periods, so there must be another mechanism at work here to preserve species.

He continues this thought:

Indeed, animals are on the run. Plants are migrating too. Earth's creatures, save for one species, do not have thermostats in their living rooms that they can adjust for an optimum environment. Animals and plants are adapted to specific climate zones, and they can survive only when they are within those zones. (P. 145)

The real difficulty with what Dr. Hansen shares here is that, for the most part, it is a distortion of the truth. For one thing he loves to use figures (like animals on the run) to emphasize the urgency of immediate action. For another habitat tends to be a collection of species, (something called an ecosystem) each one providing some benefit for the other. Fire tends to purify a forest and there are other mechanisms to keep a particular assemblage in existence. Plants, in particular, may be native to certain habitat, but can live and even thrive in other environments.

As if he anticipates our criticism he goes on to say:

Of course, species adapted and flourished during past climate fluctuations. But now the rate of climate change driven by human activity is reaching a level that dwarfs natural rates of change. Barriers created by human beings, such as urban sprawl and homogeneous agricultural fields, block many migration routes. If climate change is too great, natural barriers, such as coastlines, will spell doom for some species. (PP. 145-146)

Some species, certainly, are blocked by man-made barriers, but anyone who has tried to keep “weeds” out of his garden knows that plants can move quickly beyond their habitat. Even tree seeds are carried by the wind, and by birds and ground animals great distances. Each seed is particularly adapted to being carried some distance, some more than others.

Man may be a spoiler of species and habitat, but he also has the ability to protect and preserve species. Some species have been on the brink of extinction for many years and man is taking strong steps to protect them. (Witness the California condor, or the panda in China.) Notice, also, the huge efforts to replant trees after a forest fire. Animals tend to live among certain plants, and animals are quite mobile. Man is also able to reproduce plant life if it is important to do so. Man is not only able to adapt to a changing climate, but he is able to protect and preserve species when it is beneficial to do so.

This is an important issue for Dr. Hansen. He talks about polar animals being pushed off the planet (because they can only live where it is extremely cold?): Same for alpine species. They will be pushed higher to elevations that are not suitable for survival. He notes that in the past at one time over 90 percent of land and marine species were exterminated, yet he is unable to see the long view that somehow our ecosystem has survived. Dr. Hansen believes in the creation of new species, but it is also possible that existing species adapt in one way or another so that they are no longer viewed as the same species. He mentions a number of global extinctions in the geologic record and then calls the coming disaster the...”sixth mass extinction, the human-caused destruction of species.” (P. 147)

He goes on to say:

We do not know how many animal, plant, insect, and microbe species exist today. Nor do we know the rate we are driving species to extinction. (P. 147)

He says that we have catalogued about two million species and then adds that it is estimated that there may be as many as one hundred million species. He talks about the loss of bird species and then says “If the loss of birds is representative of other species, several thousand species are becoming extinct each year.”

Dr. Hansen mentions four birds that are now either extinct or on the verge of becoming extinct. I have listed them below, but please note that their extinction has little or nothing to do with global warming. The reasons for their decline are generally loss of food source, loss of habitat, or being hunted in large numbers.

The dodo, a close relative of the dove and pigeon, lived on the island of Mauritius. Dutch sailors arrived there in 1598, ate the birds for food, and also introduced pigs, rats and monkeys that ate the birds. The last dodo died in 1681. None of them died from rising temperatures. <http://www.mauritiusedelight.com/dodohist.htm>

The passenger pigeon existed to the number of about 5 billion when the white man first arrived in America. Their main food source was acorns, chestnuts and beechnuts, and when these were cut down they lost an important food source. With the advent of the railroads large numbers were harvested each year and sent to eastern restaurants, some years in the millions of birds. The last bird died in captivity in 1914. None of these birds died from rising temperatures. <http://www.eco-action.org/dt/pigeon.html>

The Ivory-billed woodpecker was quite common in the southeastern United States. Over the years they declined, and some were even taken by those who were trying to protect them just to prove they still existed. The last bird was sighted in 2005, so it is possible that the birds still exist. There is no evidence that the birds declined to the point of extinction due to rising temperatures. <http://www.nature.org/ivorybill/about/history.html>

The whooping crane is threatened and it is believed at the best there were only about 1,500 of the birds in North America. The birds have declined because of loss of habitat. None of these birds were lost because of rising temperatures. <http://bio150.chass.utoronto.ca/cgi-bin/bio150/cranes/book.cgi?from=&book=cranes&page=history>

Dr. Hansen attempts to build on what he said about bird extinctions, implying that they all died from global warming. Here is what he says:

If the loss of birds is representative of other species, several thousand species are becoming extinct each year.

The current extinction rate is at least one hundred times greater than the average natural rate. So the concern that humans may have initiated the sixth mass extinction is easy to understand. However, the outcome is still very much up in the air, and human-made climate change is likely to be the determining factor. I will argue that if we continue on a business-as-usual path, with a global warming of several degrees Celsius, then we will drive a large fraction of species, conceivably all species, to extinction. (P. 147)

Now, you have to follow his logic. Global warming is causing species extinction. We don't know about a lot of species, but we do know quite a bit about birds. Some birds have become extinct. Human-made climate change is likely the cause. If we continue as we are now everything will soon be extinct. But, in all this discussion Dr. Hansen has not produced one shred of evidence that these birds died out because of man-caused global warming. And, so what is his point? We have not yet reached that "tipping point" he talks about so it would appear that some species loss is a normal part of the history of the Earth.

Dr. Hansen has somehow concluded that he is, not only a credible climate scientist, but also *the most important and most credible scientist*. Here is an extended passage which puts this attitude in bold relief.

The calls requested my reaction to a statement made by NASA administrator Michael Griffin on National Public Radio. This was Griffin's response to a question about global warming:

I am not sure that it is fair to say that it is a problem we must wrestle with. To assume that it is a problem is to assume that the state of the Earth's climate today is the optimal climate, the best climate that we could have or ever have had, and that we need to take steps to make sure that it doesn't change. First of all, I don't think it's within the power of human beings to assure that the climate does not change, as millions of years of history have shown. And second of all, I guess I would ask which human beings—where and when—are to be accorded the privilege of deciding that this particular climate that we have right here today, right now, is the best climate for all other human beings. I think that's a rather arrogant position for people to take.

My reaction included “almost fell off my chair,” “incredibly ignorant,” and an assertion that surely it was in the common good to preserve species, sea level, and the climate zones that existed during the period that civilization developed. (P. 151)

I could be wrong, but from the context I would have to assume that Michael Griffin was, at the time, James Hansen's boss, and that would not seem to be the best way to treat your supervisor.

One thing that continues to stand out in Dr. Hansen's treatise is that he makes a statement that is not supported by any relevant facts, and then just keeps repeating it over and over in the hopes that you will come to accept it as a known fact. Here is another example:

But humans, by burning fossil fuels, are now increasing atmospheric carbon dioxide by 2 ppm per year. In other words, the human climate forcing is four orders of magnitude—ten thousand times—more powerful than the natural forcing. Humans are now in control of future climate, although I use the phrase “in control” loosely here. (P. 161)

Of course the question boils down to: Does nature control the climate, as Michael Griffith suggested, or does man control the climate, as Dr. Hansen continues to suggest? Notice he gives no proof that “humans, by burning fossil fuels, are now increasing atmospheric carbon dioxide by 2 ppm per year.” This is his theme, and he just keeps repeating it without any evidence.

Dr. Hansen was having some difficulty on deciding on a target level of carbon dioxide. He had started with a figure of 450 ppm maximum, which is higher than today, but then decided that was way too high.

Such was the state of PETM [Paleocene-Eocene thermal maximum] research, or at least my perspective on it, in mid-2007, right around the time that Bill McKibben was asking me about 450 ppm—though the most startling revelation from the PETM was yet to come. I finally promised Bill that I would give him a number at the December 2007 American Geophysical Union meeting, when I would present a talk on the rationale for the suggested carbon dioxide target.

In addition to paleoclimate data, my talk covered ongoing observations of five phenomena, *all of which imply* that an appropriate initial target should be no higher than 350 ppm. In brief, here are the five observations. (Emphasis Added P. 164)

(As you read down through the list of five phenomena keep asking yourself what there is about each one on the list that implies “an appropriate initial target ...no higher than 350 ppm”.)

He then lists the five phenomena with discussion. Those listed are:

1. **“The area of Arctic sea ice has been declining faster than models predicted.”** He noted that in 2007 sea ice was 40% less than in 1970. He predicted complete loss of summer sea ice within several decades causing “detrimental effects on wildlife and indigenous people.” He also predicted the loss of the Greenland ice sheet at the same time.
2. **“Mountain glaciers are disappearing all over the world.** If business-as-usual greenhouse gas emissions continue, most of the glaciers will be gone within fifty years. Rivers originating in glacier regions provide fresh water for billions of people.” He predicts that once the glaciers are gone there will be floods in the spring with dry summers. But, that is normal for any river system.

Vijay Kumar Raina, formerly with the Geological Survey of India, did his own survey and concluded that the IPCC report was completely based on observation of just a very few of the 10,000 glaciers in India. Another researcher also concluded that even if the glaciers all melted it would not seriously affect the Ganges as melting glaciers only contribute 3-4% of the flow. <http://www.theresilientearth.com/?q=content/himalayan-glaciers-not-melting>

Here is another article from the *Times*:

A WARNING that climate change will melt most of the Himalayan glaciers by 2035 is likely to be retracted after a series of scientific blunders by the United Nations body that issued it.

Two years ago the Intergovernmental Panel on Climate Change (IPCC) issued a benchmark report that was claimed to incorporate the latest and most detailed research into the impact of global warming. A central claim was the world's glaciers were melting so fast that those in the Himalayas could vanish by 2035.

In the past few days the scientists behind the warning have admitted that it was based on a news story in the *New Scientist*, a popular science journal, published eight years before the IPCC's 2007 report.

It has also emerged that the New Scientist report was itself based on a short telephone interview with Syed Hasnain, a little-known Indian scientist then based at Jawaharlal Nehru University in Delhi.

Hasnain has since admitted that the claim was "speculation" and was not supported by any formal research.

<http://www.timesonline.co.uk/tol/news/environment/article6991177.ece?token=null&offset=0&page=1>

And, in January 2010 the IPCC finally had to admit that they had just made a mistake.

<http://www.telegraph.co.uk/earth/environment/climatechange/7031403/UN-climate-panel-admits-mistake-over-Himalayan-glacier-melting.html>

So, this is just another example of Dr. Hansen relying on data that was neither reliable nor based on solid science.

3. “The Greenland and West Antarctic ice sheets are each losing mass at more than 100 cubic kilometers per year, and sea level is rising at more than 3 centimeters per decade.” But the truth of the matter is that in Antarctica, while the ice may be melting in the West, the rest is fairly stable, and maybe even growing. It is also important to note that when sea ice melts there can be no rise in sea level. <http://www.news.com.au/antarctic-ice-is-growing-not-melting-away/story-0-1225700043191>

Here are some interesting comments from a paper by Bruce B. Parker *Sea Level As an Indicator of Climate and Global Change*:

The water level measured at a tide gauge is affected by a number of oceanographic and meteorological phenomena, including the astronomical tide, changes in atmospheric pressure, wind, river discharge, ocean circulation, changes in water density, and added water volume due to the melting of ice.

Please note that there are a number of possible causes for sea level rise and melting ice is just one of them. This could be just part of natural variability.

The trend we see in historical sea level records may simply be part of a very low-frequency, global-scale natural variability and not really a trend at all—only perceived as a trend because our data records are too short. Variations on the order of a century or longer may even be possible.

So what conclusion can be drawn from the data?

In recent years there have been numerous studies to calculate global sea level rise from the historical water level record. Most studies have found a rise in global sea level on the order of 1 to 2 mm/year over the last century and no strong evidence for an increase in the rate (i.e., an acceleration) of this rise in recent decades.

1 to 2 mm/year is 10 to 20 mm/decade, much less than the 3 cm/decade mentioned by Dr. Hansen.

When asking the question if sea level rise is being caused by the greenhouse effect they make this comment:

During the last ice age, 18,000 years ago, sea level was approximately 100 m lower than it is today. It has been rising ever since, and, during the time the glaciers retreated from covering Canada and the northern United States, sea level rose at approximately five times the present rate. Could not the present slower rise simply be part of the same process?

One might expect to see an acceleration in the rise of sea level if indeed the effect of the accumulation of greenhouse gases during the last century, and especially during the last half of the century, has had an effect. **No researcher to date has convincingly demonstrated such an acceleration.** The interannual signal that makes trend determination difficult creates even more of a problem in trying to find an acceleration. The same problem exists with the global air temperature data and trying to conclusively demonstrate a recent intensification in that upward trend. (Emphasis Added)

It is probably not erroneous to say that we really do not know how much sea level will rise over the next century. (Emphasis in the Original)

This information is taken from an NOAA [National Oceanic and Atmospheric Administration] report: Condensed from a paper published in the Marine Technology Society Journal, Vol. 25, No. 4, 1992. The paper is an excellent discussion of the difficulties in establishing historical sea levels and well worth reading in full. The full report is available at: <http://tidesandcurrents.noaa.gov/sltrends/mtsparker.html>. Also: <http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml> (Some really interesting data on their Google Map.)

For those who love detailed scientific research there are a lot of links to data sources at the following link: http://www.appinsys.com/GlobalWarming/GW_4CE_SeaLevel.htm.

The simple answer to sea level rise is that the sea has continued to rise at a fairly constant rate since soon after the end of the last ice age, and no serious trend has been discerned in recent sea level rises. Concerns about some Pacific islands being completely covered by ocean are simply without any basis in fact.

So, what about Greenland? Is the ice on Greenland melting more rapidly than in the past decades? This report gives a somewhat confusing answer to that question.

Greenland's icecap has thickened slightly in recent years despite concerns that it is thawing out due to global warming, says an international team of scientists.

A team led by Professor Ola Johannessen, at the [Nansen Environmental and Remote Sensing Center](#) in Norway, report their findings online ahead of print publication in the journal [Science](#).

The 3,000-metre thick Greenland icecap is a key concern in debates about climate change because a total melt would raise world sea levels by about 7 metres. And a runaway thaw might slow the Gulf Stream that keeps the North Atlantic region warm.

Glaciers at sea level have been retreating fast because of a warming climate, making many other scientists believe the entire icecap is thinning.

But satellite measurements showed that more snowfall is falling and thickening the icecap, especially at high altitudes, say Johannessen and team.

And the scientists say that the thickening of the icecap might be offset by a melting of glaciers around the fringes of Greenland. Satellite data is not good enough to measure the melt nearer sea level.

<http://abc.gov.au/science/articles/2005/10/21/1485573.htm?site=science&topic=latest>

Most of the reports appear to agree that Greenland is losing ice at the fringes more rapidly than it is gaining in the interior, though the net loss has been very difficult to determine. That this is a matter for immediate concern has been overblown.

- 4. “Data show that subtropical regions have expanded poleward by 4 degrees of latitude on average.”** Dr. Hansen mentions that both Lake Powell and Lake Mead are drying up. But, they are both man-made lakes and their water is used for irrigation, so the water level is not totally controlled by rainfall.

Lake Mead stores water from the Colorado River. When full, it holds 9.3 trillion gallons, an amount equal to the water that flows through the Colorado River in two years. The water from Lake Mead is used for many things. It irrigates a million acres of crops in the United States and Mexico, and supplies water to tens of millions of people. Its mighty Hoover Dam generates enough electricity to power a half-million homes. Additionally, the power from Hoover Dam is used to carry water up and across the Sierra Nevada Mountains on its way to Southern California.
<http://boingboing.net/2009/05/06/good-lake-mead-is-dr.html>

Lake Powell, which is up stream to Lake Mead, is also controlled by a dam and the water is used for domestic and irrigation. And, in recent years the level of Lake Powell has actually increased. It would be difficult to prove that the falling levels of these two man-made lakes is totally because of any climate change conditions, though the flow of the Colorado River has been down for some years.

There are also numerous studies that indicate that expanding subtropical regions is beneficial for some species; they actually expand their habitat, keeping the warmer areas and expanding into new areas either poleward, or upward in elevation.

- 5. “Coral reefs, where a quarter of all marine biological species are located, are suffering from multiple stresses, with two of the most important stresses, ocean acidification**

and warming surface water, caused by increasing carbon dioxide. As carbon dioxide in the air increases, the ocean dissolves some of the carbon dioxide, becoming more acidic. This makes it more difficult for animals with carbonate shells or skeletons to survive—indeed, sufficiently acidic water dissolves carbonates. “

Calcium carbonate, the substance of which sea shells and limestone is made, is CaCO_3 . As one can readily see carbon dioxide is a significant part of that composition. Sea animals use both the calcium and the carbon dioxide in the water to make their shells.

It is certainly true that “sufficiently acidic water dissolves carbonates”, but the ocean is not an acid. There are many articles on ocean acidification, but the important point to make here is that the ocean is not an acid, but a base. The pH indicates the concentration of hydrogen ions in the water and ranges on a scale of 0 to 14. 0 is very acidic, 7 is neutral (distilled water) and 14 is very basic. The pH of the ocean varies somewhat from ocean to ocean. It is estimated that the pH of the ocean has dropped from about 8.179 in 1751 to about 8.104 today. It would be better to say the oceans are becoming less basic, since they are still a long way from becoming acidic. This simply cannot dissolve carbonate shells.

Corals are very complex organisms and inhabit very complex ecosystems. What you generally think of as a coral (coral reefs) are the dead skeletons. These build up and new animals grow on top of them. Much of the color of a coral is due to the symbiotic relationship it has with certain algae that live within it.

We have provided this added discussion on these five points simply to make it clear once again that much of what Dr. Hansen believes the future holds is based on shaky scientific evidence, with data providing conflicting results.

Dr. Hansen concludes the chapter with these remarks:

The gap between public perception and scientific reality is now enormous. While some of the public is just becoming aware of the existence of global warming, the relevant scientists—those who know what they are talking about—realize that the climate system is on the verge of tipping points. If the world does not make a dramatic shift in energy policies over the next few years, we may well pass the point of no return. (P. 171)

If you feel Dr. Hansen is repeating himself, then you are probably right. (We are no doubt also guilty.) Also, note the term “relevant scientists” and his definition as being “those who know what they are talking about”. It is unfortunate that men like Dr. Hansen have set up a situation in which they are so sure they are right that when they meet anyone who does not happen to agree with them they just naturally assume they are not credible. With that attitude it is pretty certain they will never be able to find the truth if the truth happens to be at variance with what they believe.

Dr. Hansen begins Chapter 9: *An Honest, Effective Path*, with these words:

A SIMPLE, CLEAR, URGENT CONCLUSION leaped out from our research on the appropriate target level of atmospheric carbon dioxide: Coal emissions must be phased out as rapidly as possible or global climate disasters will be a dead certainty. (P 172)

Now that sure does not sound like scientist talk to me. How about you? What do we know for “dead certainty”? Many, many things are very very likely, but few, if anything, are dead certain.

Dr. Hansen mentions Al Gore’s film *An Inconvenient Truth* and the impact it has had on the general public. He neglected to note that the film had at least 35 errors of fact, nine of which were confirmed by a British Court. The Court ruled that when the film is shown those errors must also be explained to the children.

Those who are pushing the use of “green energy” like solar and wind have forgotten that coal, oil and other energy sources have been built up from solar energy over very long periods of time. We call them concentrated forms of energy. If you eliminate coal you have to put something in its place, and solar and wind are no sufficient substitute. When all the cost is included, including the cost of producing the various machines and devices, they really do not save that much energy after all, not to mention how much space it takes to provide green power, as well as the fact that there has to be some sort of backup, as the sun does not shine a lot of the time and neither does the wind blow.

Dr. Hansen talks about coal, oil and gas reserves. He hits the point again with these words:

Although coal reserves are uncertain, we know there is plenty of coal to take the planet far into the dangerous zone, guaranteeing climate disasters. (P. 173)

Just keep repeating this and eventually it will be true. Dr. Hansen does not have any way to prove what he believes, yet he continues to believe it and “preach” it. We also want you to notice how he distorts language for his own ends.

The point is that for the sake of our children and grandchildren, we cannot allow our government to continue to connive with the coal industry in subterfuges that allow dirty-coal use to continue. (Emphasis Added P. 174)

So, what is “dirty coal”? Dirty coal is coal that leaves a lot of carbon black and sulfur dioxide and nitrous dioxide in the atmosphere. Carbon dioxide is not dirty. It is in fact a necessary ingredient for all plant life, and by extension for animal life as well. The more carbon dioxide in the air the better plants grow.

Dr. Hansen seems to be at odds with many in the environmental movement in that he favors nuclear.

When I became acquainted with this matter in 2008, I began recommending in public talks that the United States should initiate urgent development of a demonstration fourth-generation nuclear power plant. There would be no need to decide

immediately about commercialization of fourth-generation technology, but we should understand its potential. Indeed, that knowledge affects the viability of third-generation nuclear power plants—can we anticipate help from fourth-generation technology to solve the nuclear waste problem? (P. 202)

Chernobyl was a world disaster: Three Mile Island was a minor accident. American built nuclear power plants have many safety features that render them extremely safe. To date no one has died as a result of an accident at an American nuclear power plant. Nuclear electrical energy is one of the cheapest to produce, almost as cheap as hydropower. If the red tape were eliminated new plants could probably be built for about half the present projected cost.

Think about this: Nuclear power plants are used on aircraft carriers and in submarines. Contrary to some very popular movies there has never been an accident on one of these American ships. They not only produce power for propulsion, but they desalinate enough water to provide for all the needs of a large crew.

The issue today seems to be disposal of nuclear waste, but this waste is little more hazardous than the ore from which it was originally mined. Spent fuel can also be remanufactured to produce new product. At the present time, however, it is just cheaper to produce new nuclear material from ore mined from the ground than to remanufacture spent fuel.

Now we come to what Dr. Hansen calls The Main Story, his program to cut greenhouse gases.

The problem demands a solution with a clear framework and a strong backbone. Yes, I know that halting and reversing the growth of carbon dioxide in the air requires an "all hands on deck" approach—there is no "silver bullet" solution for world energy requirements. People need to make basic changes in the way they live. Countries need to cooperate. Matters as seemingly intractable as population must be addressed. And the required changes must be economically efficient. Such a pathway exists and is achievable. (P. 205)

So what does he have in mind? What is his goal?

Let's define what a workable backbone and framework should look like. The essential backbone is a rising price on carbon applied at the source (the mine, wellhead, or port of entry), such that it would affect all activities that use fossil fuels, directly or indirectly. Our goal is a global phaseout of fossil fuel carbon dioxide emissions. (Ibid)

To accomplish this he would have us phase out the use of coal entirely and other new sources, such as tar sands, unless the carbon dioxide can be captured and sequestered, a very expensive operation. He frankly admits that programs such as the Kyoto Protocol are doomed to failure. Japan, he notes, agreed to reduce emissions by 6 percent below 1990 levels, but they have actually increased 9 percent so they missed their target by 15 percent. (Just a short side note: We know how much carbon dioxide we produce by keeping track of

how much of the various hydrocarbons we use, and this must require thousands of people working for the Department of Energy to do so.)

So how will we achieve this magical result when many developing countries have refused to participate, believing that providing electricity for their people in poverty is more important than fighting global warming? For example, India has already withdrawn from any agreement or potential agreement. It is likely that China will never agree to anything that restricts its economic growth, right now probably the fastest in the world.

Remember that his original target was a carbon dioxide level of 450 ppm. Presently it is about 390 ppm. He now wants to reduce it to 350 ppm. He believes planting more trees will help, but that is not part of his plan. (Plant life does sequester carbon dioxide, but only on a short-term basis. When the tree is burned, or when it dies and rots that carbon dioxide is released to the atmosphere again.) His program means no offsets; no selling my allowances to someone else so they can continue to “pollute”.

He talks about energy standards and mileage requirements. He notes the evident fact that utilities make more money selling more fuel or electricity so they have no incentive to conserve. And, when people have enough money they do not mind driving “gas guzzlers”. He believes that the only solution to the “problem” is the “...phasing out of carbon emissions from fossil fuels.” (P.208)

So why do we keep using fossil fuels if there is such a great need to stop?

Why do fossil fuels continue to provide most of our energy? The reason is simple. Fossil fuels are the cheapest energy. This is in part due to their marvelous energy density and the intricate energy-use infrastructure that has grown up around fossil fuels. (Ibid)

So what is his solution? Increase the cost of fossil fuels so that alternative sources of energy will appear cheaper. Again, he notes the urgency:

The difficult part is that we must make the transition with extraordinary speed if we are to avert climate disaster. (P. 209)

So he would charge a fee at the mine or wellhead in proportion to the amount of carbon dioxide in the fuel. (Strictly speaking there is no carbon dioxide in the fuel, just carbon, hydrogen and some other elements. When the fuel is burned the hydrogen combines with oxygen to produce water, and the carbon in the hydrocarbon combines with oxygen to produce carbon dioxide.) The public would not pay this fee (tax?) but of course the price of the product would rise accordingly. He has chosen to call this approach “fee-and-dividend”.

Now how will this all work out?

Under fee-and-dividend, 100 percent of the money collected from the fossil fuel companies at the mine or well is distributed uniformly to the public. Thus those who

do better than average in reducing their carbon footprint will receive more in the dividend than they will pay in the added costs of the products they buy.

The fee-and-dividend approach is straightforward. It does not require a large bureaucracy. The total amount collected each month is divided equally among all legal adult residents of the country, with half shares for children, up to two children per family. This dividend is sent electronically to bank accounts, or for people without a bank account, to their debit card. (Ibid)

This, indeed, sounds like a great program: Raise the cost of energy and then give the people back the increase they have to pay, and no cost of administration. One would think, however, that someone who has worked most of his life for the government would realize that no program operates in the Federal Government without significant costs of administration. Furthermore what will the people do with the money they get back? Many will no doubt simply use it to pay for the higher costs of energy, so there will be little incentive to cut energy use. You can save a bundle by using less energy, but Americans have been pretty stubborn about energy use, letting other services and products go to continue their present use. Is the rest of the world likely to be any different? Not likely.

But, he does not stop there.

With fee-and-dividend, in contrast, [to cap and trade, which he opposes] we will reach a series of points at which various carbon-free energies and carbon-saving technologies are cheaper than fossil fuels plus their fee. As time goes on, fossil fuel use will collapse, remaining coal supplies will be left in the ground, and we will have arrived at a clean energy future. And that is our objective. (P. 114)

These are great thoughts, but not very realistic or practical. The only source of energy that is both green and realistic today is hydropower and nuclear. There are few places left to build large dams, and we have talked nuclear down for so long that it will be some time before we ever get a new nuclear power plant.

On the other hand, as we have noted before, both wind and solar need backup as there are just too many times when the wind does not blow, or the sun does not shine. Both of these technologies will never be viable without government subsidies. Of course you can control what people buy by a very selective system of taxation such that when the product gets too expensive they will find something to take its place.

Furthermore, as Dr. Hansen has noted, fossil fuels are very concentrated forms of energy. To even approach that much energy with green technology is going to take a huge amount of land space.

So what is this “fee”? Even Dr. Hansen knows it is just another tax.

Okay, at long last, we can address the fundamental problem. What is the backbone and framework for a solution to human-caused climate change?

The backbone must be a rising fee (tax) on carbon-based fuels, uniform across the board. No exceptions. The money must be returned to the public in a way that is direct, so they realize and trust that (averaged over the public) the money is being returned in full. Otherwise the rate will never be high enough to do the job. Returning the money to the public is the hard part in the United States. Congress prefers to keep the money for itself and divvy it out to special interests. (P. 219)

So what mechanism will come into play to prevent Congress from sidetracking the money? He does not suggest any. But, not only does this have to work in the United States, but across the globe. If we might have difficulty here in returning the tax (fee) to the people, how much more difficult it will be in countries where the administration is much more corrupt.

Dr. Hansen concludes his remarks by once again introducing us to his wonderful grandchildren. Anyone who has grandchildren knows how wonderful they all are. Who wouldn't want to protect their environment? The problem, of course, is that while we are protecting what we perceive as one danger we are at the same time creating another. While we tax to produce green machines we are also reducing the amount of food that is available for the developing world. And we are restricting their use of energy that would let them live happy lives, just like we do.

So, he talks about melting glaciers and the rising sea level. (He gives little credence to anything else that could affect sea level, such as expanding water from warming, or changes in the ocean basins.) He does not see sea level rise as just another part of living on the only habitable planet in the universe. He reacts radically to this possibility.

With the combination of a higher sea level, even of only a meter or so, and increased storm strength, the consequences of future storms will be horrendous to contemplate. The problems will not be restricted to those places commonly subjected to tropical storms. Other storms with comparable power will affect populations that are one or two orders of magnitude greater than the number of people displaced by Hurricane Katrina, which struck New Orleans and the American Gulf Coast in 2005. (P. 257)

Dr. Hansen goes on to detail the 1991 Halloween Nor'easter which was a very powerful storm. The only problem with what Dr. Hansen shares is that he gives no proof that any of these things will happen. From a climatological standpoint there is little to support what he projects; it is mainly just pure speculation. History is replete with freak storms that do major damage, all over the world. What is the evidence that these storms will become more frequent, more severe, or do more damage? Remember that after Katrina we were told to expect major storms the following years, but it did not happen.

As we read Dr. Hansen's comments we have to wonder what affect they are having on people who are in no position to know better. We can just picture them running around in circles wringing their hands and saying to themselves: "Whatever shall we do; whatever shall we do?"

Dr. Hansen is very sure of himself when he says:

What will the world be like if we do go down this route? The science tells us exactly what we could expect to happen on Earth if we continue our business-as-usual exploitation of fossil fuels. I've referred to it earlier: the Venus Syndrome. [See p. 224 ff] But how to portray the *horror of that devastation* in a way beyond graphs and numbers and phrases we have heard before, like "climate disaster"? (Emphasis Added P. 260)

At this point Dr. Hansen resorts to fiction to try and make his point. In his story a space ship arrives from far away only to find that Earth has been totally destroyed. The trouble with fiction is that people are apt to remember fiction longer than the truth. Just take some of the scenes in the movie *The Day After Tomorrow*, with the sea rushing up streets in New York City. We all know this is pure fiction, yet the picture remains.

Dr. Hansen explains his story:

THE ABOVE SCENARIO—with a devastated, sweltering Earth purged of life—may read like far-fetched science fiction. Yet its central hypothesis is a tragic certainty—continued unfettered burning of all fossil fuels will cause the climate system to pass tipping points such that we hand our children and grandchildren a dynamic situation that is out of control. (P. 269)

Tipping points seems to be the one controlling factor in what Dr. Hansen believes about the climate of the future. The science simply will not support what he proposes, nor will the historical evidence. There have been times in the history of the Earth when it was a lot hotter, and there have been times when the level of carbon dioxide was much higher.

When Dr. Hansen says: "Yet its central hypothesis is a tragic certainty..." he is not speaking as a scientist, but as a politician. Science is always open to receive new information, and history is replete with instances when political or religious figures controlled the science. We would hope that will not be the case again, yet it continues, at least on the Federal level.

CONCLUSION

Dr. Hansen may be a great climatologist, yet he has missed some important information about this marvelous planet, and that is the ability it has to heal and correct for excesses. Earth is always working toward a balance. Mountains are brought lower, valleys fill up, and new plants grow where there was a fire previously. Abandoned highways soon team with new plant life.

But, even more important is the fact that Dr. Hansen has allowed himself to be carried away with the emotion of what he thinks will happen to his grandchildren. Yet, there is considerable evidence that a warming Earth is a friendlier earth. Both plants and animals do better where it is warmer. In fact, statistically, more people die in cold weather than in warm weather.

There are two factors that have affected what Dr. Hansen believes: First is his own arrogance. He somehow believes that he is the only scientist who truly understands climate science and what the future holds for the Earth. The other is simply his emotional assessment of the science; he has allowed himself to become completely emotionally involved to the exclusion of the science.

Ultimately while Dr. Hansen is trying to scare us into taking drastic action he has scared himself as well. The solution lies in carefully considering the science, in re-evaluating the existing data, and then taking those measures that seem most in accord with what is best for ourselves and for the rest of the world.

It is evident that Dr. Hansen has some wonderful grandchildren: So do we all. But, we cannot allow simple emotion to overrule what we actually know to be from the science. Dr. Hansen is prone to talk about certainties when there are none, and to talk about settled science when it is all but settled. There is much to be learned from what he shares: After all he has been and is a credible scientist. But, we cannot learn from him if he is going to negate and belittle all those who happen to disagree with him.

We are truly thankful to be living on the only habitable planet in the universe and we must continue to take reasonable action to protect it. That is what God requires of us. But, there are other considerations; considerations that Dr. Hansen seems to ignore completely.

We are all concerned about what the future holds for our own grandchildren, but while Dr. Hansen worries that the Earth one day soon will be totally devoid of all life, our concern is more down to earth: We worry that our grandchildren will have to live in a civilization where all human life is controlled by a collectivist government, and where the freedoms we appreciate will be no longer. Many of the programs that are being proposed by the environmentalists have this one common theme: More government control. Not only ought we to reject the programs suggested by Dr. Hansen and others, but we must also begin to roll back the current “green” plans of the EPA, the Department of Energy and others. If what they propose makes good sense then the market will make good use of their ideas. If not, they will, and ought to be rejected.

Ultimately it must be up to those climate scientists who understand the huge dynamic of climate change to make that clear to those who make policy for the rest of us. An emotional appeal may sway public opinion but it is not a very healthy basis for the policies that control our future. (Gen 8:22 vs. II Pet 3:10)



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Cover photo of Hansen's book from barnesandnobel.com.

