

THREE SPEECHES BY MICHAEL CRICHTON



ALIENS CAUSE GLOBAL WARMING

ENVIRONMENTALISM AS RELIGION

THE CASE FOR SKEPTICISM ON GLOBAL WARMING



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ALIENS CAUSE GLOBAL WARMING

by Michael Crichton | January 17, 2003

California Institute of Technology, Pasadena, CA – An historical approach detailing how over the last thirty years scientists have begun to intermingle scientific and political claims.

My topic today sounds humorous but unfortunately I am serious. I am going to argue that extraterrestrials lie behind global warming. Or to speak more precisely, I will argue that a belief in extraterrestrials has paved the way, in a progression of steps, to a belief in global warming. Charting this progression of belief will be my task today.

Let me say at once that I have no desire to discourage anyone from believing in either extraterrestrials or global warming. That would be quite impossible to do. Rather, I want to discuss the history of several widely-publicized beliefs and to point to what I consider an emerging crisis in the whole enterprise of science—namely the increasingly uneasy relationship between hard science and public policy.

I have a special interest in this because of my own upbringing. I was born in the midst of World War II, and passed my formative years at the height of the Cold War. In school drills, I dutifully crawled under my desk in preparation for a nuclear attack.

It was a time of widespread fear and uncertainty, but even as a child I believed that science represented the best and greatest hope for mankind. Even to a child, the contrast was clear between the world of politics—a world of hate and danger, of irrational beliefs and fears, of mass manipulation and disgraceful blots on human history. In contrast, science held different values—international in scope, forging friendships and working relationships across national boundaries and political systems, encouraging a dispassionate habit of thought, and ultimately leading to fresh knowledge and technology that would benefit all mankind. The world might not be a very good place, but science would make it better. And it did. In my lifetime, science has largely fulfilled its promise. Science has been the great intellectual adventure of our age, and a great hope for our troubled and restless world.

But I did not expect science merely to extend lifespan, feed the hungry, cure disease, and shrink the world with jets and cell phones. I also expected science to banish the evils of human thought—prejudice and superstition, irrational beliefs and false fears. I expected science to be, in Carl Sagan's memorable phrase, "a candle in a demon haunted world." And here, I am not so pleased with the impact of science. Rather than serving as a cleansing force, science has in some instances been seduced by the more ancient lures of politics and publicity. Some of the demons that haunt our world in recent years are invented by scientists. The world has not benefited from permitting these demons to escape free.

But let's look at how it came to pass.

Cast your minds back to 1960. John F. Kennedy is president, commercial jet airplanes are just appearing, the biggest university mainframes have 12K of memory. And in Green Bank, West Virginia at the new National Radio Astronomy Observatory, a young astrophysicist named Frank Drake runs a two week project called Ozma, to search for extraterrestrial signals. A signal is received, to great excitement. It turns out to be false, but the excitement remains. In 1960, Drake organizes the first SETI conference, and came up with the now-famous Drake equation:

$$N=N*fp\ ne\ fl\ fi\ fc\ fL$$

Where N is the number of stars in the Milky Way galaxy; fp is the fraction with planets; ne is the number of planets per star capable of supporting life; fl is the fraction of planets where life evolves; fi is the fraction where intelligent life evolves; and fc is the fraction that communicates; and fL is the fraction of the planet's life during which the communicating civilizations live.

This serious-looking equation gave SETI an serious footing as a legitimate intellectual inquiry. The problem, of course, is that none of the terms can be known, and most cannot even be estimated. The only way to work the equation is to fill in with guesses. And guesses-just so we're clear-are merely expressions of prejudice. Nor can there be "informed guesses." If you need to state how many planets with life choose to communicate, there is simply no way to make an informed guess. It's simply prejudice.

As a result, the Drake equation can have any value from "billions and billions" to zero. An expression that can mean anything means nothing. Speaking precisely, the Drake equation is literally meaningless, and has nothing to do with science. I take the hard view that science involves the creation of testable hypotheses. The Drake equation cannot be tested and therefore SETI is not science. SETI is unquestionably a religion. Faith is defined as the firm belief in something for which there is no proof. The belief that the Koran is the word of God is a matter of faith. The belief that God created the universe in seven days is a matter of faith. The belief that there are other life forms in the universe is a matter of faith. There is not a single shred of evidence for any other life forms, and in forty years of searching, none has been discovered. There is absolutely no evidentiary reason to maintain this belief. SETI is a religion.

One way to chart the cooling of enthusiasm is to review popular works on the subject. In 1964, at the height of SETI enthusiasm, Walter Sullivan of the NY Times wrote an exciting book about life in the universe entitled WE ARE NOT ALONE. By 1995, when Paul Davis wrote a book on the same subject, he titled it ARE WE ALONE? (Since 1981, there have in fact been four books titled ARE WE ALONE.) More recently we have seen the rise of the so-called "Rare Earth" theory which suggests that we may, in fact, be all alone. Again, there is no evidence either way.

Back in the sixties, SETI had its critics, although not among astrophysicists and astronomers. The biologists and paleontologists were harshest. George Gaylord Simpson of Harvard sneered that SETI was a "study without a subject," and it remains so to the present day.

But scientists in general have been indulgent toward SETI, viewing it either with bemused tolerance, or with indifference. After all, what's the big deal? It's kind of fun. If people want to look, let them. Only a curmudgeon would speak harshly of SETI. It wasn't worth the bother.

And of course it is true that untestable theories may have heuristic value. Of course extraterrestrials are a good way to teach science to kids. But that does not relieve us of the obligation to see the Drake equation clearly for what it is—pure speculation in quasi-scientific trappings.

The fact that the Drake equation was not greeted with screams of outrage—similar to the screams of outrage that greet each Creationist new claim, for example—meant that now there was a crack in the door, a loosening of the definition of what constituted legitimate scientific procedure. And soon enough, pernicious garbage began to squeeze through the cracks.

Now let's jump ahead a decade to the 1970s, and Nuclear Winter.

In 1975, the National Academy of Sciences reported on "Long-Term Worldwide Effects of Multiple Nuclear Weapons Detonations" but the report estimated the effect of dust from nuclear blasts to be relatively minor. In 1979, the Office of Technology Assessment issued a report on "The Effects of Nuclear War" and stated that nuclear war could perhaps produce irreversible adverse consequences on the environment. However, because the scientific processes involved were poorly understood, the report stated it was not possible to estimate the probable magnitude of such damage.

Three years later, in 1982, the Swedish Academy of Sciences commissioned a report entitled "The Atmosphere after a Nuclear War: Twilight at Noon," which attempted to quantify the effect of smoke from burning forests and cities. The authors speculated that there would be so much smoke that a large cloud over the northern hemisphere would reduce incoming sunlight below the level required for photosynthesis, and that this would last for weeks or even longer.

The following year, five scientists including Richard Turco and Carl Sagan published a paper in *Science* called "Nuclear Winter: Global Consequences of Multiple Nuclear Explosions." This was the so-called TTAPS report, which attempted to quantify more rigorously the atmospheric effects, with the added credibility to be gained from an actual computer model of climate.

At the heart of the TTAPS undertaking was another equation, never specifically expressed, but one that could be paraphrased as follows:

$D_s = W_n W_s W_h T_f T_b P_t P_r P_e \dots$ etc

(The amount of tropospheric dust=# warheads x size warheads x warhead detonation height x flammability of targets x Target burn duration x Particles entering the Troposphere x Particle reflectivity x Particle endurance...and so on.)

The similarity to the Drake equation is striking. As with the Drake equation, none of the variables can be determined. None at all. The TTAPS study addressed this problem in part by mapping out different wartime scenarios and assigning numbers to some of the variables, but even so, the remaining variables were-and are-simply unknowable. Nobody knows how much smoke will be generated when cities burn, creating particles of what kind, and for how long. No one knows the effect of local weather conditions on the amount of particles that will be injected into the troposphere. No one knows how long the particles will remain in the troposphere. And so on.

And remember, this is only four years after the OTA study concluded that the underlying scientific processes were so poorly known that no estimates could be reliably made. Nevertheless, the TTAPS study not only made those estimates, but concluded they were catastrophic.

According to Sagan and his co-workers, even a limited 5,000 megaton nuclear exchange would cause a global temperature drop of more than 35 degrees Centigrade, and this change would last for three months. The greatest volcanic eruptions that we know of changed world temperatures somewhere between .5 and 2 degrees Centigrade. Ice ages changed global temperatures by 10 degrees. Here we have an estimated change three times greater than any ice age. One might expect it to be the subject of some dispute.

But Sagan and his co-workers were prepared, for nuclear winter was from the outset the subject of a well-orchestrated media campaign. The first announcement of nuclear winter appeared in an article by Sagan in the Sunday supplement, Parade. The very next day, a highly-publicized, high-profile conference on the long-term consequences of nuclear war was held in Washington, chaired by Carl Sagan and Paul Ehrlich, the most famous and media-savvy scientists of their generation. Sagan appeared on the Johnny Carson show 40 times. Ehrlich was on 25 times. Following the conference, there were press conferences, meetings with congressmen, and so on. The formal papers in Science came months later.

This is not the way science is done, it is the way products are sold.

The real nature of the conference is indicated by these artists' renderings of the effect of nuclear winter.

I cannot help but quote the caption for figure 5: "Shown here is a tranquil scene in the north woods. A beaver has just completed its dam, two black bears forage for food, a swallow-tailed butterfly flutters in the foreground, a loon swims quietly by, and a kingfisher searches for a tasty fish." Hard science if ever there was.

At the conference in Washington, during the question period, Ehrlich was reminded that

after Hiroshima and Nagasaki, scientists were quoted as saying nothing would grow there for 75 years, but in fact melons were growing the next year. So, he was asked, how accurate were these findings now?

Ehrlich answered by saying "I think they are extremely robust. Scientists may have made statements like that, although I cannot imagine what their basis would have been, even with the state of science at that time, but scientists are always making absurd statements, individually, in various places. What we are doing here, however, is presenting a consensus of a very large group of scientists..."

I want to pause here and talk about this notion of consensus, and the rise of what has been called consensus science. I regard consensus science as an extremely pernicious development that ought to be stopped cold in its tracks. Historically, the claim of consensus has been the first refuge of scoundrels; it is a way to avoid debate by claiming that the matter is already settled. Whenever you hear the consensus of scientists agrees on something or other, reach for your wallet, because you're being had.

Let's be clear: the work of science has nothing whatever to do with consensus. Consensus is the business of politics. Science, on the contrary, requires only one investigator who happens to be right, which means that he or she has results that are verifiable by reference to the real world. In science consensus is irrelevant. What is relevant is reproducible results. The greatest scientists in history are great precisely because they broke with the consensus.

There is no such thing as consensus science. If it's consensus, it isn't science. If it's science, it isn't consensus. Period.

In addition, let me remind you that the track record of the consensus is nothing to be proud of. Let's review a few cases.

In past centuries, the greatest killer of women was fever following childbirth . One woman in six died of this fever. In 1795, Alexander Gordon of Aberdeen suggested that the fevers were infectious processes, and he was able to cure them. The consensus said no. In 1843, Oliver Wendell Holmes claimed puerperal fever was contagious, and presented compelling evidence. The consensus said no. In 1849, Semmelweiss demonstrated that sanitary techniques virtually eliminated puerperal fever in hospitals under his management. The consensus said he was a Jew, ignored him, and dismissed him from his post. There was in fact no agreement on puerperal fever until the start of the twentieth century. Thus the consensus took one hundred and twenty five years to arrive at the right conclusion despite the efforts of the prominent "skeptics" around the world, skeptics who were demeaned and ignored. And despite the constant ongoing deaths of women.

There is no shortage of other examples. In the 1920s in America, tens of thousands of people, mostly poor, were dying of a disease called pellagra. The consensus of scientists said it was infectious, and what was necessary was to find the "pellagra germ." The US government asked a brilliant young investigator, Dr. Joseph Goldberger, to find the cause. Goldberger concluded that diet was the crucial factor. The consensus remained wedded to

the germ theory. Goldberger demonstrated that he could induce the disease through diet. He demonstrated that the disease was not infectious by injecting the blood of a pellagra patient into himself, and his assistant. They and other volunteers swabbed their noses with swabs from pellagra patients, and swallowed capsules containing scabs from pellagra rashes in what were called "Goldberger's filth parties." Nobody contracted pellagra. The consensus continued to disagree with him. There was, in addition, a social factor-southern States disliked the idea of poor diet as the cause, because it meant that social reform was required. They continued to deny it until the 1920s. Result-despite a twentieth century epidemic, the consensus took years to see the light.

Probably every schoolchild notices that South America and Africa seem to fit together rather snugly, and Alfred Wegener proposed, in 1912, that the continents had in fact drifted apart. The consensus sneered at continental drift for fifty years. The theory was most vigorously denied by the great names of geology-until 1961, when it began to seem as if the sea floors were spreading. The result: it took the consensus fifty years to acknowledge what any schoolchild sees.

And shall we go on? The examples can be multiplied endlessly. Jenner and smallpox, Pasteur and germ theory. Saccharine, margarine, repressed memory, fiber and colon cancer, hormone replacement therapy...the list of consensus errors goes on and on.

Finally, I would remind you to notice where the claim of consensus is invoked. Consensus is invoked only in situations where the science is not solid enough. Nobody says the consensus of scientists agrees that $E=mc^2$. Nobody says the consensus is that the sun is 93 million miles away. It would never occur to anyone to speak that way.

But back to our main subject.

What I have been suggesting to you is that nuclear winter was a meaningless formula, tricked out with bad science, for policy ends. It was political from the beginning, promoted in a well-orchestrated media campaign that had to be planned weeks or months in advance.

Further evidence of the political nature of the whole project can be found in the response to criticism. Although Richard Feynman was characteristically blunt, saying, "I really don't think these guys know what they're talking about," other prominent scientists were noticeably reticent. Freeman Dyson was quoted as saying "It's an absolutely atrocious piece of science but...who wants to be accused of being in favor of nuclear war?" And Victor Weisskopf said, "The science is terrible but--perhaps the psychology is good." The nuclear winter team followed up the publication of such comments with letters to the editors denying that these statements were ever made, though the scientists since then have subsequently confirmed their views.

At the time, there was a concerted desire on the part of lots of people to avoid nuclear war. If nuclear winter looked awful, why investigate too closely? Who wanted to disagree? Only people like Edward Teller, the "father of the H bomb."

Teller said, "While it is generally recognized that details are still uncertain and deserve much more study, Dr. Sagan nevertheless has taken the position that the whole scenario is so robust that there can be little doubt about its main conclusions." Yet for most people, the fact that nuclear winter was a scenario riddled with uncertainties did not seem to be relevant.

I say it is hugely relevant. Once you abandon strict adherence to what science tells us, once you start arranging the truth in a press conference, then anything is possible. In one context, maybe you will get some mobilization against nuclear war. But in another context, you get Lysenkoism. In another, you get Nazi euthanasia. The danger is always there, if you subvert science to political ends.

That is why it is so important for the future of science that the line between what science can say with certainty, and what it cannot, be drawn clearly-and defended.

What happened to Nuclear Winter? As the media glare faded, its robust scenario appeared less persuasive; John Maddox, editor of Nature, repeatedly criticized its claims; within a year, Stephen Schneider, one of the leading figures in the climate model, began to speak of "nuclear autumn." It just didn't have the same ring.

A final media embarrassment came in 1991, when Carl Sagan predicted on Nightline that Kuwaiti oil fires would produce a nuclear winter effect, causing a "year without a summer," and endangering crops around the world. Sagan stressed this outcome was so likely that "it should affect the war plans." None of it happened.

What, then, can we say were the lessons of Nuclear Winter? I believe the lesson was that with a catchy name, a strong policy position and an aggressive media campaign, nobody will dare to criticize the science, and in short order, a terminally weak thesis will be established as fact. After that, any criticism becomes beside the point. The war is already over without a shot being fired. That was the lesson, and we had a textbook application soon afterward, with second hand smoke.

In 1993, the EPA announced that second-hand smoke was "responsible for approximately 3,000 lung cancer deaths each year in nonsmoking adults," and that it "impairs the respiratory health of hundreds of thousands of people." In a 1994 pamphlet the EPA said that the eleven studies it based its decision on were not by themselves conclusive, and that they collectively assigned second-hand smoke a risk factor of 1.19. (For reference, a risk factor below 3.0 is too small for action by the EPA. or for publication in the New England Journal of Medicine, for example.) Furthermore, since there was no statistical association at the 95% confidence limits, the EPA lowered the limit to 90%. They then classified second hand smoke as a Group A Carcinogen.

This was openly fraudulent science, but it formed the basis for bans on smoking in restaurants, offices, and airports. California banned public smoking in 1995. Soon, no claim was too extreme. By 1998, the Christian Science Monitor was saying that "Second-hand smoke is the nation's third-leading preventable cause of death." The American Cancer

Society announced that 53,000 people died each year of second-hand smoke. The evidence for this claim is nonexistent.

In 1998, a Federal judge held that the EPA had acted improperly, had "committed to a conclusion before research had begun", and had "disregarded information and made findings on selective information." The reaction of Carol Browner, head of the EPA was: "We stand by our science....there's wide agreement. The American people certainly recognize that exposure to second hand smoke brings...a whole host of health problems." Again, note how the claim of consensus trumps science. In this case, it isn't even a consensus of scientists that Browner evokes! It's the consensus of the American people.

Meanwhile, ever-larger studies failed to confirm any association. A large, seven-country WHO study in 1998 found no association. Nor have well-controlled subsequent studies, to my knowledge. Yet we now read, for example, that second hand smoke is a cause of breast cancer. At this point you can say pretty much anything you want about second-hand smoke.

As with nuclear winter, bad science is used to promote what most people would consider good policy. I certainly think it is. I don't want people smoking around me. So who will speak out against banning second-hand smoke? Nobody, and if you do, you'll be branded a shill of RJ Reynolds. A big tobacco flunky. But the truth is that we now have a social policy supported by the grossest of superstitions. And we've given the EPA a bad lesson in how to behave in the future. We've told them that cheating is the way to succeed.

As the twentieth century drew to a close, the connection between hard scientific fact and public policy became increasingly elastic. In part this was possible because of the complacency of the scientific profession; in part because of the lack of good science education among the public; in part, because of the rise of specialized advocacy groups which have been enormously effective in getting publicity and shaping policy; and in great part because of the decline of the media as an independent assessor of fact. The deterioration of the American media is dire loss for our country. When distinguished institutions like the New York Times can no longer differentiate between factual content and editorial opinion, but rather mix both freely on their front page, then who will hold anyone to a higher standard?

And so, in this elastic anything-goes world where science-or non-science-is the hand maiden of questionable public policy, we arrive at last at global warming. It is not my purpose here to rehash the details of this most magnificent of the demons haunting the world. I would just remind you of the now-familiar pattern by which these things are established. Evidentiary uncertainties are glossed over in the unseemly rush for an overarching policy, and for grants to support the policy by delivering findings that are desired by the patron. Next, the isolation of those scientists who won't get with the program, and the characterization of those scientists as outsiders and "skeptics" in quotation marks-suspect individuals with suspect motives, industry flunkies, reactionaries, or simply anti-environmental nutcases. In short order, debate ends, even though prominent scientists are uncomfortable about how things are being done.

When did "skeptic" become a dirty word in science? When did a skeptic require quotation marks around it?

To an outsider, the most significant innovation in the global warming controversy is the overt reliance that is being placed on models. Back in the days of nuclear winter, computer models were invoked to add weight to a conclusion: "These results are derived with the help of a computer model." But now large-scale computer models are seen as generating data in themselves. No longer are models judged by how well they reproduce data from the real world-increasingly, models provide the data. As if they were themselves a reality. And indeed they are, when we are projecting forward. There can be no observational data about the year 2100. There are only model runs.

This fascination with computer models is something I understand very well. Richard Feynmann called it a disease. I fear he is right. Because only if you spend a lot of time looking at a computer screen can you arrive at the complex point where the global warming debate now stands.

Nobody believes a weather prediction twelve hours ahead. Now we're asked to believe a prediction that goes out 100 years into the future? And make financial investments based on that prediction? Has everybody lost their minds?

Stepping back, I have to say the arrogance of the modelmakers is breathtaking. There have been, in every century, scientists who say they know it all. Since climate may be a chaotic system-no one is sure-these predictions are inherently doubtful, to be polite. But more to the point, even if the models get the science spot-on, they can never get the sociology. To predict anything about the world a hundred years from now is simply absurd.

Look: If I was selling stock in a company that I told you would be profitable in 2100, would you buy it? Or would you think the idea was so crazy that it must be a scam?

Let's think back to people in 1900 in, say, New York. If they worried about people in 2000, what would they worry about? Probably: Where would people get enough horses? And what would they do about all the horseshit? Horse pollution was bad in 1900, think how much worse it would be a century later, with so many more people riding horses?

But of course, within a few years, nobody rode horses except for sport. And in 2000, France was getting 80% its power from an energy source that was unknown in 1900. Germany, Switzerland, Belgium and Japan were getting more than 30% from this source, unknown in 1900. Remember, people in 1900 didn't know what an atom was. They didn't know its structure. They also didn't know what a radio was, or an airport, or a movie, or a television, or a computer, or a cell phone, or a jet, an antibiotic, a rocket, a satellite, an MRI, ICU, IUD, IBM, IRA, ERA, EEG, EPA, IRS, DOD, PCP, HTML, internet. interferon, instant replay, remote sensing, remote control, speed dialing, gene therapy, gene splicing, genes, spot welding, heat-seeking, bipolar, prozac, leotards, lap dancing, email, tape recorder, CDs, airbags, plastic explosive, plastic, robots, cars, liposuction, transduction, superconduction, dish antennas, step aerobics, smoothies, twelve-step, ultrasound, nylon, rayon, teflon, fiber

optics, carpal tunnel, laser surgery, laparoscopy, corneal transplant, kidney transplant, AIDS... None of this would have meant anything to a person in the year 1900. They wouldn't know what you are talking about.

Now. You tell me you can predict the world of 2100. Tell me it's even worth thinking about. Our models just carry the present into the future. They're bound to be wrong. Everybody who gives a moment's thought knows it.

I remind you that in the lifetime of most scientists now living, we have already had an example of dire predictions set aside by new technology. I refer to the green revolution. In 1960, Paul Ehrlich said, "The battle to feed humanity is over. In the 1970s the world will undergo famines-hundreds of millions of people are going to starve to death." Ten years later, he predicted four billion people would die during the 1980s, including 65 million Americans. The mass starvation that was predicted never occurred, and it now seems it isn't ever going to happen. Nor is the population explosion going to reach the numbers predicted even ten years ago. In 1990, climate modelers anticipated a world population of 11 billion by 2100. Today, some people think the correct number will be 7 billion and falling. But nobody knows for sure.

But it is impossible to ignore how closely the history of global warming fits on the previous template for nuclear winter. Just as the earliest studies of nuclear winter stated that the uncertainties were so great that probabilities could never be known, so, too the first pronouncements on global warming argued strong limits on what could be determined with certainty about climate change. The 1995 IPCC draft report said, "Any claims of positive detection of significant climate change are likely to remain controversial until uncertainties in the total natural variability of the climate system are reduced." It also said, "No study to date has positively attributed all or part of observed climate changes to anthropogenic causes." Those statements were removed, and in their place appeared: "The balance of evidence suggests a discernable human influence on climate."

What is clear, however, is that on this issue, science and policy have become inextricably mixed to the point where it will be difficult, if not impossible, to separate them out. It is possible for an outside observer to ask serious questions about the conduct of investigations into global warming, such as whether we are taking appropriate steps to improve the quality of our observational data records, whether we are systematically obtaining the information that will clarify existing uncertainties, whether we have any organized disinterested mechanism to direct research in this contentious area.

The answer to all these questions is no. We don't.

In trying to think about how these questions can be resolved, it occurs to me that in the progression from SETI to nuclear winter to second hand smoke to global warming, we have one clear message, and that is that we can expect more and more problems of public policy dealing with technical issues in the future-problems of ever greater seriousness, where people care passionately on all sides.

And at the moment we have no mechanism to get good answers. So I will propose one.

Just as we have established a tradition of double-blinded research to determine drug efficacy, we must institute double-blinded research in other policy areas as well. Certainly the increased use of computer models, such as GCMs, cries out for the separation of those who make the models from those who verify them. The fact is that the present structure of science is entrepreneurial, with individual investigative teams vying for funding from organizations which all too often have a clear stake in the outcome of the research - or appear to, which may be just as bad. This is not healthy for science.

Sooner or later, we must form an independent research institute in this country. It must be funded by industry, by government, and by private philanthropy, both individuals and trusts. The money must be pooled, so that investigators do not know who is paying them. The institute must fund more than one team to do research in a particular area, and the verification of results will be a foregone requirement: teams will know their results will be checked by other groups. In many cases, those who decide how to gather the data will not gather it, and those who gather the data will not analyze it. If we were to address the land temperature records with such rigor, we would be well on our way to an understanding of exactly how much faith we can place in global warming, and therefore what seriousness we must address this.

I believe that as we come to the end of this litany, some of you may be saying, well what is the big deal, really. So we made a few mistakes. So a few scientists have overstated their cases and have egg on their faces. So what.

Well, I'll tell you.

In recent years, much has been said about the post modernist claims about science to the effect that science is just another form of raw power, tricked out in special claims for truth-seeking and objectivity that really have no basis in fact. Science, we are told, is no better than any other undertaking. These ideas anger many scientists, and they anger me. But recent events have made me wonder if they are correct. We can take as an example the scientific reception accorded a Danish statistician, Bjorn Lomborg, who wrote a book called *The Skeptical Environmentalist*.

The scientific community responded in a way that can only be described as disgraceful. In professional literature, it was complained he had no standing because he was not an earth scientist. His publisher, Cambridge University Press, was attacked with cries that the editor should be fired, and that all right-thinking scientists should shun the press. The past president of the AAAS wondered aloud how Cambridge could have ever "published a book that so clearly could never have passed peer review.")But of course the manuscript did pass peer review by three earth scientists on both sides of the Atlantic, and all recommended publication.) But what are scientists doing attacking a press? Is this the new McCarthyism-coming from scientists?

Worst of all was the behavior of the Scientific American, which seemed intent on proving the post-modernist point that it was all about power, not facts. The Scientific American attacked Lomborg for eleven pages, yet only came up with nine factual errors despite their assertion that the book was "rife with careless mistakes." It was a poor display featuring vicious ad hominem attacks, including comparing him to a Holocaust denier. The issue was captioned: "Science defends itself against the Skeptical Environmentalist." Really. Science has to defend itself? Is this what we have come to?

When Lomborg asked for space to rebut his critics, he was given only a page and a half. When he said it wasn't enough, he put the critics' essays on his web page and answered them in detail. Scientific American threatened copyright infringement and made him take the pages down.

Further attacks since have made it clear what is going on. Lomborg is charged with heresy. That's why none of his critics needs to substantiate their attacks in any detail. That's why the facts don't matter. That's why they can attack him in the most vicious personal terms. He's a heretic.

Of course, any scientist can be charged as Galileo was charged. I just never thought I'd see the Scientific American in the role of mother church.

Is this what science has become? I hope not. But it is what it will become, unless there is a concerted effort by leading scientists to aggressively separate science from policy. The late Philip Handler, former president of the National Academy of Sciences, said that "Scientists best serve public policy by living within the ethics of science, not those of politics. If the scientific community will not unfrock the charlatans, the public will not discern the difference-science and the nation will suffer." Personally, I don't worry about the nation. But I do worry about science.

Thank you very much.



Source: <http://www.crichton-official.com/speech-alienscauseglobalwarming.html>.

ENVIRONMENTALISM AS RELIGION

by Michael Crichton | September 15, 2003

Commonwealth Club, San Francisco, CA – This was not the first discussion of environmentalism as a religion, but it caught on and was widely quoted. Michael explains why religious approaches to the environment are inappropriate and cause damage to the natural world they intend to protect.

I have been asked to talk about what I consider the most important challenge facing mankind, and I have a fundamental answer. The greatest challenge facing mankind is the challenge of distinguishing reality from fantasy, truth from propaganda. Perceiving the truth has always been a challenge to mankind, but in the information age (or as I think of it, the disinformation age) it takes on a special urgency and importance.

We must daily decide whether the threats we face are real, whether the solutions we are offered will do any good, whether the problems we're told exist are in fact real problems, or non-problems. Every one of us has a sense of the world, and we all know that this sense is in part given to us by what other people and society tell us; in part generated by our emotional state, which we project outward; and in part by our genuine perceptions of reality. In short, our struggle to determine what is true is the struggle to decide which of our perceptions are genuine, and which are false because they are handed down, or sold to us, or generated by our own hopes and fears.

As an example of this challenge, I want to talk today about environmentalism. And in order not to be misunderstood, I want it perfectly clear that I believe it is incumbent on us to conduct our lives in a way that takes into account all the consequences of our actions, including the consequences to other people, and the consequences to the environment. I believe it is important to act in ways that are sympathetic to the environment, and I believe this will always be a need, carrying into the future. I believe the world has genuine problems and I believe it can and should be improved. But I also think that deciding what constitutes responsible action is immensely difficult, and the consequences of our actions are often difficult to know in advance. I think our past record of environmental action is discouraging, to put it mildly, because even our best intended efforts often go awry. But I think we do not recognize our past failures, and face them squarely. And I think I know why.

I studied anthropology in college, and one of the things I learned was that certain human social structures always reappear. They can't be eliminated from society. One of those structures is religion. Today it is said we live in a secular society in which many people--the best people, the most enlightened people--do not believe in any religion. But I think that you cannot eliminate religion from the psyche of mankind. If you suppress it in one form, it merely re-emerges in another form. You cannot believe in God, but you still have to believe in something that gives meaning to your life, and shapes your sense of the world. Such a belief is religious.

Today, one of the most powerful religions in the Western World is environmentalism. Environmentalism seems to be the religion of choice for urban atheists. Why do I say it's a religion? Well, just look at the beliefs. If you look carefully, you see that environmentalism is in fact a perfect 21st century remapping of traditional Judeo-Christian beliefs and myths.

There's an initial Eden, a paradise, a state of grace and unity with nature, there's a fall from grace into a state of pollution as a result of eating from the tree of knowledge, and as a result of our actions there is a judgment day coming for us all. We are all energy sinners, doomed to die, unless we seek salvation, which is now called sustainability. Sustainability is salvation in the church of the environment. Just as organic food is its communion, that pesticide-free wafer that the right people with the right beliefs, imbibe.

Eden, the fall of man, the loss of grace, the coming doomsday--these are deeply held mythic structures. They are profoundly conservative beliefs. They may even be hard-wired in the brain, for all I know. I certainly don't want to talk anybody out of them, as I don't want to talk anybody out of a belief that Jesus Christ is the son of God who rose from the dead. But the reason I don't want to talk anybody out of these beliefs is that I know that I can't talk anybody out of them. These are not facts that can be argued. These are issues of faith.

And so it is, sadly, with environmentalism. Increasingly it seems facts aren't necessary, because the tenets of environmentalism are all about belief. It's about whether you are going to be a sinner, or saved. Whether you are going to be one of the people on the side of salvation, or on the side of doom. Whether you are going to be one of us, or one of them.

Am I exaggerating to make a point? I am afraid not. Because we know a lot more about the world than we did forty or fifty years ago. And what we know now is not so supportive of certain core environmental myths, yet the myths do not die. Let's examine some of those beliefs.

There is no Eden. There never was. What was that Eden of the wonderful mythic past? Is it the time when infant mortality was 80%, when four children in five died of disease before the age of five? When one woman in six died in childbirth? When the average lifespan was 40, as it was in America a century ago. When plagues swept across the planet, killing millions in a stroke. Was it when millions starved to death? Is that when it was Eden?

And what about indigenous peoples, living in a state of harmony with the Eden-like environment? Well, they never did. On this continent, the newly arrived people who crossed the land bridge almost immediately set about wiping out hundreds of species of large animals, and they did this several thousand years before the white man showed up, to accelerate the process. And what was the condition of life? Loving, peaceful, harmonious? Hardly: the early peoples of the New World lived in a state of constant warfare. Generations of hatred, tribal hatreds, constant battles. The warlike tribes of this continent are famous: the Comanche, Sioux, Apache, Mohawk, Aztecs, Toltec, Incas. Some of them practiced infanticide, and human sacrifice. And those tribes that were not fiercely warlike were exterminated, or learned to build their villages high in the cliffs to attain some measure of safety.

How about the human condition in the rest of the world? The Maori of New Zealand committed massacres regularly. The dyaks of Borneo were headhunters. The Polynesians, living in an environment as close to paradise as one can imagine, fought constantly, and created a society so hideously restrictive that you could lose your life if you stepped in the footprint of a chief. It was the Polynesians who gave us the very concept of taboo, as well as the word itself. The noble savage is a fantasy, and it was never true. That anyone still believes it, 200 years after Rousseau, shows the tenacity of religious myths, their ability to hang on in the face of centuries of factual contradiction.

There was even an academic movement, during the latter 20th century, that claimed that cannibalism was a white man's invention to demonize the indigenous peoples. (Only academics could fight such a battle.) It was some thirty years before professors finally agreed that yes, cannibalism does indeed occur among human beings. Meanwhile, all during this time New Guinea highlanders in the 20th century continued to eat the brains of their enemies until they were finally made to understand that they risked kuru, a fatal neurological disease, when they did so.

More recently still the gentle Tasaday of the Philippines turned out to be a publicity stunt, a nonexistent tribe. And African pygmies have one of the highest murder rates on the planet.

In short, the romantic view of the natural world as a blissful Eden is only held by people who have no actual experience of nature. People who live in nature are not romantic about it at all. They may hold spiritual beliefs about the world around them, they may have a sense of the unity of nature or the aliveness of all things, but they still kill the animals and uproot the plants in order to eat, to live. If they don't, they will die.

And if you, even now, put yourself in nature even for a matter of days, you will quickly be disabused of all your romantic fantasies. Take a trek through the jungles of Borneo, and in short order you will have festering sores on your skin, you'll have bugs all over your body, biting in your hair, crawling up your nose and into your ears, you'll have infections and sickness and if you're not with somebody who knows what they're doing, you'll quickly starve to death. But chances are that even in the jungles of Borneo you won't experience nature so directly, because you will have covered your entire body with DEET and you will be doing everything you can to keep those bugs off you.

The truth is, almost nobody wants to experience real nature. What people want is to spend a week or two in a cabin in the woods, with screens on the windows. They want a simplified life for a while, without all their stuff. Or a nice river rafting trip for a few days, with somebody else doing the cooking. Nobody wants to go back to nature in any real way, and nobody does. It's all talk-and as the years go on, and the world population grows increasingly urban, it's uninformed talk. Farmers know what they're talking about. City people don't. It's all fantasy.

One way to measure the prevalence of fantasy is to note the number of people who die because they haven't the least knowledge of how nature really is. They stand beside wild animals, like buffalo, for a picture and get trampled to death; they climb a mountain in dicey

weather without proper gear, and freeze to death. They drown in the surf on holiday because they can't conceive the real power of what we blithely call "the force of nature." They have seen the ocean. But they haven't been in it.

The television generation expects nature to act the way they want it to be. They think all life experiences can be tivo-ed. The notion that the natural world obeys its own rules and doesn't give a damn about your expectations comes as a massive shock. Well-to-do, educated people in an urban environment experience the ability to fashion their daily lives as they wish. They buy clothes that suit their taste, and decorate their apartments as they wish. Within limits, they can contrive a daily urban world that pleases them.

But the natural world is not so malleable. On the contrary, it will demand that you adapt to it-and if you don't, you die. It is a harsh, powerful, and unforgiving world, that most urban westerners have never experienced.

Many years ago I was trekking in the Karakorum mountains of northern Pakistan, when my group came to a river that we had to cross. It was a glacial river, freezing cold, and it was running very fast, but it wasn't deep--maybe three feet at most. My guide set out ropes for people to hold as they crossed the river, and everybody proceeded, one at a time, with extreme care. I asked the guide what was the big deal about crossing a three-foot river. He said, well, supposing you fell and suffered a compound fracture. We were now four days trek from the last big town, where there was a radio. Even if the guide went back double time to get help, it'd still be at least three days before he could return with a helicopter. If a helicopter were available at all. And in three days, I'd probably be dead from my injuries. So that was why everybody was crossing carefully. Because out in nature a little slip could be deadly.

But let's return to religion. If Eden is a fantasy that never existed, and mankind wasn't ever noble and kind and loving, if we didn't fall from grace, then what about the rest of the religious tenets? What about salvation, sustainability, and judgment day? What about the coming environmental doom from fossil fuels and global warming, if we all don't get down on our knees and conserve every day?

Well, it's interesting. You may have noticed that something has been left off the doomsday list, lately. Although the preachers of environmentalism have been yelling about population for fifty years, over the last decade world population seems to be taking an unexpected turn. Fertility rates are falling almost everywhere. As a result, over the course of my lifetime the thoughtful predictions for total world population have gone from a high of 20 billion, to 15 billion, to 11 billion (which was the UN estimate around 1990) to now 9 billion, and soon, perhaps less. There are some who think that world population will peak in 2050 and then start to decline. There are some who predict we will have fewer people in 2100 than we do today. Is this a reason to rejoice, to say halleluiah? Certainly not. Without a pause, we now hear about the coming crisis of world economy from a shrinking population. We hear about the impending crisis of an aging population. Nobody anywhere will say that the core fears expressed for most of my life have turned out not to be true. As we have moved into the

future, these doomsday visions vanished, like a mirage in the desert. They were never there--though they still appear, in the future. As mirages do.

Okay, so, the preachers made a mistake. They got one prediction wrong; they're human. So what. Unfortunately, it's not just one prediction. It's a whole slew of them. We are running out of oil. We are running out of all natural resources. Paul Ehrlich: 60 million Americans will die of starvation in the 1980s. Forty thousand species become extinct every year. Half of all species on the planet will be extinct by 2000. And on and on and on.

With so many past failures, you might think that environmental predictions would become more cautious. But not if it's a religion. Remember, the nut on the sidewalk carrying the placard that predicts the end of the world doesn't quit when the world doesn't end on the day he expects. He just changes his placard, sets a new doomsday date, and goes back to walking the streets. One of the defining features of religion is that your beliefs are not troubled by facts, because they have nothing to do with facts.

So I can tell you some facts. I know you haven't read any of what I am about to tell you in the newspaper, because newspapers literally don't report them. I can tell you that DDT is not a carcinogen and did not cause birds to die and should never have been banned. I can tell you that the people who banned it knew that it wasn't carcinogenic and banned it anyway. I can tell you that the DDT ban has caused the deaths of tens of millions of poor people, mostly children, whose deaths are directly attributable to a callous, technologically advanced western society that promoted the new cause of environmentalism by pushing a fantasy about a pesticide, and thus irrevocably harmed the third world. Banning DDT is one of the most disgraceful episodes in the twentieth century history of America. We knew better, and we did it anyway, and we let people around the world die and didn't give a damn.

I can tell you that second hand smoke is not a health hazard to anyone and never was, and the EPA has always known it. I can tell you that the evidence for global warming is far weaker than its proponents would ever admit. I can tell you the percentage the US land area that is taken by urbanization, including cities and roads, is 5%. I can tell you that the Sahara desert is shrinking, and the total ice of Antarctica is increasing. I can tell you that a blue-ribbon panel in Science magazine concluded that there is no known technology that will enable us to halt the rise of carbon dioxide in the 21st century. Not wind, not solar, not even nuclear. The panel concluded a totally new technology-like nuclear fusion-was necessary, otherwise nothing could be done and in the meantime all efforts would be a waste of time. They said that when the UN IPCC reports stated alternative technologies existed that could control greenhouse gases, the UN was wrong.

I can, with a lot of time, give you the factual basis for these views, and I can cite the appropriate journal articles not in whacko magazines, but in the most prestigious science journals, such as Science and Nature. But such references probably won't impact more than a handful of you, because the beliefs of a religion are not dependent on facts, but rather are matters of faith. Unshakeable belief.

Most of us have had some experience interacting with religious fundamentalists, and we understand that one of the problems with fundamentalists is that they have no perspective on themselves. They never recognize that their way of thinking is just one of many other possible ways of thinking, which may be equally useful or good. On the contrary, they believe their way is the right way, everyone else is wrong; they are in the business of salvation, and they want to help you to see things the right way. They want to help you be saved. They are totally rigid and totally uninterested in opposing points of view. In our modern complex world, fundamentalism is dangerous because of its rigidity and its imperviousness to other ideas.

I want to argue that it is now time for us to make a major shift in our thinking about the environment, similar to the shift that occurred around the first Earth Day in 1970, when this awareness was first heightened. But this time around, we need to get environmentalism out of the sphere of religion. We need to stop the mythic fantasies, and we need to stop the doomsday predictions. We need to start doing hard science instead.

There are two reasons why I think we all need to get rid of the religion of environmentalism.

First, we need an environmental movement, and such a movement is not very effective if it is conducted as a religion. We know from history that religions tend to kill people, and environmentalism has already killed somewhere between 10-30 million people since the 1970s. It's not a good record. Environmentalism needs to be absolutely based in objective and verifiable science, it needs to be rational, and it needs to be flexible. And it needs to be apolitical. To mix environmental concerns with the frantic fantasies that people have about one political party or another is to miss the cold truth--that there is very little difference between the parties, except a difference in pandering rhetoric. The effort to promote effective legislation for the environment is not helped by thinking that the Democrats will save us and the Republicans won't. Political history is more complicated than that. Never forget which president started the EPA: Richard Nixon. And never forget which president sold federal oil leases, allowing oil drilling in Santa Barbara: Lyndon Johnson. So get politics out of your thinking about the environment.

The second reason to abandon environmental religion is more pressing. Religions think they know it all, but the unhappy truth of the environment is that we are dealing with incredibly complex, evolving systems, and we usually are not certain how best to proceed. Those who are certain are demonstrating their personality type, or their belief system, not the state of their knowledge. Our record in the past, for example managing national parks, is humiliating. Our fifty-year effort at forest-fire suppression is a well-intentioned disaster from which our forests will never recover. We need to be humble, deeply humble, in the face of what we are trying to accomplish. We need to be trying various methods of accomplishing things. We need to be open-minded about assessing results of our efforts, and we need to be flexible about balancing needs. Religions are good at none of these things.

How will we manage to get environmentalism out of the clutches of religion, and back to a scientific discipline? There's a simple answer: we must institute far more stringent

requirements for what constitutes knowledge in the environmental realm. I am thoroughly sick of politicized so-called facts that simply aren't true. It isn't that these "facts" are exaggerations of an underlying truth. Nor is it that certain organizations are spinning their case to present it in the strongest way. Not at all--what more and more groups are doing is putting out lies, pure and simple. Falsehoods that they know to be false.

This trend began with the DDT campaign, and it persists to this day. At this moment, the EPA is hopelessly politicized. In the wake of Carol Browner, it is probably better to shut it down and start over. What we need is a new organization much closer to the FDA. We need an organization that will be ruthless about acquiring verifiable results, that will fund identical research projects to more than one group, and that will make everybody in this field get honest fast.

Because in the end, science offers us the only way out of politics. And if we allow science to become politicized, then we are lost. We will enter the Internet version of the dark ages, an era of shifting fears and wild prejudices, transmitted to people who don't know any better. That's not a good future for the human race. That's our past. So it's time to abandon the religion of environmentalism, and return to the science of environmentalism, and base our public policy decisions firmly on that.

Thank you very much.



Source: <http://www.crichton-official.com/speech-environmentalism-as-religion.html>.

THE CASE FOR SKEPTICISM ON GLOBAL WARMING

by Michael Crichton | January 25, 2005

National Press Club, Washington DC – Michael's detailed explanation of why he criticizes global warming scenarios. Using published UN data, he reviews why claims for catastrophic warming arouse doubt; why reducing CO₂ is vastly more difficult than we are being told; and why we are morally unjustified to spend vast sums on this speculative issue when around the world people are dying of starvation and disease.

To be in Washington tonight reminds me that the only person to ever offer me a job in Washington was Daniel Patrick Moynihan. That was thirty years ago, and he was working for Nixon at the time. Moynihan was a hero of mine, the exemplar of an intellectual engaged in public policy. What I admired was that he confronted every issue according to the data and not a belief system. Moynihan could work for both Democratic and Republican presidents.

He took a lot of flack for his analyses but he was more often right than wrong.

Moynihan was a Democrat, and I'm a political agnostic. I was also raised in a scientific tradition that regarded politics as inferior: If you weren't bright enough to do science, you could go into politics. I retain that prejudice today. I also come from an older and tougher tradition that regards science as the business of testing theories with measured data from the outside world. Untestable hypotheses are not science but rather something else.

We are going to talk about the environment, so I should tell you I am the child of a mother who 60 years ago insisted on organic food, recycling, and energy efficiency long before people had terms for those ideas. She drove refrigerator salesmen mad. And over the years, I have recycled my trash, installed solar panels and low flow appliances, driven diesel cars, and used cloth diapers on my child — all approved ideas at the time.

I still believe that environmental awareness is desperately important. The environment is our shared life support system, it is what we pass on to the next generation, and how we act today has consequences — potentially serious consequences — for future generations. But I have also come to believe that our conventional wisdom is wrongheaded, unscientific, badly out of date, and damaging to the environment. Yellowstone National Park has raw sewage seeping out of the ground. We must be doing something wrong.

In my view, our approach to global warming exemplifies everything that is wrong with our approach to the environment. We are basing our decisions on speculation, not evidence. Proponents are pressing their views with more PR than scientific data. Indeed, we have allowed the whole issue to be politicized — red vs. blue, Republican vs. Democrat. This is in my view absurd. Data aren't political. Data are data. Politics leads you in the direction of a belief. Data, if you follow them, lead you to truth.



When I was a student in the 1950s, like many kids I noticed that Africa seemed to fit nicely into South America. Were they once connected? I asked my teacher, who said that that this apparent fit was just an accident, and the continents did not move. I had trouble with that, unaware that people had been having trouble with it ever since Francis Bacon noticed the same thing back in 1620. A German named Wegener had made a more modern case for it in 1912. But still, my teacher said no.

By the time I was in college ten years later, it was recognized that continents did indeed move, and had done so for most of Earth's history. Continental drift and plate tectonics were born. The teacher was wrong.

Now, jump ahead to the 1970s. Gerald Ford is president, Saigon falls, Hoffa disappears, and in climate science, evidence points to catastrophic cooling and a new ice age.



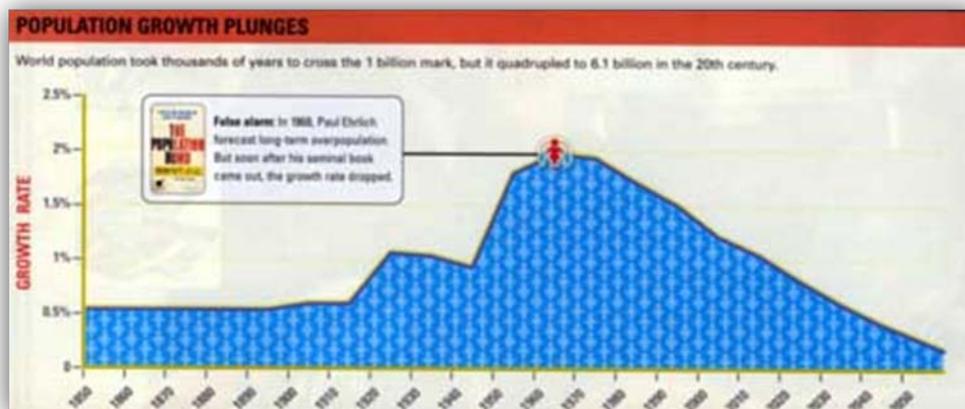
Such fears had been building for many years. In the first Earth Day in 1970, UC Davis's Kenneth Watt said, "If present trends continue, the world will be about four degrees colder in 1990, but eleven degrees colder by the year 2000. This is about twice what it would take to put us in an ice age." International Wildlife warned "a new ice age must now stand alongside nuclear war" as a threat to mankind. Science Digest said "we must prepare for the next ice age." The Christian Science Monitor noted that armadillos had moved out of Nebraska because it was too cold, glaciers had begun to advance, and growing seasons had shortened around the world. Newsweek reported "ominous signs" of a "fundamental change in the world's weather."

But in fact, every one of these statements was wrong. Fears of an ice age had vanished within five years, to be replaced by fears of global warming. These fears were heightened because population was exploding. By 1995, it was 5.7 billion, up 10% in the last five years.

Back in the 90s, if someone said to you, "This population explosion is overstated. In the next hundred years, population will actually decline." That would contradict what all the environmental groups were saying, what the UN was saying. You would regard such a statement as outrageous.

More or less as you would regard a statement by someone in 2005 that global warming has been overstated.

But in fact, we now know that the hypothetical person in 1995 was right. And we know that there was strong evidence that this was the case going back for twenty years. We just weren't told about that contradictory evidence, because the conventional wisdom, awesome in its power, kept it from us.



(This is a graph from Wired magazine showing rate of fertility decline over the last 50 years.)

I mention these examples because in my experience, we all tend to put a lot of faith in science. We believe what we're told. My father suffered a life filled with margarine, before he died of a heart attack anyway. Others of us have stuffed our colons with fiber to ward off cancer, only to learn later that it was all a waste of time, and fiber.

When I wrote Jurassic Park, I worried that people would reject the idea of creating a dinosaur as absurd. Nobody did, not even scientists. It was reported to me that a Harvard geneticist, one of the first to read the book, slammed it shut when he finished and announced, "It can be done!" Which was missing the point. Soon after, a Congressman announced he was introducing legislation to ban research leading to the creation of a dinosaur. I held my breath, but my hopes were dashed. Someone whispered in his ear that it couldn't be done.

But even so, the belief lingers. Reporters would ask me, "When you were doing research on Jurassic Park, did you visit real biotech labs?" No, I said, why would I? They didn't know how to make a dinosaur. And they don't.

So we all tend to give science credence, even when it is not warranted. I will show you many examples of unwarranted credence tonight. But here's an example to begin. This is the famous Drake equation from the 1960s to estimate the number of advanced civilizations in the galaxy.

$$N=N*fp ne fl fi fc fL$$

Where N is the number of stars in the Milky Way galaxy; fp is the fraction with planets; ne is the number of planets per star capable of supporting life; fl is the fraction of planets where life evolves; fi is the fraction where intelligent life evolves; and fc is the fraction that communicates; and fL is the fraction of the planet's life during which the communicating civilizations live.

The problem with this equation is that none of the terms can be known. As a result, the Drake equation can have any value from "billions and billions" to zero. An expression that can mean anything means nothing. The mathematical appearance is deceptive. In scientific terms — by which I mean testable hypotheses — the Drake equation is really meaningless.

And here's another example. Most people just read it and nod:



"How Many Species Exist? The question takes on increasing significance as plants and animals vanish before scientists can even identify them."

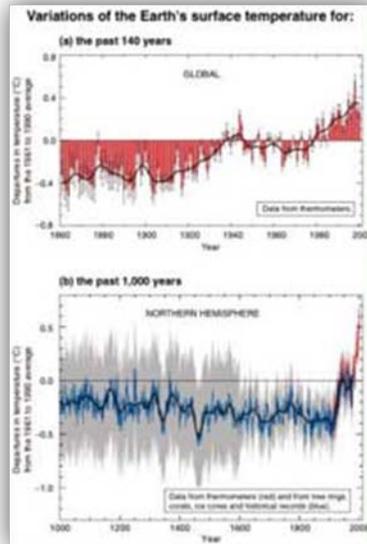
Now, wait a minute...How could you know something vanished before you identified it? If you didn't know it existed, you wouldn't have any way to know it was gone. Would you? In fact, the statement is nonsense. If you were never married you'd never know if your wife left you.

Okay. With this as a preparation, let's turn to the evidence, both graphic and verbal, for global warming. As most of you have heard many times, the consensus of climate scientists believes in global warming. Historically, the claim of consensus has been the first refuge of scoundrels; it is a way to avoid debate by claiming that the matter is already settled. Whenever you hear the consensus of scientists agrees on something or other, reach for your wallet, because you're being had.

Let's be clear: the work of science has nothing whatever to do with consensus. Consensus is the business of politics. Science, on the contrary, requires only one investigator who happens to be right, which means that he or she has results that are verifiable by reference to the real world. In science, consensus is irrelevant. What is relevant is reproducible results. The greatest scientists in history are great precisely because they broke with the consensus.

And furthermore, the consensus of scientists has frequently been wrong. As they were wrong when they believed, earlier in my lifetime, that the continents did not move. So we must remember the immortal words of Mark Twain, who said, "Whenever you find yourself on the side of the majority, it is time to pause and reflect."

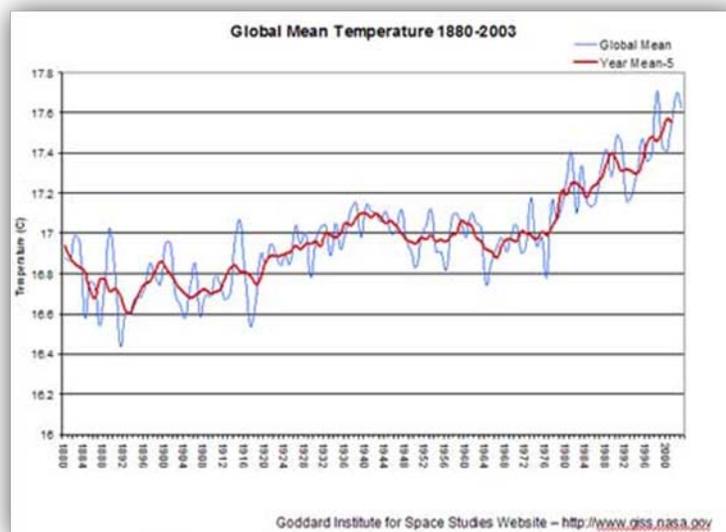
So let's look at global warming. We start with the summary for policymakers, which is what everybody reads. We will go into more detail in a minute, but for now, we assume the summary has all the important stuff, and turning to page three we find what are arguably the two most important graphs in climate science in 2001.



The top graph is taken from the Hadley Center in England, and shows global surface warming. The bottom graph is from an American research team headed by Mann and shows temperature for the last thousand years.

Of these two graphs, one is entirely discredited and the other is seriously disputed. Let's begin with the top graph.

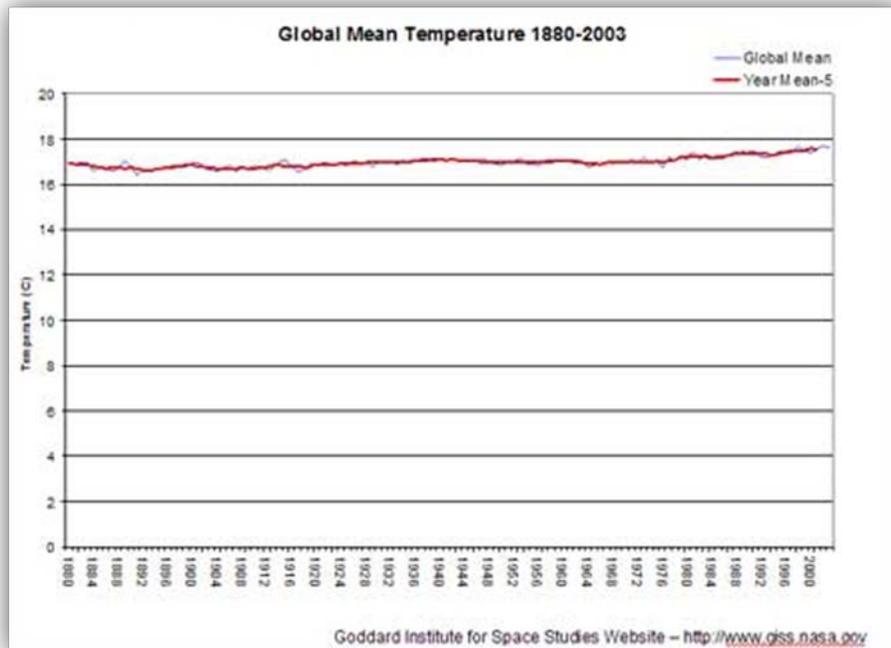
I have redrawn the graph in Excel, and it looks like this.



Now the first thing to say is that there is some uncertainty about how much warming has really occurred. The IPCC says the 20th century temperatures increase is between .4 and .8 degrees. The Goddard Institute says it is between .5 and .75 degrees. That's a fair degree of uncertainty about how much warming has already occurred.

But let's take the graph as given. It shows a warming of .4 degrees until 1940, which precedes major industrialization and so may or may not be a largely natural process. Then from 1940 to 1970, temperatures fell. That was the reason for the global cooling scare, and the fears that it was never going to get warm again. Since then, temperatures have gone up, as you see here. They have risen in association with carbon dioxide levels. And the core of the claim of CO₂ driven warming is based on this thirty-five year record.

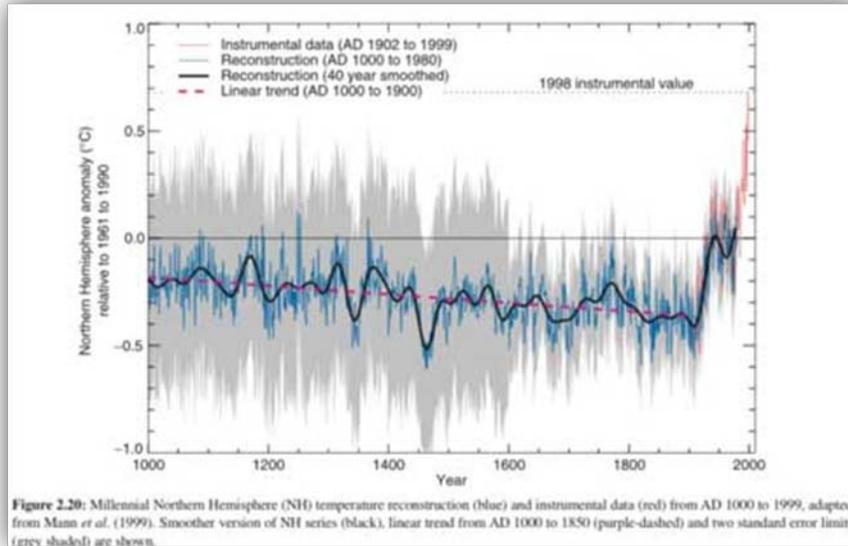
But we must remember that this graph really shows annual variations in the average surface temperature of the earth over time. That total average temperature is ballpark sixteen degrees. So if we graph the entire average fluctuation, it looks like this:



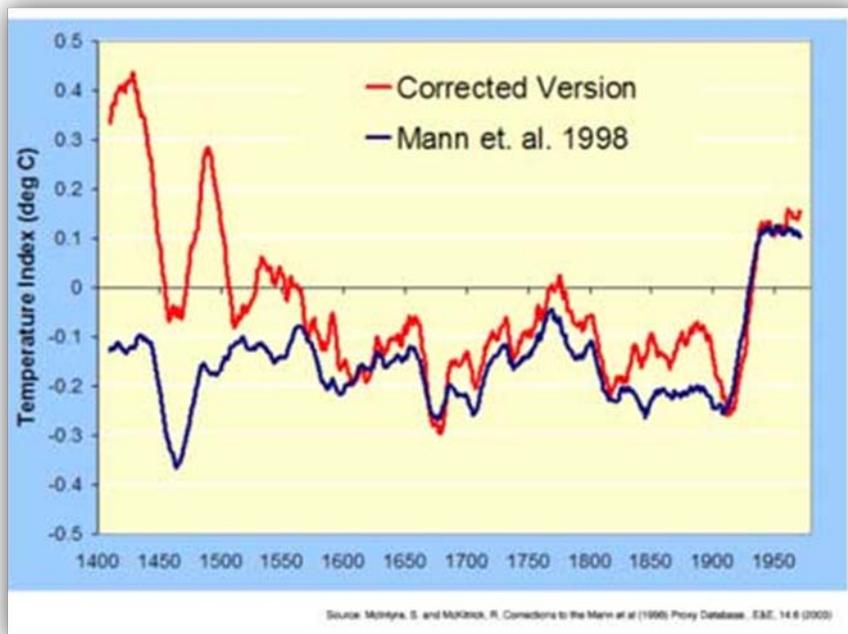
So all the interest is in this little fluttering on the surface. Let's be clear that I am graphing the data in a way that minimizes it. But the earlier graph maximizes it. If you put a ball bearing under a microscope it will look like the surface of the moon. But it is smooth to the touch. Both things are true. Question is which is important.

Since I think the evidence is weak, I urge you to bear this second graph in mind.

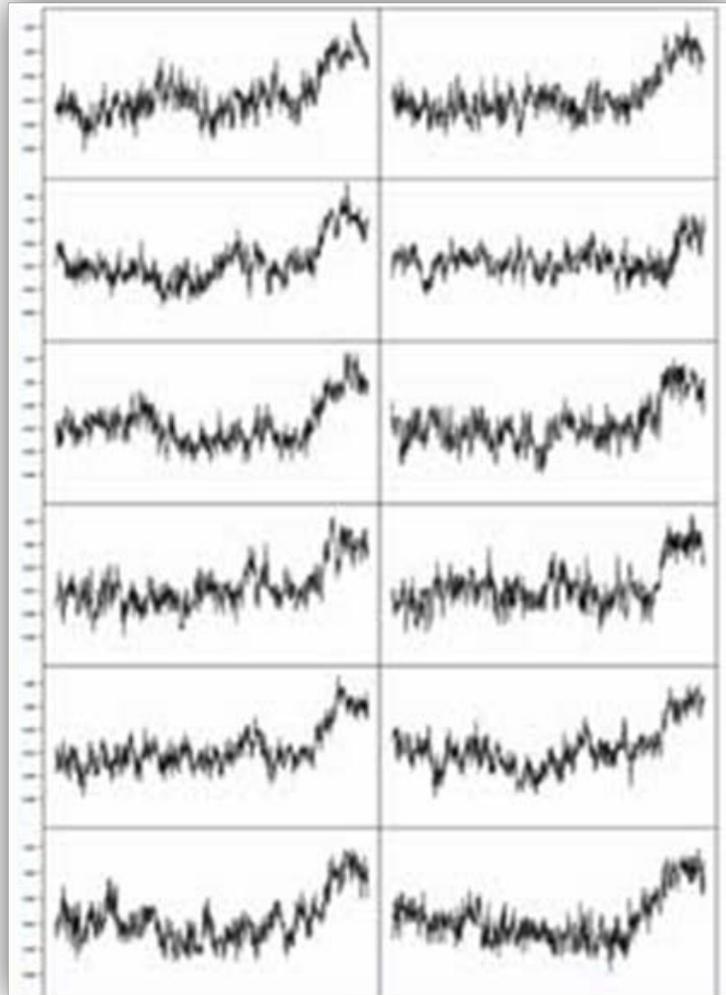
Now the question is, is this twentieth-century temperature rise extraordinary? For that we must turn to the second graph by Michael Mann, which is known as the "hockey stick."



This graph shows the results of a study of 112 so-called proxy studies: tree rings, isotopes in ice, and other markers of relative temperature. Obviously there were no thermometers back in the year 1000, so proxies are needed to get some idea of past warmth. Mann's findings were a centerpiece of the last UN study, and they were the basis for the claim that the twentieth century showed the steepest temperature rise of the last thousand years. That was said in 2001. No one would say it now. Mann's work has come under attack from several laboratories around the world. Two Canadian investigators, McKittrick and McIntyre, re-did the study using Mann's data and methods, and found dozens of errors, including two data series with exactly the same data for a number of years. Not surprisingly, when they corrected all the errors, they came up with sharply differing results.

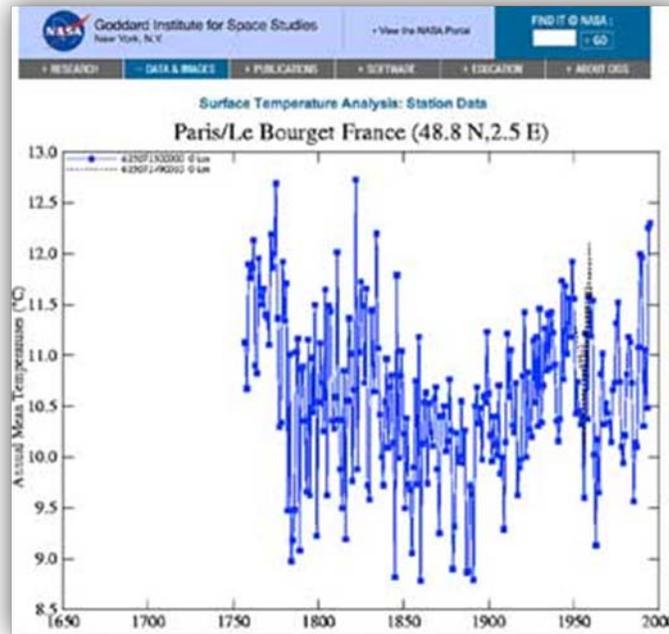


But still this increase is steep and unusual, isn't it? Well, no, because actually you can't trust it. It turns out that Mann and his associates used a non-standard formula to analyze his data, and this particular formula will turn anything into a hockey stick—including trendless data generated by computer.

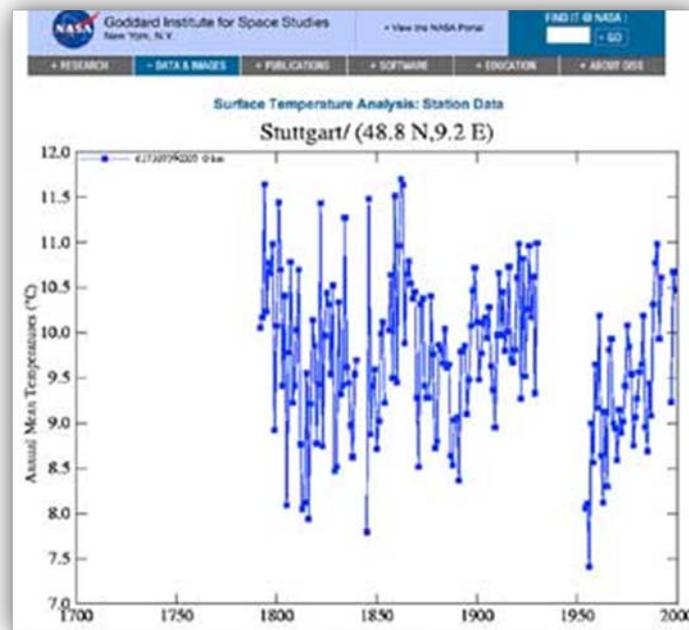


Physicist Richard Muller called this result "a shocker..." and he is right. Hans von Storch calls Mann's study "rubbish." Both men are staunch advocates of global warming. But Mann's mistakes are considerable. But he will get tenure soon anyway.

But the disrepute into which his study has fallen leaves us wondering just how much variation in climate is normal. Let's look at a couple of stations.

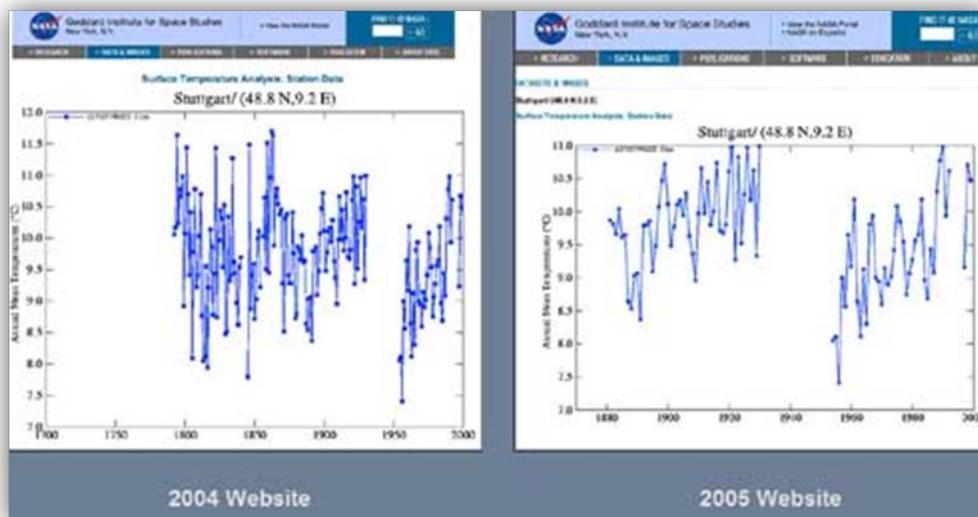
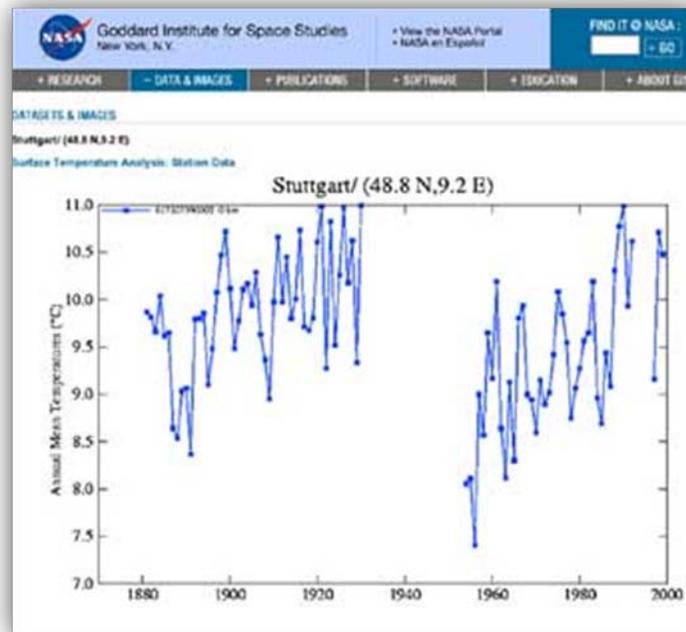


Here you see that the current temperature rise, while distinctive, is far from unique. Paris was hotter in the 1750s and 1830s than today.



Similarly, if you look at Stuttgart from 1950 to present, it looks dramatic. If you look at the whole record, it is put into an entirely different perspective. And again, it was warmer in the 1800s than now.

Now, these are graphs taken from the GISS website at the time I did my research for the book. For those of you think the science is all aboveboard, you might contemplate this. The data have been changed.

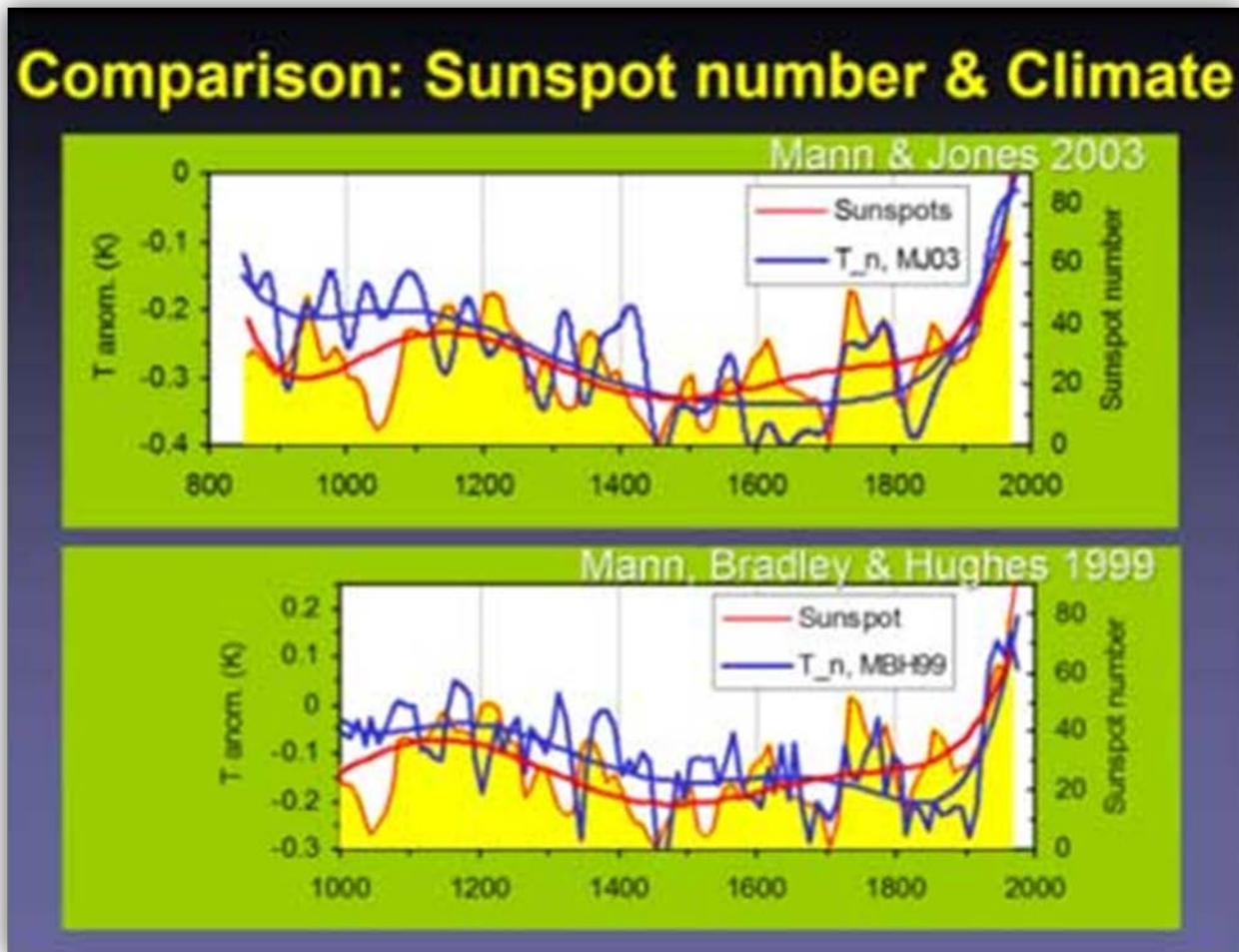


I have no comment on why the Goddard Institute changed the data on their website. But it clearly makes the temperature record look more consistently upward-trending and more fearsome than it did a few months ago.

All right. With the second graph demolished, it is time to return to the first. Now we must ask, if surface temperatures have gone up in the twentieth century, what has caused the rise? Most people have been taught that the increase is caused by carbon dioxide, but that is by no means clear.

Two factors that were previously not of concern have recently come to the renewed attention of scientists. The first is the sun. In the past it was imagined that the effect of the sun was fairly constant and therefore any rise in temperature must be caused by some other factor. But it is now clear from work of scientists at the Max Planck institute in Germany that the sun is not constant, and is right now at a 1,000 year maximum. The data comes from sunspots.

According to Solanki and his associates,



This shows that solar radiation and surface temperature are correlated until recent times. Solanki says that the sun is insufficient to explain the current temperatures, and therefore another factor is also at work, presumably greenhouse gases. But the question is whether the sun accounts for a significant part of twentieth-century warming. Nobody is sure. But it is likely to be some amount greater than was previously thought.

Now we turn to cities:



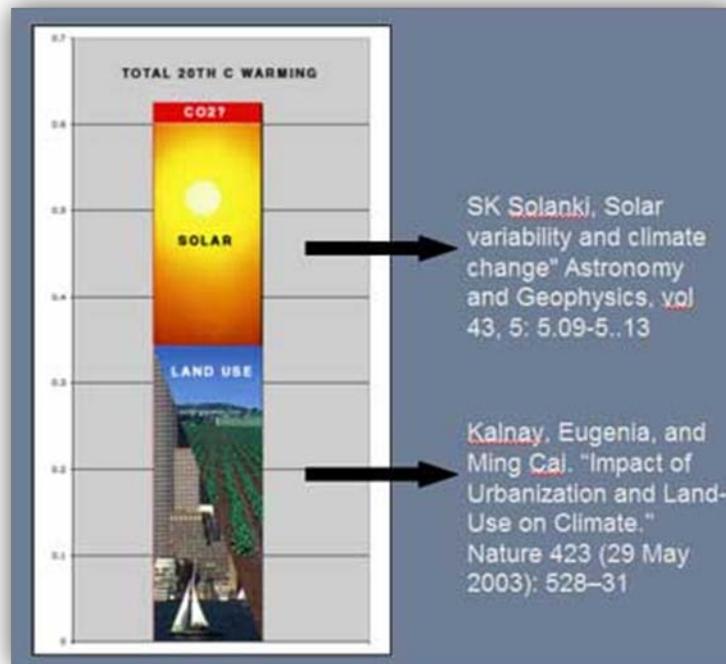
Another factor that could change the record is heat from cities. This is called the urban heat bias, and as with solar effects, scientists tended to think the effect, while real, was relatively minor. That is why the IPCC allowed only six hundredths of a degree for urban heating. But cities are hot: the correction is likely to be much greater. We now understand that many cities are 7 or 8 degrees warmer than the surrounding countryside.



(A temperature chart from a car driving around Berlin. The difference between city and country is 7 degrees.)

Some studies have suggested that the proper adjustment to the record needs to be four or five times greater than the IPCC allowance.

Now what does this mean to our record? Well remember, the total warming in the 20th century is six tenths of a degree.



If some of this is from land use and urban heating (and one studies suggests it is .35 C for the century), and some is solar heating (.25 C for century), then the amount attributable to carbon dioxide becomes less. And let me repeat: nobody knows how much is attributable to carbon dioxide right now.

But if carbon dioxide is not the major factor, it may not make a lot of sense to try and limit it. There are many reasons to reduce our dependence on fossil fuels, and I support such a reduction. But global warming may not be a good or a primary reason.

So this is very important stuff. The uncertainties are great.

And now, we turn to the most important issue. WHAT WILL HAPPEN IN THE FUTURE?

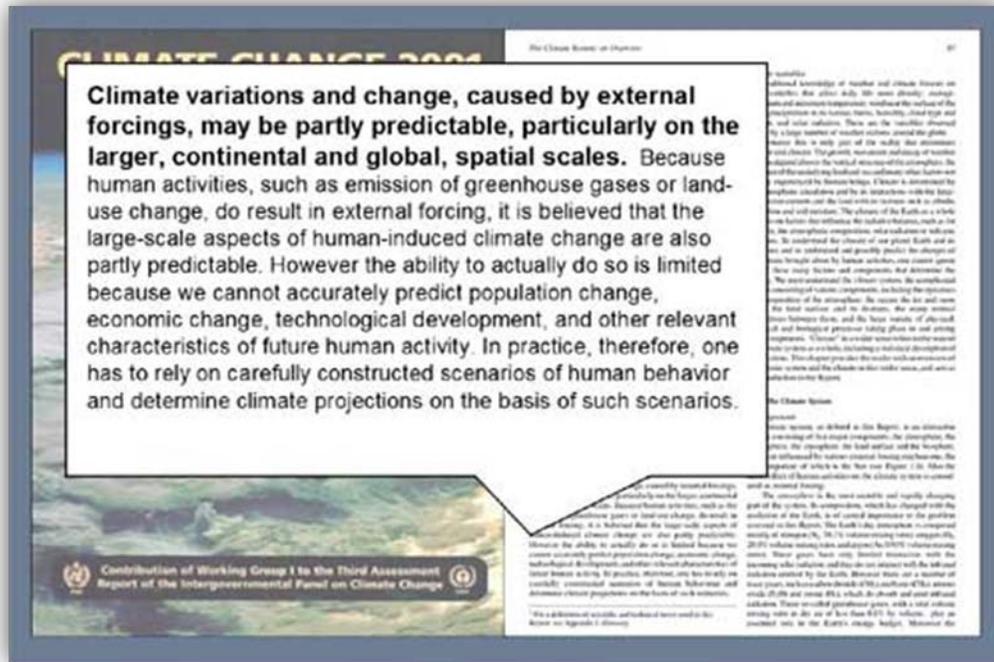
To answer this, we must turn to the UN body known as the Intergovernmental Panel on Climate Change. The IPCC, the gold standard in climate science.

In the last ten years, the IPCC has published book after book. And I believe I may be the only person who has read them. I say that because if any journalist were to read these volumes with any care they would come away with the most extreme unease---and not in the way the texts intend.

The most recent volume is the Third Assessment Report, from 2001. It contains the most up-to-date views of scientists in the field. Let's see what the text says. I will be reading aloud.

Sorry, but these books are written in academic-ese. They are hard to decipher, but we will do that.

Starting with the first section, The Climate System: An Overview, we turn to the first page of text, and on the third paragraph read:



Climate variations and change, caused by external forcings, may be partly predictable, particularly on the larger, continental and global, spatial scales. Because human activities, such as the emission of greenhouse gases or land-use change, do result in external forcing, it is believed that the large-scale aspects of human-induced climate change are also partly predictable. However the ability to actually do so is limited because we cannot accurately predict population change, economic change, technological development, and other relevant characteristics of future human activity. In practice, therefore, one has to rely on carefully constructed scenarios of human behaviour and determine climate projections on the basis of such scenarios.

Take these sentence by sentence, and translate into plain English. Starting with the first sentence. It's really just saying:

Climate may be partly predictable.

Second sentence means:

We believe human-induced climate change is predictable.

Third sentence means:

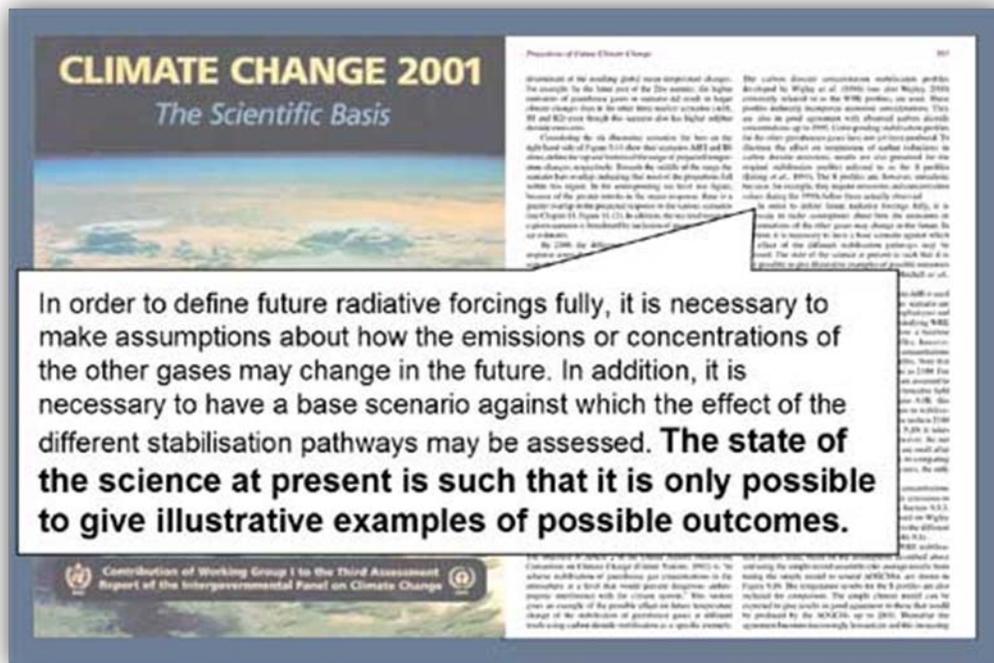
But we can't predict human behavior.

Fourth sentence:

Therefore we rely on "scenarios."

The logic here is difficult to follow. What does "may be partly predictable" mean? Is it like a little bit pregnant? We see in two sentences we go from may be predictable to is predictable. And then, if we can't make accurate predictions about population and development and technology... how can you make a carefully-constructed scenario? What does "carefully-constructed" mean if you can't make accurate predictions about population and economic and other factors that are essential to the scenario?

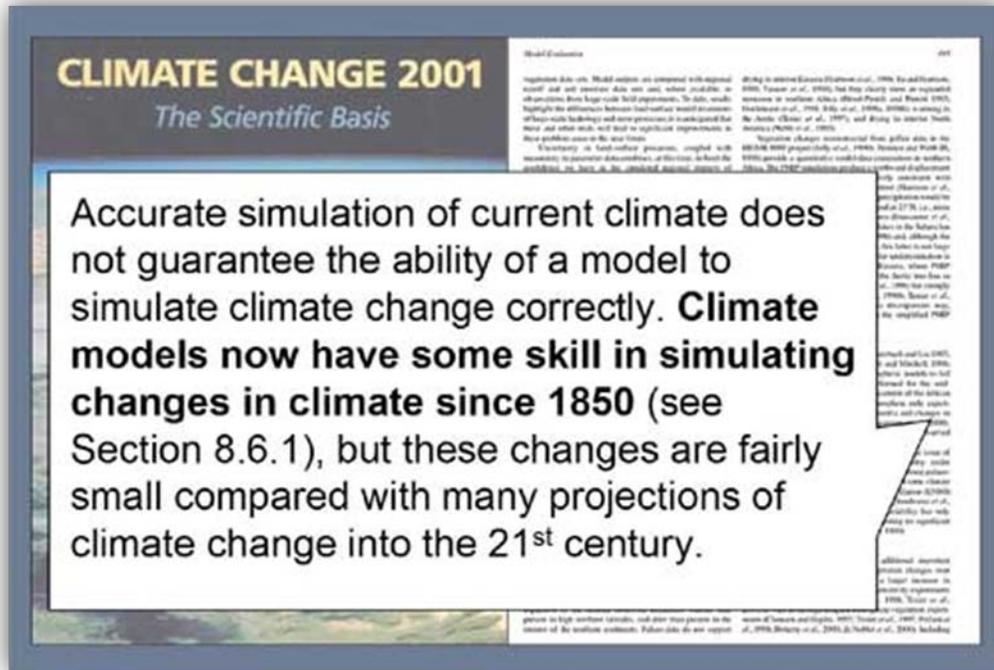
The flow of illogic is stunning. Am I are making too much of this? Let's look at another quote:



"The state of science at present is such that it is only possible to give illustrative examples of possible outcomes."

Illustrative examples. The estimates for even partial US compliance with Kyoto---a reduction of 3% below 1990 levels, not the required 7%---has been predicted to cost almost 300 billion dollars a year. Year after year. We can afford it. But if we are going to spend trillions of dollars, I would like to base that decision on something more substantial than "illustrative examples."

Let's look at another quote.



My concerns deepen when I read "**Climate models now have some skill in simulating changes in climate since 1850...**" SOME SKILL? This is not skill in predicting the future. This is skill in reproducing the past. It doesn't sound like these models really perform very well. It would be natural to ask how they are tested.

NEXT QUOTE

While we do not consider that the complexity of a climate model makes it impossible to ever prove such a model "false" in any absolute sense, it does make the task of evaluation extremely difficult and leaves room for a subjective component in any assessment.

Now, the term "subjective" ought to set off alarm bells in every person here. Science, by definition, is not subjective. I will point out to you that this is precisely the kind of issue that has Americans furious about the EPA. We know you can't let a drug company manufacture a drug and also test it--that's unreliable, and everybody knows it. So why in this high stakes climate issue do we allow the same person who makes a climate model to test it?

The flaws in this process are well known. James Madison, our fourth President:

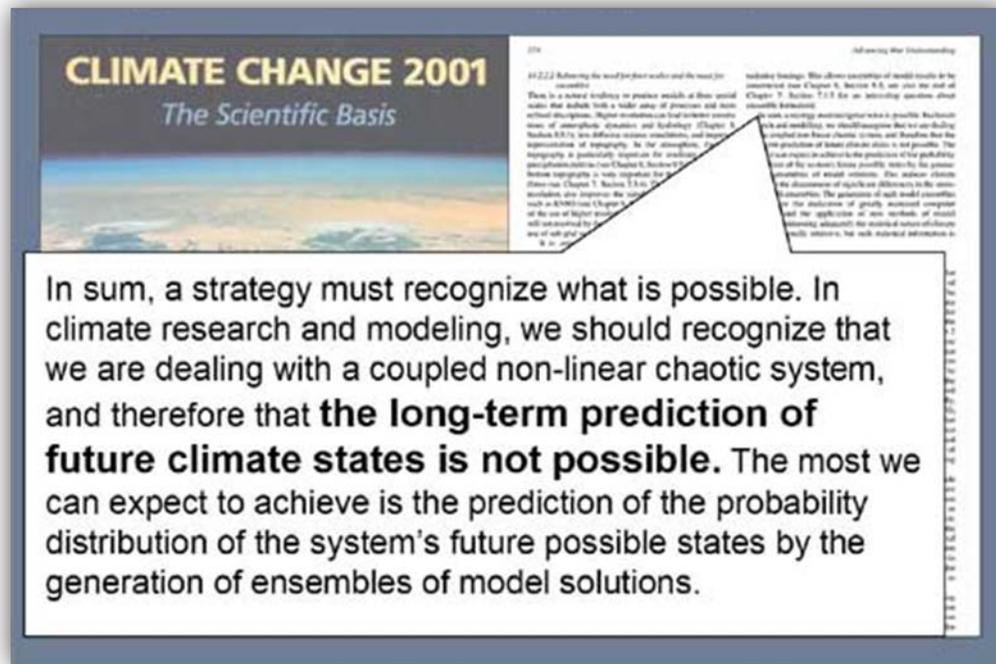
No man is allowed to be judge in his own cause, because his interest would certainly bias his judgment, and not improbably, corrupt his integrity.

Madison is right.

Climate science needs some verification by outsiders.

NEXT QUOTE

Again, am I making too much of all this? It turns out I am not. Late in the text, we read:



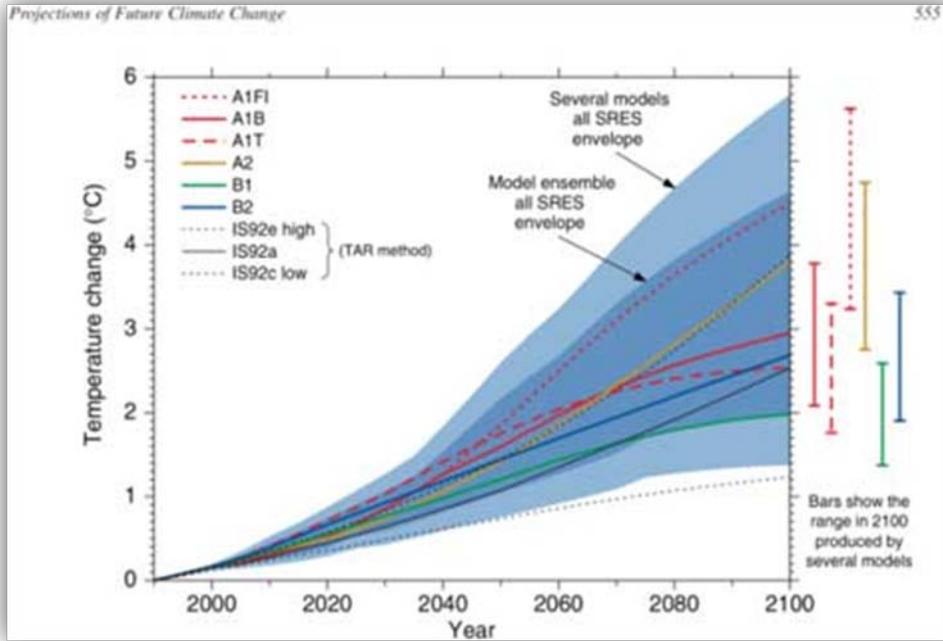
"The long term prediction of future climate states is not possible."

Surely it should lead us to close the book at this point. If the system is non-linear and chaotic — and it is — then it can't be predicted, and if it can't be predicted, what are we doing here? Why are we worrying about the year 2100?

All right, you may be saying. Perhaps this is the state of climate science, as the IPCC itself tell us. Nevertheless we read every day about the dire consequences of global warming. What if I am wrong? What if a major temperature rise is really going to happen? Shouldn't we act now and be safe? Don't we have a responsibility to unborn generations to do so?

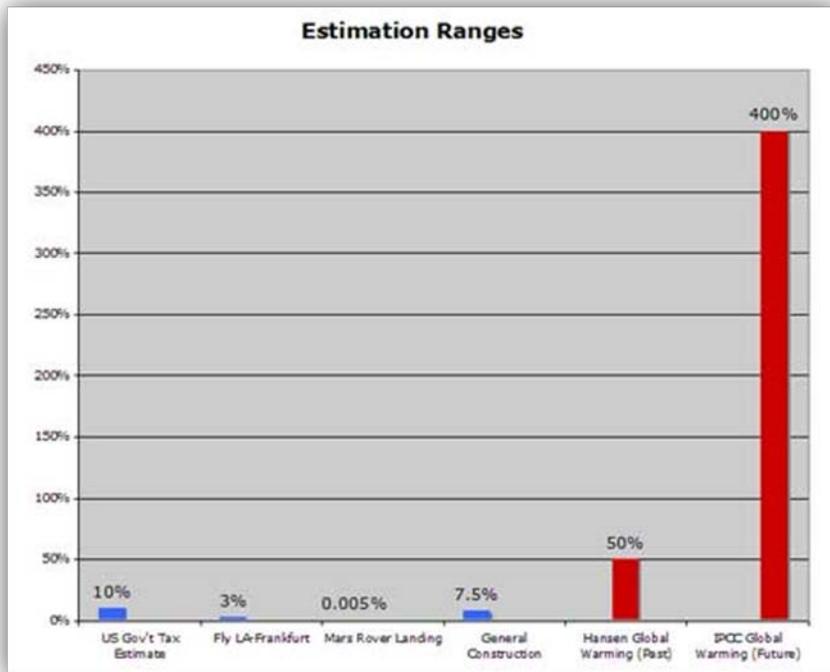
NEXT CHART –

Act Now or Later?



Here is again the IPCC chart of predictions for 2100. As you see, they range from a low of 1.5 degrees to a high of 6 degrees. That is a 400% variation. It's fine in academic research. Now let's transfer this to the real world.

In the real world, a 400% uncertainty is so great that nobody acts on it. Ever.



If you planned to build a house and the builder said, it will cost somewhere between a million and a half and six million dollars, would you proceed? Of course not, you'd get a new builder. If you told your boss you were going on vacation and would be gone somewhere between 15 and 60 days, would he accept that? No, he'd say tell me exactly what day you will be back. Real world estimation has to be much, much better than 400%.

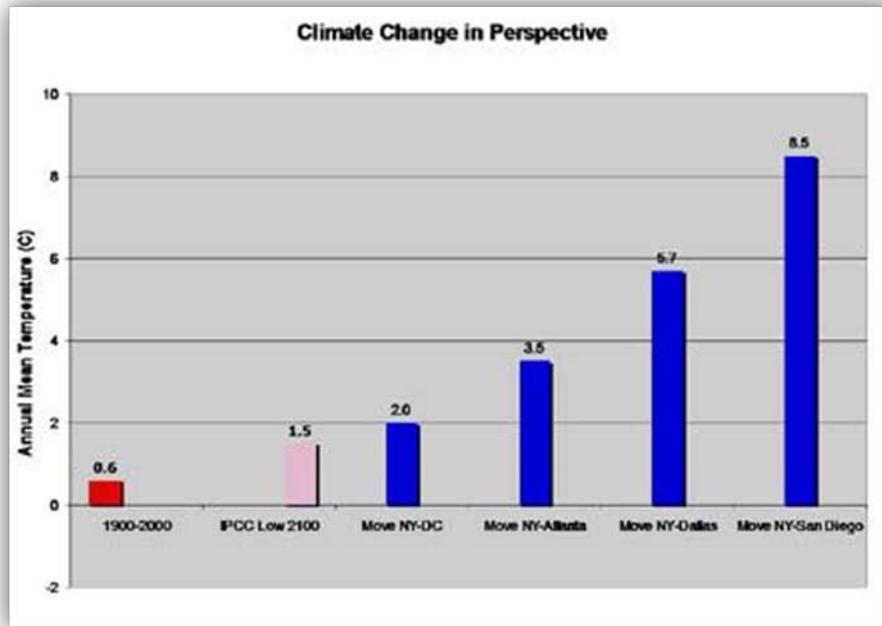
When all is said and done, Kyoto is a giant global construction project. In the real world nobody builds with that much uncertainty.

Next, we must face facts about the present. If warming is a problem, we have no good technological solutions at this point. Everybody talks wind farms, but people hate them. They're ugly and noisy and change the weather and chop birds and bats to pieces, and they are fought everywhere they are proposed. Here is the wind farm at Cape Cod, which has aroused everyone who lives there, including lots of environmentalists who are embarrassed but still...they don't want them. Who can blame them? A very large anti-wind faction has grown up in England, partly because the government are trying to put farms in the Lake District and other scenic areas.

But whether we like the technology or not, do we really have the capability to meet the Kyoto Protocols? Reporting in Science magazine, a blue-ribbon group of scientists concluded that we do not:



So, if we don't have good technology perhaps we should wait. And there are other reasons to wait. If in fact we are facing a really expensive construction job, we can afford it better later on. We will be richer. This is a 400 year trend.



Finally, I think it is important to recognize that we can adapt to the temperature changes that are being discussed. We are told that catastrophe will befall if we increase global temperature 2 degrees. But that is the difference in average temperature between New York and Washington DC. I don't think most New Yorkers think a move to Washington is balmy. Similarly, a move to San Diego is an increase of 9 degrees.

Of course this is not a fair comparison, because a local change is not the same as a global change. But it ought at least to alert you to the possibility that perhaps things are not as dire as we are being told. And were told thirty years ago, about the ice age.

Last, I want you to think about what it means to say that we are going to act now to address something 100 years from now. People say this with confidence; we hear that the people of the future will condemn us if we don't act. But is that true?

We're at the start of the 21st century, looking ahead. We're just like someone in 1900, thinking about the year 2000. Could someone in 1900 have helped us?

Here is Teddy Roosevelt, a major environmental figure from 1900. These are some of the words that he does not know the meaning of:

- | | | | |
|-------------------|------------|------------------|---------------|
| airport | zipper | gene | ecosystem |
| antibiotic | nylon | proton | jumpsuits |
| antibody | radio | neutron | fingerprints |
| antenna | television | atomic structure | step aerobics |
| computer | robot | quark | 12-step |
| continental drift | video | atomic bomb | jet stream |
| tectonic plates | virus | nuclear energy | shell shock |

shock wave
radio wave
microwave
tidal wave
tsunami
IUD
DVD
MP3
MRI
HIV
SUV
VHS
VAT

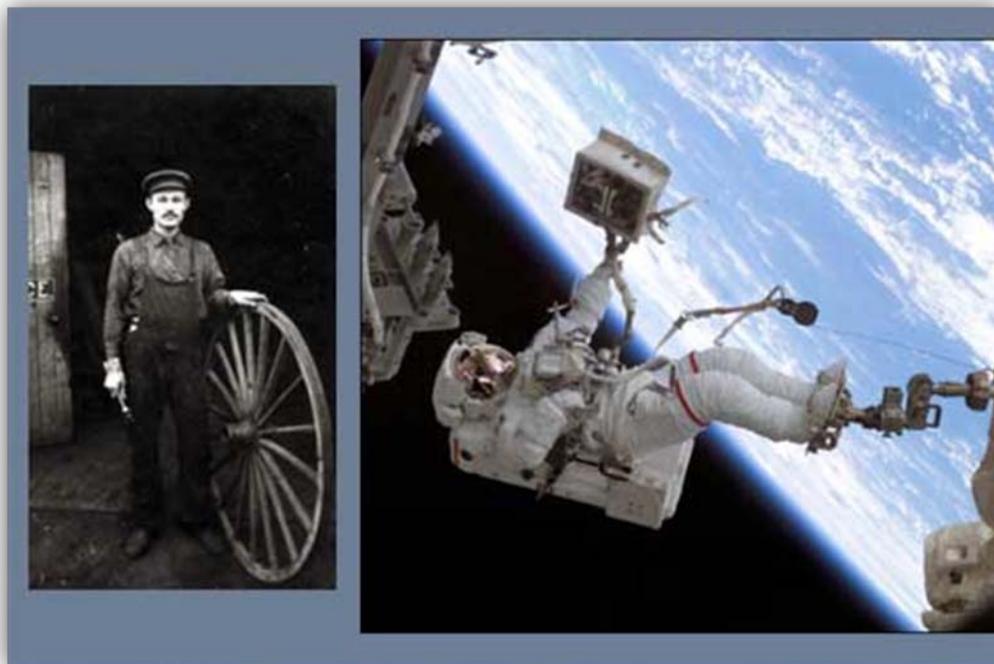
whiplash
wind tunnel
carpal tunnel
fiber optics
direct dialing
dish antennas
gorilla
corneal
transplant
liver transplant
heart transplant
liposuction
transduction

maser
taser
laser
acrylic
penicillin
Internet
interferon
nylon
rayon
leisure suit
leotard
lap dancing
laparoscopy

arthroscopy
gene therapy
bipolar
moonwalk
spot welding
heat-seeking
Prozac
sunscreen
urban legends
rollover minutes

Given all those changes, is there anything Teddy could have done in 1900 to help us? And aren't we in his position right now, with regard to 2100?

Think how incredibly the world has changed in 100 years. It will change vastly more in the next century. A hundred years ago there were no airplanes and almost no cars. Do you really believe that 100 years from now we will still be burning fossil fuels and driving around in cars and airplanes?



The idea of spending trillions on the future is only sensible if you totally lack any historical sense, and any imagination about the future.

If we should not spend our money on Kyoto, what should we do instead? I will argue three points.

First, we need to establish 21st century policy mechanisms. I want to return to those pages from the IPCC. The fact is if we required the same standard of information from climate scientists that we do from drug companies, the whole debate on global warming would be long over. We wouldn't be talking about it. We need mechanisms to insure a much, much higher standard of reliability in information in the future.

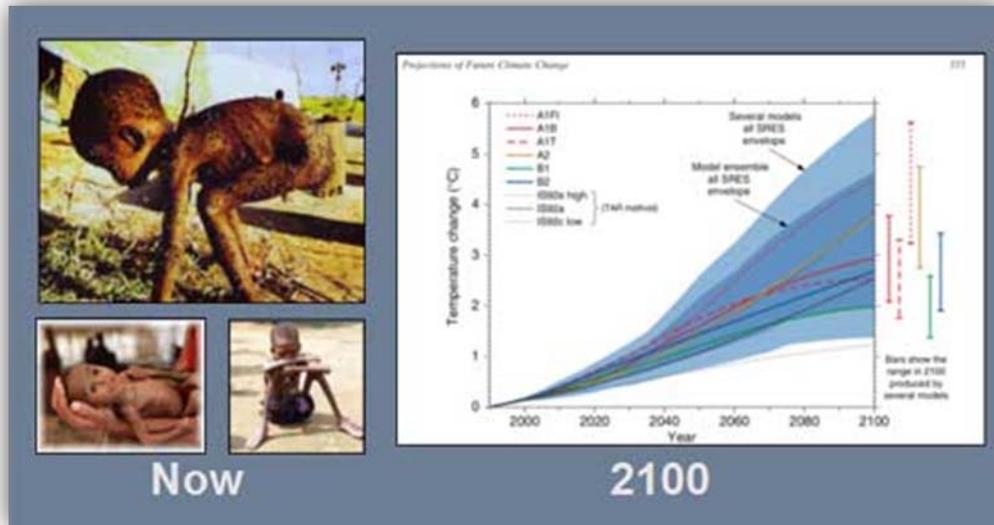
Second, we need to deal correctly with complexity of non-linear systems. The environment is a complex system, a term that has a specific meaning in science. Beyond being complicated, it means that interacting parts that modify each other have the capacity to change the output of the system in unexpected ways. This fact has several ramifications.

The first is that the old notion of the balance of nature is thoroughly discredited. There is no balance of nature. To think so is to share an agreeable fantasy with the ancient Greeks. But it is also a shocking change for us, and we resist it. Some now talk of "balance in nature," as a way to keep the old idea alive. Some claim there are multiple equilibrium states, but this is just a way of pretending that the balance can be attained in different ways. It is a misstatement of the truth. The natural system of inherently chaotic, major disruption is the rule not the exception, and if we are to manage the system we are going to have to be actively involved.

This represents a revision of the role of mankind in nature, and a revision of the perception of nature as something untouched. We now know that nature has never been untouched. The first white visitors to the New World didn't understand what they were looking at. In California, Indians burned old growth forest with such regularity that there is more old growth today than there was in 1850. Yellowstone was a beauty spot precisely because the Indians hunted the elk and moose to the edge of extinction. When they were prevented from hunting in their traditional grounds, Yellowstone began its complex decline.

We now have research to help us formulate strategies for management of complex systems. But I am not sure we have organizations capable of making these changes. I would also remind you that to properly manage what we call wilderness is going to be stupefyingly expensive. Good wilderness is expensive!

Finally, and most important — we can't predict the future, but we can know the present. In the time we have been talking, 2,000 people have died in the third world. A child is orphaned by AIDS every 7 seconds. Fifty people die of waterborne disease every minute. This does not have to happen. We allow it.



What is wrong with us that we ignore this human misery and focus on events a hundred years from now? What must we do to awaken this phenomenally rich, spoiled and self-centered society to the issues of the wider world? The global crisis is not 100 years from now — it is right now. We should be addressing it. But we are not. Instead, we cling to the reactionary and antihuman doctrines of outdated environmentalism and turn our backs to the cries of the dying and the starving and the diseased of our shared world.

And if we are going to remain too self-involved to care about the third world, can we at least care about our own? We live in a country where 40% of high school graduates are functionally illiterate. Where schoolchildren pass through metal detectors on the way to class. Where one child in four says they have seen a murdered person. Where millions of our fellow citizens have no health care, no decent education, no prospects for the future. If we really have trillions of dollars to spend, let us spend it on our fellow human beings. And let us spend it now. And not on our impossible fantasies of what may happen one hundred years from now.

Thank you very much.



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