

# 21<sup>st</sup> CENTURY SCIENCE & TECHNOLOGY

S P E C I A L R E P O R T

## The Coming Ice Age

*Why Global Warming  
Is a Scientific Fraud*

November 1997



# The Coming Ice Age

*Why Global Warming  
Is a Scientific Fraud*

## Why This Report?

The title of this report conveys the major scientific evidence missing from discussions of global warming: The Earth is moving out of a milder, interglacial period and into a period of glacial advance. Until the mid-1970s, it was assumed that the long-term astronomical cycles—those measured in tens or hundreds of thousands of years—were climate drivers. But then ideology replaced climate science, launching the virtual reality world of computer-modelled global warming. The scientific articles collected here provide an overall perspective in which to view the claims of the global warming promoters. The report also gives readers a brief account of why the Malthusians behind this fraud have targetted the United States, and its industrial capability, for destruction.

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November 1997  
\$100

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# The Coming Ice Age

## *Why Global Warming Is a Scientific Fraud*

21<sup>st</sup> CENTURY  
SCIENCE & TECHNOLOGY

SPECIAL REPORT

November 1997

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## FOREWORD

# Time to Say 'No'

by Lyndon H. LaRouche, Jr.

**A**s this Special Report goes into production, George Soros's operations are reported as having lost an amount in excess of 2 billion U.S. dollars equivalent, much of this in the last two weeks' unsuccessful efforts to break the Hong Kong economy as the same forces had successfully looted Thailand and other Asian economies earlier. Nonetheless, the piratical speculative assault on Japan, Korea, and China continues, with the London financial center calling new forces from Sweden and other parts of Europe, for the next round of assaults. Thus does London continue to saw at the branch upon which it sits.

No matter what else may occur, by the close of the present century, plus or minus a year or two, the international financial system, as we have known it during the most recent decades, will have ceased to exist. Either a concert of governments will act to put the present system out of its misery, by declaring it bankrupt and putting its institutions into receivership, or, if governments lack the nerve to do so, then the system will self-destruct, leaving global chaos behind.

The point I am making, is that what have become, until now, the "mainstream" trends in policy-making, during the course of the recent 30 years, are now facing an abrupt end. Most of these trends will end automatically, through the unstoppable collapse of the institutions associated with them. Others, unfortunately, might outlive the inevitably doomed present international financial system. However, at the worst, the time is either here, or fast approaching, when it may be possible to summon sufficient popular support to bring certain malicious, dangerous hoaxes of the recent decades to an end.

Among those trends which must be ended, is a series of frauds, beginning with Rachel Carson's *Silent Spring* hoax against the safest insecticide since the invention of birds, DDT. Since then, the virtual banning of DDT has killed countless human beings through the pests whose menace to humanity had been virtually ended with DDT. Since then, the rate of human sickness and even death through tainted food, has been escalating as a result of another hoax, the anti-scientific charge, that chlorofluorocarbons are the cause for man-made depletion of the so-called ozone layer. Now, the same hoaxsters are deployed by Britain's Prime Minister Tony Blair and his European allies from behind Alice's Looking-Glass, in demanding an accelerated increase in misery, sickness, and death-rates, through a "Global Warming" hoax.

There are three leading issues among those which should impel us to rid our planet of these anti-scientific hoaxes put forward in the name of "ecology."

# to World Government

## **(1) The Issue of National Sovereignty**

The chaotic state of economic and monetary affairs being unleashed by the present global financial crisis, is creating a situation in which either sovereign nations return to significant degrees of economic protectionism, or the entire planet will collapse into a ruinous state of chaos worse than anything imagined during this century to date.

Under these conditions, it is necessary to bring to an end, and to reverse trends toward imposing self-enforcing, supra-national rule over the internal affairs of national economies. Most of the so-called "population" and "ecology" regulations already in place should be repealed, and, certainly, no new such regulations ought to be tolerated.

## **(2) The Issue of National Economy**

There has been no net physical-economic growth in the U.S. economy, since the 1970-1972 interval of breakdown of the replacement of the old Bretton Woods agreements by the increasingly chaotic and corrosive effects of maintaining a "floating exchange-rate system." Measured in physical content of market-baskets, including maintenance of infrastructure and productive capital, per capita of labor-force, the U.S. economy's productivity has collapsed by about half during the recent three decades.

The reported growth of employment in the U.S. economy, is in forms of administrative and unskilled services, while the percentile of the employed labor-force in production occupations has collapsed catastrophically. Otherwise, the alleged growth of the economy is a mixture of fraud and self-deception cloaked in a mushroom-cloud of purely parasitical financial speculation.

Without both a massive infusion of such elements of infrastructure as water-management, modern mass transit, massive expansion of power production, and renewal and modernization of urban infrastructure and productive capital, the physical economy of leading and other nations will spiral into an early state of general collapse. Without purging the system of ground-

less, irrational restrictions imposed in the abused name of "ecology," it is human beings who become the world's leading endangered species.

## **(3) The Issue of Technology**

If we measure market-baskets of incomes of households, infrastructure-maintenance, agriculture, and manufacturing in terms of "energy of the system" standards, per capita of labor-force, the productivity of the U.S. economy has been declining during the recent quarter of a century, a collapse which is becoming nearly irreversible during any future medium-term period. This danger to the human species can not be resisted effectively without introducing high rates of technological attrition. This will require us to apply the intensity of credit and other investment incentives to scientific and technological progress in peace-time production of power, mass-transit, and goods, which we have pushed previously only as a part of national-defense mobilization.

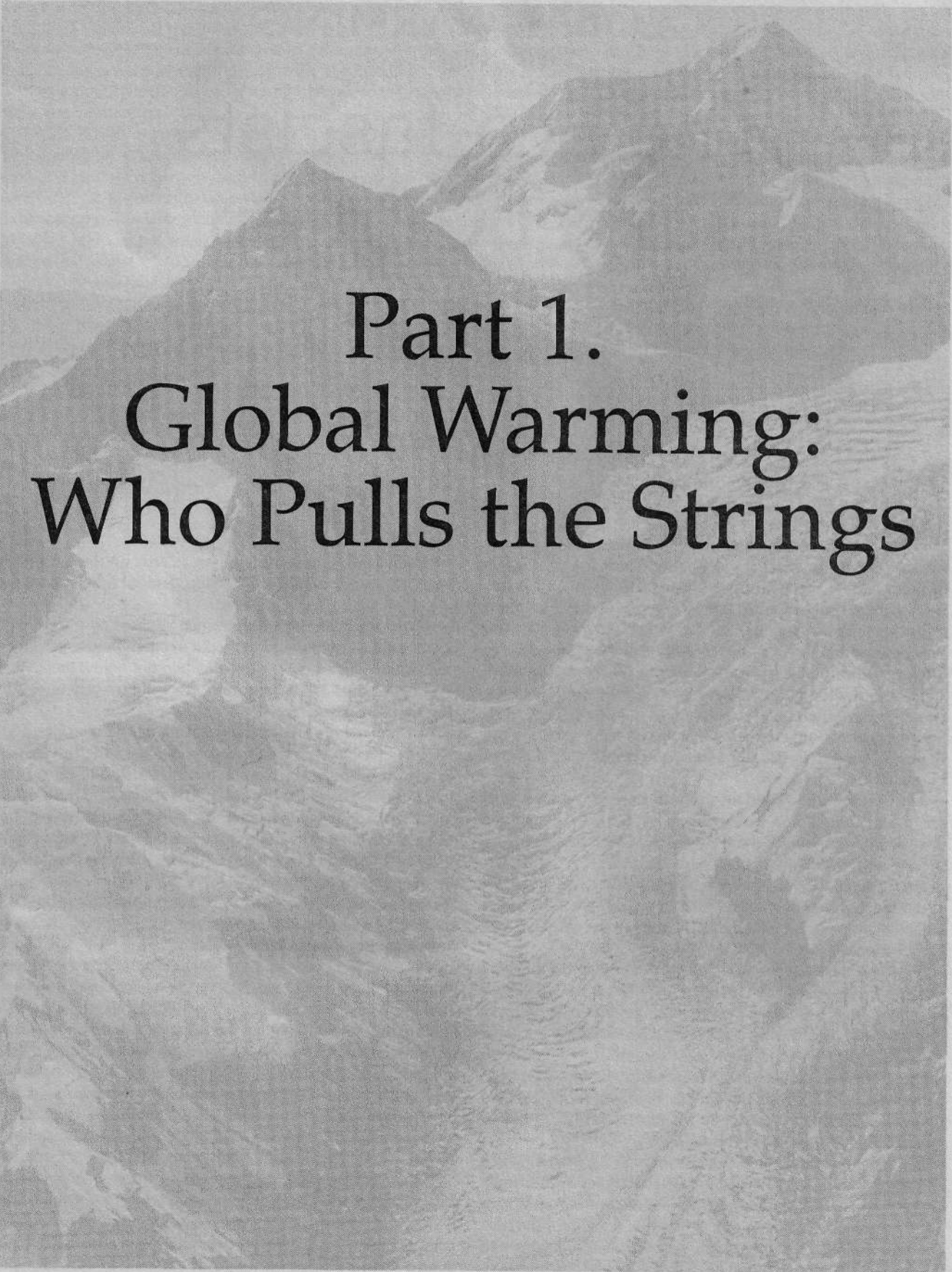
We must remove unnecessary bureaucratic and related obstacles to such greatly increased emphasis upon investment in scientific and technological progress.

For these three and other implicit reasons, the time has come, for rational people to join forces, in reexamining the so-called "ecology issue." It is time to bring reason back into policy-making of government, and to purge the system of the kinds of anti-scientific hoaxes which should never have been tolerated in the first place.

Thus, the time has come for a fresh examination of some of the worst of the hoaxes which have been made virtual articles of religious blind faith among the "ecology lobby" set. Let us return to the proven methods for "cleaning up the environment," deploying the technologies needed to do the job.

*Economist Lyndon H. LaRouche, Jr. is a Contributing Editor of the Executive Intelligence Review, and a member of the Scientific Advisory Board of 21st Century Science & Technology magazine.*





Part 1.  
Global Warming:  
Who Pulls the Strings



# GLOBAL WARMING: The Eco-fascists Target Clinton

by Jeffrey Steinberg

In the Oct. 25-26 London *Financial Times*, staff writer and rabid environmentalist Joe Rogaly penned a vicious attack against the Clinton administration, for the President's refusal to dismantle the U.S. economy, by caving in to eco-fascist hoaxes, like global warming. Although the President, in his Oct. 22 speech at the National Geographic Society announcing his policy for the December climate summit in Kyoto, Japan, unfortunately gave credence to the hoax, he nevertheless refused to adopt the draconian greenhouse gas emissions standards that are being peddled by the Blair government in Britain, and by the rest of the European Union (EU).

As a result of the President's refusal to read from a British script, the anti-Clinton venom came bubbling to the surface once again, from Buckingham Palace to 10 Downing Street.

"It is a pity," Rogaly sneered, "that the U.S. is not a member of the Commonwealth. If it were, the 54-nation association . . . could suspend or even expel it. That would teach Washington a lesson. It might then take serious action to curb emissions of greenhouse gases."

From the day that the Blair government was installed by Britain's Privy Council at 10 Downing Street, it has mobilized to bully the United States into accepting emissions cutbacks that would decimate what is left of the U.S. industrial base.

At the June 1997 Group of Eight summit in Denver, Colorado, Blair, French President Jacques Chirac, and even a so-called U.S. ally, German Chancellor Helmut Kohl, all ganged up against President Clinton for his refusal to bow to Blair's greenhouse gas emissions proposals.

In a speech at the United Nations on June 23, Blair attacked Clinton, charging: "At Kyoto, industrialized countries must agree to legally binding targets for significant reductions in greenhouse gas emissions during the first decade of the next century. The biggest responsibility falls on those countries with the biggest emissions," Blair said, in a blunt reference to the

United States.

"We in Europe have now put our cards on the table. It is time for the special pleading to stop, and for others to follow suit," Blair said.

Blair spelled out his position, since adopted by the EU. The EU, he said, is committed to "reducing greenhouse gas emissions in developed countries to 15 percent below their 1990 level by the year 2010. In Britain, we will be ready to go further, to a 20 percent target."

Blair praised his predecessor, Margaret Thatcher, for peddling the global warming fraud: "I attacked the last British government for many things, but they did deliver on the greenhouse gas emissions targets set at Rio. Some other countries cannot say the same, including some of the industrialized nations. I say that our targets will not be taken seriously by the poorer countries until we, the richer countries, are meeting them."

On the same day that Blair delivered his remarks, which the London *Guardian* described as a "thinly disguised attack on America," Blair's attack dog, Foreign Secretary Robin Cook, also lambasted Clinton and the United States, in an address to the world government body. "At the moment," Cook was quoted by the *Daily Telegraph*, "the biggest single problem is that the American public has not yet grasped, that if it continues with its present lifestyle, then it is going to make it impossible for its children or grandchildren to enjoy the kind of environment, and therefore the kind of lifestyle that the Americans have today."

## That Deadly Virus, Prince Philip

Blair and Cook are singing a royal tune, written by the royal consort and chief operations officer of the Club of the Isles, Prince Philip. It was Philip and his "ex" Nazi cohort, Prince Bernhard of the Netherlands, who launched the World Wildlife Fund (WWF) in the early 1960s, to spread

the genocidal pagan dogma of "environmentalism," that is, the polite version of eugenics and radical Malthusianism. Philip is notorious for his 1988 boast to a German journalist, that, "In the event that I am reincarnated, I would like to return as a deadly virus, in order to contribute something to solve overpopulation."

Prince Philip despises the United States. On May 18, 1990, while in Washington to attend a conference on religion and ecology, co-sponsored by the WWF and the North American Congress on Religion and Ecology, he called for the breakup of the United States into scores of "bio-regions," to be led by local pagan religious sects, which he finds to be far more "realistic" than the revealed religions—that is, Christianity and Judaism.

And, at a Washington, D.C., press conference on Oct. 29—right after the Clinton global warming announcement—Prince Philip's WWF released its detailed blueprint for the

breakup of the United States. The 680-page report, "North America Conservation Assessment," according to its accompanying press release, calls for the division of the United States and Canada into 116 semi-autonomous eco-regions, crossing state and national borders. WWF is pouring \$10 million into the effort.

Prince Philip's WWF minions, in dozens of well-heeled U.S.-based radical ecology sects, have joined the Blair-Cook chorus, targeting the United States, to create the appearance of "domestic" opposition to the President's position. Given the ferocity of the House of Windsor-led attacks, the President would do well to speak the truth: There is no global warming, so people attending the Kyoto conference ought to have a nice sushi dinner, and go home.

*This article is adapted from The New Federalist newspaper, Nov. 10, 1997. Jeffrey Steinberg is the Counterintelligence Director for Executive Intelligence Review magazine.*

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# Eco-fascism: A Royal Virus

by Jeffrey Steinberg

**T**oday, as the result of a 35-year effort, personally led by Prince Philip and his Dutch counterpart, Prince Bernhard, a worldwide eco-fascist structure is already well-entrenched throughout the globe, particularly within the British Commonwealth, and in the United Nations, the World Bank, and the International Monetary Fund bureaucracies, whose stated purpose is to carry out levels of population genocide that would make Adolf Hitler's crimes pale by comparison.

*Executive Intelligence Review* first documented the role of Prince Philip as the "new Hitler" in "The Coming Fall of the House of Windsor," on Oct. 28, 1994. Since then, *EIR* has published a series of in-depth stories, detailing aspects of the global eco-fascist apparatus and its links to the London-headquartered Club of the Isles financial oligarchy. This report is intended to update the story, and to situate the recent public launching of a series of flagrantly pro-genocide organizations in Canada, the United States, and Britain, that are flooding the Internet with propaganda advocating the elimination of 80% of the human race over the next one to two generations.

It is no exaggeration that the Prince Philip- and Prince Bern-

hard-led worldwide ecology movement is devoted to mass genocide—not to saving dolphins and defenseless furry creatures. Take the British Royal Consort at his own words.

In August 1988, in an interview with Deutsche Presse-Agentur, Prince Philip stated: "In the event that I am reincarnated, I would like to return as a deadly virus, in order to contribute something to solve overpopulation." Earlier, in the foreword to his 1986 book *If I Were an Animal*, Prince Philip wrote: "I just wonder what it would be like to be reincarnated as an animal whose species had been so reduced in numbers that it was in danger of extinction. What would be its feelings toward the human species whose population explosion had denied it somewhere to exist. . . . I must confess that I am tempted to ask for reincarnation as a particularly deadly virus."

While there is no evidence that Prince Philip has yet been reincarnated thusly, there is ample evidence that the British Royal Consort and de facto chief operations officer of the London-centered Club of the Isles, has devoted the last 36 years of his life to death and destruction, beginning with his 1961 founding of the World Wildlife Fund (WWF), now known as the World Wide Fund for Nature.

Prince Philip's principal collaborators in launching the WWF as a funding and worldwide operations arm of the International Union for the Conservation of Nature, were Sir Julian Huxley and Max Nicholson, both ardent advocates of eugenics and racial purification. In fact, Huxley was president of the Eugenics Society when he co-founded the WWF. First, as head of the United Nations Educational, Social and Cultural Organization (Unesco), and later as a WWF founder, Huxley preached the need to revive race science and the urgent mission of "culling the human herd"—particularly of the darker-skinned races of Africa and South America. In the founding document of Unesco, Huxley had frankly acknowledged the difficulties he would encounter in reviving eugenics, in light of the Nazi genocide. "Even though it is quite true that any radical eugenic policy will be for many years politically and psychologically impossible," he wrote, "it will be important for Unesco to see that the . . . public mind is informed of the issues at stake so that much that now is unthinkable may at least become thinkable."

The method Huxley and others devised for forcing people to "think the unthinkable," was to replace the idea of eugenics with the idea of environmentalism. Huxley, Prince Philip, and the others, however, understood that, in their way of thinking, the two terms were interchangeable. During a 1960 tour of Africa, on the eve of the launching of the WWF, Huxley openly boasted that the ecology movement would be the principal weapon used by the British oligarchy to impose a Malthusian world order over the dead body of the nation-state system, and, most importantly, the United States.

It is no coincidence, in the context of Huxley's remarks, that the man who helped found the Canadian branch of Prince Philip's WWF, Maj. Louis Mortimer Bloomfield, would be implicated by New Orleans District Attorney Jim Garrison in the assassination of President John F. Kennedy. Bloomfield, the wartime liaison of the British Special Operations Executive (SOE) to FBI Director J. Edgar Hoover, ran the Montreal-based Permindex Corporation, the entity identified in the Garrison investigation as the hands-on controller of the Kennedy assassination plot.

#### **The 1001 Club and Other Eco-fascist Fronts**

To further spread the work of the WWF, in 1970, Prince Philip teamed up with a former SS officer, Prince Bernhard of the Netherlands, already a prominent player in the WWF, to create a permanent funding mechanism for the growing number of ecology fronts being spawned, to scoop up the dregs of the late-1960s counterculture, and deploy them as the storm-troopers of the new "green" fascism.

The 1001: A Nature Trust, known among its members as the "1001 Club," was created as an adjunct to Prince Bernhard's well-known Bilderberg Group, the Cold War-era secret society of leading North American and European oligarchical insiders—1,001 close personal associates of Prince Bernhard and Prince Philip were "invited" to join the 1001 Club at an initial fee of \$10,000 per person. The bulk of the members were drawn from the boards of directors of the leading Club of the Isles raw materials cartels, banks, insurance companies, and family trusts (the *fondi*). Typical of this caste were John Loudon, former CEO of Royal Dutch Shell and chairman of Shell Oil Co., who served from 1977 until his death as president of the

WWF; Maurice Strong, head of the Canada-based Power Corporation, and one of the most important of the WWF operators; Baron Aubrey Buxton of Alsa, of Barclays Bank; Bertold Beitz, director of Alfred Krupp von Bohlen and Halbach Foundation; Conrad Black, chairman of Britain's leading media cartel, the Hollinger Corporation; Peter Cadbury, of the George Cadbury Trust; Anton Rupert, of the South African Rembrandt tobacco interests; Sir Kenneth Kleinwort, owner of Kleinwort Benson, one of Britain's oldest investment banks; and Henry Keswick, chairman of Jardine Matheson and brother of John Keswick, the chairman of Hambros Bank and a director of the Bank of England.

Maj. Louis Mortimer Bloomfield was a 1001 Club charter member, as were a number of notorious scoundrels, including swindler-bankers Robert Vesco and Edmond Safra.

By the time Princes Philip and Bernhard had assembled the \$10 million war-chest, the first of the leading eco-fascist front groups and think-tanks had already been launched. In 1969, a Sierra Club official, David Ross Brower, founded Friends of the Earth, which, several years later, would help spawn such overtly terrorist groups as Greenpeace and Earth First!. The same year, WWF Chairman Sir Peter Scott launched Survival International, originally known as the Primitive Peoples Fund, which, three years later, spawned Cultural Survival.

In 1968, Aurelio Peccei, a former executive of Fiat (Fiat President Gianni Agnelli was a charter member of the 1001 Club), founded the Club of Rome, another by-invitation-only organization, to peddle a new, computer-age brand of Malthusianism. In 1970, with a grant from the Volkswagen Foundation, Peccei hired Massachusetts Institute of Technology computer whiz-kid Jay Forrester, and a team of his students, to prepare a report on the world population crisis, which was published several years later under the title *Limits to Growth*. Using a fraudulent concept of "carrying capacity" that completely ruled out human scientific discovery, Forrester and his students, Dennis and Donella Meadows, claimed that a combination of overpopulation and resource depletion would wreck the planet. The Club of Rome became not only a leading "establishment" lobby for every wacky environmental hoax; it launched the zero population growth movement, which has now devolved into a demand for drastic world population reduction—i.e., genocide.

During the same build-up phase, Ford Foundation President McGeorge Bundy launched a joint project with the Soviet government, the International Institute for Applied Systems Analysis (IIASA), headquartered in Laxenburg, Austria, to begin the process of peddling the radical ecology, zero-growth mania into the Warsaw Pact. By the time that Mikhail Gorbachov came to power in the Kremlin in 1985, a whole segment of the Soviet nomenklatura had turned from "red" to "green."

#### **Kissinger's NSSM-200**

With the drug-rock-sex countercultural "paradigm shift" under way, in the early 1970s Prince Philip's minions launched a string of publicity stunts to accelerate the recruitment to their top-down irrationalist movement. In 1970, Maurice Strong sponsored Earth Day, to place a spotlight on the WWF agenda. In 1972, in Stockholm, Strong organized a United Nations conference on the environment, which further accel-





*The environmentalist-terrorist movement, created by the British oligarchy, is well-funded and has extensive international operations capabilities. The Greenpeace fleet, for example, is bigger than the navies of many nations.*

erated the proliferation of unscientific hoaxes. Out of that conference, the UN launched the United Nations Environmental Program (UNEP), whose first director was Strong. In 1974, another UN conference, on population, took place in Bucharest, Romania, in which the same cast of characters, using the Club of Rome's Malthusian propaganda, openly advocated population control.

By this time, Kissinger, the self-confessed agent of the British Crown, was deeply ensconced in both the White House and the State Department, serving simultaneously as national security adviser and secretary of state under Presidents Nixon and Ford. On Dec. 10, 1974, Kissinger wrote National Security Study Memorandum 200 (NSSM-200), "Implications of Worldwide Population Growth for U.S. Security Overseas Interests," in which he singled out 13 nations for drastic population reduction, in order to secure the uninterrupted flow of vital raw materials to the United States and its allies.

In the 23 years since Kissinger inserted Prince Philip's genocidal agenda into the U.S. national security doctrine, the World Wildlife Fund and its extended eco-fascist apparatus has been responsible for unprecedented levels of genocide in Africa, Ibero-America, and other vulnerable spots on the planet.

#### **A New Phase Today**

In EIR's "The Coming Fall of the House of Windsor" report, we exposed the direct hand of the WWF in triggering the out-

break of "tribal" warfare in the Great Lakes region of Central Africa. Nearly three years later, that genocide continues unabated. As you will read in this present report, one of the architects of the mass killing, Ugandan President Yoweri Museveni, is a prominent figure in the WWF apparatus, hob-nobbing with Maurice Strong protégé and current World Bank President, James Wolfensohn, and chairing one of the leading ecology "study projects," 2020 Vision.

As part of the depopulation and chaos fostered by Prince Philip's green legions, has come the biggest raw materials grab in modern history—led by the Club of the Isles cartels. In effect, Prince Philip, his underling Tony Blair, et al. have launched a new British imperial revival, modeled on the eighteenth- and nineteenth-century British East India Company, with its private armies, and its corporate sovereignty over large tracts of land, ripped from the hands of nation-states. Today, relics of the heyday of the British Empire, such as Crown Associates and the Corps of Commissionaires, are directly running the affairs of state for such London puppets as Museveni, and are deploying private armies made up of "former" British SAS officers, now employed by companies such as Executive Outcomes, Defense Systems, Ltd., KAS, KMS, etc. Under the new imperial mandate, the agenda is now explicitly the depopulation of the globe.

*This article is excerpted from EIR, July 18, 1997, " 'Tinny Blair' Blares for Prince Philip's Eco-fascism."*

# Blair Delivers Gaseous Emission At U.N. Summit

*British Prime Minister Tony Blair made the following remarks on June 23 at the United Nations Earth Summit II in New York, on the fifth anniversary of the U.N. Conference on Environment and Cooperation, held in Rio de Janeiro in 1992.*

**T**his is my fifth international meeting in eight weeks in office. My three young children in London say that I'm not enough at home, but I know that this is one summit that they would really want me to be at, because they know that the decisions here will have a profound effect on the world that they inherit. So I speak to you not just as the new British prime minister, but as a father.

Three principles should guide us as we strive to protect the environment for future generations.

First, we must give everyone a stake in the world's environment. That is why the fall in aid flow since 1992 is so worrying, and why my government supports the UN aid targets, and why we are committed to improving further the quality of our assistance, reversing the decline in Britain's development assistance, and refocusing our efforts on combatting poverty. We shall give priority to the poorest countries, including in Africa.

At the Denver summit [of the Group of Seven plus Russia], I committed the U.K. to raising by 50 percent our bilateral support for health, education, and water projects in Africa. And we believe in the objective of halving abject poverty in the world by the year 2015.

Reducing poverty is in our own interests. The poverty of landless and desperate people causes most of the destruction of the rain forest. And it is the reduction of the rain forest, the lungs of the world, that threatens the stability of our own climate.

I hope this week we will agree to start negotiations on a forest convention. It takes less than an hour to fell a tree; it can take a lifetime to replace it. If we are serious about sustainable development, we must show that we are serious about sustainable forestry management.

Britain has long experience of the public and private management of forests. We are keen to share that experience. And today, I can announce that we intend to adopt a new forest standard to provide a benchmark for the regeneration of our forest. It may help provide a model for other countries. So I can

announce that Britain will be increasing our development assistance for forestry management to countries wanting to share our expertise.

There is a liquid more precious than oil—water. Yet while some countries expect running water on tap, too many people in the same world get through the day on what they can carry back from the morning trip to the well. Britain will play its part in developing an action plan to ensure universal access to clean water and sanitation. I hope progress this week will lead to real results at next year's Commission on Sustainable Development.

Five years ago, Mr. President, the Rio summit launched Agenda 21. Since then, in Britain, 70 percent of our local authorities have been inspired to think global, act local through local Agenda 21. But we must do more. I want all local authorities in the United Kingdom to adopt local Agenda 21 strategies by the year 2000.

Perhaps the most worrying problem is climate change. If greenhouse gas emissions continue to rise unabated, by the year 2100, global temperatures will have gone up by 1 to 3.5°C and sea levels risen by, perhaps, as much as a meter. Some small islands are seriously at risk. So, the European Union has proposed the new and challenging target of reducing greenhouse gas emissions in developed countries to 15 percent below their 1990 level by the year 2010. In Britain we will be ready to go further, to a 20 percent target. This target will require significant measures: more efficient use of transport, improved energy conservation, and greater use of renewable sources of energy.

Many of you were at Rio. It was an exciting event. Environmental issues dominated politics and the media. Challenges were laid down, targets set. I attacked the last British government for many things, but they did deliver on the greenhouse gas emission targets set at Rio. Some other countries cannot say the same, including some of the industrialized nations. I say that our targets will not be taken seriously by the poorer countries until we, the richer countries, are meeting them.

To be really effective, we must act globally. At Kyoto [U.N. Climate Control Convention in December], industrialized countries must agree to legally binding targets for significant reductions in greenhouse gas emissions during the first

decade of the next century. The biggest responsibility falls on those countries with the biggest emissions. We in Europe have now put our cards on the table. It is time for the special pleading to stop and for others to follow suit. If we fail at Kyoto, we fail our children, because the consequences will be felt in their lifetime. And we must deliver on all the commitments that we make. Setting new targets means little if old ones are ignored.

At the same time, industrialized countries must work with developing countries to help them combat climate change, biodiversity loss, and other global environmental challenges. We must live up to our side of the bargain and ensure they have the resources to do this. So, the United Kingdom supports the replenishment of the global environment facility, and we propose to enhance the U.K.'s partnership with key developing countries in energy efficiency and climate change research and observation.

Mr. President, we are all in this together. No country can opt out of global warming, or fence in its own private climate. We need common action to save our common environment. The Earth is the only planet in the solar system with an environment that can sustain life. Our solemn duty as leaders of the world is to treasure that precious heritage and to hand on to our children and grandchildren an environment that will enable them to enjoy the same full life that we took for granted. And indeed, young people themselves have an important part to play in all of this.

Like other nations, Britain is now preparing to mark the coming millennium. But the millennium project on which we must all work is to rescue the global environment so that it can

nurture life in all our countries for another thousand years and more. Let us show this week that we have the vision to rise to the task and the commitment to see it through.

*This article is reprinted from EIR, July 18, 1997, pp. 20-21.*



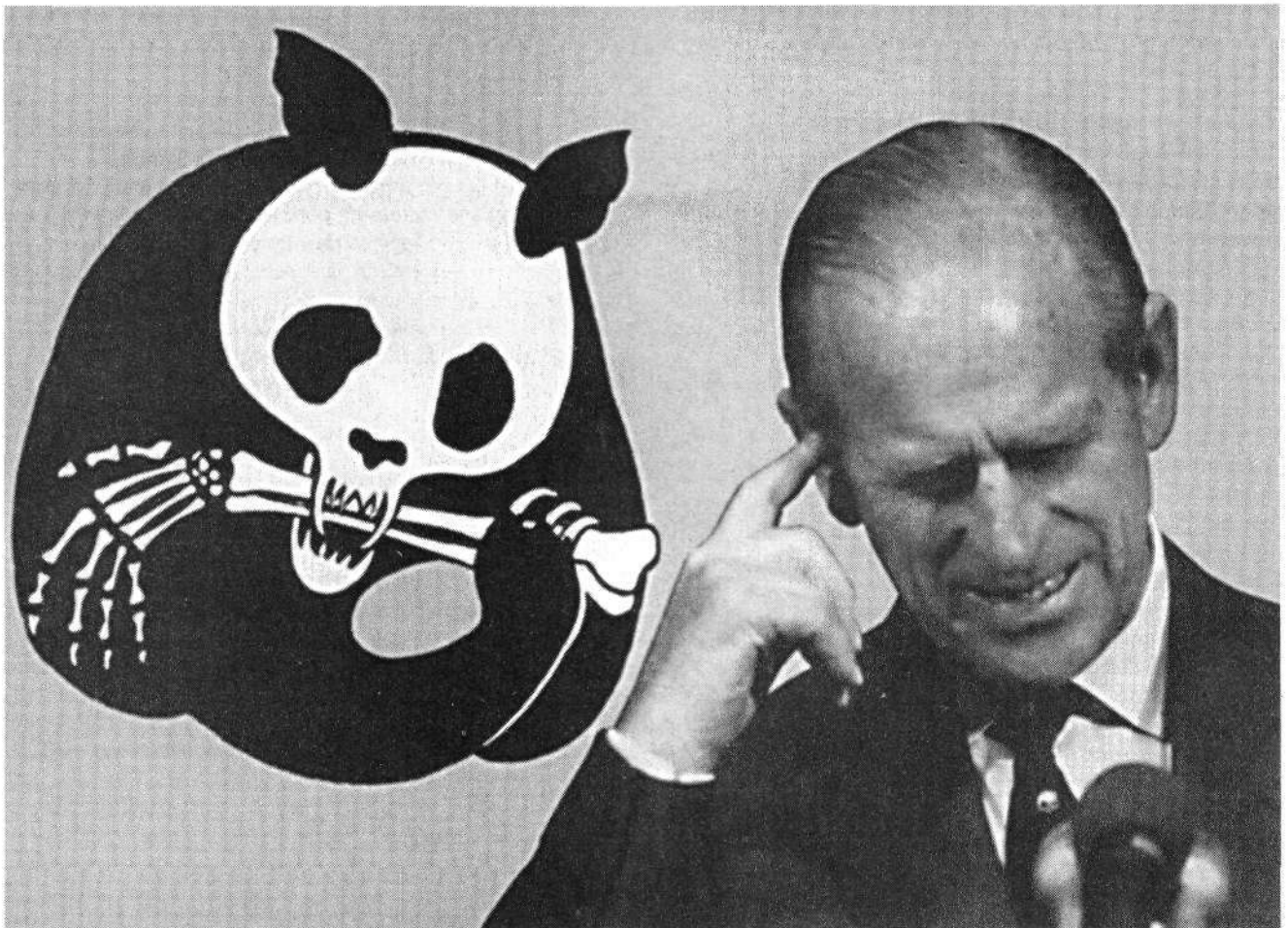
Christopher Lewis/EIRNS

*Prime Minister Tony Blair: "I attacked the last British government for many things, but they did deliver on the greenhouse gas emission targets set at Rio."*



# Prince Philip Orders Breakup of the U.S.

by Kathleen Klenetsky



*"Prince Philip wants you to give him a hand." (EIR cover photograph, October 28, 1994)*

**T**he goal of balkanizing the United States into a morass of small, economically backward, and politically impotent states, continuously embroiled in squabbles with each other, was publicly expressed by the British monarchy's Royal Consort Prince Philip during a visit to Washington, D.C. in May 1990, where he attended an international conference on religion and ecology cosponsored by the North American Congress on Religion and Ecology (NACRE) and the World Wildlife Fund. The WWF is a branch of the World

Wide Fund for Nature, the leading international oligarchical environmentalist organization which, at the time, was headed by Prince Philip. Its global war on population and industrial growth, and national sovereignty, was documented in an Oct. 28, 1994 *EIR Special Report*, "The Coming Fall of the House of Windsor."

At a press conference at the National Press Club on May 18, 1990, Prince Philip issued a virtual declaration of war against the United States as a sovereign nation-state.

The United States should be divided up into "bioregions," the prince asserted, and ecologically-oriented religious groups should lead the way. "The idea," he explained, "is that religious communities in a given bio-region, such as the Mississippi River system, might combine together to plan programs of environmental action based upon a common ecological situation."

The Duke of Edinburgh then assaulted the Judeo-Christian underpinnings of the United States and other western countries. Praising the concept of "local" religions, Philip blasted "what might be termed the 'revealed' religions" for having attempted "to draw people away from what they have seen as the pagan worship of natural phenomena. It is now apparent," he went on, "that the ecological pragmatism of the so-called pagan religions, such as that of the American Indians, the Polynesians and the Australian Aborigines, was a great deal more realistic in terms of conservation ethics than the more intellectual monotheistic philosophies of the revealed religions."

#### **Science and Technology 'Selfish'**

Philip followed up this diatribe the next day, with a vituperative attack on what the oligarchy despises most about the United States: its foundational commitment to economic growth, predicated on advances in science and technology and the development of the creative powers of its citizens. Addressing an audience at the Washington Cathedral, which had played host to the religion and ecology conference, Philip said:

"Over hundreds of thousands of years, human societies had

to learn to live within the limits of the natural resources at their disposal. What we call 'primitive' societies are living under those restraints to the present day; until, that is, the children of the growth societies move in to exploit their resources for immediate gain and to promise them the fruits of their growth philosophy. . . .

"It is as if we were in the grip of an adolescent culture [which] seems to have rejected all the hard-learned lessons of previous generations. Faith, mythology, symbolism, taboos and simple first-hand experience are treated as old-fashioned and irrelevant. Instant gratification of the material and physical desires is the justification for economic growth and yet more growth.

"The trouble is that the industrial and then the scientific revolutions have not only changed the material environment, they have also changed human perceptions. Knowledge and power and the staggering success of applied science and technology appear to have influenced Western culture to believe that humanity has complete control of the planet.

"Economic development and growth are the gods today and the cornucopia of benefits has blinded people to the rules that have governed life on Earth since the very beginning. . . .

"So long as people perceive constantly rising material standards of living and increasing population as the criteria of successful existence, so long as they ignore the inevitable consequences of their self-indulgence, science and technology will be exploited to pander to this selfish philosophy."

This article is excerpted from *EIR*, June 2, 1995, "The British Royals Plot to Balkanize the United States," by Kathleen Klenetsky, pp.18-30.

# Who's Who In Prince Philip's Eco-fascist SS

by Jeffrey Steinberg

1. **Club of the Isles/House of Windsor:** Through the Club of the Isles (see p. 9), the Windsor Dynasty functions as *primus inter pares* for an extended royal family that claims the thrones of Russia, Prussia, Denmark, Sweden, Belgium, Greece, the Netherlands, Yugoslavia, and scores of smaller principalities.

2. **Prince Philip of Greece and Denmark, Baron Greenwich, Earl of Merioneth, Duke of Edinburgh:** Royal Consort to Queen Elizabeth II, Prince Philip founded the World Wildlife Fund in 1961, became its International President in 1981. Former president, Zoological Society London (ZSL).

3. **Zoological Society of London:** Founded in 1826 by Sir Stamford Raffles, former Viceroy of India and founder of Singapore. Inspired the New York and Frankfurt Zoological Societies. Mother organization of the London Zoo. **Royal Geographical Society (RGS).** Founded in 1830 as the Geographical Society of London; Royal Charter in 1859. Sponsored major colonial expeditions such as Livingstone's and Sir Richard Burton's into Africa. The boards of the ZSL and RGS are almost indistinguishable from that of the WWF; Prince Philip was president of the ZSL in the 1970s.

The ZSL and RGS stand at the pinnacle of the British intelligence establishment. The ZSL's recent chief executives: Julian Huxley, 1935-1942; Field Marshal Lord Alanbrooke, Senior Chief of Staff for the U.K., 1950-1954; Lord Solly Zuckerman, U.K. Government Chief Scientific Adviser, 1955-1984; Sir Frank Chappell, the former General Commanding Officer (GOC) of the British Army, present director, member of WWF-U.K. The ZSL and RGS share the WWF's eugenics ideology, and the Darwin-Huxley tribe is omnipresent in both. Eugenics "founder" Sir Francis Galton was a major mid-19th century power in the RGS. Michael Huxley, Julian's cousin, founded its *Geographical Magazine*. RGS officials together with the WWF's Sir Peter Scott founded Survival International.

4. **RTZ, Shell, Lonrho, ICI, Unilever, DeBeers, AAC:** These are the modern versions of the Crown-chartered "merchant adventurer" companies of Elizabethan England, and the chartered colonial groups such as the British East Africa Company

of the late 19th century. For example, Tiny Rowland's Lonrho Corp., Africa's major private food producer and a powerhouse in precious metals, employed more than 100,000 people in Africa in 1990.

5. **The Fauna and Flora Preservation Society:** Founded in 1903 as the Society for the Preservation of the Wild Fauna of the Empire. Second oldest British conservation organization after the Royal Society for the Protection of Birds (1889). Has a panel of 108 "honorary overseas consultants" in 70 countries. Maintains liaisons with most other key conservation bodies. Mother organization, with the Eugenics Society, of the IUCN and the WWF. Housed since its founding in the London Zoo. Patron: Her Majesty the Queen.

"The Fauna" was founded as an arm of British imperial policy under the guise of "conservation." Its founding vice presidents, Lords Milner, Grey, Cromer, Curzon, and Minto, were all imperial proconsuls, chiefly in India and Africa. As Sir Peter Scott, FFPS chairman for most of the three decades from the 1960s until his death in 1989, noted in his history of the Fauna: "Since the Empire at that time covered about a quarter of the surface of the globe, it was a fair start on internationalizing the infant wildlife conservation movement."

Chief aim of FFPS was to expand the national park system worldwide. It convened international conferences in 1933, 1938, and 1953 to plan new national parks. Its secretary, Colonel Stevenson-Hamilton, established the Kruger National Park in South Africa. The architect of the Kenyan National Park system, Col. Mervyn Cowie, is still an FFPS board member today.

FFPS personnel have dominated the WWF and the IUCN since their founding, frequently chairing the IUCN's two key committees, the Commission on National Parks and Protected Areas; and the Survival Service Commission, concerned with WWF-style "species preservation," chaired for almost two decades starting in 1963 by Peter Scott.

6. **The Nature Conservancy:** Founded by Royal charter in 1949. One of the U.K.'s four official research bodies under



the Privy Council. Known as the "world's first statutory conservation body," it became one of the most powerful postwar covert operations of the Crown. From his influential post as permanent secretary to the Lord President of the Council (the deputy prime minister), Max Nicholson wrote the legislation for the Conservancy, then left his government post to head it, 1952-1966. Nicholson personally developed most of the major strategies and tactics of the world environmentalist movement for the next decades. He started the campaign against DDT later popularized by Rachel Carson in *The Silent Spring*; drafted the constitution for the IUCN; set up and chaired the committee which established the WWF in 1961; and chose Sir Peter Scott as the WWF's first chairman, who held the post for over two decades. The subtitle to his 1970 history of the postwar environmental movement is "A Guide for the New Masters of the Earth."

#### 7. IUCN, Unesco, UNEP:

*IUCN*: The Swiss-based International Union for the Conservation of Nature was formed in 1948 by Sir Julian Huxley; its constitution was written by the British Foreign Office. Bringing together 68 nations, 103 government agencies, and 640 non-governmental organizations, the IUCN is nominally tied to the United Nations, but is outside of its oversight. The WWF was originally formed to fund the IUCN; many of the IUCN's key commissions are run by the Fauna Preservation Society. Together with the UNEP and the World Resources Institute, the IUCN launched the "Global Biodiversity Strategy," which guides the conservation planning of many nations. Its staff directly plan the conservation strategies and administer the national parks systems of many former colonies today. It sees the preservation of "biodiversity" as its main mission. The IUCN president is Sir Shridath Ramphal, the former Secretary General of the British Commonwealth 1975-90; its director general, Martin Holdgate, was a senior official of the United Kingdom's Department of the Environment.

*Unesco*: The United Nations Education, Scientific, and Cultural Organization, is a Paris-based specialized U.N. organization that was designed by Sir Julian Huxley, who also was its first director general. In his founding 1946 document, Hux-



*Great Britain's Queen Elizabeth II, and her consort, Prince Philip, Duke of Edinburgh.*

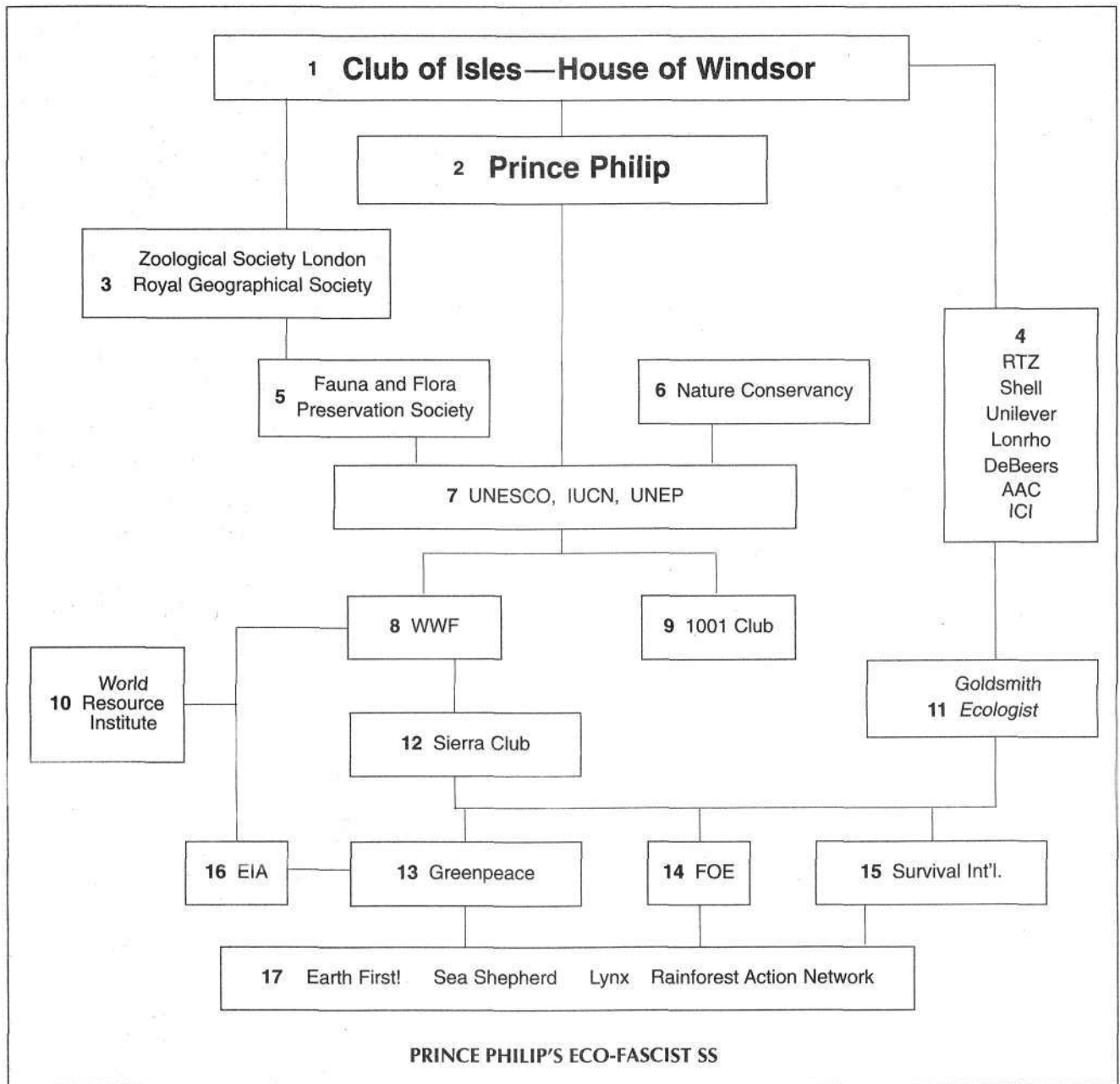
ley defines Unesco's two main aims as popularizing the need for eugenics, and protecting wildlife through the creation of national parks, especially in Africa. With a \$550 million annual budget, Unesco funds a vast network of conservation groups; it defines protection of the environment as one of its three main goals.

*UNEP*: The United Nations Environment Program was formed at the 1972 U.N. Conference on the Environment, which was organized by WWF founder Maurice Strong. Based in Kenya, the UNEP works closely with Unesco, the IUCN, and the WWF in diverse ventures. Its World Conservation Monitoring Center in Cambridge, England, jointly sponsored with the IUCN and the WWF, is the central intelligence agency of the conservation movement.

8. **World Wildlife Fund (Since 1987, World Wide Fund for Nature)**: See pp. 9-10.

9. **1001 Club**: See p. 10.

10. **World Resources Institute**: Founded in 1982 under the guidance of WWF U.S.A. president Russell E. Train with generous grants from the Rockefeller Brothers Fund and the MacArthur Foundation. James Gustave Speth was appointed



president. Speth was a cofounder of the Natural Resources Defense Council and formerly the chairman of the U.S. Council on Environmental Quality and the director of the Global 2000 project. After 11 years at WRI Speth was made head of the United Nations Development Program (UNDP) in 1993. WRI is the main think-tank for U.S. environmental groups, putting forward study after study promoting the new world order and the global biodiversity strategy. WRI is affiliated with the International Institute for Environment and Development in London, formerly headed by Lady Jackson (Barbara Ward).

11. **Goldsmith/The Ecologist:** Sir James Goldsmith and his older brother Edward are leading financiers of the WWF apparatus globally. Along with John Aspinall, they are major funders of Survival International and Friends of the Earth. In

1970, Edward Goldsmith founded *The Ecologist*, magazine of the radical wing of the green movement. Edward also launched the Green Party movement in the U.K. which spawned Green parties in every European Community state.

12. **Sierra Club:** The Sierra Club was founded in 1892 by preservationist John Muir with funding from the famous robber baron E.H. Harriman. Mostly an outing club until the 1950s, the Sierra Club became a radical environmental lobbying organization under the leadership of David Brower. In 1969, Brower left Sierra Club to create the more radical Friends of the Earth. Later on he also founded the Earth Island Institute. Michael McCloskey replaced Brower and proceeded to refocus the Sierra Club into an organization dedicated to preventing all commercial uses of public lands in the United States. In 1971, leaders of the Sierra Club in Canada created Green-

peace. In 1979, the Sierra Club and the Wilderness Society gave David Foreman a 10-year contract to create and lead an overtly terrorist environmental organization. That organization became Earth First!

13. **Greenpeace:** Founded in 1971 out of the Don't Make a Wave Committee, to coopt drug-rock-sex counterculture victims into WWF-sponsored "direct action." Now has branches in 24 countries, with headquarters in The Netherlands and an annual budget of \$157 million. Spawned eco-terrorist groups Sea Shepherd, Lynx, Animal Liberation Front, and Earth First! Current director is Lord Peter Melchett, heir to the Imperial Chemical Industries fortune. Behind-the-scenes operator from early years is David McTaggart, Canadian confidence man, who received funding from WWF Executive Director Sir Peter Scott to purchase ships to assault nuclear test ranges, whaling fleets, and seal hunters.

14. **Friends of the Earth:** Founded in 1969 by David Ross Brower, former executive director of Sierra Club. In 1990, merged with Environmental Policy Institute and Oceanic Society and obtained tax-exempt status from the U.S. Internal Revenue Service. Moved into England in 1970, with financing from the Goldsmith and Rothschild interests and John Aspinall. Engages in direct action and other activities particularly targeting nuclear power plants. Director of FOE U.K. during the 1980s was Jonathan Porritt, son of ex-governor general of New Zealand. Founder of FOE France, Brice LaLonde was later ap-

pointed President François Mitterrand's environmental minister. FOE, like Greenpeace, deployed personnel to found Earth First!

15. **Survival International:** Founded in London in 1969 with sponsorship of WWF chairman Sir Peter Scott to provide funding to "help tribal peoples protect their lands, environment and way of life." Originally named Primitive Peoples Fund. Continues close collaboration with WWF and the Royal Geographic Society. Other founding members include: Edward Goldsmith, John Aspinall, Nicolas Guppy, Francis Huxley, and Royal Geographic Society director John Hemming. South American Indians, particularly Yanomami, were initial targets of SI operations. In 1972, spawned Cultural Survival, headed by British anthropologist David Maybury—Lewis and chaired by Queen Margarethe of Denmark.

16. **Environmental Investigative Agency:** London-headquartered private eye unit spawned out of Greenpeace U.K. Founder is Allan Thornton, an early leader of Greenpeace. Financed by Animal Welfare Institute and other WWF fronts to conduct "muckraking" investigations into environmental abuses.

17. **Sea Shepherd, Lynx, Earth First!, Rainforest Action Network.** These are among the second-generation of "direct action" eco-terrorist groups spawned by World Wildlife Fund.

*This article is adapted from EIR's Special Report, "The Coming Fall of the House of Windsor," pp. 8-11.*

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# Environmental Hoaxes Are Based on Population Reduction, Not Science

by Marjorie Mazel Hecht

**E**nvironmental policy today is driven by population-reduction ideology, not science. Today's hot-button environmental issues would have flunked even the most cursory science (or sanity) test a half-century ago. There is no real scientific evidence behind the scare stories, just the Malthusian view that the Earth must be protected from greedy, resource-using human beings, of whom there are too many. From the Malthusian point of view, the scare stories and their consequences—such as banning useful pesticides—have proven to be a very efficient means of directly or indirectly killing large numbers of people.

Let's take three examples: DDT, the ozone hole, and global warming.

DDT is the "mother" of environmental hoaxes. The pesticide was banned in 1972 by Environmental Protection Agency (EPA) administrator William Ruckelshaus, for what he admitted were "political" reasons. Ruckelshaus chose to ban DDT, despite the fact that the EPA had held seven months of scientific hearings on DDT, and that the EPA's own hearing examiner had ruled on the basis of the voluminous scientific evidence presented, that DDT should *not* be banned.<sup>1</sup>

EPA hearing examiner Edmund Sweeney stated at the time, "DDT is not carcinogenic, mutagenic, or teratogenic to man [and] these uses of DDT do not have a deleterious effect on fish, birds, wildlife, or estuarine organisms." The major scientific organizations testified on behalf of continued use of DDT.

In the past 25 years, despite the repeated lies about the dangers of DDT, the scientific evidence has continued to prove it safe. It does not cause cancer in human beings, eggshell thinning in birds, bird die-offs, or any of the other

catastrophic effects attributed to it by the greens.

DDT came under fire because, since its discovery in 1942, it had saved more millions of human lives than any other man-made chemical. Alexander King, founder of the Club of Rome, a Malthusian outfit, wrote in a 1990 biographical essay: "My chief quarrel with DDT in hindsight is that it has greatly added to the population problem." King was particularly concerned that DDT had dramatically cut the incidence of malaria and the death rate in the developing sector.

Today, without the use of DDT, malaria is the world's leading killer disease, causing more than 2 million deaths per year. Nearly half the world's population is at risk from malaria and its debilitating effects; most of the 200 to 300 million new malaria cases each year are among children. No effective vaccine has been developed, and the malaria parasite has developed resistance to some of the anti-malarial drugs.

As estimated by entomologist J. Gordon Edwards, professor emeritus at San Jose State University in San Jose, California, the anti-pesticide activities in the United States and other industrialized nations, which began with the DDT hoax, are responsible for killing at least 100 million people a year, directly and indirectly, most of them people of color.

## **Bring Back DDT!**

DDT should be brought back now, to defeat malaria. If there were an international program to spray the insides of houses with DDT to stop the spread of malaria, it could still save hundreds of thousands of lives in tropical countries. DDT is relatively inexpensive, benign to human beings, long-lasting on house walls, and extremely effective. Even where mosquito populations have developed resistance to DDT, the



Rachel Carson's 1962 book, *Silent Spring*, launched an emotional campaign to ban pesticides, which has resulted, directly and indirectly, in the deaths of 100 million people per year.

pesticide is more effective (and less problematic) than alternative chemicals: Research studies show that mosquitoes avoid houses where DDT has been sprayed.

Because DDT spraying is both effective and affordable, many developing countries have tried to continue their DDT spraying programs to control malaria, despite environmentalist pressure. It costs only \$1.44 per year to spray one house with DDT. The more toxic substitutes cost as much as 10 times more and require more frequent applications, making spraying programs prohibitively expensive.

Recent research has shown that there is a direct relationship between DDT house spraying and the incidence of malaria. As the number of houses sprayed increases, the incidence of malaria decreases. According to a 1995 report of

the Pan American Health Organization, for example, the number of malaria cases increased from a low of 173,570 in 1962 to a high of 1,186,053 in 1992, in the 21 countries of Ibero-America. During that same period, the number of houses sprayed dropped from 13,922,121 to 4,432,398.

#### **The Bugaboo of Resistance**

The insect resistance that developed in the earlier malaria control programs is often cited by the World Health Organization and others as a "scientific" reason that DDT could no longer be effective, but this is false. *DDT house spraying can effectively control malaria even when the mosquitoes are resistant.* The reason is that mosquitoes, repelled by the DDT sprayed on house walls, do not stay around to bite and infect

the inhabitants. Scientifically, this effect is known as excitorepellency, and has been shown to be the dominant way DDT controls malaria-bearing mosquitoes (rather than killing mosquitoes on contact). Studies have demonstrated this for all major species of malaria-bearing mosquitoes.

House spraying involves relatively small amounts of pesticide, compared with agricultural uses, and the pesticide on walls stays put. Resistance to DDT in the mosquito population occurred in areas where there was widespread use of DDT on cropland. The surviving mosquitoes in some areas, which had some natural ability to resist DDT's killing mechanism, propagated and changed the nature of the local mosquito population to one that was mainly resistant to DDT. One scientist has suggested that researchers were so involved in examining the resistance issue that they did not notice that DDT house spraying still controlled malaria, even where the mosquitoes were resistant.

### The Big Lie about the Ozone Hole

There is *no* scientific certainty whatsoever that the very small amounts of man-made chlorofluorocarbons are depleting the ozone layer. The so-called evidence is the product of computer models, not real data. Yet, the ozone-depletion theory was used to give birth to a 1987 international agreement, the Montreal Protocol on Substances That Deplete the Ozone Layer, that mandates the phaseout of a benign, efficient, and inexpensive refrigerant, which has been responsible in the past 50 years for saving lives by preserving the food supply and keeping it wholesome.<sup>2</sup>

The individuals behind the Montreal Protocol—for example, Richard Elliot Benedick, the U.S. State Department's ozone negotiator who organized the Montreal Protocol, and who headed the State Department's Office of Population—admitted that there was “no measurable evidence of damage” at the time the treaty was signed.<sup>3</sup>

There still is no measurable evidence of damage. But as the phaseout of CFCs takes hold, and poorer nations cannot afford the more expensive substitute refrigerants, there will be a breakdown of the refrigeration cold chain, which protects crops after harvest and during storage and distribution, and mass deaths will occur. International refrigeration experts have estimated that the ban on CFCs would kill between 20 to 40 million people by the end of the 1990s, through starvation and food-borne diseases.

As with the DDT ban, the population control lobby brags about its institution of the ozone hole hoax. For example, in a 1992 update of the Club of Rome's 1972 book *Limits to Growth*, the authors devote an entire chapter to praising the Montreal Protocol, as follows:

“The world's nations acknowledged that they had overrun a serious limit. Soberly, reluctantly, they agreed to give up a profitable and useful industrial product. They did it before there was any measurable economic, ecological, or human damage and before there was complete scientific certainty.”<sup>4</sup>

### Atmospheric Dynamics Are Primary

New scientific evidence continues to demonstrate that the ozone depletion models are based on a big lie. The satellite

## British Empire Pushes Malthusian Treaties

Since the end of World War II, the United Nations has drafted and ratified more than 50 treaties that dictate that the primary concern of nations must become the “protection of the environment,” “ecosystems,” “endangered species,” the “atmosphere,” and whatnot. While these treaties pay lip service to the idea that all of these environmental and population-control policies are intended to benefit mankind by preserving Mother Earth, their primary purpose is to destroy scientific and technological progress, thus depriving mankind of its most important tools to nurture nature, and to drive the world's natural resources into the hands of multinational corporations that are an integral part of the present-day, reorganized British Empire known as the British Commonwealth.

The treaties also explicitly are aimed at replacing national sovereignty with rule by the United Nations and non-governmental organizations (NGOs). While most people assume that these treaties have been drafted by the representatives of sovereign governments, in fact, most were drafted by a gaggle of NGOs. The most influential of these are the International Union for the Conservation of Nature (IUCN), also known as the World Conservation Union, and the World

Wildlife Fund, also known as the World Wide Fund for Nature (WWF). More recently, the World Resources Institute, an offshoot of the WWF, has been playing a major role in drafting such treaties.

### The Command Structure

The way these U.N. treaties work, is that a draft proposal is issued at the highest levels of the British Empire, that is, the Club of the Isles. These policies are written down into proposals or draft conventions by the IUCN, WWF, and, in the final stages, the World Resources Institute. The non-governmental organizations are mobilized to promote these conventions and provide a popular call for their implementation. Of particular importance in this phase are Greenpeace, Friends of the Earth, the Nature Conservancy, the Environmental Defense Fund, and the Natural Resources Defense Council.

These UN treaties, however, could not be ratified unless some governments provided the crucial early backing. How this works is outlined in the *Green Globe Yearbook*, published by the Fridtjof Nansen Institute in Norway. The *Yearbook* provides an overview of the status of all UN environmental treaties and conventions, including maps and charts of which countries have signed and ratified which treaties (the yearbook tracks 49 treaties). What is immediately apparent from the charts—and apparent to anyone who has attended any of the meetings where the treaties are drafted



ozone data and other atmospheric studies based on actual measurements confirm that the ozone layer is not a homogeneous, flat structure, and that atmospheric dynamics, not chemistry, is the driving factor that determines the "thickness" of the ozone layer.<sup>5</sup>

The Crista-Spas ensemble of instruments, designed by scientists at the University of Wuppertal in Germany and deployed on the Space Shuttle in November 1994, and again in 1997, create three-dimensional images of the distribution of the gases in the stratosphere. The Wuppertal scientists discussed their results in a press conference, and told the press that these 3-D images show that the models behind the ozone depletion scare are completely wrong. As the German newspaper *Die Welt* put it, in a Nov. 7 comment on the announcement of the Crista-Spas results, the Crista-Spas data mean that "all ozone computer models produced so far have, in effect, turned into waste paper [*Makulatur*]."

The new 3-D images show that ozone is organized into complex and dynamic vortical and filamentary structures that are constantly changing, in patterns that are as complex as those of weather systems near the Earth's surface. The ozone "layer" is actually a patchwork of small-scale and large-scale dynamical structures. In contrast, the computer models used by the promoters of ozone depletion (and global warming) assume that the ozone layer is homogeneous and can be modelled by linear equations. Axiomatically, any such attempts to model the kinds of complex, nonlinear processes that have been shown to occur in the stratosphere, will produce the wrong results.

Once again, ideology, not scientific evidence, has fabricated a scare story and a "solution" that purports to help the environment, and even help human beings, but will actually kill people by disrupting the food production cold chain.

### What Global Warming?

Until the early 1970s, it was generally assumed that long-term astronomical cycles—those measured in tens or hundreds of thousands of years—were the way in which an understanding of climate had to be situated.<sup>6</sup> The 100,000-year and shorter cycles of Ice Ages are determined by the periodicities in the eccentricity, tilt, and precession of the Earth's orbit. In between Ice Ages, there are roughly 10,000-year periods known as interglacials, when relatively milder climates prevail. Right now, the Earth is at the end of an interglacial, and probably already entering a period of glacial advance.

The Ice Ages of the past, and the coming Ice Age, have a timetable of their own, quite independent of man's industrial output of carbon dioxide. No scientist who knows these astronomical cycles could be honestly worried about the ups and downs of local or global temperatures in time spans of years or even decades, or seriously concerned with short-term computer modelling and associated scare stories.

How then, have we come to the point where an international climate treaty is on the table, buttressed by a "consensus" that flies in the face of the reality that, based on the last several million years of history, the world is inexorably moving into another Ice Age?<sup>7</sup> Again, we can look to a leading

and ratified—is that, almost invariably, the British Commonwealth nations are the first ones to sign and ratify these treaties.

The significance of this is that, according to the individual rules of each treaty, and the rules of the UN, it takes anywhere from 20 to 50 nations to ratify a treaty so that the treaty becomes international law. Thus, all it takes for a treaty to become international law, is the ratification of the British Commonwealth nations, of which there are 56!

#### Major Treaties on the Environment

Here are some of the major treaties now being negotiated or implemented. Most of these impose severe penalties, all the way up to total economic embargo, even against nations that don't sign them:

- *Framework Convention on Climate Change*

The objective of this treaty is to "stabilize greenhouse gas concentrations in the atmosphere." To accomplish this, nations will gather in Kyoto, Japan in December 1997 to set industrial emissions limits. The effect will be to shut down industries around the world and prevent the industrialization of the Third World.

- *Vienna Convention for the Protection of the Ozone Layer (better known as the Montreal Protocol)*

This treaty bans the production of chlorofluorocarbons (CFCs) and other halogenated chemicals. Millions of people will die around the world as a result of this treaty, from the

collapse of the world's refrigerated cold-chain, which depends on CFCs (refrigerants).

- *Antarctic Treaty*

This treaty seals off an enormous area of the world, the Antarctic Continent and surrounding oceans, from development and commercial use.

- *World Heritage Convention*

This treaty sets aside huge areas of the world in which economic development, and even the presence of man, are prohibited.

- *Convention on Biological Diversity*

This treaty sets nature and animals on an equal, if not a higher footing than man, and prohibits any kind of economic activity anywhere in the world that would harm an endangered ecosystem, whatever that may be.

- *Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)*

This prohibits international trade in so-called endangered species.

- *International Convention to Combat Desertification*

Now in negotiation, this treaty would restrict any kind of human activities in areas that are deemed to be in danger of desertification. It is perhaps one of the most dangerous conventions, because its definition of "desertification" is so broad, for example, that more than half the United States would qualify as "desertified."

—Rogelio A. Maduro



Part 2.  
Global Warming Is a  
Scientific Fraud

# Orbital Cycles, Not CO<sub>2</sub>, Determine Earth's Climate

by Rogelio A. Maduro

*Contrary to the scare stories and scientific frauds, such as the alleged danger of "global warming," the Earth is headed into a new ice age.*

*Rogelio A. Maduro is an associate editor of 21st Century Science & Technology magazine and the co-author of The Holes in the Ozone Scare: The Scientific Evidence That the Sky Isn't Falling.*

*This article is an edited version of a speech given on Feb. 16 at a Schiller Institute conference in Reston, Virginia, and published in Executive Intelligence Review, May 16, 1997, pp. 10-17. The author noted that his speech was based on work published in the Winter 1993-1994 issue of 21st Century Science & Technology magazine by Laurence Hecht, one of five associates of Lyndon LaRouche who are now political prisoners in Virginia, and he recommended that the audience go back to that article to get the full scope of the discussion. [The Hecht article appears on page 36 of this report.]*

**T**he crucial issue is that climate is astronomically determined, as opposed to what the news media tell you—which is correctly classified as the *astrological* determination of climate. Just about everything you hear in the news media today regarding environmental issues is a scientific fraud, particularly when it comes to global warming; it's the magicians at work. They have replaced science with magic. What I will cover in this presentation is the scientific basis for determining climate over the long term.

Over the last hundred years, it has been demonstrated conclusively that there are four factors that have determined the long-term climate of the Earth for the last 10 million years or so. The first three factors are the eccentricity of the Earth's orbit around the Sun, the tilt of the Earth's axis, and the preces-

sion of the equinox. The fourth, and longer-term factor, is continental drift.

When those factors combine, what you get is a succession of ice ages, which is what the Earth has been experiencing over the last 10 million years or so. The last four great ice ages took place over the last 500,000 years. You can see in Figure 1 what the world looked like 18,000 years ago. Much of the United States and all of Canada were covered by glaciers. Almost all of eastern and western Europe was covered by glaciers. There was as much as three miles of ice on top of Hudson's Bay, and about a mile of ice on top of Chicago, Illinois.

From that time until now, the glaciers have receded.

Over the last billion years, there have been only three periods of ice ages. The first period was in the late pre-Cambrian into the Cambrian, around 800 to 600 million years ago. There was another period in the Permian, back around 300 million years ago, and another, the most recent period, around the last 10 million years. When you look at geological ages, when you look at the biosphere of the Earth, it's important to keep in mind that you are encountering what Lyndon LaRouche has described as "discontinuities."

You know that things change as the Earth goes from one period to the next, because almost every living species that existed on the Earth in the prior period has disappeared, and a whole new set of living species has appeared. What you have is a great discontinuity; something major has happened that has completely changed the Earth's biosphere, and this process is what determines the Earth's geological history.



The reason for the ice ages, the astronomical theory of the ice ages, was elaborated by the great Yugoslav climatologist-mathematician Milutin Milankovitch. He worked with Alfred Wegener, who discovered the theory of plate tectonics—the theory of continental drift.

Ice ages occur when there are land masses that are close to the poles; that is the only condition in which you can have an ice age. This occurred in the pre-Cambrian period, and it occurred in the Permian, when there were large land masses in the northern and southern hemispheres. And 50 million years ago, conditions were created when the continents were drifting apart, and then together, and then apart, ending up close to the poles, so that the land mass there could support an enormous amount of ice—upwards of three to four miles of ice. It has to be land. It can't happen in the Arctic Circle. The ice would just sink into the water and there would be only about 100 feet of ice.

It was not until 150 years ago that it was determined that there were such things as ice ages, and that there were great glaciers, which left huge deposits, known as moraines—some of them hundreds of feet tall—around Illinois, and over Europe and the Alps. About 150 years ago, a Swiss geologist, Louis Agassiz, came up with a theory that had been postulated by Alpine hunters in Switzerland, that all these deposits of rocks and soil, had been left there by glaciers.

It took about 40 years of very intense debate in the geological community to accept the existence of ice ages. There was still no explanation of why the ice ages came into being, and why there were so many of them.

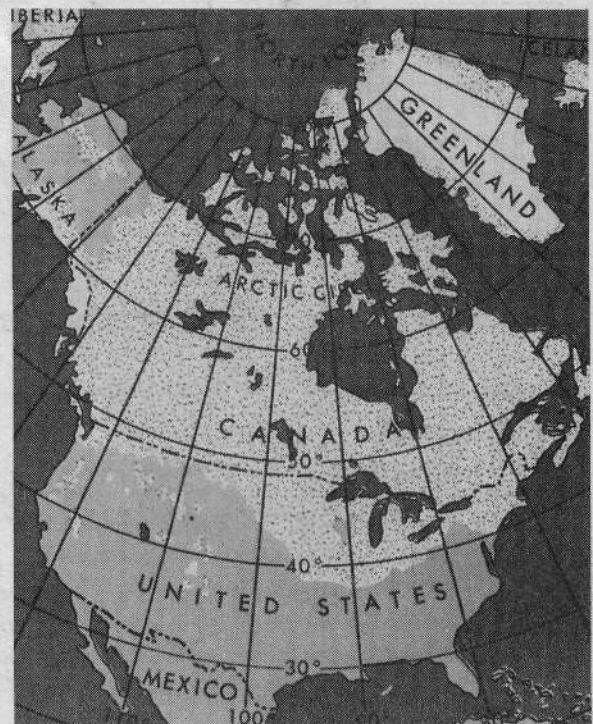
### The Earth's Eccentricity

The first comprehensive theory was postulated by James Croll, a Scottish carpenter in the mid-1800s who had an inclination for astronomy and mathematics. He was *not* a member of the British Royal Society, and he and his theory were very much rejected at the beginning. He proposed the idea that the ice ages were created by the changes in eccentricity of the Earth's elliptical orbit. These changes in eccentricity, he demonstrated, strongly affect the intensity of radiation the Earth receives from the Sun during a given *season*, a factor known as insolation.

Johannes Kepler had discovered, more than 300 years ago, that the Earth's orbit was not a circle around the Sun, but an ellipse (Figure 2), with the Sun at one focus of the ellipse. Therefore, at certain points, the Earth is farther away from the Sun, than at other points on the ellipse. Croll calculated that there was a 100,000-year cycle to a change in the shape of the Earth's elliptical orbit, known as eccentricity. This was the first attempt at explaining the occurrence of the ice ages.

The work of Croll was later picked up by Milutin Milankovitch, who made it his life's work. He spent more than 30 years developing his theory through very arduous work, using calculations of the orbits of the planets, so he could determine the amount of insolation being received by the Earth, taking into consideration the three factors that he considered to be involved in determining the onset of the ice ages and their duration. In addition to eccentricity, these were the tilt of the Earth's axis and the precession of the equinox.

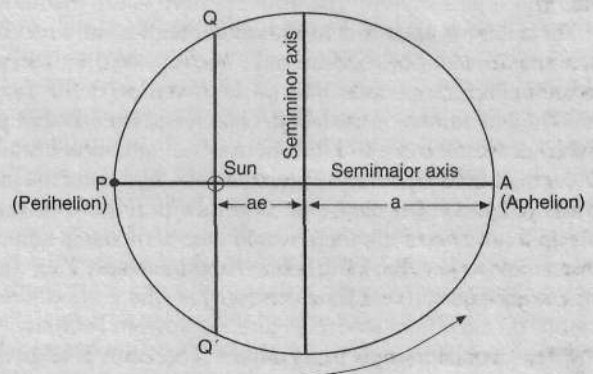
Figure 3 is the first curve that Milankovitch published. It appeared in a work by Alfred Wegener and Vladimir Köppin,



**Figure 1**  
**GLACIATION IN NORTH AMERICA**

The maximum extent of glaciation occurred 18,000 years ago. The lighter areas show the huge glacier that covered the northern area of the continent.

Source: U.S. Geological Survey



**Figure 2**  
**ORBITAL MOTION OF THE EARTH**  
**AROUND THE SUN**

The Sun is at one focus of the ellipse. Looking down from the North Pole of the Earth, the orbital motion is counterclockwise from P to Q', to A, to Q, and back to P again. The distance from Earth to Sun is least when the Earth is at P, the position known as perihelion, and greatest at A, the aphelion.

Source: 21st Century Science & Technology, Winter 1993-1994.

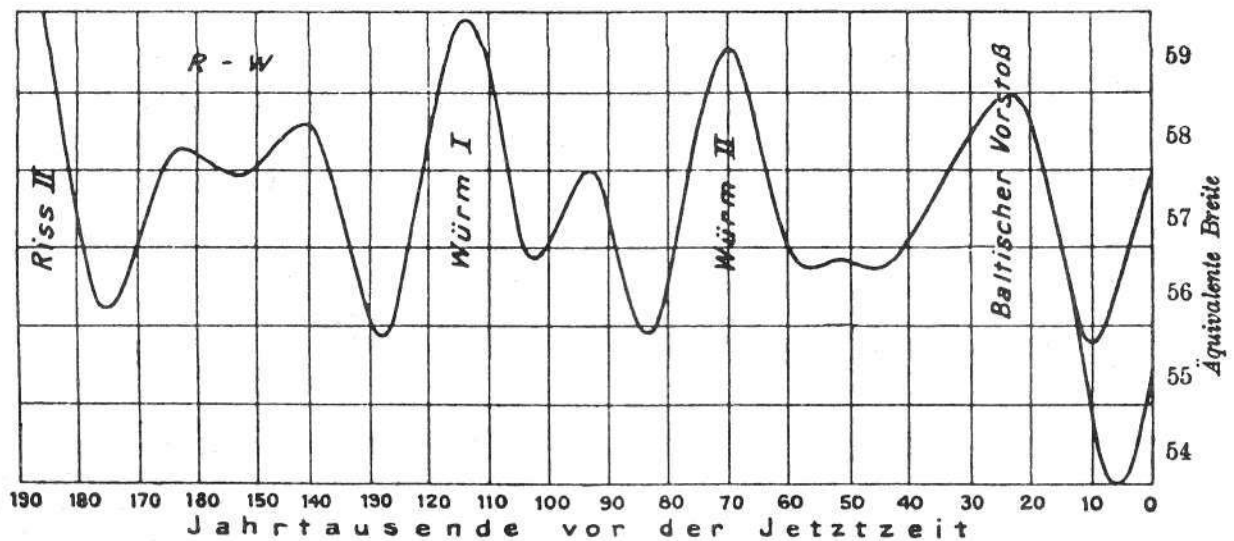


Figure 3  
**MILANKOVITCH'S RADIATION CURVE FOR THE LAST 190,000 YEARS**

This radiation curve by Milankovitch was reproduced by Köppen and Wegener in their book *Die Klimate der geologischen Vorzeit* (The Climates of the Geological Past), a pioneering work in paleoclimatology, published in 1924. The horizontal axis shows years from present: the vertical plots fluctuations in radiation.

Source: 21st Century Science & Technology, Winter 1993-1994.

Wegener's father-in-law, who developed the modern theories of climate zones on the Earth. As the curve shows, at about 100,000-year intervals there are interglacial periods of milder weather, such as the period we are now in. Then, great masses of ice start to move, and the globe goes into an ice age.

Now, with eccentricity, the Earth gets farther away from the Sun, and it gets colder. The concept here is the insolation, which is the full spectrum of radiation that the Earth receives from the Sun. In our modern day, because of the theory of thermodynamics, people think of the radiation of the Sun as simply heat, but that is mistaken. Heat is just the infrared part of the spectrum; there is a full spectrum of radiation from the Sun, which does work on different parts of the Earth. The insolation is determined by the tilt of the Earth (Figure 4). If the Earth did not have a tilt, there would be a completely different climate. At present, the Earth is tilted approximately 23.5° from the Sun. So, at different times of the year, there are different seasons on each hemisphere (Figure 5). Now, in February, the Northern Hemisphere is in its winter. The Earth is revolving around the Sun, so this differential allows for differential in temperatures during the year.

**The 43,000-Year Cycle**

One of the things that astronomers during Milankovitch's time determined rather accurately, is that the Earth is tilting between 22 and 25°, or an average 23.5°, over a period of 43,000 years. In other words, the Earth's axis tilts back and forth, from 22 to 25° during this long period, and this is a major component of the ice ages. When the Earth is tilted most acutely, we have the greatest amount of ice and snow. When it has the least tilt, there is the least amount of ice and snow. So, you have this 43,000-year cycle, and the 100,000-year cycle of the

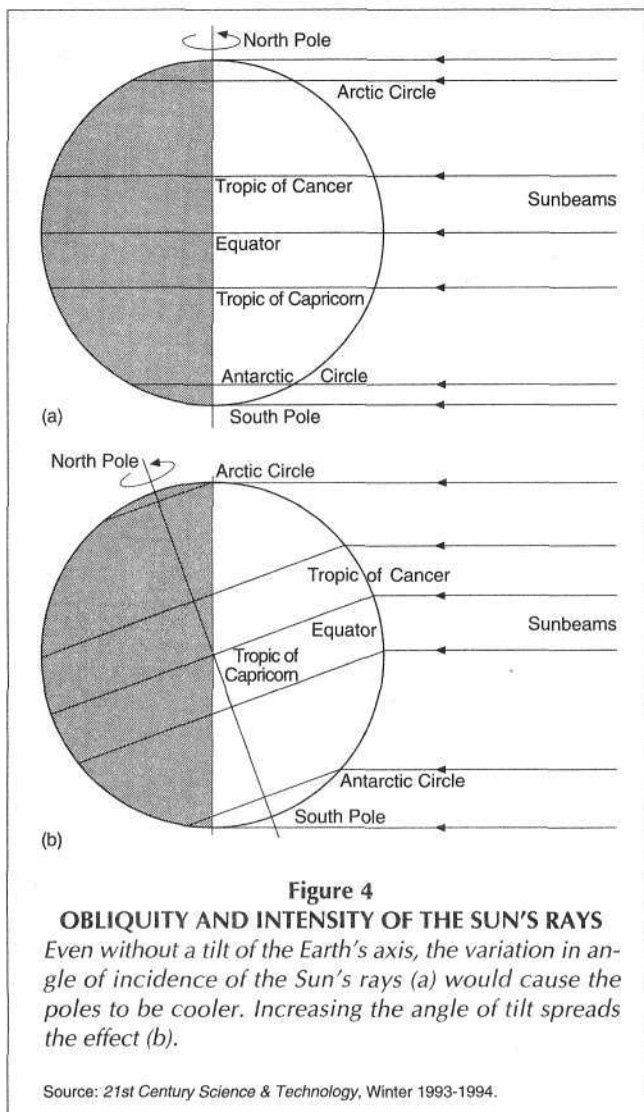
eccentricity of the Earth's orbit around the Sun.

This is an extremely important astronomical calculation, which can be determined astronomically with great accuracy, and was determined as far back as the Vedics. If you take the summer solstice, now June 21, the Northern Hemisphere is tilted completely toward the Sun, and there is sunlight all the way up to the North Pole (Figure 5). On the opposite side of the Earth, it is the polar night in Antarctica. The summer solstice is the longest day in the Northern Hemisphere. Then, at the autumnal equinox, there is the same amount of daylight as darkness. At the winter solstice in the Northern Hemisphere, the Southern Hemisphere is more exposed to the Sun, and the Northern Hemisphere, above the Arctic Circle, is in darkness. Then we move on to the vernal equinox, when day and night are of equal length again.

**The Precession of the Equinoxes**

The third cycle is the precession of the equinox (Figure 6). The Earth is moving around in its elliptical orbit of the Sun, but the position of the equinoxes and the solstices in that ellipse, changes over time. There are two cycles involved here. There is a 26,000-year cycle, which is what you would call the "wobble" of the Earth, as it spins on its axis like a top. The wobble means that at one point, the North Star is Polaris, but as the direction of the Earth's axis revolves, the North Star becomes Vega. This movement is known as the precession of the equinoxes.

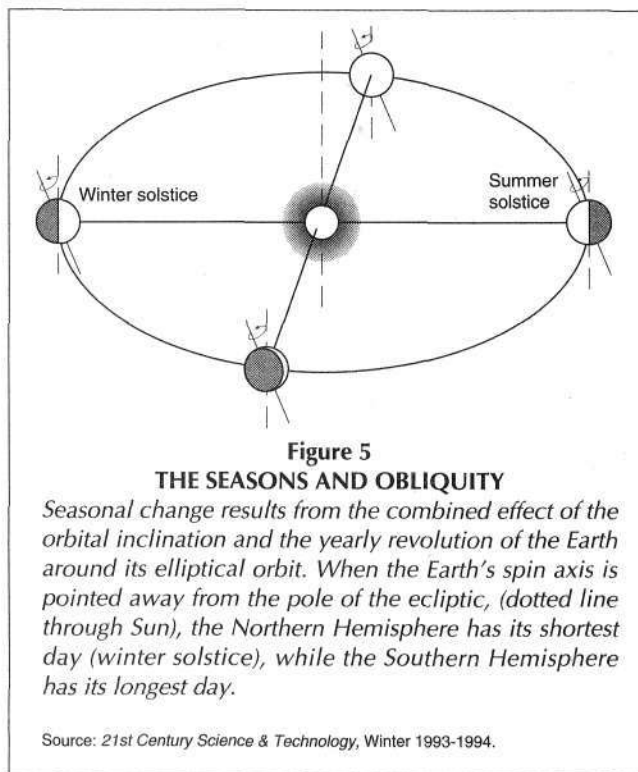
Now there's also a second precession, known as orbital precession, that of the ellipse itself, the orbit of the Earth. Because of the motion of the other planets, the elliptical orbit of the Earth also changes in its relationship to the Sun. So the actual cycle that is known as the precession of the equinoxes is a cy-



cle of about 22,000 years, as the Earth is rotating. You can see Figure 7 where the Earth is in this cycle now. Note that the equinox does not line up with the aphelion or perihelion of the ellipse. At present, the Earth is about 94.5 million miles from the Sun in aphelion, which is the farthest point of the ellipse. It is about 91.5 million miles away when it is in perihelion, which is the closest point to the Sun, which makes a significant difference in the amount of insolation of solar radiation that hits the Earth.

Now, the summer solstice is on June 21. Notice how we are far away from the Sun right now. This is very significant, because it means that we are entering into an ice age. This is one of several key points that Milankovitch made. What actually triggers the ice ages is not cold winters, but mild summers, when the winter snow does not melt, but keeps on piling up, so that after a few hundreds or thousands of years, there is enough snow piled up that the glaciers start moving. We are now reaching the point that the summer solstice is getting close to the farthest point away from the Sun.

So, in terms of the three cycles that Milankovitch determined, first, the eccentricity of the Sun today indicates that we



are now going into another ice age. The second cycle is the combination of the equinoctial and orbital precessions, a 22,000-year cycle, and again, you can see that we are entering a period where the Earth is headed into an ice age. And third, the tilt of the Earth's axis is in a downward curve, indicating that we're going into an ice age.

### Milankovitch's Theory

Now, this is Milankovitch's theory, and it's quite a fascinating story. Milankovitch's theory was not accepted by the scientific community at large for 50 years. It was a tremendous subject of scientific debate, but it was dismissed by most geologists and paleontologists. You have to realize that there was no method at that time of dating these glacial deposits, and dating the sedimentation that had occurred, so there was no way of corroborating Milankovitch's theory. Milankovitch had developed a theory based on astronomical observations, and used mathematical calculations that many other scientists had made, and a large number that he made himself, to date the advance and retreat of the glaciers—without using any chronological evidence from the glacial deposits.

Milankovitch wrote his papers, and published them, saying that because of the astronomical evidence we have of the Earth's orbit, the ice ages occurred at these specific intervals, and on these dates. And, almost everyone in the scientific community thought he was nuts. "How can you prove that?" they asked. "You have no evidence to prove any of this." It took 50 years, and the work of a large number of dedicated scientists, to prove that Milankovitch's calculations were absolutely correct.

The Rosetta Stone of climatology, which finally proved Milankovitch's theory, involved a group of more than 100 scientists who got together in what was known as the "Climate Pro-



ject," to determine the periodicity of the ice ages. This was a great scientific endeavor that involved experts in every field.

One factor that had complicated the acceptance of Milankovitch's theory was that there had been different dating mechanisms for the geological sediments, which would indicate different ages, that were accurate for only a certain point in time. For example, the carbon-14 dating method, which is

the one that is best known, because it is used to date human remains of ancient civilizations, is accurate only as far back as 14,000 years. So when scientists used this carbon-14 method, they would date things back to 80,000 years, and 100,000 years, and then announce that the carbon-14 method shows that Milankovitch's calculations are wrong, and therefore his theory must be wrong.

Another dating method used radioactive isotopes to date different periods and different sediments, and each one of these methods was very good and very accurate for a certain period of time. But these methods became inaccurate if they were expanded through the last million years. So it was a little like Sherlock Holmes, using various different fingerprints, to try to show the dating of the different ice ages, but all the fingerprints were wrong, because the method was wrong.

The Climate Project, which included oceanographers, paleontologists, limnologists, and geologists, each one an expert in his field, put together all the data from around the world. They spent several years collecting more data internationally, and then did some spectral analysis, which produced the so-called Rosetta Stone of geology (Figure 8). The data, compiled from the different isotope ratios of sediments, showed very accurately the four great ice ages of the last half-million years, and the interglacial periods. And these datings are precisely the dates that Milankovitch had established using his astronomical theory.

Sure enough, Milankovitch was proven right. The 100,000-year cycle, the eccentricity of the Earth, is an important cycle. The second cycle, 43,000 years, is of the change in tilt of the

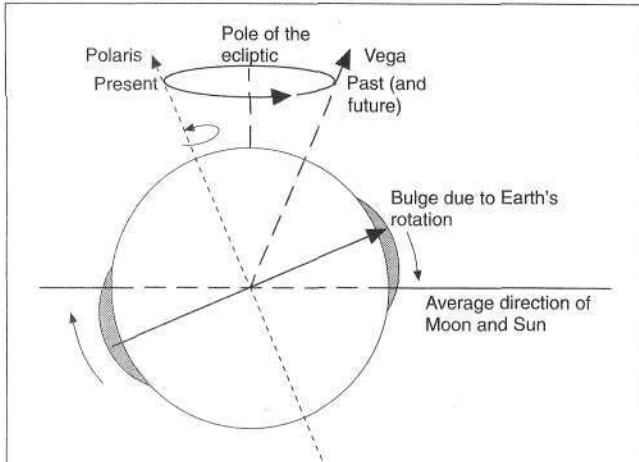


Figure 6

**PRECESSION AND CHANGE OF THE POLE STAR**

The Earth's spin axis makes a complete rotation around the pole of the ecliptic in a cycle of approximately 26,000 years. The North Star is now Polaris, but about 13,000 years ago, it was Vega.

Source: 21st Century Science & Technology, Winter 1993-1994.

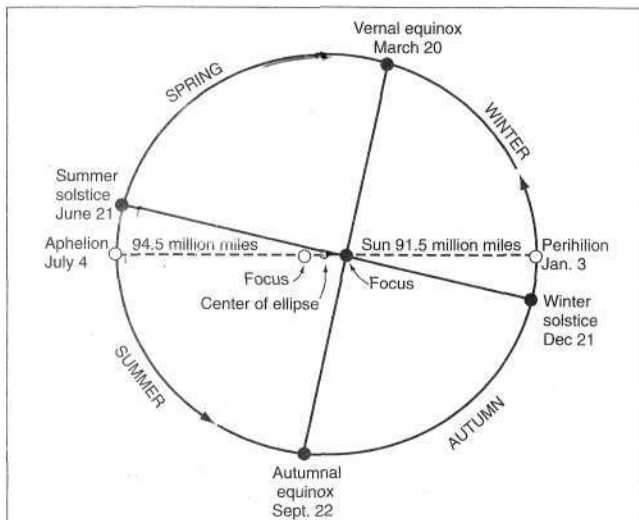


Figure 7

**EARTH'S DISTANCE FROM THE SUN AND POSITION OF SOLSTICE ON THE ELLIPSE**

The summer solstice, Jun 21, is now near aphelion, when the Earth is 94.5 million miles from the Sun, one of the indicators that we are entering an ice age.

Source: Data from J.D. Hays et al., in John Imbrie and Katherine Palmer Imbrie, *Ice Ages: Solving the Mystery*.

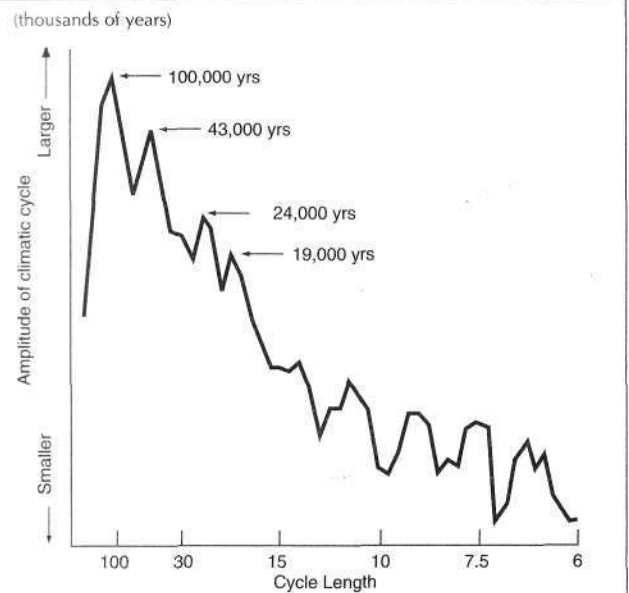
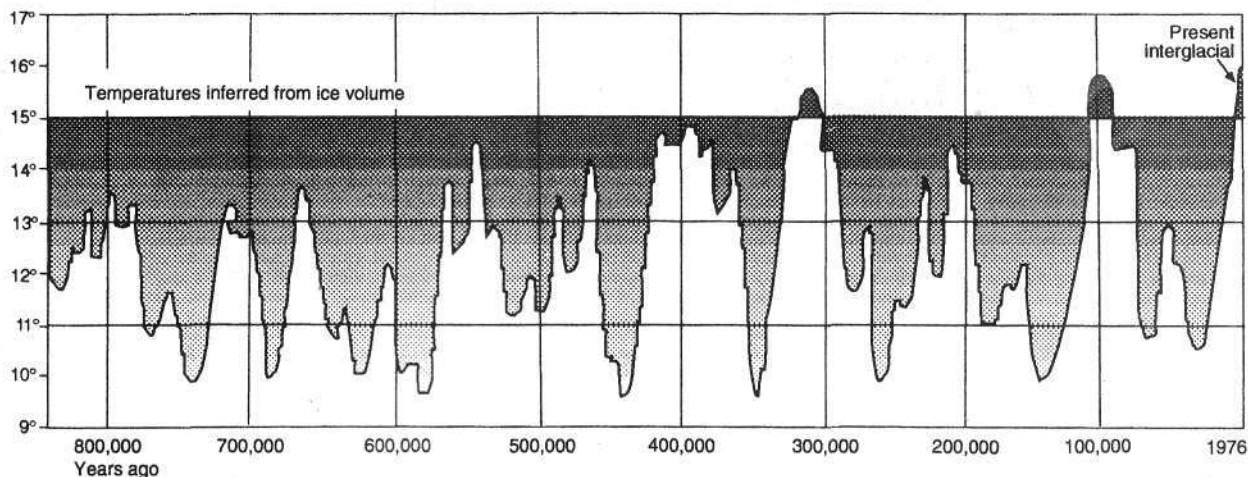


Figure 8

**CLIMATIC CYCLES FROM THE ISOTOPIC RECORD OF INDIAN OCEAN CORES**

This spectrum of climatic variation characteristic of the past half-million years, is taken from data compiled by the Climate Project. The dates confirm those of Milankovitch's theory.

Source: Data from J.D. Hays et al., in John Imbrie and Katherine Palmer Imbrie, *Ice Ages: Solving the Mystery*.



**Figure 9**  
**THE EARTH'S CLIMATE OVER THE LAST EIGHT CYCLES**

*The major ice ages are the downward spikes. The 100,000-year periods of glaciation occur in roughly 20,000-year cycles, consisting of 10,000 years of cooling and glacial advance followed by 10,000 years of warming and retreat. The glacial climax of the last 100,000-year ice age, occurred just 18,000 years ago.*

Earth's axis. The third cycle, the precession of the equinoxes has two spikes, because the precession changes, depending upon the orbits of all the planets. There are two major precession cycles: 19,000 years, and 24,000 years. So, Milankovitch, given the mathematical tools he had at the time, was accurate at saying 22,000 years.

Figure 9 shows what the record looks like for the last million years or so. The major ice ages are the downward spikes. You can see that the warm periods, known as the interglacials, are very short. You can see that there was an interglacial period 300,000 years ago, but there wasn't one 200,000 years ago, or about 500,000 years ago. And today, as you can see from the astronomical determinations, the Earth has either entered an ice age, or is about to enter the next cycle of the ice ages.

### Global Warming

Now, what about the global warming theory? This is a very serious problem, not because of any global warming, but because of the political damage that is being done in the name of the theory. Prince Philip and his associates in the World Wildlife Fund and other such groups have organized various different United Nations treaties to "protect" the Earth from man and various alleged disasters. By December 1997, the plan is to have a signed international treaty to protect the Earth from "global warming." This treaty is going to dictate very severe penalties against nations, particularly in the Third World, that dare to do those things—such as burn coal for producing electricity—that allegedly increase the amount of carbon dioxide in the air, and thus cause global warming. The demand is that to stop this global warming, this rise in temperature, we have to shut down modern industrial production.

The framers of the treaty intend for it to dictate that Third World countries will not be allowed to industrialize; they're

not going to be allowed to build power plants. Furthermore, the treaty organizers are demanding that a large chunk of energy production in the West, in the United States and western Europe, has to be shut down in order to save the Earth from this global warming. Yet, as you have seen from the scientific view of the past hundreds of thousands of years, this is all sheer nonsense!

Let's look at what paleontologists call the "climate optimum," which occurred about 7,000 years ago (Figure 10). At that time, the Earth was more than 2° warmer, than it is today. Now what was the Earth like during the climate optimum? Well, most of the Sahara Desert was green. There were major rivers, large cities, and civilizations all over the Sahara. And there were also major civilizations in northern latitudes. In fact, the Earth was much better off when it was warmer, which is why the period was given the name climate optimum.

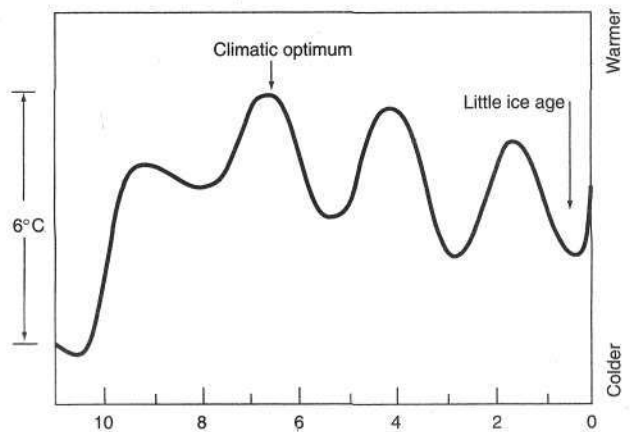
In the last few hundred years, there have also been little ice ages and warmer periods of a relatively short duration, within the larger cycles. These periods are not determined by the orbits. For example, there was a little ice age that ended around 1850, which was determined by the cycles of the sunspots and magnetic storms in the Sun. Between the years 800 and 1200, the temperature, according to some scientists, was about 1° warmer than our temperature today. There were vineyards in Britain, vineyards in Greenland, and Norse navigation to the North American continent. So you can see that there is a great deal of variability, even within these long-term astronomical cycles.

The issue here, however, is that there is no scientific evidence, behind anyone who promotes the global warming theory. Any *scientist* who promotes it, knows that he is lying, because they know what the astronomical cycles are. So it is axiomatically a lie for scientists to say that we are now facing

**Figure 10**  
**CLIMATE OF THE PAST 10,000 YEARS**

Temperatures during the climatic optimum, about 7,000 years ago, were about 2° warmer than they are today. During the Little Ice Age, about 300 years ago, temperatures were cooler than they are today. The temperatures are estimated from geological records of glaciers and fossil plants.

Source: Data from J.D. Hays et al., in John Imbrie and Katherine Palmer Imbrie, *Ice Ages: Solving the Mystery*.



global warming, and that this is going to raise the levels of the oceans and warm the Earth, and so on. These scientists know that there is no real evidence to support that. The climate models that they are using do not, in any way, reflect the nature of the biosphere.

#### Dame Margaret Mead

To show you what these climate models are all about, I'm going to read a statement by Dame Margaret Mead, one of the most evil people of the 20th century. Helga Zepp LaRouche confronted Mead at the United Nations Population Conference in Bucharest in 1974, and denounced her for her policies to depopulate the Earth, to cause mass genocide. Mead's policy, and the policy of people who worked with her, has been to use whatever means they can come up with to exterminate the majority of the population of the Earth.

The global warming scare was created in 1975-1976. At that time, all the evidence for the Milankovitch theory was published. And many scientists who today are propagandizing for global warming, during that period actually published books and papers, and made public pronouncements on television (Stephen Schneider was one of them), warning that the Earth was going into a period of global cooling.

At that time, they created various computerized climate models, and they started finding out, from their computers, that if you put all this carbon dioxide in the air, and industrialized the whole world, it would raise the temperature of the Earth, and perhaps stop the next ice age. But, because the Prince Philip types wanted to shut down industry and reduce the world's population, the scientists were pressured to change their story. And so, the story of these scientists changed.

The scientific conference at which this switch occurred was in November 1975. Chaired by Dame Margaret Mead, it was called "The Atmosphere: Endangered or Endangering." Mead told the assembled scientists, most of whom were the media science stars that you see today promoting global warming:

The unparalleled increase in the human population and its demands for food, energy, and resources is clearly the most important destabilizing influence in the biosphere. We are facing a period when society must

make decisions on a planetary scale. Unless the peoples of the world can begin to understand the immense and long-term consequences of what appear to be small immediate choices: to drill a well, open a road, build a large airplane, make a nuclear test, install a liquid fast-breeder reactor, release chemicals which diffuse throughout the atmosphere, or discharge waste in concentrated amounts into the sea, the whole planet may become endangered. What we need from scientists are estimates, presented with sufficient conservatism and plausibility, that will allow us to start building a system of artificial, but effective warnings, warnings which will parallel the instincts of animals which flee the hurricane. Only by making clear how physically interdependent are the people of all nations, can we relate measures taken by one nation, to measures taken by another, in a way that will draw from the necessary capacities for sacrifice, of which human beings, as a group, have proven capable. It is therefore a statement of major possibilities of danger, which may overtake humankind, on which it is important to concentrate attention.

The conference presentations elaborated how the participants would be able to scare people out of their wits with these intangible global catastrophes, which would overcome mankind; how they could use these scares to get otherwise sane people to act in an insane fashion and destroy their own nations and civilization itself. And Margaret Mead pushed the global warming theory, so all the scientists who went into that conference promoting global cooling, came out of the conference promoting global warming. Shortly thereafter, these same scientists came up with scares about ozone depletion, acid rain, "nuclear winter," and many other things. And every one of these scares is a scientific fraud.

#### Milankovitch on the Role of Science

I want to compare this statement by Mead to one of the last statements of Milankovitch. At that time, he had finished with his theory, and he went on to other things. Milankovitch did not even bother to argue or defend his theory. He simply said, my theory proves itself; the astronomical proof is there, and I don't need to argue with people about it. Milankovitch wrote in 1941:



These causes, the changes in insolation, brought about by the mutual perturbations of the planets, lie far beyond the vision of the descriptive natural sciences. It is therefore the task of the exact natural sciences to outline the scheme by means of its laws ruling the universe, and by its developed mathematical tools. It is left, however, to the descriptive natural science, to establish an agreement between this scheme, and geological experiences.

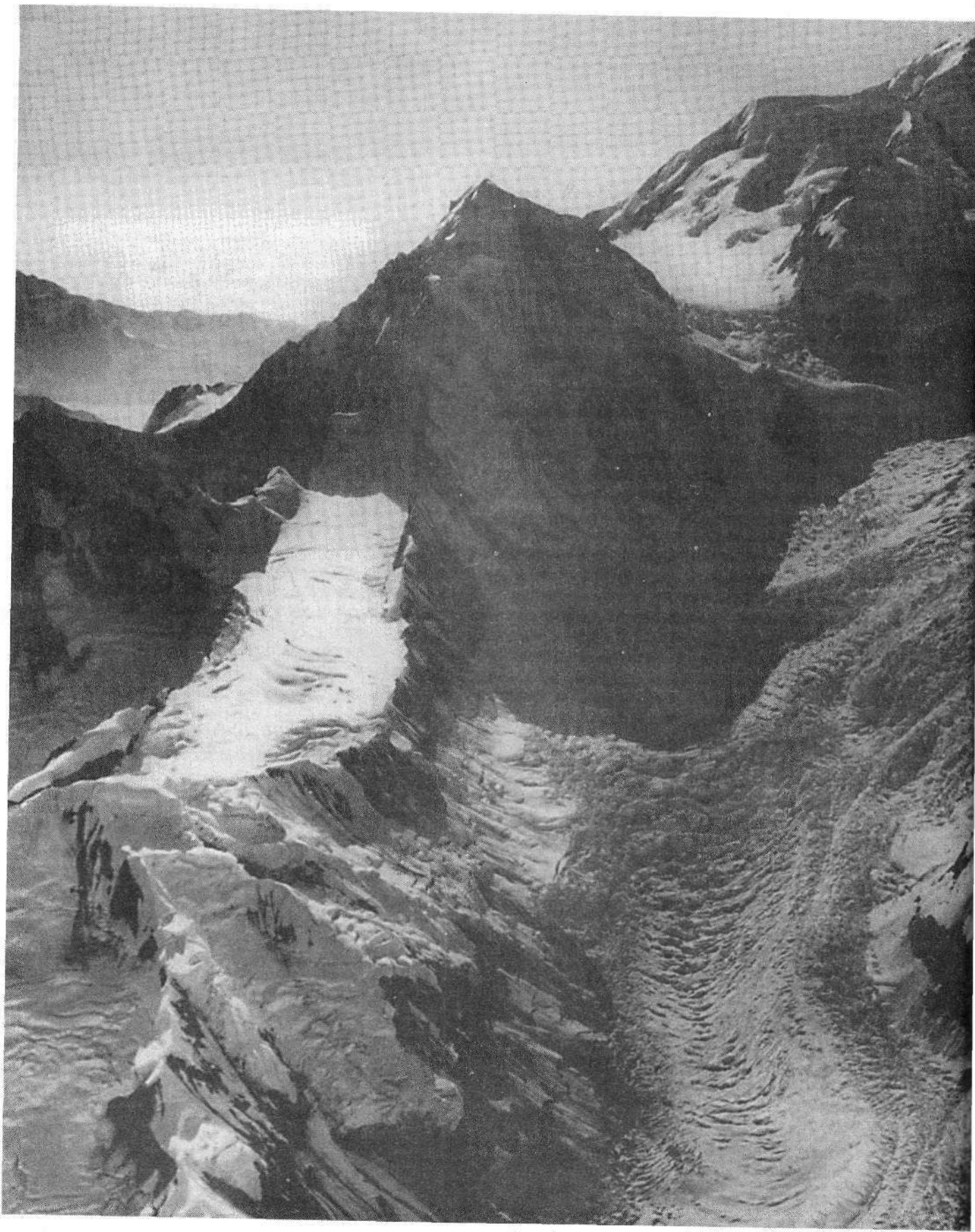
This is a very crucial point. If we had tried to put together a theory of these ice ages based entirely on the geological evidence that had been discovered at that point, it would not have been possible. No amount of running around to all the different mounds and piles of debris left over by the glaciers, and no amount of correlations and mathematical calculations based on those strata, or any kind of dating scheme, could have produced an actual theory of why the ice ages occurred, and why they occurred when they did. Such knowledge had to be arrived at completely from the opposite direction—using man's reason, and the tools that God has given man to determine the harmony of the universe. And that's how Milankovitch and his associates, Wegener and Köppen, approached it, along with the other great scientists who worked together in developing this theory.

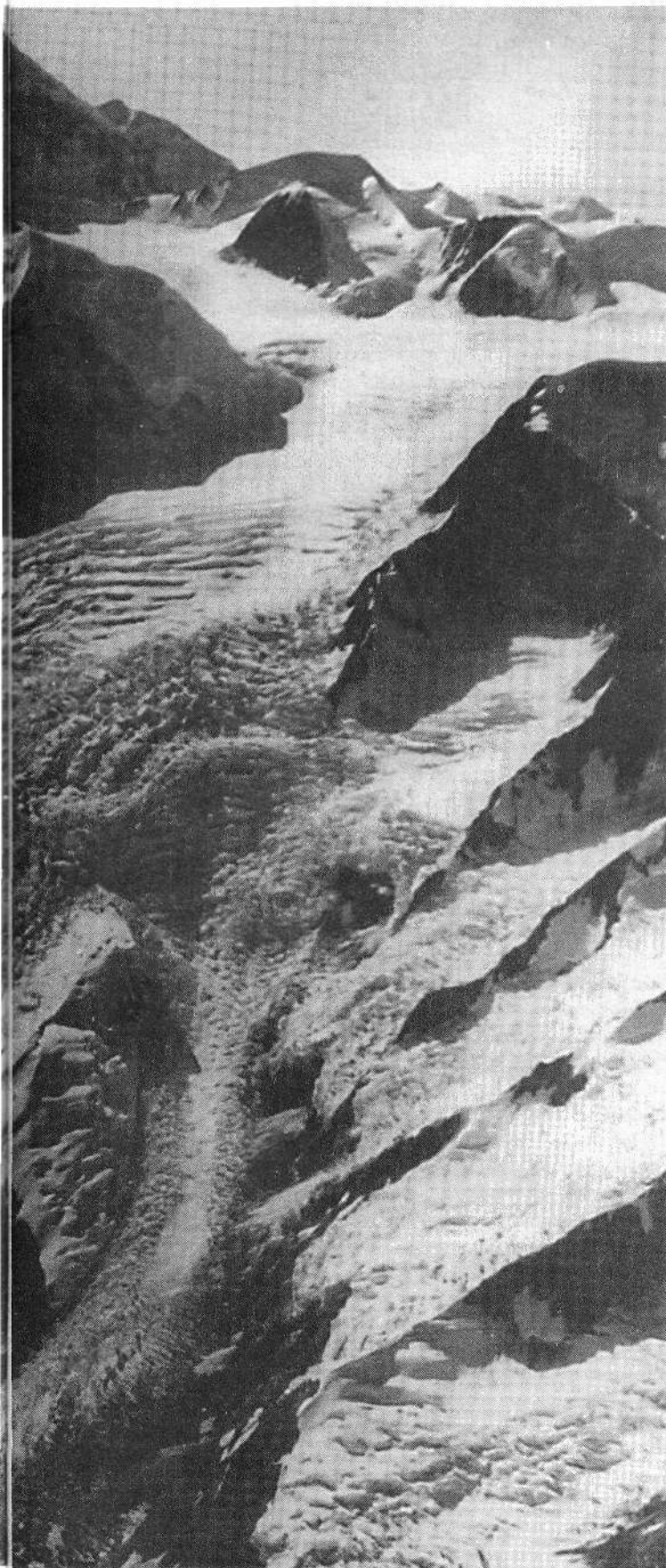
And, as has been pointed out by real scientists today, in the face of a coming ice age, we should not be stampeded into a scare scenario. The issue is, how will man master nature, perhaps to prevent another ice age. And, if we can't prevent it, how can we create the conditions in which we can deal with the world as it develops? Which means that it is necessary to have scientific and technological progress, as opposed to shutting down modern society.

Further, as Dr. Sherwood Idso and other scientists have pointed out, perhaps by releasing more carbon dioxide into the air, we would prevent the onset of another ice age.

As Lyndon LaRouche noted in his presentation yesterday, all this carbon dioxide has already had a wonderful effect on the biosphere. The amount of biomass around the world has increased tremendously. We were reaching a point where the levels of carbon dioxide were getting too low. Plant life around the world was suffering. We have just about the lowest levels of carbon dioxide ever recorded in history, at the present time. So, by burning fossil fuels, we are helping nature with our industrial emissions, even though they are such a small percentage of the production from natural sources. We are thereby actually *increasing* the amount of food available for plants around the world. That poses no danger to anybody.

One of the world's great climatologists, Michael Budiko, a follower of the great Russian scientist Vernadsky, gave a speech in 1988, at one of the first major conferences on global warming. Budiko is now in his 90s, and most of the textbooks on climatology are based on his work, along with that of Hubert Lamb. Everyone expected him to give a speech about the dangers of global warming. But, he got to the podium and he gave a wonderful paper, where he told the conference that, as Vernadsky had pointed out, now it is man's reason that will determine the geological future of the Earth. We will have a much greater world, if we can actually *warm* up the temperature. So, Budiko proposed that we burn all the fossil fuels we can get our hands on, and put as much CO<sub>2</sub> into the air as we possibly can, which will help transform the biosphere into its next, and better, stage! Needless to say, Budiko has not been invited to address any further conferences on global warming.





# The Coming (or Present) Ice Age

*A long-term perspective on the current  
global warming fad*

by Laurence Hecht

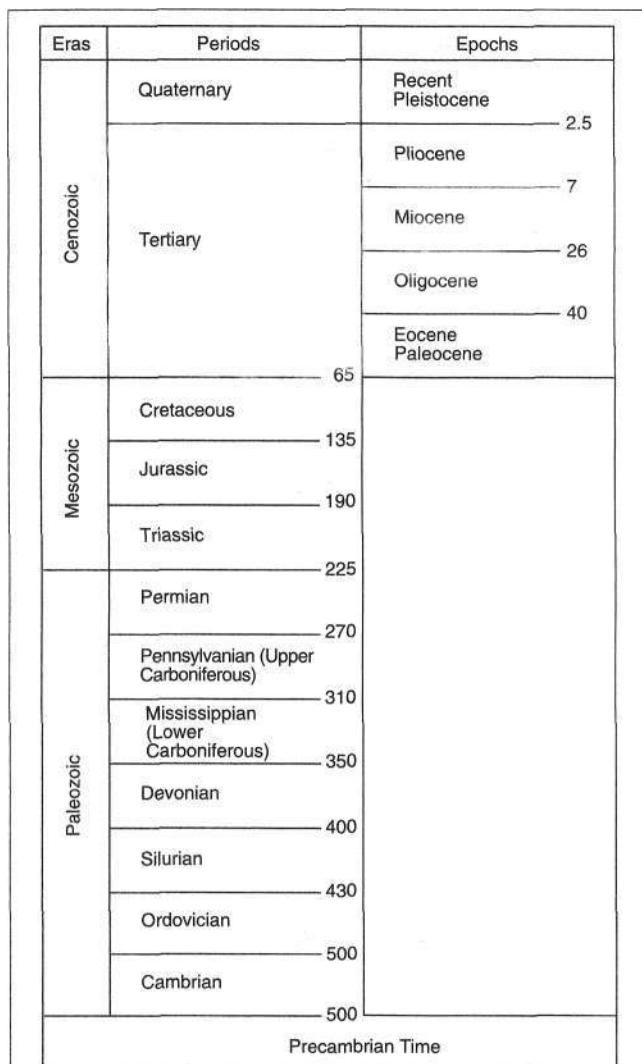
*Reprinted from 21st Century Science & Technology, Winter  
1993-1994, pp. 22-35.*

**W**e are now in an ice age and have been for about the past 2 million years. Over the past 800,000 or so years, the Earth's climate has gone through eight distinct cycles of roughly 100,000-year duration. These cycles are driven by regular periodicities in the eccentricity, tilt, and precession of the Earth's orbit. In each of the past eight cycles, a period of glacial buildup has ended with a melt, followed by a roughly 10,000-year period—known as an interglacial—in which relatively warm climates prevail over previously ice-covered northern latitudes.

U.S. Geological Survey

*The Margerie Glacier in Glacier Bay National Monument,  
Alaska, is a typical fast-moving mountain glacier.*





**Figure 1**  
**THE GEOLOGIC TIME SCALE**  
*Time units of the geologic time scale. (Numbers are absolute dates in millions of years before present.)*

The present interglacial has already lasted beyond the 10,000-year average. One may thus suspect that a new period of glacial advance, a new "ice age," is in the making. Whether it will take a few thousand years or a few hundred, or whether the process of glacial advance is already under way is difficult to say. Of one thing we are sure: The present hysteria over global warming—with its apocalyptic forecast of melting of the polar ice caps, flooding of the coastal cities, and desertification of the world's breadbaskets—is not helping citizens to understand the real and complex forces that shape the Earth's climate.

We do not wish to counter the global-warming hysterics with a new scare tactic of our own. Nor will we concern ourselves here with refuting every wild conjecture put forward by the proponents of a global warming. Enough holes have already been poked in this "theory" (really only a conjecture) to cause honest scientists to exercise caution.<sup>1</sup> Rather, let us take a sober look at the long-term picture of Earth's climate that has been put together over centuries of careful work in the fasci-

nating and challenging multidisciplinary science known as paleoclimatology.

### Our Present Ice Age

At the present time, glaciers—large, slowly flowing masses of ice formed from recrystallized snow—cover about 6 million of the approximately 57 million square miles of land area on the Earth. At the height of an ice age, perhaps another 8 to 12 million square miles of land area, largely in the Northern Hemisphere, becomes covered with a thick layer of ice and crushed snow.

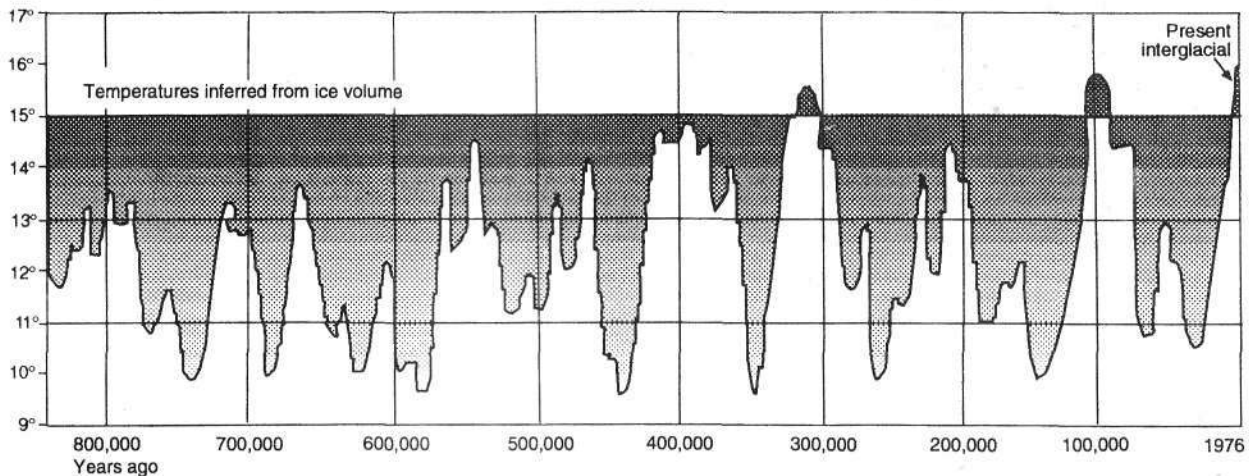
The idea of large-scale glacial motion was brought to the attention of modern science by a Swiss chamois hunter in the early 19th century, who hypothesized that unusual striations in large exposed rocks had been caused by the pressure of a glacier that had since retreated up the mountain. Louis Agassiz, the Swiss paleontologist and associate of the famous Humboldt brothers, waged the fight to convince the scientific community of the truth of this hypothesis, beginning at a conference of the Swiss Society of Natural Sciences at Neuchatel in 1837.

Northern Hemisphere glaciers have been with us only for approximately the past 2 million years, a short stretch on the roughly 4.6 billion-year scale of geologic time, in which our present era, the Cenozoic, occupies the most recent 50 million years (Figure 1). The Cenozoic era is divided into two periods, the Tertiary and Quaternary, the latter of which began about 2 million years ago with the onset of the glacial buildup. Within our present Quaternary period, there are two further subdivisions known as epochs. These are the Pleistocene, which began about 2 million years ago, and the Holocene (or Recent) epoch, which is roughly 10,000 to 12,000 years old. (Some paleontologists argue quite cogently that we are still in the Pleistocene and dispense with the designation of a Recent epoch.)

Currently, the greatest area of glaciation is the continental ice sheet of Antarctica (about 5.0 million square miles), which began its expansion about 5 million years ago. The largest Northern Hemisphere glacier is the Greenland ice sheet (about 0.8 million square miles). As the glaciation expands, most of the additional growth takes place in the Northern Hemisphere.

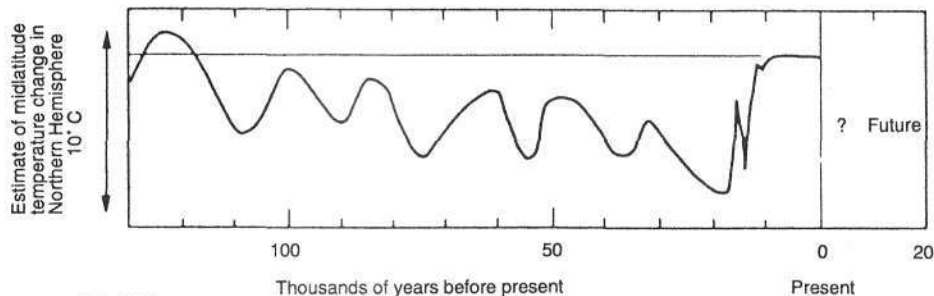
The whole of the last 2 million years, the Quaternary period, is considered an ice age, a relatively rare state of affairs in geologic history. But this long-term ice age has been marked by ebbs and flows in glacial extent. The work of the past two centuries in climatology, paleobiology, meteorology, astronomy, geology, geophysics, and many other fields has confirmed the existence of an *astronomically* determined cyclical pattern within the Quaternary ice age. Driven by well-defined cycles in the Earth's orbital orientation to the Sun, periods of roughly 100,000 years of generally advancing glaciation have been followed by short periods, of roughly 10,000 years' duration, in which the glaciers retreat. These two periods or subdivisions of the ice age are known as *glacials* and *interglacials*.

The 100,000-year periods are not one continuous downward slope of temperature and glaciation, but are modulated by roughly 20,000-year cycles, consisting of 10,000 years of cooling and glacial advance followed by 10,000 years of warming and retreat. But these shorter-term ups and downs of the glaciation curve tend to get cooler and cooler as the



(a) Past 850,000 years

Source: Adapted from Samuel W. Matthews, "What's Happening to Our Climate," *National Geographic* (Nov. 1976), p. 576.



(b) The recent 100,000 years

Source: Estimate of the midlatitude air temperature in the Northern Hemisphere, reprinted with the permission of Macmillan Publishing Company, a Division of Macmillan, Inc., from *Earth and Cosmos* by Robert S. Kandel, Copyright © 1980

Figure 2  
THE EARTH'S CLIMATE OVER THE LAST EIGHT CYCLES

100,000-year cycle advances (Figure 2).

The maximum extent of glaciation, the glacial climax of the last 100,000-year ice age, occurred just 18,000 years ago, at a time when human societies were already well established on the Earth. At that time, a huge continental glacier covered North America down through the northeastern states of the United States, reaching across the midwestern plains and up into Canada (Figure 3). This most recent of the great continental glaciations is known in North America as the Wisconsin (in Europe as the *Weichselian*). Its southernmost limit extended across the middle of Long Island, through northern New Jersey, lower New York State, western Pennsylvania, Ohio, Indiana, Illinois, Iowa, then up diagonally through the northeastern corner of Nebraska, into the Dakotas, and across the southern tier of the Canadian plains.

In more southerly regions, mountain glaciers also spread downward from heights in the Colorado Rockies, the Sierra Nevadas, and the Cascade Range. In western Europe, the glacier reached down from Scandinavia over northern Germany, Poland, and the Baltic nations. It reached deep into Russia and Ukraine south of Kiev, and eastward as far as the central Siberian Plateau. It stretched southwestward over the Netherlands and covered Ireland and most of the British Isles. A separate portion extended outward from the Alps and another

one from the Caucasus Mountains in Asia Minor.

An Arctic climate thus prevailed over much of what are now the major population centers of western and central Europe and the United States. The weather over most of the remaining portions of the three northern continents was quite a bit colder than today's. But hunting was apparently good along the fringes of the continental glaciers, and man survived in these regions in a fairly primitive state, wearing animal furs for warmth and seeking shelter in caves.

The changes wrought in geography during the several-thousand-year period of retreat of that glacier were enormous. It is somewhat shocking to realize that major topographical features on the map of the United States are only about 12,000 years old. Before the completion of the glacial retreat, there were no Great Lakes, for example. None of the many lakes, large and small, that dot the northern tier of the United States existed. Other lakes—such as the 20,000-square-mile Lake Bonneville that once covered much of Utah—dried up, leaving behind only a few relatively smaller remnants, like the Great Salt Lake.

The rivers that emerged after the retreat were not the same as those that had been there 100,000 years earlier, before the glaciation. The northern Missouri River, for example, drained northward into Hudson Bay, and what is now the upper Ohio



**Figure 3**  
**THE LAST GLACIATION IN NORTH AMERICA**

The maximum extent of glaciation occurred just 18,000 years ago and was known in North America as the Wisconsin. The dotted white areas show this huge glacier that covered the northern area of the continent and parts of the western mountain ranges. White areas show today's glaciers.

Source: U.S. Geological Survey

flowed northeast into the Gulf of St. Lawrence. The lower Ohio drained into a now nonexistent river, which geologists have named the Teays.

### Where Are We Now?

We are currently beyond the expected end-point of an interglacial period that began more than 10,000 years ago. We are thus at a point on the paleoclimatic timetable where the onset of a new 100,000-year ice age is expected and may even be already in progress. The global climate has been generally cooling over the past 6,000 to 8,000 years, and is now about 1 degree Fahrenheit cooler than at the time of the postglacial climatic optimum. One might cite evidence such as the advance of the Greenland ice sheet and the southward movement of the limit of citrus growing in the southeast United States over the past 40 years to suggest that the expected cooling is even now under way. However, because these astronomically driven cyclical trends are of long duration (10,000 years being the shortest cooling cycle), it is not possible to attribute a climatic trend on a time span so short as a few decades or even a few centuries to a single cause. One must take a broader view.

The melting of the glaciers that had formed during the last 100,000-year ice age cycle took a long time, and the rate of melting was varied. The North American Laurentide ice sheet was the last to retreat. If we date the beginning of postglacial (interglacial) times to a point roughly 10,000 years ago (c. 8000 B.C.), it is then useful to look at the climate, especially

temperature trends, over this recent 10,000 years.

Following a number of short-term oscillations beginning about 12,000 B.C., a rise in temperature that set in about 8300 B.C. led to sustained warm climates in the northern European lands formerly covered by ice. The maximum summer temperatures experienced in Europe over the last 10,000 years occurred in about 6000 B.C. Over North America, where the process of glacial retreat lagged somewhat, the maximum was reached by about 4000 B.C. That period is known as the Postglacial Climatic Optimum (or the altithermal period) when mean temperatures were about 1 degree Fahrenheit warmer than today.

Beginning about 3500 B.C., a sharp reversal known as the Piora oscillation set in, marked by advance of the glaciers in Europe and large-scale migration of agricultural peoples. From 3000 B.C. to 1000 B.C., the climate regained some of its former warmth but was apparently subject to recurrent fluctuations, particularly in rainfall. From 1000 to 500 B.C., the glaciers advanced again. In Europe the most marked change appears from 1200 B.C. to 700 B.C., coinciding with the Dark Age period that Homeric scholarship suggests occurred in Greek-speaking lands. In some places (Alaska, Chile, China) there is evidence that the cooling and readvance of the glaciers began as early as 1500 B.C.<sup>2</sup>

A period of warmth and higher sea level came to Europe around the year 400 followed by another reversion to colder and wetter climates. This was again reversed, and there was a very warm period that culminated in Greenland about 900 to 1200 and in Europe 1100 to 1300. Known as the Medieval (or Little) Climatic Optimum, temperatures in this period became, briefly, nearly as warm as in the postglacial climatic optimum.

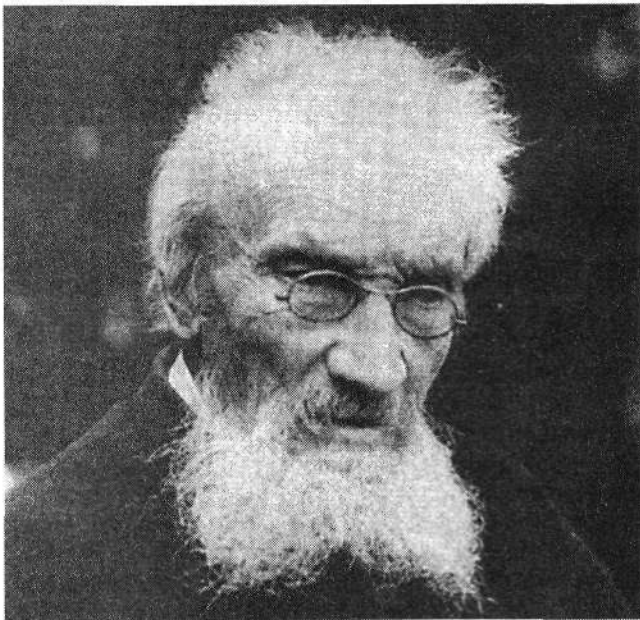
As historical climatologist H. H. Lamb describes it: Oats and barley grew in Iceland. The limit of tillage in northern England, Wales, the Scottish highlands, in central Norway, and in high regions of central Europe was extended hundreds of meters up the hills and mountainsides. Mining operations were begun high in the Alps. Norse colonists were catching cod in the sea off western Greenland, and a regular northern sea route developed to North America.

In the Mississippi valley, peoples were moving northward into Wisconsin and eastern Minnesota, and human settlements spread up the valleys of all the major rivers. Renewed moisture in North Africa allowed cattle to thrive in now-arid regions, and journeys across the desert from North Africa to Ghana, Mali, and Kufra are described by the Arab geographers between the 11th and 14th centuries.

This warming period, which ended as early as 1100 in parts of North America and later in Europe, was followed by a roughly 500-year period of severe cooling known as the Little Ice Age—the *Klima-Verschlechterung*, or climate-worsening in the German literature. The low point of the cooling occurred from about 1550 to 1750, but extreme cold weather began earlier and ended considerably later in many parts. The Greenland colony, for example, died out not long after the year 1400. And in England, tent cities were set up and Frost Fairs celebrated on the frozen river Thames as late as the winter of 1813-14. Some of the symptoms of the cooling as described by Lamb were:

- advance of the inland ice and permafrost in Greenland and of the glaciers in Iceland, Norway, and the Alps;
- spread of Arctic sea ice into the north Atlantic around





E. Kuhbrodt

*Climatologist Vladimir Köppen, Alfred Wegener's father-in-law and collaborator, at the age of 78.*



"Die Weissewüste" by K. Aerdemerten

*Alfred Wegener in Greenland.*

Greenland, forcing abandonment of the sailing routes used from the year 1000 to 1300;

- lowering of the treeline in central European highlands and in the Rockies, spread of lakes and marshes in Europe and northern Russia, swollen rivers and increasing frequency of landslides;
- increasing frequency of freezing of rivers and lakes;
- increasing severity of windstorms and sea floods;
- harvest failures and rising prices of wheat and bread;
- abandonment of tillage, vineyards, and farm villages; and
- increased incidence of disease and death among human and animal populations.

### The Conditions for an Ice Age

From the long-range view of the geologist, the last 2 million years of glacial climate conditions are not the global "norm." Only two times in the 600-million year near-term geologic record have the conditions been ripe for an ice age: once in the Permian period of the Paleozoic era, about 250 million years ago, and once more in the present Quaternary period.

There are two basic requirements for an ice age:

First, a configuration of the continents that places a large portion of the land mass in polar and nontropical regions.

Second, a climate in the higher latitudes characterized by wet, snowy winters followed by summers cool enough to not reduce the glacial advances made the previous winter.

Although the causes that give rise to these two conditions are complex and far from perfectly understood, the recognition of their importance and of some of the basic mechanisms governing their genesis dates to no later than the early part of this century. Subsequent advances in nearly all the physical sciences and the work of thousands of researchers in the many fields related to historical climatology have greatly enhanced our understanding and documentation of the climate record. But the big challenge, to understand climate well enough to be

able to predict its future course, is still out of reach.

### The Köppen-Wegener Connection

If the name of a single person were to be identified with the birth of the modern science of paleoclimatology, it would be one that is little known, even to many specialists in the field: Vladimir Köppen (1846-1940). The St. Petersburg-born meteorologist came from a German family that had settled in Russia during the reign of Catherine II. He began his study of natural sciences in Heidelberg in 1866 and received his doctorate in 1870 with a paper, published in Moscow, on the effects of heat on plant growth. After a brief period of work at the Central Observatory in St. Petersburg, Köppen came to the German Marine Observatory in Hamburg where he stayed for 44 years, becoming first the head of the weather service and then meteorologist of the observatory.

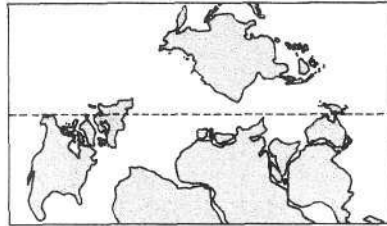
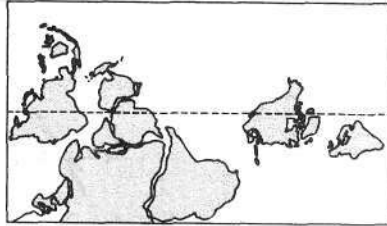
Köppen's list of publications numbers 526 items. Of these, probably the most important for today is the one he coauthored with his son-in-law, Alfred Wegener, in 1924, *Die Klimate der geologischen Vorzeit* (The Climates of the Geological Past).

Alfred Wegener (1880-1930) is known to students of the earth sciences today as the father of the modern theory of continental drift. Wegener's now-famous theory was initially rejected by the science establishment, and became widely accepted only in the 1960s and 1970s, well after his tragic death on the Greenland glacier in 1930.

It is far less well known that Wegener and his father-in-law Köppen were also leading proponents of the modern theory of astronomical determination of the ice age cycles.

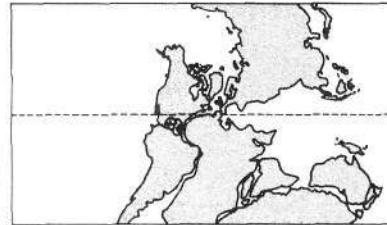
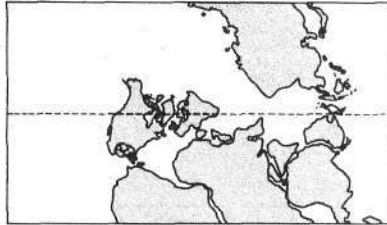
The two theories—continental drift and the determination of the ice ages by the cycle of solar insolation—had a common thread. In the minds of Wegener and Köppen they were really one grand conception. The first theory began with Wegener no later than 1910. It is recorded in a charming letter to his wife:

The supercontinent "Pangaea I," lay across the Southern Hemisphere in the Cambrian, 510 million years ago.



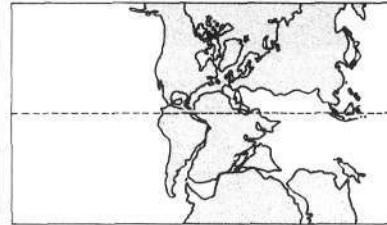
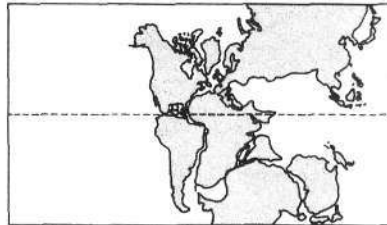
Life moved from the ocean and began to flourish on land during the Devonian, 380 million years ago.

A single land mass, Gondwanaland, existed in the Southern Hemisphere in the Carboniferous, 340 million years ago.



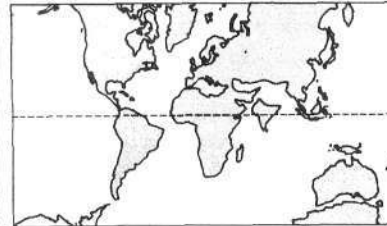
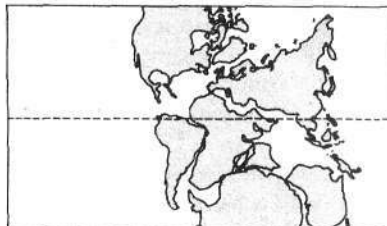
An ice age occurred in the southern continents, grouped around the pole, in the Permian, 250 million years ago.

A rift appeared in "Pangaea II," as it began to crack during the Triassic, 220 million years ago.



The continents began to drift toward the poles again during the Jurassic, 170 million years ago.

A warm and equable climate prevailed during the Cretaceous, 100 million years ago.



By Tertiary times, 50 million years ago, conditions were similar to those of today, and suitable for ice-caps to form.

Figure 4

Ice ages occur not because the Earth as a whole is plunged into a deep freeze with ice extending down to the equator, but because in the Earth's evolution, the slow process of continental drift carries continents to high latitudes, where snow can fall and build up into great ice-sheets.

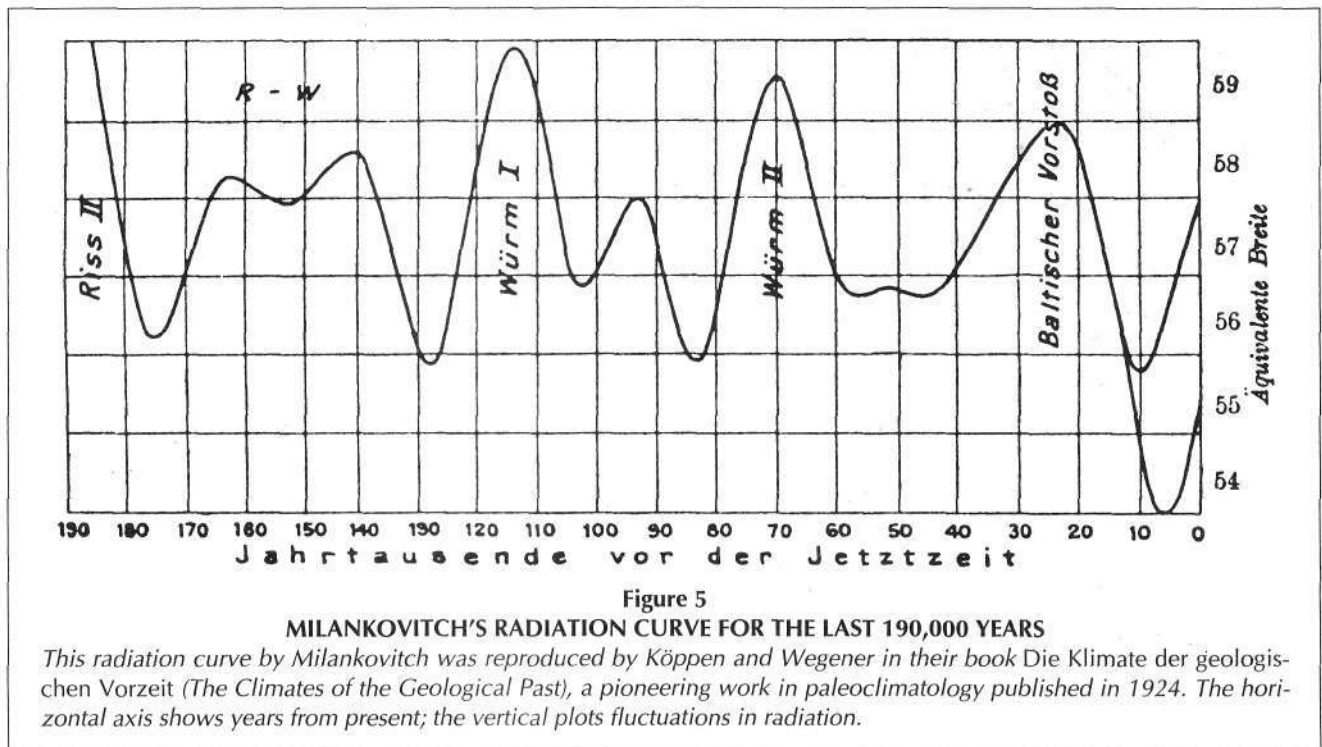
Source: From *The Weather Book* by Peter Wright, Ralph Hardy, John Kingston, and John Gribbin. Copyright © 1982 by Harrow House. By permission of Little, Brown and Company

"Doesn't the east coast of South America fit exactly against the west coast of Africa, as if they had once been joined? The fit is even better if you look at a map of the floor of the Atlantic and compare the edges of the dropoff into the ocean basin rather than the current edges of the continents. This is an idea I'll have to pursue."<sup>3</sup> The idea itself was not new; it had been noted in Alexander von Humboldt's famous *Cosmos*, among other locations.

But Wegener had at his command the extensive researches of the previous century, which included data of both a geologic and paleobiologic sort, suggesting the possibility that the continents had once been linked. The similarity of South American and African fossils and the close relationship of flora and fauna of many regions separated by oceans had already been noticed by investigators. One prominent attempt

at an explanation was the hypothesis that land bridges had once existed, for example, connecting South Africa with southern South America, North Africa with Florida and the Caribbean, and so forth. Twenty years before Wegener, the great Viennese geologist Eduard Suess had proposed that the continents may have been linked together in one supercontinent, which he called Gondwanaland. The similarity in geological development of the continents of the Southern Hemisphere (including the Indian subcontinent), and their marked difference from those of the north, had already suggested some such link. But Suess was not sufficiently versed in these fields to recognize the paleobiological and climatological significance of his hypothesis.

Wegener drew on Suess's differentiation of the two major types of rocks *sial* (for silicon-alumina) and *sima* (for silicon-



magnesia) that make up, respectively, the bulk of the crustal material of the continents and the ocean floors. The sial, which corresponds most closely to granite, has a specific gravity (a measure of its weight in comparison to an equivalent volume of water) of 2.7, while the sima, which is like basalt, is somewhat heavier at 3.0. Thus the lighter rock making up the continental crust could be thought of as formed into giant blocks floating, somewhat like icebergs, above the denser sima.

Wegener's drift hypothesis was first presented in Frankfurt-am-Main on Jan. 6, 1912, at the annual meeting of the Geological Association. The first book-length account, *Die Entstehung der Kontinente und Ozeane* (The Origin of the Continents and Oceans), appeared in 1915. Here and in his other early papers, Wegener was somewhat at a loss to explain by what mechanism the drifting apart of these blocks would occur. In 1929, he tentatively proposed the answer accepted today, referring to the possibility of convection currents in the *magma*—the layer of molten rock on which the Earth's crust is thought to float. The high mountain ranges found near the edge of continents—the Alps, Himalayas, and the Cordilleras, which range from Alaska to southern Chile—were seen as produced by the crumpling up of layers of rock on the leading edge of the drifting continents, produced by forces similar to that of a bow wave.<sup>4</sup>

Together, these ideas condensed in the notion that the continental blocks had once been united in a single great continent, called *Pangaea*, and had subsequently drifted apart, taking up various configurations before arriving at the one we know today. In its details, the Wegener hypothesis also went a long way toward explaining some of the climatic anomalies in the fossil record and other paleobiologic evidence from widely varying places on the Earth. A snapshot summary of the modern reconstruction of the theory of drifting continents can be

seen in the map series showing reconstructions of the global map at major points on the geologic time scale (Figure 4).

### The Solar Astronomical Cycles

In 1910, the same year that Wegener was formulating the theory of continental drift, his father-in-law, Köppen, was mus-ing over the earlier research of glaciologists Albrecht Penck (1858-1945) and Eduard Brückner (1862-1927), *Die Alpen in Eiszeitalter* (The Alps in the Ice Age). Through their extensive fieldwork in Alpine regions, Penck and Brückner had been able to distinguish four separate cycles of glacial advance and retreat over the ages, and they produced a climatic curve for the ice age. Köppen conceived the idea of superimposing on this curve the time-scale produced by examining the changes in insolation caused by regular cycles in the Earth's orbital relationship to the Sun. Köppen's hope was that the cycles of glacial advance and retreat could be dated by correlating them to the astronomical cycles.

The idea of a correlation between long-term changes in climate and the solar-astronomical cycles goes back to a hypothesis put forth in 1830 by Sir John Herschel, the son of the great astronomer Friedrich Wilhelm Herschel and a leading figure in 19th-century British science. Herschel thought that the 21,000-year cycle of seasonal precession of the equinox might have a determining effect on climatic history. His hypothesis was taken up and elaborated first by the French mathematician J.F. Adhémar in 1842, and then by the self-taught Scottish climatologist James Croll beginning in 1860, who added into his calculations the cycle of change of the eccentricity of the orbit. However, at the end of the 19th century, the exact periodicity and extent of this cyclical variable had not been precisely calculated. Croll was also hampered by his incorrect supposition that periods of ice buildup would coincide with the harshest winters.





K. Brunnacker

Milutin Milankovitch, the Yugoslav climatologist who calculated the astronomical cycles.

It has since been deduced that mild summers, in which the glacial advance of the previous winter's snow is not erased, are more important than the harshness of winter. Nevertheless, against great opposition, Croll defended the hypothesis first advanced by Herschel into the end of the 19th century. In 1910, when Köppen and then Wegener took it up again, it was neither a popular nor a widely accepted hypothesis.

#### Milutin Milankovitch

But one man, Milutin Milankovitch (1879-1958), a skilled mathematician from the University of Belgrade, had independently begun his own investigation of the astronomical theory of climate. From 1911 until his first contact with Köppen in 1920, Milankovitch carried out painstaking calculations of the long curve of the variability of solar insolation (the amount of sunlight) at northern latitudes, in hopes of demonstrating its forcing effect on the ice age cycles (Figure 5). He published a few small papers on his work and then, in 1920, a book in the French language, *The Mathematical Theory of Heat Phenomena Produced by Solar Radiation*, which came to the attention of Köppen.

In that work, Milankovitch spelled out his theory of astronomical rhythms, carefully determining the effect of three major cyclical variables:

- the 26,000-year period of the precession of the equinox, which, when combined with the advance of the perihelion, the point at which the Earth is closest to the Sun, produces a 21,000-year cycle;
- the 40,000-year cycle of variation of the obliquity of the ecliptic (the tilt of the Earth's axis), which varies from 22 to 24.5 degrees;
- the 90,000 to 100,000-year cycle of variation of the eccentricity of the Earth's elliptical orbit.

A postcard from Köppen initiated an extended correspondence between the two men. Milankovitch, who hoped to use his cal-

culations to produce a curve of past climates, was troubled by the question of which season and which latitude was most critical to the advance of glaciation. One of the important fruits of the exchange was Köppen's conclusion that it is the diminution of summer heat—not the increase of winter coldness, as Croll had thought—that is most important to the ice buildup.

At the encouragement of Köppen, Milankovitch calculated the effect of the three astronomical cycles on Northern Hemisphere glaciation for 650,000 years into the past and 160,000 years into the future. This came to be known as the Milankovitch-cycle theory of climatic history. In a popular book published in Leipzig in 1936, Milankovitch described his theory and his close collaboration with Köppen and Wegener in the form of letters to an imaginary girlfriend, *Durch Ferne Welten und Zeiten*. . . (Through Distant Worlds and Ages: Letters from an Ambler through the Universe).<sup>5</sup>

## What's Wrong with Global Warming Theory?

Everyone would like to know what the temperature will be tomorrow and some far-sighted people wonder what it will be like fifty, one hundred, or even thousands of years into the future. The only honest answer is that we really do not know.

As indicated by the fluctuations and sometimes rather rapid reversals of global and regional climate briefly documented here, it is not possible to draw competent conclusions from trends of a few decades, or even centuries concerning the direction of climatic trends. It is certainly not possible to forecast future climates on the basis of one parameter (CO<sub>2</sub> density). What the historical record does tell us is that we are in a secular tendency toward a new glaciation. To propose—as does the currently popular Malthusian fad known as global warming—that we are moving into a period of substantial glacial melt and sea-level rise runs counter to the evidence and the conclusions of more than two centuries of scientific work.

It is sufficient to point out a few anomalies to call the whole global warming conjecture into serious doubt:

- The Greenland ice sheet and snow buildup in Antarctica have recently advanced.
- Since 1980, there has been an advance of more than 55 percent of the 625 mountain glaciers (Austria, Switzerland, Italy, Iceland, United States, and Soviet Union) under observation by the World Glacier Monitoring group in Zurich. (From 1926 to 1960, 70 to 95 percent of the monitored glaciers were in retreat.)
- The limit of the citrus-growing region in the U.S. Southeast has moved southward, and the U.S. Department of Agriculture has revised its hardiness zones southward.

#### On Temperature Increases

The often cited figures for the current warming trend show a rise in mean global temperature of about 1 degree F since 1880. However, these data are somewhat suspect. A great deal of statistical manipulation is required to try to

Like Wegener's theory of continental drift, the Milankovitch theory of astronomical cycles was not widely accepted by the scientific establishment. Nevertheless, a number of paleoclimatologists in America and Europe took it up and carried out pioneering work from the 1930s onward, which tended to corroborate the Milankovitch cycles. Much of this was in the field of paleobiology, examining core samples from various marine basins under the microscope, using innovative means of dating the biota and determining sea levels and temperature levels coinciding with the time of their formation.

Although Milankovitch was still fighting an uphill battle at the time of his death in 1958, today his general theory is widely accepted. Deep-sea core samples taken in the 1970s showed the Milankovitch 20,000, 40,000, and 100,000-year periodicities going back for 1.7 million years. The new work was reported in *Science* magazine in 1976 in a paper written by a team of

young researchers at Columbia University's Lamont-Doherty Geological Laboratory.<sup>6</sup> Somewhat ironically, the geology department at that university had been one of the staunchest holdouts against Wegener's theory of continental drift.

Dr. John Imbrie, who ran the computer programs analyzing the data, was the first to hypothesize that the evident periodicities were caused by the Milankovitch cycles. He found that the 100,000-year cycle was predominant. (Milankovitch had expected that the 40,000-year cycle of the angle of obliquity would be the dominant one; it was for the periods before about 800,000 years ago. But since that time, for reasons not yet fully understood, the 100,000-year periodicity has become dominant.)

To understand the solar astronomical cycles, which are one of the foundations of the scientific theory of climate history, we need only examine some of the key geometric features of the

discount the warming caused by urbanization around the monitoring stations. What one should bear in mind is that the global climate in 1880, including the Northern Hemisphere was exceptionally cool. Thus the curve starts from a point in time when temperatures were unusually low, which exaggerates the warming effect.

Furthermore, the global temperature curve shows warming from 1880 to 1940, cooling from 1940 to 1976, and renewed warming from 1976 to the present—the net rise being 0.5 Celsius or about 1 degree Fahrenheit. The point should be made that most of this warming took place in the first half of the century before widespread use of fossil fuels (and increased carbon dioxide emissions).

Moreover, the recent global temperature increase has occurred over tropical regions. As atmospheric scientist Hugh Ellsaesser points out (*21st Century*, Winter 1991, p. 53): "While the warming up to 1940 was greatest in the North Atlantic and in winter, the more recent warming since 1976 has been greatest in the tropics, and some of the earlier warming in the North Atlantic has gone away." These are conditions that can and apparently do favor advance of glaciation.

Regarding measurement of carbon dioxide and our understanding of its role in the atmosphere, one should consider the following:

- Estimates of the preindustrial levels of CO<sub>2</sub> are subjective. Nineteenth century measurements of CO<sub>2</sub> were carried out with error factors of up to 100 percent.
- The Mauna Loa observatory in Hawaii is considered an ideal site for CO<sub>2</sub> monitoring. However it is also near the site of an active volcano whose CO<sub>2</sub> emissions must be



U.S. Geological Survey

*The evidence points more to coming glaciation than to warming. Here, the four-mile wide front of the massive (425 square mile) Columbia glacier, near Valdez, Alaska.*

"edited" from the data.

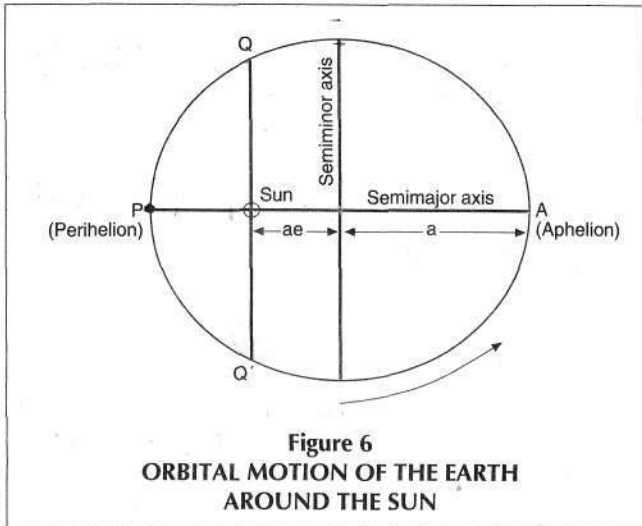
- The concentrations of CO<sub>2</sub> in air bubbles trapped in ice are often taken as previous atmospheric concentrations, which assumes that the air's composition remains unchanged. However, studies show that CO<sub>2</sub> content in ice can be greatly enriched or depleted in comparison to original atmospheric levels.

- The outgassing of CO<sub>2</sub> from the Earth's mantle annually is 10 times that of man-made sources, and the CO<sub>2</sub> ex-

changed annually between the ocean and the atmosphere is much greater than that. If all the Earth's fossil fuels were burned it is likely that the CO<sub>2</sub> produced would be dissolved in the ocean, before reaching an atmospheric concentration double current CO<sub>2</sub> levels.

It is not out of the question that a short-term, counter-cyclical trend, such as the conjectured warming caused by human production of CO<sub>2</sub> and other greenhouse gases (of which water vapor of natural origin is by far the most prevalent), might disrupt a longer-term cooling trend. But this must be proven, as it has not been.

Any competent scientific discussion of the global warming conjecture would have to be located in the context of the secular tendency toward an ice age. The global warming case has not been put forth as science, however. Instead, what has been set before the public are scare scenarios of massive polar ice melt, sea level rise, and catastrophic flooding for the coastal regions, combined with heat and drought conditions over large parts of the rest of the globe. This is not science but intellectual dishonesty bordering on fraud.



**Figure 6**  
**ORBITAL MOTION OF THE EARTH**  
**AROUND THE SUN**

Earth's elliptical orbit. Johannes Kepler's discovery in the early 17th century that the planets move in ellipses about the Sun, with the Sun at one focus, and his elaboration of the laws of this motion are the basis of all astronomical hypothesis concerning climate. (Wegener, in fact, had studied classical astronomy and wrote his dissertation at the University of Berlin on the subject "The Alphonsine Tables for the Use of a Modern Calculator," a recalculation of the old tables used to ascertain the positions of the Sun, Moon, and the five then-known planets.)

#### Geometry of the Solar Cycles

Let  $PQ'AQ$  represent the elliptical orbit of the Earth around the Sun at  $S$  (Figure 6). Looking down upon the North Pole of the Earth, the orbital motion is counter-clockwise from  $P$  to  $Q'$  to  $A$  to  $Q$  and back to  $P$  again. We have exaggerated the ellipse in order to simplify visualization of the processes described. As the Sun sits at one focus of the ellipse, the distance from Earth to Sun is least when the Earth is at  $P$ , the position known as *perihelion*, and greatest at  $A$ , the *aphelion*.

Let us examine the change in the amount of solar radiation that will be received as the Earth moves from aphelion to perihelion. (The radiation received at the edge of the Earth's atmosphere is known as *insolation*.)

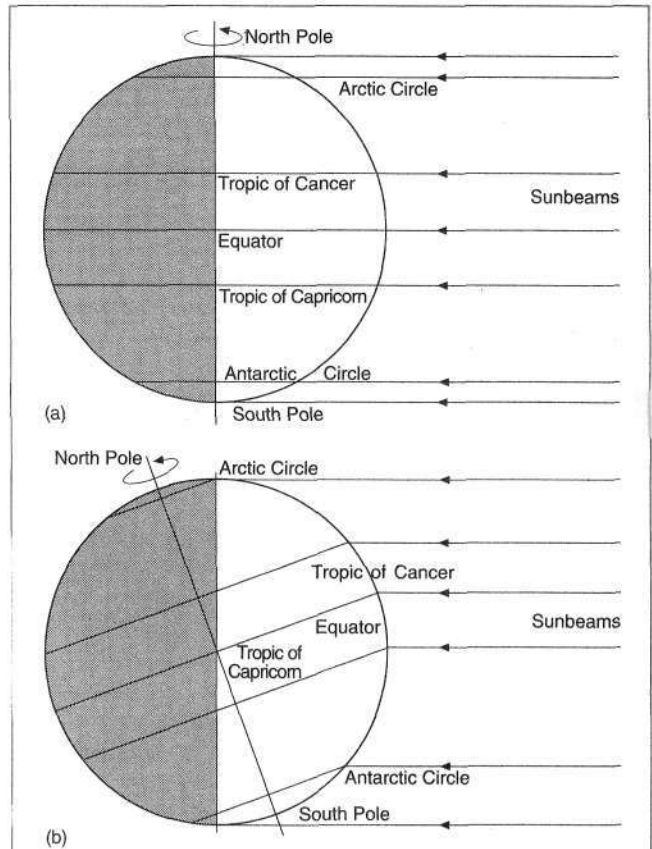
An ellipse is completely described by two parameters, the length of its semimajor axis,  $a$ , and the value of the eccentricity,  $e$ , which is the factor by which  $a$  is multiplied to find the foci. Measuring from the center of the ellipse (where the semimajor and semiminor axes cross), a focus is located at a distance  $ae$  along the semimajor axis. The eccentricity  $e$  is thus always a number between 0 and 1.

With this in mind, we see that the perihelion point,  $P$ , sits at a distance  $(a - ae)$  from the Sun while the aphelion,  $A$ , is at the distance  $(a + ae)$ . If, to simplify, we let  $a = 1$ , then the distances from the Sun are:

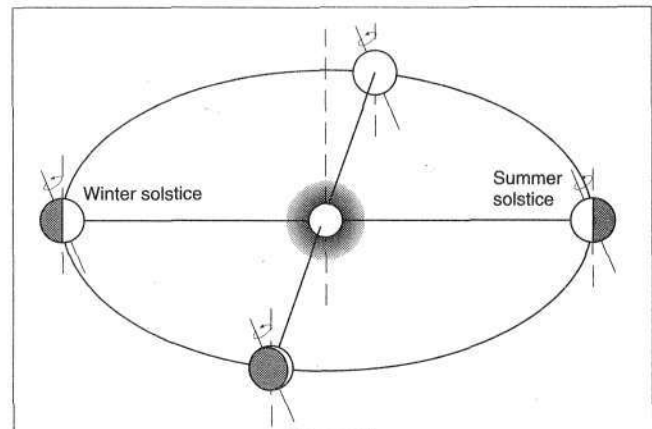
$$P = 1 - e, \text{ and}$$

$$A = 1 + e.$$

Now, since the intensity of light varies as the inverse square of the distance from the source, the insolation at  $A$  and  $P$  will be:

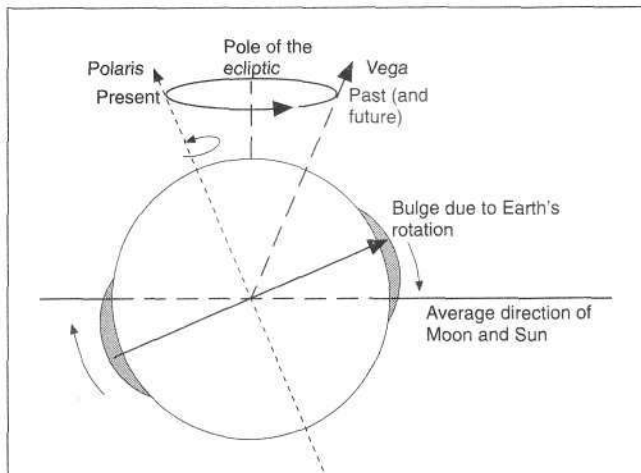


**Figure 7**  
**OBLIQUITY AND INTENSITY OF THE SUN'S RAYS**  
*Even without a tilt of the axis, the variation in angle of incidence of the Sun's rays (a) would cause the poles to be cooler. Increasing the angle of obliquity spreads the effect (b).*



**Figure 8**  
**SEASONS AND OBLIQUITY**  
*Seasonal change results from the combined effect of the orbital inclination and the yearly revolution of the Earth around the ellipse. When the Earth's spin axis is pointed away from the pole of the ecliptic, the Northern Hemisphere has its shortest day (winter solstice), while the Southern Hemisphere has its longest day (summer solstice).*





**Figure 9**

**PRECESSION AND CHANGE OF POLE STAR**

The Earth's spin axis makes a complete rotation around the pole of the ecliptic in a cycle of approximately 26,000 years. The pole star is now Polaris, but about 13,000 years ago it was Vega.

$$P_{\text{insol}} = 1/(1 - e)^2$$

$$A_{\text{insol}} = 1/(1 + e)^2$$

And the difference of the two is:

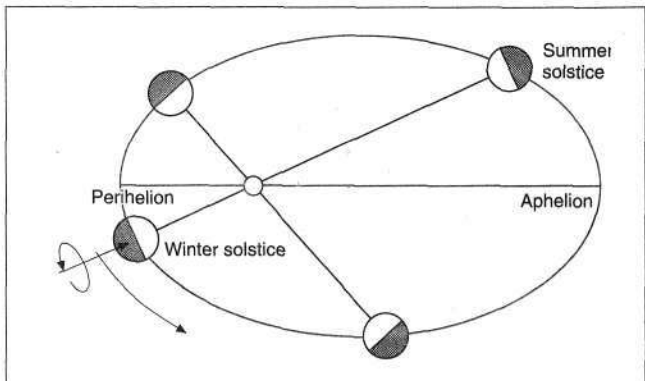
$$\frac{1}{(1 - e)^2} - \frac{1}{(1 + e)^2} = \frac{4e}{(1 - e^2)^2}$$

This is the maximum variation of insolation between perihelion and aphelion. Since for small values of  $e$  the denominator differs insignificantly from 1, the value  $4e$  provides a very good approximation for this flux difference.

The present value of eccentricity for the Earth's orbit is 0.017, and the variation in insolation thus comes to 0.068, or approximately 7 percent. But the orbital eccentricity is known to pass through a complete cycle in approximately 94,000 years, varying from near 0 (a circular orbit) to 0.07. At the latter value, the difference in insolation between aphelion and perihelion becomes 28 percent.

Now, the Earth is not simply a moving point, but a solid body of more or less spherical shape. It rotates about an axis that is inclined to the plane of the ellipse by a certain angle known as the *angle of obliquity*. It is this inclination of the Earth's axis, which is now about 23.5 degrees, that causes the main difference in temperature between polar and equatorial regions. The flux of the Sun's rays striking the Earth obliquely is spread over a greater surface area than that of the rays that strike in a more perpendicular direction. Even without that obliquity there would be some variation in temperature between pole and equator, because of the changing angle at which the parallel rays of the Sun will strike the circular arc that represents the Earth's surface (Figure 7). An increase in the angle of obliquity tends to exacerbate this effect.

Seasonal change, that is the yearly passage through spring-summer-fall-winter, is caused by the combined effect of the or-



**Figure 10**

**PRECESSION AND LOCATION OF THE SOLSTICE**

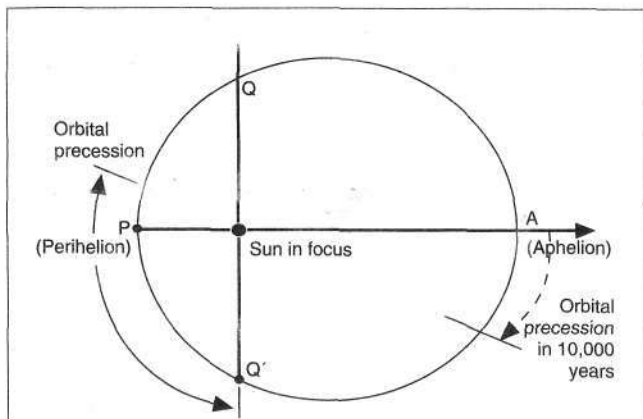
The precession cycle changes the location on the ellipse where the winter and summer solstices occur. The approximate positions on the ellipse are shown for the solstices today.

bital inclination and the yearly revolution of the Earth around the ellipse. In the course of a year, the Earth's axis of rotation will point to the same approximate direction in the distant sky, no matter where on the ellipse we find ourselves (Figure 8). However, in one annual revolution around the Sun, the axis will take up all orientations with respect to the line perpendicular to the plane of the ellipse and passing through the center of the Sun, which is known as the pole of the ecliptic. When the Earth's spin axis is pointed away from the pole of the ecliptic, the Northern Hemisphere experiences its shortest day, known as the winter solstice. On the same day, the Southern Hemisphere experiences its longest day, the summer solstice. The opposite situation occurs at the position 180 degrees around the ellipse.

If the axis of the Earth had no motion of its own, the seasons would always occur at the same points in the orbit. But the direction in the sky to which the Earth's axis of rotation points varies on a cycle of approximately 26,000 years. In the course of that cycle, the spin axis makes a complete rotation around the pole of the ecliptic, one obvious consequence of which is a change in the pole star (Figure 9). Another consequence, which was noted by the ancient astronomers, was the long-period change of that constellation in which they observed the Sun rising on the day of the vernal (spring) equinox. Later comparison of the physical dynamics of this phenomenon to the precession of a spinning top (the wobbling as it winds down) led to the name *precession of the equinox* for the 26,000-year cycle.

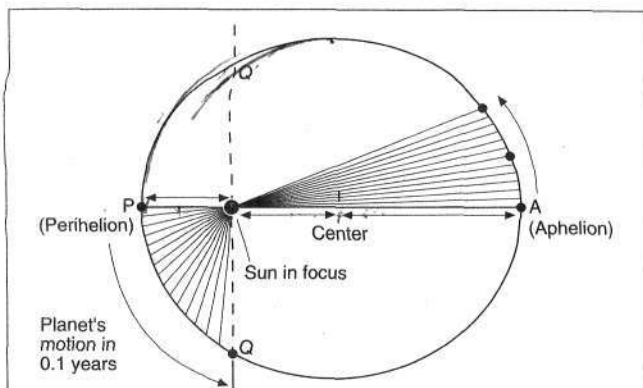
As a result of this phenomenon, we must take into account where on the ellipse the winter and summer solstices occur. When the Earth is at  $P$  in Figure 6 and the axis is turned 180 degrees away from the Sun, we will have winter in the Northern Hemisphere. That was the situation in approximately the year 1250. Today we have moved a bit on the precession cycle and find the Northern Hemisphere winter occurring at roughly the position shown in Figure 10.

In addition to the phenomenon known as precession of the equinox, the perturbations in the Earth's orbit caused by the motion of the other planets, most notably Jupiter, cause a



**Figure 11**  
**ADVANCE OF THE PERIHELION**  
**OR ORBITAL PRECESSION**

*Perturbations in the Earth's orbit, the result of the motion of the other planets (in particular, Jupiter) cause a phenomenon known as advance of the perihelion or precession of the orbit, in which the complete cycle of precession takes approximately 21,000 years, not 26,000.*

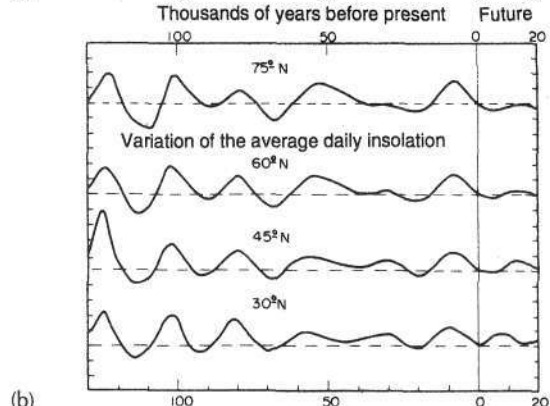
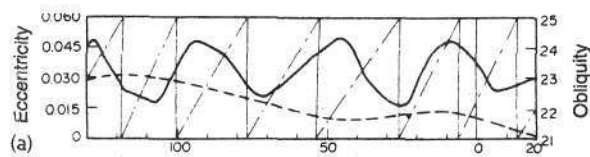


**Figure 12**  
**INSOLATION AND THE EQUAL AREA LAW**

*As Kepler demonstrated, the rate of motion of the Earth in its elliptical orbit is not uniform: Planets move more swiftly when near to the Sun at perihelion than when at aphelion. In this ellipse of high eccentricity,  $e = 0.5$ , the planet takes the same time to move from aphelion to B as it takes from perihelion to Q'. The rate of change of the angle that the radius vector makes with a fixed direction is inversely proportional to the square of the distance between the Sun and planet. This is the same law that describes the diminution of insolation with distance.*

phenomenon known as *precession of the orbit*, or *advance of the perihelion*. The result is that the complete cycle of return to the position where Northern Hemisphere winter occurs at P takes approximately 21,000, not 26,000, years (Figure 11).

Recalling that the most important astronomical requirement for glacial advance is a string of mild summers in which the



**Figure 13**  
**MILANKOVITCH CURVES**  
**AND THE LAST GLACIATION**

*Milankovitch calculated variations of the orbital and rotational parameters of the Earth, and climate, over the past 130,000 years and the next 20,000.*

*In (a), the obliquity of the ecliptic (solid line) and the eccentricity of the orbit (dashed line) are shown. The dash-dot line gives the variation of the angle between perihelion and the position at vernal equinox, now about 90°, and going from 0 to 360° in about 20,000 years.*

*The variation of the average daily insolation from the values of the year 1950 is shown in (b), with 1 unit of the vertical scale corresponding to 25 watts per square meter.*

Source: Adapted from A. Berger, 1977, *Celestial Mechanics*, Vol. 15, p. 53, and 1978, *Quaternary Research*, Vol. 9, p. 139. Reprinted with the permission of Macmillan Publishing Company, a Division of Macmillan, Inc., from *Earth and Cosmos* by Robert S. Kandel, Copyright © 1980

winter snow buildup is not completely erased by melt, we are now in a position to examine how the orientations of the orbit might contribute to meeting this need.

### Astronomy and Climate

It might at first appear that the occurrence of Northern Hemisphere summer at A, combined with a relatively high eccentricity, would produce the most favorable conditions.

However, we have yet to take one other consideration into account. The rate of motion of the Earth in its elliptical orbit is not uniform. As Kepler was able to demonstrate, the planets move more swiftly when near to the Sun at position P than when at position A. He was able to define the rate of change of velocity as such that the radius vector of the moving planet sweeps out equal areas on the surface of the ellipse in equal times (the Equal Area Law). The case is illustrated for an ellipse of high eccentricity ( $e = 0.5$ ) in which the planet's motion in one-tenth of a year is marked out in portions of the orbit near perihelion and aphelion (Figure 12). When this

variation in time is analyzed more closely, it is found that the rate of change of angle that the radius vector makes with a fixed direction is inversely proportional to the square of the distance between the Sun and planet. Thus, the same mathematical law that describes the diminution of insolation with distance also describes the diminution in rate of change of the angle of the radius vector.

The consequence is that the planet intercepts the same quantity of solar radiation for each degree of angular rotation, although it passes through each degree of rotation at a varying rate. Thus, if the orbit is divided up into four quadrants, such as by the points *P*, *Q*, *A*, *Q* and the lines connecting them to the Sun, the planet will receive exactly the same insolation in all four quadrants. The trick is to recognize that the time spent in the two larger quadrants that surround *A* is longer than that spent in the two smaller quadrants that surround *P*. Thus, the same insolation is received over a longer number of days in the two larger quadrants and its flux density per day is consequently less.

If winter solstice occurs at *P*, climatologists call the two smaller quadrants *caloric winter* and the two larger ones *caloric summer*. One sees then that another way of describing the condition described above is to say that the summer is longer and milder (at least with respect to solar insolation) than winter. The difference in length between caloric summer and winter can be as great as 33 days. At the present time, the difference is 7 days. This will vary with the eccentricity, which, as we have mentioned, has a cycle of about 94,000 years.

As the position of the winter solstice moves around the ellipse, a pair of perpendicular lines drawn through the Sun will always describe the four seasonal positions. Thus it can be seen that a cycle of 21,000 years' duration will be superimposed on the longer cycle of 94,000 years' duration. Let us suppose, for example, that we begin at a point in time when the winter solstice is at *P* and the orbital eccentricity is at a maximum. The greatest excess in the number of days of caloric summer over winter will then be experienced, and consequently the lowest flux density of the summer insolation. Assuming the proper meteorological dynamics, this should be an ideal position for the rapid advance of glaciation.

Let the rotational axis then move through one-half of its 21,000-year cycle of seasonal precession—10,500 years—bringing us to the position where the winter solstice is occurring at *A*. As the eccentricity will have lessened by only about one-fifth of its greatest value in this position (its cycle of change is not perfectly linear), the Earth will now experience a most intense daily flux of solar radiation during the relatively brief caloric summer, creating ideal conditions for glacial melt. The winter, however, will be longer and colder than normal insofar as the solar flux affects it. The outcome is perhaps a toss-up. Half a precessional cycle later, winter solstice occurs again at *P* and the eccentricity is still relatively great. Conditions for glacial advance are again good.

It will only rarely be the case, however, that the ideal situation should occur, in which the maximum of eccentricity and a winter solstice at *P* take place simultaneously. Further, a third cycle, the one that Milankovitch thought primary, must be considered—the variation in the angle of obliquity over a 40,000-year period. When these added considerations are

taken into account, a curve can be derived of the sort illustrated for various latitudes in Figure 13. The close relationship between the variations of average daily insolation and the estimated variation in average temperature during the last 100,000-year-plus ice age cycle is seen.

The relative smoothness of the future 20,000 years of the cycle led Milankovitch at one point to forecast that the onset of the next 100,000-year ice age would not occur for another 20,000 years. The situation is not so simple, however. One sees a similar smoothness in the insolation curve in the period 20,000 to 50,000 years before the present, when the ice age cycle was known to be advancing, in fact, toward the maximum glaciation. Many other things must be taken into account, and one cannot use the mathematically derived curves exactly as a fortune-telling wheel. One of the interesting features of the climate cycle is the fact that an advance of glaciation seems to be self-feeding, because of the increase in the Earth's surface albedo (the reflectance of incident light) caused by a covering of bright white ice or snow. The effect, however, is never direct, but is modulated by weather patterns—the production of winds, clouds, ocean currents, and all the many other interrelated factors that make weather forecasting so difficult and imprecise a science.

Milankovitch's own reflections on the validity of his theory of the astronomical cycles are worth noting: "The fluctuations in the radiation received by the Earth over long periods of time are only one component of the climate of the past, but they are the most important one, and, moreover, one which is amenable to precise investigation."<sup>7</sup>

*Laurence Hecht is an associate editor of 21st Century magazine. He began serving a 33-year sentence as a political prisoner in the state of Virginia on Nov. 4, 1993, along with five other associates of Lyndon LaRouche.*

#### Notes

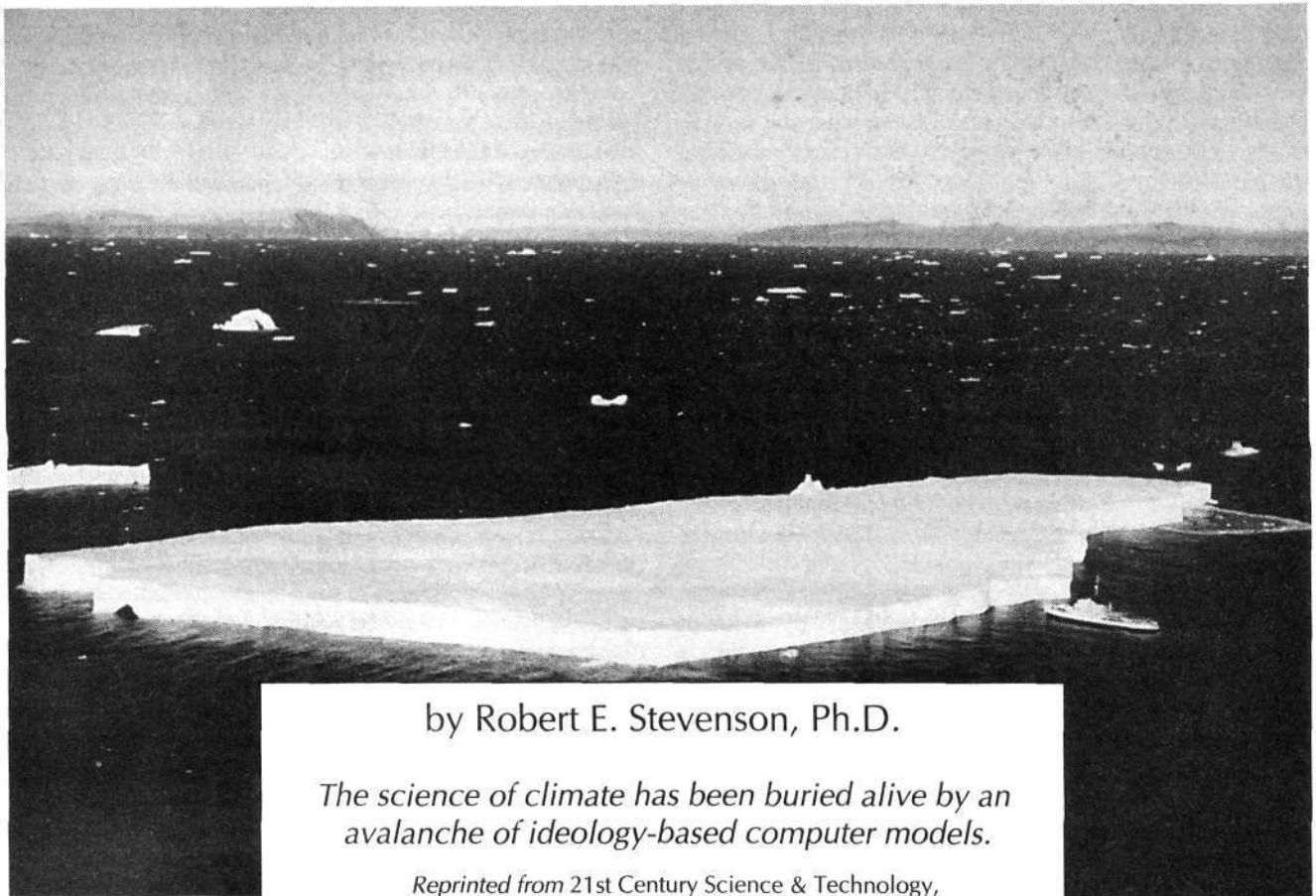
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4. Schwarzbach, p. 82.
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# An Oceanographer Looks at the Non-Science of Global Warming



by Robert E. Stevenson, Ph.D.

*The science of climate has been buried alive by an avalanche of ideology-based computer models.*

*Reprinted from 21st Century Science & Technology, Winter 1996-1997, pp. 51-59.*

**N**ot so long ago, in the early 1970s, climate scientists thought in 100,000-year cycles, or at least 10,000-year cycles, and were talking about global cooling. Scientifically speaking, the evidence indicated that the Earth was coming out of a 10,000-year interglacial period, on the way to a new Ice Age. Some scientists thought that this might happen in perhaps hundreds or thousands of years, while others thought it might take only 100 years. A lecture at Scripps Institution of

U.S. Coast Guard

Oceanography in La Jolla, Calif., by Prof. John Isaacs in 1972, for example, startled the entire staff by promoting the latter fast track.

The National Science Foundation and the National Academy of Sciences both began looking at the Ice Age concept, and beating the bushes to look for scientists who would research climate. The emphasis seemed to be not so much one of science, but of devising scenarios to explain how climate change might be very rapid—and might adversely and drastically affect human behavior, for example, forcing entire populations to move south.

To give you the flavor of this: At the time (1974), the disaster-is-coming atmosphere was so thick, that I submitted, tongue-in-cheek, a proposal to the National Science Foundation (NSF) asking funds to study the Polynesians. My alleged rationale was that it would be useful to look at a population, which, for some reason, possibly environmental, had packed up all its members and possessions, and traveled via canoe thousands of miles to set up a new civilization on a faraway island. I requested funds for a three-year project that would outfit a large sailing ship, fully equipped, including medical specialists, in order to sail to the less populated islands and try to find out from the present residents, what events prompted their ancestors to move. (The idea of the doctors and dentists, was to offer islanders some services in exchange for their history.)

To my great surprise, the NSF was ready to fund this proposal; the funders were crushed to find out it was a joke! The science funding agencies, in this period, also gave birth to computer climate modeling. That action buried the actual science of climate, based on study of the solar-astronomical cycles and their correlation with long-term climate changes.

It was then, in the early 1970s, that ideology, and not science, began to drive so-called climate science. If a disaster scenario for global cooling might promote the use of more fossil fuels, and hence more industrialization and more population, another scenario would have to be found—equally scary but more directly blamable on human activity. The driving force, it seemed, was to get people to blame science for environmental disasters, to use fewer resources, and to shrink the world population, particularly its brown, black, and yellow parts.

And so the climate science funding proliferated, climate modeling proliferated, global warming and “greenhouse effect” propaganda proliferated—and climate science, based on study of solar astronomical cycles, oceanography, geology, and so on, was relegated to the closet.

### Enter the Greenhouse

That there is a “greenhouse effect” in the atmosphere has been known and studied for more than 100 years. That there are certain obvious gases that make up the “greenhouse” has also been known; gases such as carbon dioxide, methane, nitrous oxide, ozone, and water vapor. The residual “natural” greenhouse effect (without the supposed anthropogenic input in the last 150 years), has been sufficient in the past 12,000 years to raise the Earth’s atmospheric temperature by about 15°C, mainly as a result of the presence of water vapor and carbon dioxide. Considering the temperature at the beginning of this rise (about 5°C), with glaciers extending across all of North America to Cairo, Illinois, and in northwestern Europe,

that increase in temperature has been rather beneficial to the well-being of humankind—to say the least.

It was as early as 1896 when Svent Arrhenius, at the University of Oslo in Norway, wondered, to himself and his colleagues, whether or not the expanding use of fossil fuels would lead to a shift in climate by the increase in atmospheric carbon dioxide. Professor Arrhenius was bringing to the surface an issue first commented on decades earlier by Jean-Baptiste Fourier and John Tyndall, both significant scientists in those days.

It was just 60 years later when Svent’s son, Gustav, convinced the director of Scripps Institution of Oceanography in La Jolla, Calif., Roger Revelle, that it was time to begin measuring regularly the atmospheric content of carbon dioxide. Revelle agreed and hired a young post-doc out of Cal Tech, Dave Keeling, to set up a CO<sub>2</sub> laboratory atop Mauna Loa, on the big island of Hawaii. At that height, it would be above the marine inversion layer and, therefore, represent a basic, “pristine,” Earth atmosphere.

By 1970, Keeling had enough useful measurements that Revelle considered it safe to announce that CO<sub>2</sub> in the atmosphere was increasing. Furthermore, because there were yet no carbon-12/carbon-13 microchemical analyses, the assumption seemed logical that the increase was from CO<sub>2</sub> produced by the burning of fossil fuels.

By the early 1980s, other carbon dioxide measuring stations had been established, in Bermuda and Antarctica especially. Furthermore, it was becoming possible to obtain useful samples from aircraft and high-altitude balloons. By 1990, the increase, as measured by all stations, indicated that the CO<sub>2</sub> content of the Earth’s atmosphere was about 23 percent higher than it had been in 1840. This 23 percent is an estimate, in reality, because in 1840 there were no reliable measurements of atmospheric CO<sub>2</sub>.

Well, so a 23 percent increase in CO<sub>2</sub> isn’t as reliable as we might wish it to be. It is an increase, though, and it must be the result of the burning of fossil fuels. What else could it be? So, the presumption was born and grew under the careful tutelage of the new, growing breed, the green “environmentalists.” They, in turn, found kindred souls in the computer modelers who, finally, had computers with enough RAM memory and disk storage to carry enough input to make their predictions seem plausible.

As a result, a story began to emerge that seemed to be credible if we were to believe the “evidence.” And, who among the proletariat had any reason to doubt what “scientists say” or what “researchers say”? As the story goes, and it is familiar to us all, the increasing amounts of CO<sub>2</sub>, methane, ozone, nitrogen oxides and the family of freon compounds produced by man will enhance the “greenhouse.” As a result, more Earth-reflected solar radiation than normal will be “trapped” in this intensified “greenhouse,” in the form of heat, thus raising the mean temperature of the globe.

The consequences, so the story continues, will be dire. Sea levels will rise because of the melting of the polar ice, large regions of forests and farmland will be destroyed, increased evaporation will wipe out all irrigation systems, and the changes in weather patterns will lead to droughts, or floods, or worse.

During the last period the Earth was significantly warmer

then it is today, during the "climatic optimum," about 1200 to 1400, there were vineyards in England and in Greenland ("Vineland"). Even as late as 1800, oranges grew at Natchez, Miss., and the Sahel was a vast, grassy plain. Considering climate change through the past 700 years, one can hardly say that today's globe is warming.

### Speculation on Top of Speculation

There was, and is, of course, a disagreement about the reaction to a warming atmosphere, if there were to be one. Certainly, goes one argument, a warming ocean would result in increased evaporation, thence clouds and precipitation. The greater than normal cloud cover would decrease incoming radiation, lowering temperatures at the Earth's surface (V. Ramanathan of Scripps has verified this point). The increased precipitation would enlarge the continental glaciers, in Antarctica and Greenland, thereby resulting in a falling, rather than a rising, sea level. The greater-than-normal rainfall would enhance the growth of vegetation, crops, and forests, decreasing, as a result, the area of arid regions and improving the food supply worldwide.

So, we have speculation on top of speculation. Answers can come only when we know better than we do now the interactions, the fluxes, and the transports in the entire environmental system of the Earth. And, that's what research is all about.

The modelers would have none of this concept, however. Especially after James Hansen, of NASA's Goddard Space Flight Center, appeared before a Congressional committee in the summer of 1988, during one of the hottest months on record, and declared that there was no denying it, "Global warming is here!" Considering the temperature in Washington, D.C., at the time, it was simple for everyone to agree. The panic was on!

To scientists in federal laboratories, institutions funded by federal agencies, to the non-governmental organization (NGO) environmental advocacies (Worldwatch, World Wildlife Fund, Sierra Club, Greenpeace, and so on), and to a number of international organizations seeking a *cause célèbre*, the announcement and the political acceptance promised a bonanza. New federal offices were created, such as the U.S. Office of Climate Change, operating in the National Academy of Sciences. New international groups were created, such as the International Geosphere-Biosphere Program.

The United Nations, where control is the operative word, quickly organized the United Nations Environmental Program (UNEP), with Dr. Noel Brown, a social scientist (now retired), as the Director. UNEP immediately initiated the Intergovernmental Panel on Climate Change (IPCC), funded through the World Meteorological Organization (WMO). In turn, WMO quickly formed the World Climate Research Program (WCRP). And the money flowed.

One of the first "products" of these claquees was the preparation of a "treaty" to be signed by the world at an international "summit," so that the growing impact of humankind on the Earth's environment could be slowed (maybe stopped) to avoid the catastrophe unfolding from computer models. Humankind, especially those who lived the "good life" in the so-called Western world, were the unconscionable "bad guys" in this scenario, and they would bear the brunt of any controls. Those in the less affluent societies, who could not provide the re-

sources to avert the "discernible human influence on the global climate," would be covered by funds from the "bad guys"—about \$150 billion per year.

And so, the Rio Earth Summit took place in 1992, trumpeting the greed of the "Western populations"; and all but a handful of countries signed "treaties" giving the U.N. the authority to control those human activities that the models claimed were adversely impacting the global climate. Those nations that did not sign the treaty, include the United States, the former Soviet Union, China, India, and the European Community.

### IPCC Sounds the Alarm

Before the Rio Summit took place, in the summer of 1992, it was necessary to have an "official" document of the effects to be experienced from the "human influence on the global climate." This document was dutifully produced by the IPCC in 1990, from a group of about 200 of the most "competent professionals" from member countries of the U.N.

Chaired by Dr. Bert Bolin, renowned meteorologist, this group included such other stalwarts as Sir John Houghton of the United Kingdom, Thomas Wigley from the U.S. National Oceanographic and Atmospheric Administration (NOAA), and a lot of other scientists of good repute. There were also a number of panel members who probably had clear conflicts of interest, such as Merylin Hedger, climate policy officer of the Worldwide Fund for Nature. Scientific truth could be expected from scientists as Bolin, Houghton, Wigley and the like. One might question the input from members who were environmental advocates and had, therefore, vested interests other than scientific truth.

Well, the 1990 IPCC report stated that in the past century (1) CO<sub>2</sub> had risen by more than 30 percent, (2) average temperatures worldwide had increased by 1.2° to 1.5° Celsius, and (3) sea level rose by 50 to 60 centimeters. Then they predicted that we could expect (1) CO<sub>2</sub> would grow by another 50 percent, (2) atmospheric temperatures would increase by 3° to 4° Celsius, and (3) sea level could rise up to six meters, as the polar icecaps melted with the global warming—all by the year 2050.

A good choice of timing: Who of these clowns would be around in 2050 to be faced with their predictions?

### 'Working Geophysical Scientists' Respond

I must say, also, that the "working geophysical scientists"—the oceanographers, the meteorologists, the atmospheric chemists and physicists, and the basic climatologists—were all caught by surprise by the vast publicity that spread through the media and popular press from what were clearly *speculations*—speculations that were publicized even though there was no suitable scientific research to support the claims. But, how was the the public to know that? Furthermore, it seemed that journalists, editors, and publishers, as well as the electronic media, had turned overnight from reporters into advocates.

Reputable scientists disagreed that an atmospheric crisis was at hand. Nils-Axel Morner, from Stockholm University, at a meeting of the American Association for the Advancement of Science in New York, scorned the prediction of rising sea levels. He noted that there was simply not enough water in mid-latitude glaciers to cause such a rise (of several meters),





Science was left by the wayside as scientists, journalists, non-governmental organizations, and political officials scrambled onto the greenhouse bandwagon.

and that a 4° Celsius increase in temperature (the modelers' claim for the year 2050) might result in sea level rising 4 inches. Morner got no play in *The New York Times* the next day, or elsewhere.

Robert Stewart, from Victoria University in Vancouver, British Columbia, had given a keynote address at the Joint Oceanographic Assembly, Acapulco, Mexico, in August 1988, on the conditions around the world that influence changes in sea level. Considering every possible factor, he noted that eustatic sea level had been rising at a rate no more than 1 millimeter per year for the past two centuries, and there were no natural or anthropogenic circumstances likely to change that rate for the next century.

K.O. Emery and David Aubrey, from the Woods Hole Oceanographic Institution, verified Stewart's analysis in their 1991 publication (*Sea Levels, Land Levels, and Tide Gauges*, Springer-Verlag), a *tour de force*, in which they analyzed every tide gauge location and its tidal curves worldwide for the century from 1880 to 1980. In those 100 years, eustatic sea level had risen 11 centimeters—about the rate at which juvenile water enters the Earth's ocean water cycle, at a snappy 1 millimeter per year.

Bob Balling, from Arizona State University, a world renowned and respected climatologist (who does not get invited to the IPCC) had the following to say at a 1994 meeting of Doctors for Disaster Preparedness in Tucson:

From 1979 to 1990, and during the time of most rapid buildup in atmospheric concentrations of greenhouse gases, the satellite-based temperature measurements have shown a planetary warming of only 0.001°C (including data from 1991 and 1992 would lower this value because of the cooling effects from the aerosols produced by Mt. Pinatubo). Most of the numerical models of climate suggest that the warming (given the known increase in equivalent CO<sub>2</sub>) should be of the order of 0.3°C over the same period of time. The satellite data indicate virtually

no warming at all, and certainly do not support the claim of accelerated warming in recent decades.

From the global evidence, along with mounds of hemispheric and regional evidence not covered here. . . I firmly believe that the observed changes in planetary temperature are not consistent with expected changes given the known increases in the atmospheric concentration of various greenhouse gases. Most of the observed warming occurred before the bulk of the greenhouse gases were added to the atmosphere (in the decades of the '20s and '30s). The amount of warming has been too low to be consistent with catastrophic predictions. Many other factors other than the rise in CO<sub>2</sub> concentration account for the trend and variations in planetary temperature. In addition, this warming has not occurred in the right places to be consistent with the models (for example, the Arctic region). Furthermore, most of the warming has occurred at night, which is not a greenhouse expectation.

Very simply, the climate record over the last century, or decade, is not pointing in the direction of a greenhouse apocalypse.

These comments by Bob Balling were echoed by scientists around the world.

In addition, many climate scientists "jumped" on the computer models. The model problems of the 1980s, were, and still are today, that the models suffer from a bad case of holding too many things constant. Variations in sea-surface temperature, the effects of clouds, deep-ocean convection and circulation, and Lorenz's "butterfly effect," are either ignored, held constant, or even entered backwards. If clouds are entered, the assumption is that they will produce warming when, in fact, all satellite data indicate that clouds cool rather than heat the Earth.

Several reliable research scientists using and studying models, including Michael Schlesinger, from Oregon State Univer-

sity at Corvallis, pointed out that "You have every right to be skeptical [of today's models], but it is the best we can do [at this time]. Our ability to detect global warming is near zero." Mike was one of about two dozen who responded with similar caution. Several of them were in federal government laboratories; in NOAA and NASA, and who, after a few months of such reaction were heard from no more. And, as you might imagine, their responses never reached the popular media.

Scientists not under direct control of federal agencies, or dependent on federal funding, continued to provide and publish data that provided a contrary view to that of the IPCC, WMO, environmental NGOs, and federally "captured" scientists.

One of the more telling blows came from highly regarded scientists at the University of Oslo. After a detailed study of stable carbon isotope ratios of all carbon compounds that contribute CO<sub>2</sub> to the atmosphere, from 3,000-year old Antarctic ice cores, and evaluating Dave Keeling's data from Mauna Loa, and other Northern Hemisphere stations, Dr. T.V. Segalstad, from the University of Oslo, determined that

At least 96 percent of the current atmospheric CO<sub>2</sub> comes from non-fossil fuel sources; that is, natural marine and juvenile [volcanic] sources. Hence for the atmosphere CO<sub>2</sub> budget, marine degassing and juvenile degassing (from volcanic eruptions) are far more important, and the burning of fossil-fuel and biogenic materials much less important, than hitherto assumed.

This statement is from a paper that Segalstad presented at the 1992 Chapman Conference in Hawaii, on "Climate and Volcanic Aerosols." Over the next two years, he and his colleagues at the University of Oslo continued their evaluation of the carbon isotope ratios on thousands of additional samples from the atmosphere and stratosphere around the world. Segalstad published an update in 1994, showing that the ratios did not change from those determined in 1992. By this time, even Dave Keeling, at Scripps and Mauna Loa, agreed that the major contributions to atmospheric CO<sub>2</sub> come from natural sources.

You can easily imagine the reactions of the environmental activists upon hearing that there is no global warming, that the activities of "humankind" have had no impact on the world's atmosphere or stratosphere, and that there is no scientific expectation that there ever will be an anthropogenic influence on our "universal climate." The environmentalists expressed "horror" at such "callous disregard of future generations," to quote one of them. They fought back by name-calling: Scientists who oppose global warming are simply "fringe scientists." They also fought back by demanding more regulations than have already been produced by local, national, and international bureaucracies. And, unimaginable as it might seem, the environmentalists fought back with personal threats on the lives, careers, and families of those of us who have scientific truth as our fundamental agenda.

I won't bore you with the details of the interplay between scientists and environmental advocates that took place between 1990 and the next IPCC report in 1995. None of the geophysical data, nor the publications, nor the discussions by working scientists seemed to have the least bit of impact on the IPCC/WMO/UNEP.

In the popular media, it was "no contest"! The "advocates" were the clear winners. In peer-reviewed scientific literature, however, the results of fine research were "blowing the advocates out of the saddle." Since 1992, I have personally perused more than 2,800 papers that contradict "global warming."\*

### IPCC Reports to the World, Aug.-Dec. 1995

The long-awaited report from the IPCC, that all of us knew would be greatly revised from that of 1990, was a "comedy of errors."

In April, three months before the report was scheduled to be released, members of the IPCC, and observers appointed by various nations, met in Maastricht, the Netherlands, to preview and comment on the draft report prepared by the "working staff" of the IPCC. (Of course the IPCC has a staff. Do you really think the "Great and Good" at the top do all their own research, reading, delving, analyzing, interpreting, and writing?)

The members were to have the draft some weeks before the meeting, and then break up into working groups to address the many chapters and items in the report. Not only did none of the members receive the draft document ahead of time, but no copies were ready for them when they arrived in Maastricht. Nevertheless, during the confusion of the first few days, the staff—whoever they are—issued a press report to the world's assembled press, titled "Conclusions reached by the IPCC's studies over the preceding three years." As you might expect, this release was seen by none of the milling, assembled members of the Panel.

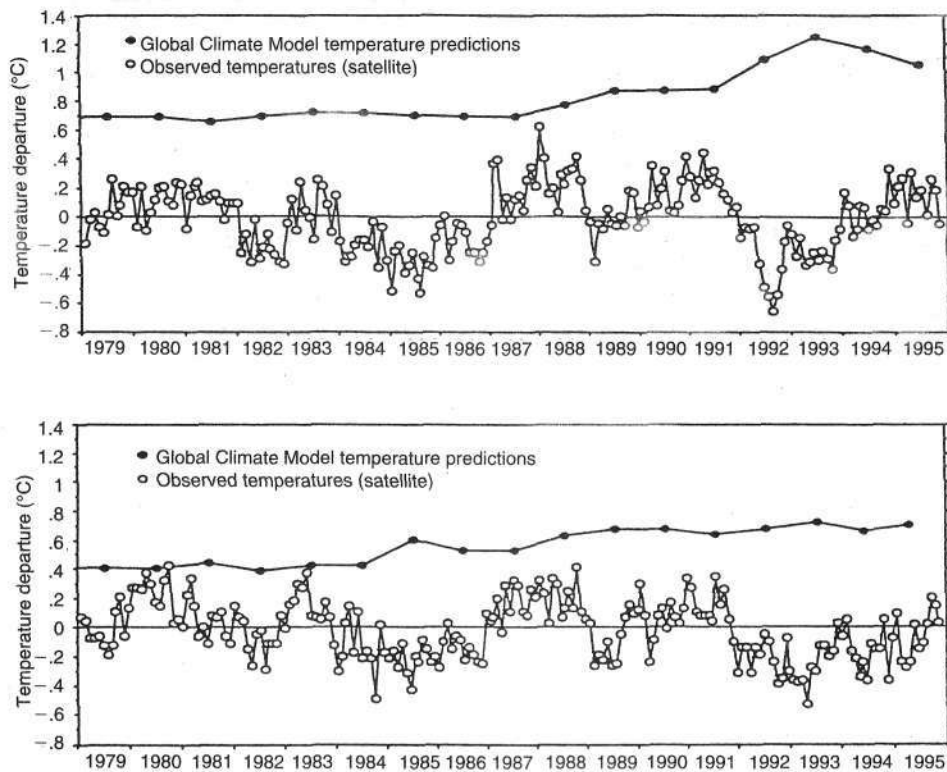
Dr. Fred Seitz, former president of the U.S. National Academy of Sciences and former president of Rockefeller University, among other credits, and currently director of the Marshall Institute, was not only unhappy; he was furious. He returned to Washington and immediately sought audiences with the Secretary of State and the president of the National Academy of Sciences. The results of these meetings were letters of condemnation, censure, you name it, to U.N. Secretary General Boutros Boutros-Ghali, the United Nations Environment Programme, WMO, and Bert Bolin, Chairman of the IPCC. The news release was retracted. Were any of the IPCC staff fired for this activity? No.

The next IPCC meeting was in Boulder, Colorado, in 1995, during the XXIst General Assembly of the International Union of Geodesy and Geophysics, at which the "official" IPCC report was discussed in several sessions over 8 hours. The IPCC had, indeed, modified the predictions made in 1990. The most obvious, and conspicuous, was the change of the prediction date from 2050 to 2100.

### IPCC's 1995 Modifications

Yes, CO<sub>2</sub> would continue to increase in response to the burning of fossil fuels, the report said. Interestingly, there was no mention of the data and results from the research at the University of Oslo, nor of the information regarding the introduction of CO<sub>2</sub> from the oceans. There was considerable space used to address the increasing methane in the atmosphere—failing to mention, however, the production of methane by volcanic eruptions, of which in this past decade there have been three times the number that occurred in the past 40 years.

It was declared that "recent years have been the warmest since 1960," and that "global mean temperatures have



**Figure 1**  
**CLIMATE MODEL PREDICTIONS VS. SATELLITE MEASUREMENTS**

*Climate model predictions for temperature in the Northern and Southern hemispheres (solid black dots) are far higher than the actual satellite measurements. The observed warming is 0.5° C, while the models cited by the United Nations in 1992 predict warming between 1.3° and 2.3° C. In its 1995 report, the IPCC acknowledged that the earlier predictions were too high.*

Source: Adapted from Patrick J. Michaels, testimony Nov. 16, 1995, before the House Committee on Science Subcommittee on Energy and Environment

increased by between 0.3 and 0.6° Celsius since the late 19th century." The IPCC did not note, however, that the years between 1920 and 1940 were the warmest of this century. It was interesting, too, that the century-long increase "certified" by the IPCC is almost precisely that measured by meteorologists, and analyzed and reported by Bob Balling. He, of course, was not mentioned, even though the report had a rather extensive bibliography.

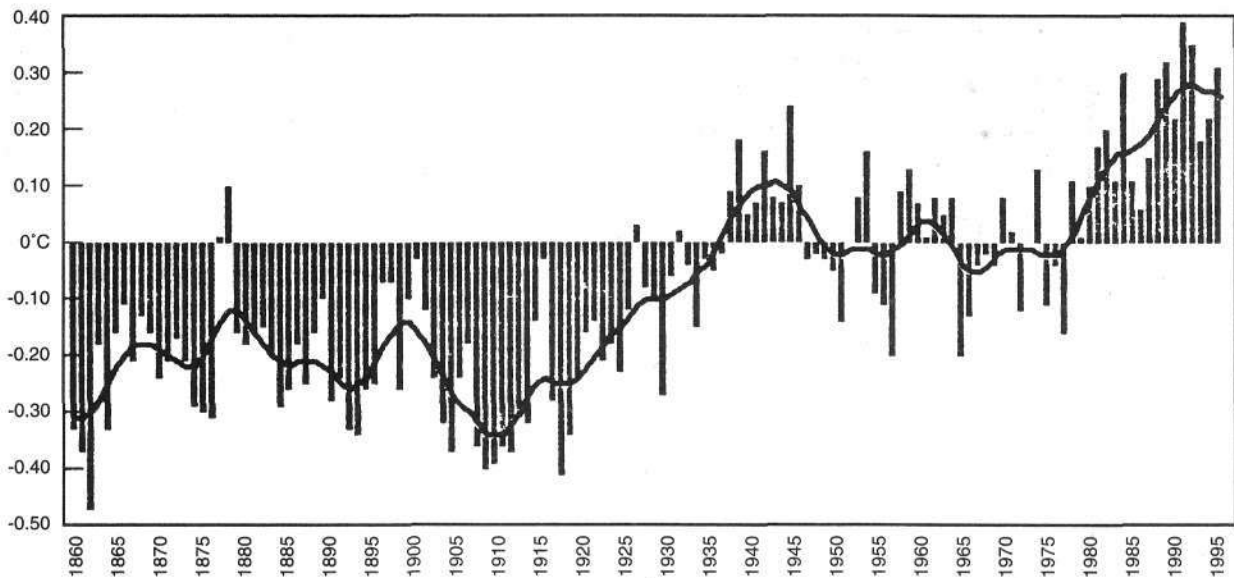
For the "future," CO<sub>2</sub> would reach 500 ppmv, the report said—by the year 2100, I guess. They didn't really say. And, during that century-long period, atmospheric temperatures would rise by 1°C. One degree Celsius! *In other words, we're going through all of this for 1° Celsius.* Three-tenths of a degree is easily within the margin of error (for thermometers), and five-tenths of a degree is still dicey, because of the "heat island effect" of cities, which tends to artificially raise the average of temperatures measured.

As for sea levels: The report claimed that "global sea levels have risen by between 10 to 25 centimeters over the past century. [Ten yes, but 25, no way.] The increasing atmospheric temperature from 0.6°C (taking the highest) to 1.0°C

will result in "sea levels rising by another 15 cm." Naturally, the IPCC report doesn't describe the cause of this rise. Were they simply to do some elementary-school math, taking the coefficient of expansion of water (sea or otherwise), and applying an atmospheric temperature increase of 0.4°C, then reckoning with the manner of thermal distribution through the ocean surface, they would have easily produced the answer that the additional heat would raise sea level by *0.03 millimeter by the year 2100*—a three-orders-of-magnitude miscalculation.

As for the temperature record: The accompanying illustrations show the following: Figure 1 compares 16 years of temperatures from U.S. satellites, as analyzed at Marshall Space Center in Huntsville, Ala., to the predictions of the climate modelers. Figure 2 is a graph produced by the staff of the "Great and Good" at WMO of global temperature anomalies from 1860, using 1951 to 1980 as the base. Notice the difference it would have made, had they used 1935 to 1965 as the base. Figure 3 is an extremely interesting graph of air temperature and sea surface temperatures from 1856 to 1987. This is from a joint study by people at the Massachusetts Institute of



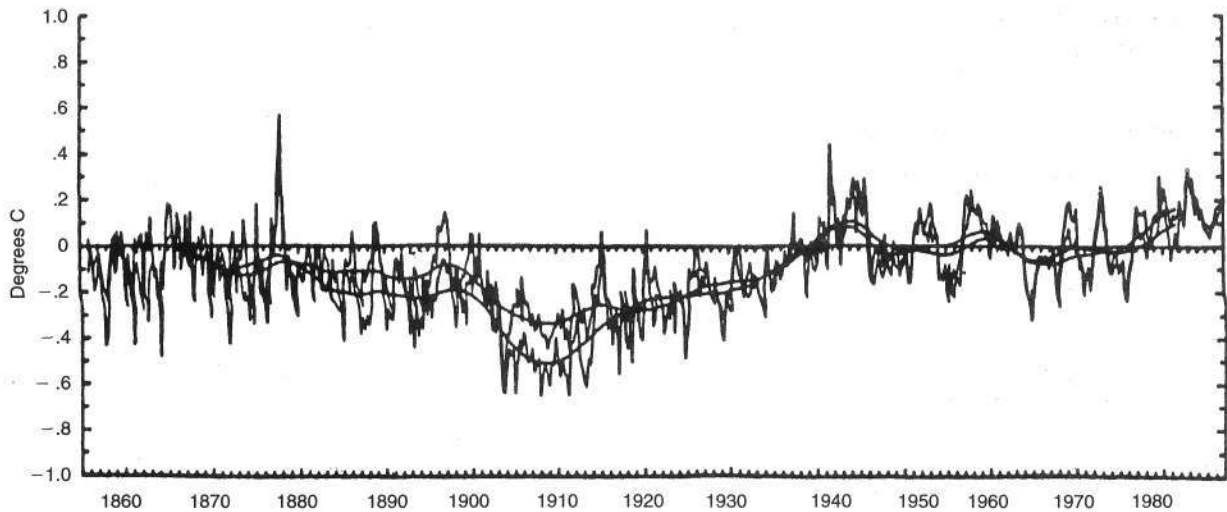


**Figure 2**

**SEA SURFACE TEMPERATURE AND SURFACE GLOBAL TEMPERATURE ANOMALIES COMBINED (1860-1980)**

Global land, air, and sea-surface temperature anomalies in °C are computed as departures from the 1951-1980 base-period means. The fitted curve is a 21-point binomial filter. This graph is updated from the one used in the 1992 IPCC report.

Source: Hadley Centre, Meteorological Office, U.K.



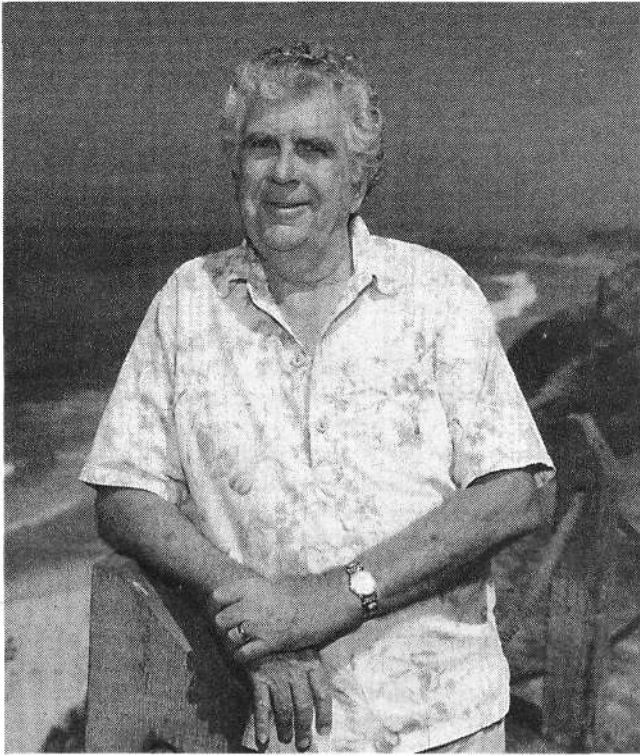
**Figure 3**

**AIR AND SEA SURFACE TEMPERATURES (1856 TO 1987)**

These data, taken from ships' logs over 130 years, indicate no change in sea surface temperatures. The higher line is water temperature; the lower line is air temperature.

The range in this graph and in Figure 2 is nearly the same; the graph in Figure 2 simply uses a larger scale than that of the seagoing data. The difference between the extremes of the data peaks in Figure 3 is 0.14°C. In Figure 2, the difference between the extremes is 0.08°C—in other words, nearly the same.

Source: Massachusetts Institute of Technology and the British Meteorological Office



The author looking out at the Pacific, near his home in California.

Technology (MIT) and the British Meteorological Office, taking the data from the logs of thousands of ships that sailed the world's oceans and seas in the 130 years in question. The researchers went to the effort to learn how water temperatures might be affected by winds blowing around the wooden and canvas buckets used to collect the water sample, and the influence of the ship on air temperatures, modifying the numbers by these results.

Everyone has agreed that the British/MIT graph indicates no change in sea-surface or marine air temperature in the 130 years since 1856. Notice, too, that the range in the WMO and the British/MIT graphs are nearly identical; the WMO simply uses a more exaggerated scale than that of the sea-going data.

### Major Faux Pas

Up to this point, I've not elucidated any major *faux pas* in the IPCC report. Believe me, though, they made them: two wing-dingers, wowies, holy cows, you-got-to-be-kiddings, and you-clearly-were-absent-when-they-passed-out-brains.

The main advisory panel of the IPCC endorsed the conclusion that "the balance of evidence suggests that there is a discernible human influence on global climate." This misguided judgment created bitter arguments during a three-day meeting in Madrid in fall 1995, when "experts" from more than one country emphasized the "uncertain" nature of recent evidence pointing to human effects on climate.

The result of this discussion was to be a compromise in the language of the statement, but that did not happen. Despite the opposition of many signatory countries and their scientists, the leaders of IPCC published the "final version" using the phrase "discernible human influence," on the global climate. The un-

ethical editorial changes were exposed and published by Dr. Fred Seitz, the premier American scientist in the field. Even when exposed, the IPCC leaders claimed it was their "right" to change scientific conclusions so that political leaders could better understand the report. Unbelievable!

To the world's geophysical community, these unethical practices and total lack of integrity by the leadership of the IPCC have been enough to reveal that their collective claims were—and are—fraudulent.

The most interesting aspect of this ridiculous *faux pas* is that the responsible panel of the IPCC produced no documentation—raw data or otherwise—for their claim.

Then came the boldly false statement, of greater interest to me and other oceanographers than to others. The IPCC wrote:

It is clear that the oceans are warming significantly in response to the global warming of the atmosphere. Furthermore, this matches the evidence that coral reefs are dying.

I've already addressed the non-warming ocean to some extent, but let me add some additional documentation.

At meetings of the American Geophysical Union in 1992 (Hong Kong), 1993 (San Francisco), 1994 and 1995 (San Francisco), Warren B. White of Scripps, and six colleagues, presented a series of papers on the "Global Interannual/Interdecadal Variations in the Upper Ocean Thermal Structure." They had made careful examinations and analysis of more than 5,200,000 temperature-depth measurements between 30°S and 60°N in the oceans from 1979 to 1994. Both sea-surface temperatures and the upper ocean to a depth of 400 meters exhibited a *cooling* trend throughout the 1980s of about 0.1°C, followed by a similar warming through 1994. Although not a large change, the trends were clear and certain in all oceans, especially in the mid-latitudes.

In the tropics, the two extensive El Niños in the 1980s moderated the cooling tendency. By 1995, Warren had enough data, and had conducted sufficient analyses, to be convinced that the variations in both the Atlantic and Pacific followed closely the 11-year sunspot cycle.

Now for that blather about coral reefs: Richard Grigg, coral-reef expert of the University of Hawaii, has surveyed Pacific reefs and atolls multiple times in the past two decades. *There is no evidence of any reduction or detrimental modification in the growth of the corals on any Pacific or Indian ocean reef that can be attributed to warming waters.* Furthermore, from his colleagues, Grigg has learned of no such change in the reefs in any other tropical ocean or sea.

### The IAPSO Data

At the August 1995 General Assembly of the International Association for the Physical Sciences of the Oceans, held in Hawaii, there were 14 symposia presented, 5 of which dealt with subjects related to climate scale variations in the oceans and marine atmosphere, in both time and space. These were (1) Large-Scale Ocean Circulation, (2) Decadal and Interdecadal Variations in the Oceans, (3) Carbon Dioxide in the Ocean, (4) Air-Sea-Ice Interactions and High Latitude Ocean Processes, and (5) Ocean-Atmosphere Coupling and the Tropical Ocean and Global Atmosphere. In those 5 symposia, about

450 oceanographers and atmospheric physicists/chemists gave papers based on research conducted in the past four years.

Without going into great detail, the "bottom lines" are as follows:

(1) *There is no warming trend in the oceans, and has not been in the past 50 years.* There are places in the ocean that get warmer than other locations for periods of time up to decades, but those waters then cool as other ocean areas warm. These periods are so close to the 11-year sunspot cycle that it is difficult not to consider a correlation. Yet, over all, there are no warming or cooling trends in any ocean, including the Southern Ocean near Antarctica.

(2) Special attention was paid to the Arctic Ocean, when teams from the United States, Canada, and Russia occupied stations that had been visited repeatedly since 1937. The results? *There is no warming trend in the Arctic, and has been none since 1937.* Indications by the Canadian team of warmer than normal water turned out to be an intrusion of water from the Atlantic. In the past 60 years, *the Arctic ice pack has neither retreated nor thinned.* These data are not controversial!

(3) *There is increasing evidence that the computer model calculations of the ocean's absorption of anthropogenic CO<sub>2</sub> may be seriously biased.* Furthermore, intermediate latitudes of the ocean are highly variable CO<sub>2</sub> sinks throughout the year, being disrupted by storms and mineralization of carbonates by biological processes. The ocean's summer warming, or warming by water-mass intrusions, or El Niños, makes the ocean a source of CO<sub>2</sub> rather than a sink, as is usually supposed. The consequence is that there is far more ocean-produced CO<sub>2</sub> in the atmosphere than hitherto considered.

(4) *There is a growing volume of evidence and, therefore, a rapidly growing suspicion, that an El Niño does not produce weather, such as, "El Niño rains," "El Niño droughts," and so on.* Quite to the contrary. It seems that the weather comes first, then comes the El Niño! This will cause a lot of heartburn among weather forecasters, and it also ruins the contention of the "global warmers," that much of the "warming" comes from El Niños.

(5) *It seems that the prime source of global weather (maybe even climate) lies in the tropics.* Throughout the 10 years of the international Tropical Ocean-Global Atmosphere program (TOGA), there was great evidence (a) for the basic, equatorial origin of tropical storms, such as hurricanes, typhoons, and cyclones; (b) that the equatorial ocean and atmosphere are more energetic than suspected; (c) that the Asian monsoons play significant roles in the formation of El Niños, droughts, and modifications in the ITCZ (Intertropical Convergence Zone); and (d) that El Niño characteristics in the Pacific and Indian oceans do not correlate, one with the other, in time and space.

Now, here is a scientific discovery that will have extraordinary consequences on global circulation models and the forecast models for weather systems!

(6) *There is a long way to go before we really understand all of the interactions, the vagaries, and products of weather and climate.* Furthermore, it is clear that mankind is at least an order of magnitude, in numbers, from becoming a "geophysical force" on Earth, if ever!

Were there any environmental groups, or advocates giving papers, or even in attendance at the Honolulu IAPSO Assembly? Need you ask?

### Time to Get on with Real Science

So, despite the cries of Jim Hansen, Carl Sagan, Stephen Schneider, James Anderson, Susan Solomon, Rowland and Molina, Robert Redford, Barbra Streisand, Jimmy Carter, the Club of Rome, the United Nations Environmental Program, the 1992 Earth Summit in Rio, the Montreal Protocol, and Worldwatch, Greenpeace, World Wildlife Fund, Prince Philip, or even Al Gore, the human population of the Earth has not reached untenable numbers, has not become a geophysical force, and has not established practices nor products leading to "global warming!"

The evidence supporting the above six statements has become too voluminous to ignore. The "bottom line" of today is that the advocates of "global warming/ozone hole/There's no more room at the inn," have lost the game. Yet, they have so much invested in treaties, regulations, intra- and inter-governmental agencies, organizations, NGOs, prestigious positions, personal endorsements, and so on, that their efforts to blow true and selfless science out of the saddle must grow more and more pernicious by the day.

To the general populace, there may seem to be no battle at all—especially for those who read only the popular media, who are unfortunate enough to be in schools ruled by politically correct environmentalists, or who watch and believe only network news, PBS, the Discovery Channel, or the Captain Planet cartoons on CNN. But, there is a battle, and the real geophysical scientists around the world are rising to fight and intend to win—right over might, to coin a phrase.

I believe that the unabashed lies put out to the world by UNEP, IPCC, and WMO are a true injustice, a great crime, that is causing completely unwarranted anxieties for many people around the world. Officials in such international organizations are mouthing disinformation—information that is totally without merit of truth.

It is past time to bury these officials and their clique of supporters and get on with real science.

*Robert E. Stevenson, an oceanography consultant based in Del Mar, California, trains the NASA astronauts in oceanography and marine meteorology. He was Secretary General of the International Association for the Physical Science of the Oceans from 1987-1995, and worked as an oceanographer for the U.S. Office of Naval Research for 20 years. He is the author of more than 100 articles and several books, including the most widely used textbook on the natural sciences.*

### Notes

\* This total does not include the published information in scientific journals that proves the hoax of CFCs and ozone depletion. These papers would double the 2,800 figure. I, along with others, are putting together suitable documentation of this rather unbelievable story of scientific quackery. In the meantime, we can only deplore the awarding of Nobel prizes to the three leading contributors, and the arrival of the federal deadline in the United States for ceasing the production, distribution, and use of all of the CFC species. The accompanying hazards this ban on CFCs has introduced to aircraft operations, air conditioning, medical practices, and agriculture, because of a U.S. regulation based on a pure hoax, begins to devastate all.

I must add, too, that the Montreal Protocol "group" which met first in London in 1990, has become, as you might imagine, a "permanent group." At its December 1995 meeting in Vienna, a large number of objections were raised to the basis for the disappearance of CFCs; noted the economic hardships such losses would place on all developing countries; and heard requests from several countries, notably those of the former Soviet Union, to delay the deadline of a CFC phaseout from 2001 to a later date. As one delegate from China remarked, "Perhaps to 3001."



# Scientists Respond to the 'Non-Science of Global Warming'

Reprinted from 21st Century Science & Technology, Summer 1997, pp. 6-7.

Dr. Robert Stevenson, whose article, "An Oceanographer Looks at the Non-Science of Global Warming," appeared in the Winter 1996-1997 issue of 21st Century magazine, received a great many comments from scientists around the world who are concerned, as he is, about the abandonment of science in the debate over global warming. He has made his open letter to colleagues and some of their responses available to 21st Century, because of the importance of the issues involved for the future of science.

## Dr. Stevenson's Letter

### Dear colleagues and friends:

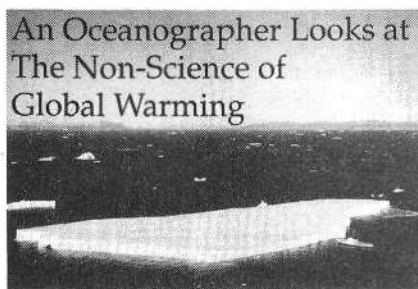
I am sending you the Winter 1996-1997 edition of *21st Century Science & Technology*, in which you'll note my paper on the "Non-Science of Global Warming." After reading the paper, I hope you will become enthused and active in the defense of honorable scientific research.

My first peer-reviewed paper was in 1947, co-authored with U.S. Grant IV, my major professor at UCLA. I could have published before 1947, but in 1942 I joined the U.S. Army Air Force to "save the world for democracy"; with an encore during the Korean Conflict. Since then, I've published annually papers, books, training manuals, and classified oceanography tactical documents for the Navy, and became an expert in space oceanography.

My professors were all from the great American universities of the early 20th century; Harvard, Chicago, Illinois, Cal/Berkeley, Stanford. Each practiced the principle of personal "honor." Scientific honor codes were not explicitly taught in my classes, but were learned by example. Of course, about 99 percent of fellow students then were veterans of World War II in whom honor had been thoroughly indoctrinated. It was enhanced by our professors, and all of us understood "dishonor." Such conduct simply was not tolerated; by student or professor.

During my career, as professor, sci-

ence and institution director, oceanographer with the Office of Naval Research, and as Secretary General of the International Association for the Physical Sciences of the Oceans (IAPSO), I met thousands of scientists, read and listened to uncountable scientific papers, attended hundreds of scientific meetings and workshops, national and international, and reviewed hundreds of research proposals. The science ranged from excellent to mundane; the papers, books, and monographs, the same. Through it all, I watched the tremendous growth in our knowledge of geophysics, and the dynamics of the atmosphere, the oceans,



and the solid Earth. It has been exhilarating to be part of this greatest of all possible adventures.

In all these years, I never recognized any fraudulent or deliberately dishonorable scientific conduct—until 1989. It was then, as Secretary General/IAPSO, that I began to hear about anthropogenic "global warming" and "ozone depletion." At first, I considered these "doomsday scenarios" just the usual idiotic bleating of radical environmental NGOs [nongovernmental organizations]. Then came the extraordinary, non-scientific Rio Summit in 1992! In the following years, I observed "scientists" associated with, and supporting, the Intergovernmental Panel on Climate Change (IPCC), World Meteorological Organization (WMO), and United Nations Environmental Program (UNEP) practice dishonest and, therefore, dishonorable science. It seemed, too, that much of the scientific community had lost its intolerance of dishonorable scientific conduct. Personal pragmatism appeared to replace honor, especially amongst those scientists supported by government funding.

*Science is the anchor of rationality for our civilization. It cannot serve this pur-*

pose if dishonorable conduct is common and tolerated. Such conduct must be eliminated! True scientists and their scientific institutions must stand up and be counted.

Dr. Robert E. Stevenson  
Del Mar, Calif.

## Aksel Wiin-Nielsen Graested, Denmark

Thank you very much for sending me a copy of your paper, "An Oceanographer looks at the Non-Science of Global Warming." . . . I have read it with great interest.

From my present base as a professor (now emeritus) at the University of Copenhagen, I have done what I could to throw some light on the same matters through the last decade. I have published papers (in Danish) in the journal of the Danish Meteorological Society called *Vejret* (The Weather) trying (in vain) to influence the position of Denmark's Meteorological Institute in the IPCC work. Rather critical comments were submitted as one of the many reviewers of IPCC (1990), but since my remarks were totally neglected, I asked at that time to be removed from the review process. . . .

In Denmark, we pay a CO<sub>2</sub> and an SO<sub>2</sub> tax. They are simply added to the electricity bill. Adding these two taxes to the common sales tax, the electricity expenses are increased by 167 percent. In general, you do not hear many complaints about these taxes simply because the environmental activists have won the battle and convinced everybody that doomsday is near. I find it totally unacceptable that my grandchildren are indoctrinated already in the lower grades to believe that most of their rather flat homeland will disappear under the surface of the ocean in a few decades! I am just quoting the teachers' instruction book.

To counteract these developments I have recently published an elementary textbook (*Climate Problems* in Danish), co-authored by my daughter, who is a staff meteorologist at the Danish Defense Command, and aimed at first- and second-year college students. The reason is of course that we need to re-educate the young students to take the normal critical scientific attitude. . . .

As a former Secretary General of the World Meteorological Organization (1979-1983), I look with some dismay on the role of this organization and the U.N. Environmental Programme in the whole IPCC affair. But since I am *persona non grata* at the WMO Secretariat I can do nothing about it.

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**Paul Scully-Power**  
Sydney, Australia

Thanks for sending me a copy of the *21st Century* magazine. It is a very good article that needs/requires that it be published in other journals and periodicals so that the scientific community and the general popular community can be exposed to the ideas in it. . . .

. . . start from the premise that nature is inherently nonlinear. Once you accept that, it is blatantly obvious that any modelling of nature is today rather limited either in accuracy or extent. . . We therefore probably need to consider a series of nonlinear balances inherent in nature if we are to ever understand nature and its embedded balancing mechanisms.

*Dr. Scully-Power, an oceanographer for 19 years at the Naval Underwater Center, New London, Conn., flew on the Space Shuttle (STS-41G) in Oct. 1984. He is now chief executive officer of Zylotech Corp., Sydney, Australia.*

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**Ye Longfei**  
Guangzhou, China

It is exhilarating to read your paper, "Non-Science of Global Warming." First I am happy to learn that you work so well now after you resigned from IAPSO. Second, this is so important not only just in science.

It is well known very certainly that about 3,000 years ago, elephants were even commonly employed for agricultural labor in northern China. This agrees well with [the view] that the Earth is going on the way to an ice age as predicted by long-term statistics.

*Dr. Ye works at the South China Sea Institute of Oceanology of the Chinese Academy of Sciences.*

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**Alfred H. Pekarek**  
Englewood, Colorado

I am constantly amazed by the volume of hard data that conclusively argues

against global warming. The use of the paper tiger, global warming, as justification for the global social engineering being proposed is nothing short of fraudulent.

*Dr. Pekarek is a consulting geologist in the field of oil and gas exploration.*

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**Michael Gadsden**  
Aberdeen, Scotland

I was glad to be on your mailing list for "The Non-Science of Global Warming." I found myself, not for the first time, in full sympathy with your rant. . . .

All this, Bob, is to say that you are not alone. And long may that continue to be!

*Dr. Gadsden is professor of physics at the University of Aberdeen and secretary general emeritus of the International Association for Geomagnetism and Aeronomy.*

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**Yuli D. Chashechkin**  
Moscow, Russia

Again everybody can recognize the lion from his claws. Thank you very much for your message and magazine with impressive paper which I have read with great pleasure. . . . It is my pleasure to let you know that physicists who are not involved in climatic problems are still continuing their routine work. By the way, in one of them we describe the possible mechanism (linear!) of direct interaction of large and small scales motions without any vortex cascade.

*Dr. Chashechkin works at the Institute for Problems in Mechanics of the Russian Academy of Sciences.*

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**Anna Ginzburg**  
Moscow, Russia

Yesterday I received and read your paper in *21st Century*. My congratulations! Important problem, good argued paper in polemic style. I did not imagine that [such] evident disregard of scientific results is possible in such a progressive country as America. It will be interesting, if your paper, which gives the total information on the global "warming" problem, will change the situation.

*Ginzburg is an oceanographer at the Institute of Oceanology of the Russian Academy of Sciences, Moscow, Russia.*

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**Peter Dietze**  
Langensendelbach, Germany

. . . I am glad to be able to contact another active contrarian. From science journalist Holger Heuseler, I got an excellent article from you, translated into German to be published here. . . .

*Dr. Dietze is an electrical engineer at Siemens. For 10 years he studied the global warming debate privately and independently, and, with others, presented a new global carbon model in Leipzig in November 1995 at the congress of the European Academy for Environmental Affairs.*

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**Gunther Krause**  
Bremerhaven, Germany

Thank you very much for your exciting article on "The Non-Science of Global Warming." Next door to my office resides the secretary of a German Federal Council on "global environmental issues," who will distribute copies to its prominent members. I have also handed out copies to our department leaders, and I am looking forward to reactions.

I like your article very much and also your treatise on the scientific honor codes and their violations in recent times. I share your views, and I am really looking forward to the response of the powerful international organizations to the criticism of a brave and well-known scientist!

*Prof. Dr. Krause, of the Alfred Wegener Institute in Bremerhaven, is a deputy secretary general emeritus of IAPSO.*

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**Bob Dale**  
San Diego, Calif.

. . . Really, your article should be required reading in *all* science classes. A young sixth grader wrote to me for an interview on "global warming" and how it will affect flying. The boy wants to be a pilot. So, I explained how an airplane handles differently on hot days and cold days—and there was much evidence to support "Non global warming." I sent him a copy of your article and suggested it might be interesting to do his science fair project using some of *your* information rather than just accepting global warming as a "done deal."

*Bob Dale is the long-time weatherman on the San Diego NBC-TV affiliate.*

## ANOTHER GLOBAL WARMING FRAUD EXPOSED

# Ice Core Data Show No Carbon Dioxide Increase

by Zbigniew Jaworowski, Ph.D.

*Attempts to support the global warming thesis with analyses of the carbon dioxide content of air bubbles in glacial ice samples, are based on fudged data and ignorance of the physical processes of glacial ice formation.*

Margerie Glacier in Glacier Bay National Monument, Alaska/NOAA

Reprinted from 21st Century Science & Technology, Spring 1997, pp. 42-52.

### EDITOR'S NOTE

When climate science was not driven by ideology, it was generally assumed that long-term astronomical cycles—those measured in tens or hundreds of thousands of years—were the way in which climate had to be situated. The long 100,000-year cycles of Ice Ages are determined by the periodicities in the eccentricity, tilt, and precession of the Earth's orbit; in between Ice Ages, there are roughly 10,000-year periods known as interglacials, when relatively milder climates prevail. Right now, the Earth is at the tail end of an interglacial and probably already entering a period of glacial advance.

The Ice Ages of the past and the coming Ice Age have a timetable of their own, quite independent of man's industrial output of carbon dioxide. No scientist who knew these astronomical cycles could possibly be trapped into worrying about the ups and downs of local or global temperatures in time

spans of years or even decades, or seriously be concerned with short-term computer modelling and associated scare stories about global warming.

The times have changed, and so has environmental ideology—but the long-range climate cycles have not changed. This means, that based on the last several million years of history, the world is inexorably moving into another Ice Age, no matter how much propaganda is generated about global warming. The global warming hypothesis and the many research artifacts it has generated can be dissected and disproved one by one; but the fact remains that the overall question of climate must be situated in a long view of history, not the short term.

This article examines one of the main pillars of the global warming thesis: the assertion that ice core data—analyses of gas bubbles trapped in glacial ice—prove that atmospheric carbon dioxide, CO<sub>2</sub>, has increased since the pre-industrial era as a result of fossil-fuel burning and other human activities.



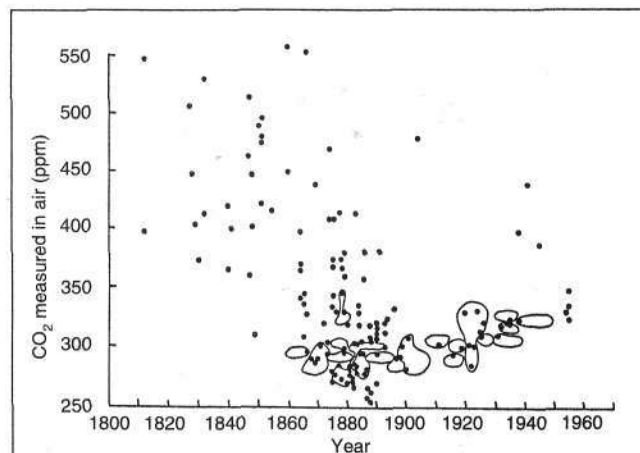
From its very beginning, the hypothesis on anthropogenic greenhouse warming was tainted with a biased selection of data, ad hoc assumptions that were not verified experimentally, and one-sided interpretations. Such symptoms of affliction, which Irving Langmuir called "pathological science,"<sup>1</sup> are evident in the publications of G.S. Callendar, who truly can be regarded as the father of the modern "man-made climatic warming" hypothesis. In 1938, Callendar revived Svante Arrhenius's idea of man-made climatic warming, now 100 years old.<sup>2</sup> Callendar claimed that because of fossil fuel burning, the average atmospheric concentration of CO<sub>2</sub> had increased from the 19th century value of 274 parts per million volume (ppmv) to 325 ppmv in 1935, that is, by 18.6 percent; and that between 1880 and 1935, this caused an increase in the global surface temperature of 0.33°C.<sup>3-5</sup> However, the measured 19th century CO<sub>2</sub> concentrations in the atmosphere ranged from about 250 to 550 ppmv (Figure 1), and the average concentration estimated from these values was 335 ppmv.<sup>6</sup>

A nonsignificant decreasing trend of values in Figure 1, between 1860 and 1900, when CO<sub>2</sub> emissions from fossil fuel burning increased from 91.5 to 485.6 million tons of carbon was similar to a decrease in global surface air temperature in this period.<sup>7</sup> This may reflect lower CO<sub>2</sub> degassing from colder oceans, the result of natural climatic fluctuation.<sup>8</sup>

To reach the low 19th century CO<sub>2</sub> concentration, the cornerstone of his hypothesis, Callendar used a biased selection method. From a set of 26 19th century averages, Callendar rejected 16 that were higher than his assumed low global average, and 2 that were lower. Callendar's paper of 1938, presented at a meeting of the Royal Meteorological Society, was criticized by its members, who asked a dozen fundamental questions (for example, the validity of the estimate of CO<sub>2</sub> average concentrations, the basics of the carbon cycle, and the balance between radiation and atmospheric temperature distribution), which, after half a century, have remained unanswered and are still the subject of ardent discussions (for example, see Reference 9).

Because of uncertainties in 19th century air measurements, studies of greenhouse gases in glacier ice are often regarded—incorrectly—as the most reliable estimates of CO<sub>2</sub>, CH<sub>4</sub> (methane), and N<sub>2</sub>O (nitrous oxide) concentrations in the pre-industrial atmosphere. The results of ice core analyses are supposed to be "the only possible validation of models that were set up to describe future climatic changes caused by anthropogenic emissions."<sup>10</sup> On the basis of these analyses, the Intergovernmental Panel on Climate Change<sup>11</sup> declared that the pre-industrial concentration of CO<sub>2</sub> in the atmosphere was 26 percent lower than the current level. The IPCC also declared that the pre-industrial concentration of N<sub>2</sub>O was 19 percent lower, and that CH<sub>4</sub> was 215 percent lower than current levels. However, no study has yet demonstrated that the content of greenhouse trace gases in old ice,

*Zbigniew Jaworowski, M.D., Ph.D., and D.Sc., a multidisciplinary scientist, is a professor at the Central Laboratory for Radiological Protection, Warsaw, Poland. He has served as the chairman of the United Nations Scientific Committee on the Effects of Atomic Radiation, and has studied glacier ice samples from around the world, analyzing traces of heavy metals and radionuclides.*



**Figure 1**  
**AVERAGE ATMOSPHERIC CO<sub>2</sub> CONCENTRATIONS**  
**MEASURED IN THE 19TH AND 20TH CENTURIES**

*The values that G.S. Callendar chose to use are shown encircled. He rejected both higher and lower values, to arrive at a figure that backed up his hypothesis.*

Source: Adapted from S. Fonselius, et al., 1956. *Tellus*, Vol. 8, p. 176

or even in the interstitial air from recent snow, represents the atmospheric composition.

#### Ice Core Data Unreliable

The ice core data from various polar sites are not consistent with each another, and there is a discrepancy between these data and geological climatic evidence.<sup>12</sup> One such example is the discrepancy between the classic Antarctic Byrd and Vostok ice cores, where an important decrease in the CO<sub>2</sub> content in the air bubbles occurred at the same depth of about 500 meters, but at which the ice age differed by about 16,000 years. In an approximately 14,000-year-old part of the Byrd core, a drop in the CO<sub>2</sub> concentration of 50 ppmv was observed, but in similarly old ice from the Vostok core, an increase of 60 ppmv was found. In about ~6,000-year-old ice from Camp Century, Greenland, the CO<sub>2</sub> concentration in air bubbles was 420 ppmv, but it was 270 ppmv in similarly old ice from Byrd, Antarctica.

H. Oeschger, et al. made an ad hoc attempt to explain some of these discrepancies as (1) "a process which has not yet been identified," (2) wrong modelling, and (3) "not overlapping time intervals," but these explained nothing.<sup>13</sup> The failure to resolve the notorious problem of why about 30 percent of man-made CO<sub>2</sub> is missing in the global carbon cycle, based on CO<sub>2</sub> ice core measurements, suggests a systematic bias in ice core data.<sup>14</sup> It is not possible to explain the ice core CO<sub>2</sub> record in terms of a system with time-invariant processes perturbed by a combination of fossil fuel carbon release, CO<sub>2</sub>-enhanced biotic growth, and deforestation.<sup>15</sup>

Dating of such important climatic events as the termination of the Younger Dryas period based on dendrochronology (examination of tree ring growth) and lake sediments, differs from recent ice core data from Greenland by up to about 900 years.<sup>16</sup> The short-term peaks of δ<sup>18</sup>O in the ice sheets have been ascribed to annual summer/winter layering of snow

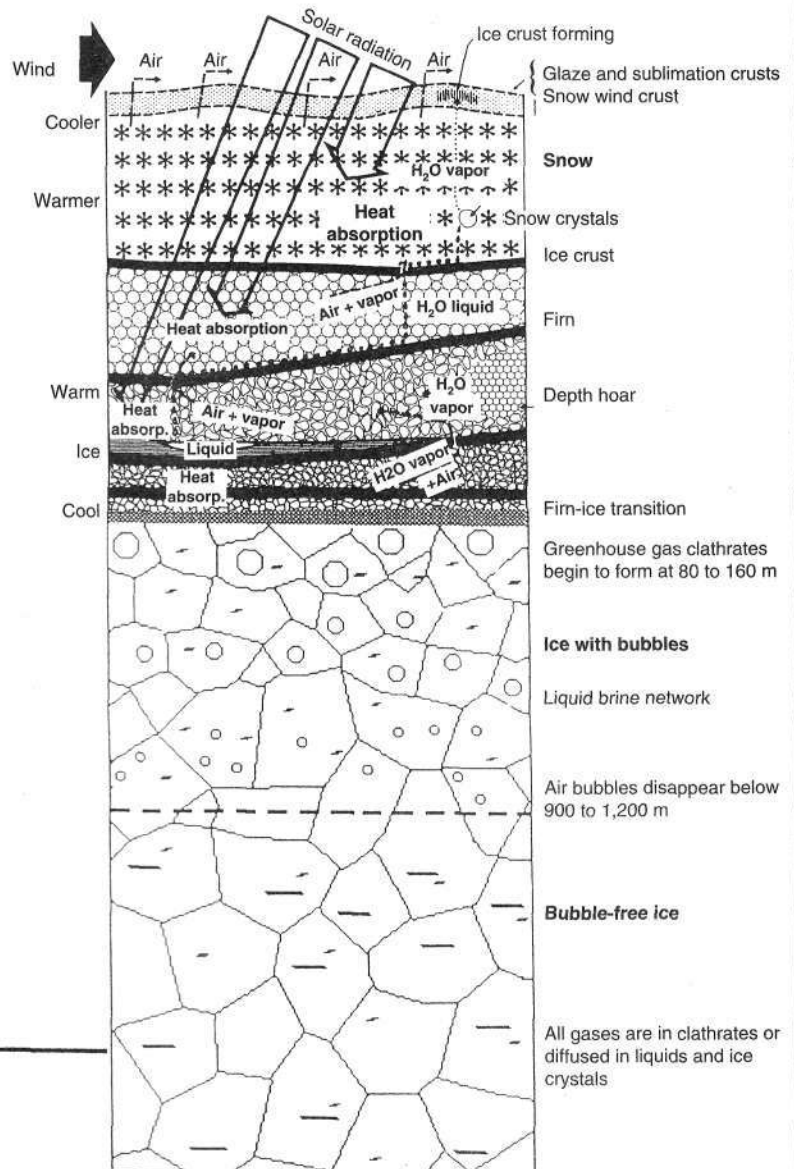
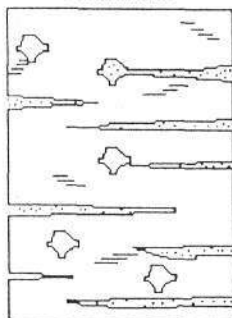
**Figure 2**  
**PROCESSES OCCURRING IN**  
**POLAR ICE SHEETS**

Absorption of solar radiation at low temperature partly volatilizes and melts the snowflakes. Snow is metamorphosed to firn. The thermal gradient and gravitational compression of snow cause upward movement of gas. Some air escapes from firn back to the atmosphere, and H<sub>2</sub>O vapor condenses near the wind-cooled surface, starting formation of the ice crusts. Depth hoar forms as a result of loss of material by sublimation. Meltwater seeps down and collects over impermeable layers. The firn density gradually increases with depth, and at 0.83 g/cm<sup>3</sup>, firn changes into solid ice in which all pores are occluded, forming the primary air bubbles. Between a depth of 900 to 1,200 m, air bubbles disappear. Liquid water is contained in quasi-infinite network of capillary veins and films between the ice crystals. After relaxation of the load pressure, secondary gas cavities are formed in the cracked ice cores contaminated with the drilling fluid.



Snowflake covered with supercooled liquid water

**Artifacts in decompressed core of bubble-free ice**  
Micro- and macro-cracks  
Secondary cavities  
Contaminants



formed at higher and lower air temperatures. These peaks have been used for dating the glacier ice, assuming that the sample increments of ice cores represent the original mean isotopic composition of precipitation, and that the increments are in a steady-state closed system.<sup>17,18</sup>

Experimental evidence, however, suggests that this assumption is not valid, because of dramatic metamorphosis of snow and ice in the ice sheets as a result of changing temperature and pressure. At very cold Antarctic sites, the temperature gradients were found to reach 500°C/m, because of subsurface absorption of Sun radiation.<sup>19</sup> Radiational subsurface melting is common in Antarctica at locations with summer temperatures

below -20°C, leading to formation of ponds of liquid water, at a depth of about 1 m below the surface.<sup>12</sup> Other mechanisms are responsible for the existence of liquid water deep in the cold Antarctic ice, which leads to the presence of vast subsheet lakes of liquid water, covering an area of about 8,000 square kilometers in inland eastern Antarctica and near Vostok Station, at near basal temperatures of -4 to -26.2°C.<sup>12</sup> The sub-surface recrystallization, sublimation, and formation of liquid water and vapor disturb the original isotopic composition of snow and ice (Figure 2).

Important isotopic changes were found experimentally in firn (partially compacted granular snow that forms the glacier

surface) exposed to even 10 times lower thermal gradients.<sup>19</sup> Such changes, which may occur several times in a year, reflecting sunny and overcast periods, would lead to false age estimates of ice. It is not possible to synchronize the events in the Northern and Southern Hemispheres, such as, for example, CO<sub>2</sub> concentrations in Antarctic and Greenland ice. This is, in part the result of ascribing short-term stable isotope peaks of hydrogen and oxygen to annual summer/winter layering of ice and using them for dating.<sup>17</sup>

New light was shed on the validity of the dating of recent ice strata when six U.S. Lightning fighter planes and two B 17 Flying Fortresses from World War II were found buried in 1942 ice, about 200 km south from a classic Greenland site at Dye 3, where they had made an emergency landing. The planes were found 47 years later at a depth of 78 m, and not at the 12-m depth that had been estimated by glaciologists using oxygen isotope dating.<sup>20</sup>

In the air from firn and ice at Summit, Greenland, deposited during the past ~200 years, the CO<sub>2</sub> concentration ranged from 243.3 ppmv to 641.4 ppmv.<sup>21</sup> Such a wide range reflects artifacts caused by sampling, or natural processes in the ice sheet, rather than the variations of CO<sub>2</sub> concentration in the atmosphere. Similar or greater range was observed in other studies of greenhouse gases in polar ice. (See reviews in References 12 and 22.)

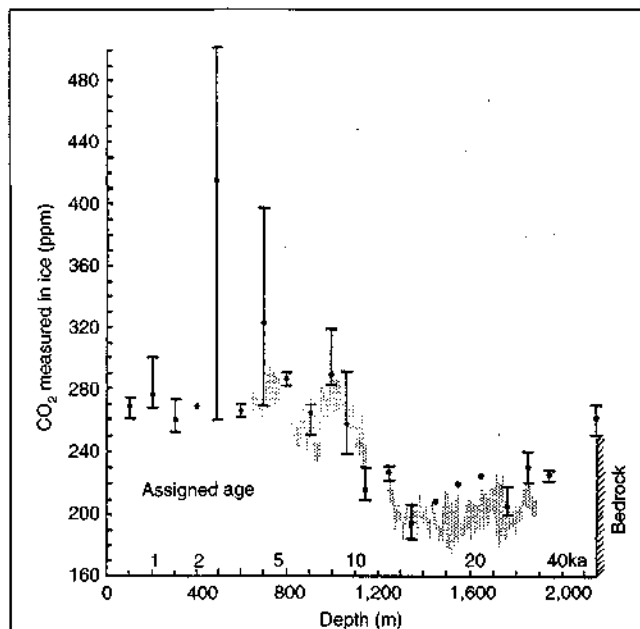
#### Fudging the CO<sub>2</sub> Data

Until 1985, the published CO<sub>2</sub> readings from air bubbles in pre-industrial ice ranged from 160 to about 700 ppmv, and occasionally even up to 2,450 ppmv. After 1985, high readings disappeared from the publications! To fit such a wide range of results to the anthropogenic climatic warming theory, which was based on low pre-industrial CO<sub>2</sub> levels, three methods were used: (1) rejection of high readings from sets of pre-industrial samples, based on the credo: "The lowest CO<sub>2</sub> values best represent the CO<sub>2</sub> concentrations in the originally trapped ice";<sup>23</sup> (2) rejection of low readings from sets of 20th century samples; and (3) interpretation of the high readings from pre-industrial samples as representing the contemporary atmosphere rather than the pre-industrial one.

Publications on greenhouse gases in ice often exhibit similar symptoms to those of G.S. Callendar, cited above. But the most important deficiency of these studies is the ice matrix itself, which does not fulfill the absolutely essential closed-system criterion. This is because liquid water is present in ice even at very low temperatures, and because many chemical and physical processes occur, in situ, in ice sheets and in recovered ice cores. These factors, discussed in References 8, 12, 22, and 24-28, change the original composition of air entrapped in ice, making the ice core results unrepresentative of the original chemical composition of the ancient atmosphere.

Here are some typical examples of how the estimates of pre-industrial atmospheric levels of greenhouse gases were determined. These results were then taken as a basis for estimation of the man-made climatic warming.<sup>11</sup>

- Neftel, et al. reported in 1982 rather high median CO<sub>2</sub> concentrations in the preindustrial ice core from Byrd, Antarctica, of about 330 and 415 ppmv, with maximum value reaching 500 ppmv.<sup>23</sup> However, in 1988, in the second publication on the same core, Neftel et al. did not show these high read-



**Figure 3**  
**HOW SELECTION OF ICE CORE DATA**  
**SKEWS RESULTS TO MATCH**  
**THE GLOBAL WARMING THEORY**

*In presenting measurements of CO<sub>2</sub> concentrations in the pre-industrial ice core from Byrd Antarctica, Neftel, et al., in 1982 showed maximum values up to 500 ppmv (dots and bars). In 1988, the same authors published measurements for the same section of the Byrd ice core (gray areas), but left off the high readings published previously, reporting a highest concentration of 290 ppmv, in agreement with the global warming theory.*

ings; the highest concentration reported was 290 ppmv, in agreement with the global warming theory<sup>29</sup> (Figure 3).

- Pearman, et al. "on examination of the data," rejected 43 percent of the CO<sub>2</sub> readings from Law Dome, Antarctica core, 39 percent of the CH<sub>4</sub> readings, and 43 percent of the N<sub>2</sub>O readings, because they were higher or lower than the assumed "correct" values.<sup>30</sup> Thus, they concluded a value of 281 ppmv CO<sub>2</sub> for the pre-industrial atmosphere, and increases from the year 1600 of 90 percent and 8 percent of CH<sub>4</sub> and N<sub>2</sub>O, respectively.

- Leuenberger and Siegenthaler claimed that their data from a Greenland ice core demonstrate that the present level of N<sub>2</sub>O in the atmosphere, 310 ppbv, is an effect of a recent 19 percent increase caused by industrial activity.<sup>31</sup> To reach this conclusion, they rejected 27 percent of the samples with N<sub>2</sub>O readings deemed to be "too high" for pre-industrial ice. After this "correction," the average pre-industrial atmospheric concentration of N<sub>2</sub>O was declared to be 260 ppmv, although their value for ice from the year 1822 was 296.1 ppmv. Their results from a shallow Dye 3, Greenland core show a random N<sub>2</sub>O distribution. Nevertheless, the authors formed an increasing temporal trend by rejecting the "incorrect" high readings.

- Etheridge, et al. claimed that their ice core results show a pre-industrial N<sub>2</sub>O concentration of 285 ppbv.<sup>32</sup> This value



was calculated after rejection of 44 percent of their measurements! From the remaining analyses, the high readings from 16th and 17th century ice (328.3 and 329.8 ppbv), which were higher than in the 20th century samples (285.7 and 322.9 ppmv), were again eliminated without explanation.

• Zardini, et al. rejected a low  $N_2O$  reading of 240 ppbv in the youngest part of an Antarctic core from the year 1919.<sup>33</sup> From the several-thousand-year-old part of the core, they did not reject an even lower value of 217 ppbv, but they eliminated the high values of 310, 354, 359, and 362 ppbv. After these "improvements," Zardini, et al. concluded that the pre-industrial  $N_2O$  level in the atmosphere was 270 ppbv, and that in the present atmosphere  $N_2O$  increased "due to fossil fuel burning."

#### Some False Assumptions

For climatic interpretation of the ice core data the following assumptions are used:

(1) The entrapment of air in the ice is essentially a mechanical process, which occurs with no fractionation of the gas components;<sup>34</sup> the original composition of trapped air is believed to be permanently preserved in the polar ice sheets and in the collected ice cores. This means that the ice, with its included air bubbles, should remain a closed system during tens or hundreds of thousands of years in the ice sheets, and that this system is not disturbed during the core drilling or its transportation to the laboratory and its storage.

(2) No liquid phase occurs in firn and ice at average annual air temperatures of  $-24^\circ\text{C}$  or less.<sup>35</sup>

(3) The gas inclusions are 80 to 2,800 years younger than the age of the ice in which they are entrapped. (See, for example, Reference 36.) This assumption is needed to accommodate the data from the shallow ice cores, which show that air entrapped in 19th century ice, or earlier, exhibits levels of  $CO_2$ ,  $CH_4$ , and  $N_2O$  similar to present atmospheric concentrations.

It has been pointed out that these assumptions are incorrect, and thus that the conclusions on low pre-industrial levels of atmospheric greenhouse gases are wrong. (See, for example, References 12, 22, 24-28.) However, this criticism was largely ignored by greenhouse gases glaciologists, who offered no convincing arguments to refute this criticism in the one and only paper that it provoked.<sup>37</sup>

In addition to this biased selection of experimental evidence, there are many technical aspects to the science of glacial ice analysis that are ignored by the global warming enthusiasts in their desire to bolster their arguments with glacial data. Presented here are some of the scientific points eliminated by the global warming advocates.

#### Chemical Fractionation

A striking feature of the ice core arguments that there is a recent man-made increase of atmospheric  $CO_2$ ,  $CH_4$ , and  $N_2O$ , is that all the ice core data are from ice deposited not in the last few decades, but in the 19th century or earlier. No information is presented on the recent concentrations of greenhouse gases in firn and ice deposited in the 20th century. Instead, the concentrations of greenhouse gases found in the pre-industrial ice are compared with the concentration of these gases in the contemporary free atmosphere.<sup>12</sup>

To justify such comparisons, an assumption is required that

the entrapment of air in ice does not involve any chemical fractionation of gases. However, there are more than 20 chemical and physical processes that change the original chemical and isotopic composition of ice and of gas inclusions recovered from the ice cores.<sup>12</sup> Even the composition of air from near-surface snow in Antarctica is different from that of the atmosphere; the surface snow air was found to be depleted in  $CO_2$  by 20 to 50 percent. (See references in Reference 12.)

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**"No study has yet demonstrated that the content of greenhouse trace gases in old ice, or even in the interstitial air from recent snow, represents the atmospheric composition."**

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Chemical and isotopic fractionation of gases occurs at the occlusion of air in snowflakes, in interstitial air in near-surface snow (effects of insolation), deep in the firn and ice, and in the ice cores. In the upper snow and firn strata, fractionation occurs on a time scale of days and of a few years; but deep in the ice, it occurs on a scale of up to hundreds of thousands of years. Fractionation is caused by the differences in solubility in cold water of air components, chemical reactions, formation of gas clathrates and gravitational thermal effects.<sup>12</sup> (Clathrates are compounds formed by the inclusion of one type of molecule in the cavities of the crystal lattice of another.) In firn, fractionation is related to subsurface melting of ice crystals, evaporation of water, transport of vapor in firn pores along the thermal gradient, liquefaction of vapor, formation of ice layers and depth hoar (Figure 2).

Most of these processes are related to liquid water, which is present in the cold snow and ice down to the temperature of  $-73^\circ\text{C}$ ,<sup>38</sup> to pressure and temperature changes, and to metamorphosis of snow crystals.<sup>12</sup> The fractionation of gases as a result of their various solubilities in water ( $CH_4$  is 2.8 times more soluble than  $N_2$  in water at  $0^\circ\text{C}$ ;  $N_2O$ , 55 times; and  $CO_2$ , 73 times), starts from the formation of snowflakes, which are covered with a film of supercooled liquid.<sup>22</sup> Gases dissolved first in liquid water are then equilibrated with air trapped in the firn pores and in the air bubbles of the solid ice.

Carbonates and other impurities present in the ice sheet—such as the reactive species  $HNO_3$  (nitric acid),  $HCl$  (hydrochloric acid),  $H_2O_2$  (hydrogen peroxide),  $SO_2$  (sulfur dioxide), and  $O_3$  (ozone), as well as catalysts such as copper, iron, manganese, or particulate matter—are dissolved or suspended in the liquids present at the surface of snow and ice grains, and can react with themselves (for example, producing or consuming  $CO_2$ ), or with the greenhouse gases. Oxidation or reduction processes occur not only in the upper firn part of the ice sheet, where solar radiation penetrates, but also in the deep, dark parts. This is indicated by sharp decreases in  $H_2O_2$  concentration profiles observed deep in the ice sheet, and also by the systematic decrease of its concentration with depth (for references, see Reference 22).

Another important process is differential formation and dissociation of pure and mixed clathrates (hydrates) of greenhouse

gases and of major components of air. Dissociation pressures are much lower for greenhouse gases than for oxygen and nitrogen. At  $-20^{\circ}\text{C}$ , these pressures are only 4, 5, and 13.5 bars, for  $\text{N}_2\text{O}$ ,  $\text{CO}_2$ , and  $\text{CH}_4$ , respectively; but these pressures are 120 bars for  $\text{N}_2$ , and 160 for  $\text{O}_2$ . At  $-20^{\circ}\text{C}$  in the ice sheet,  $\text{CO}_2$  gas begins to change into the  $\text{CO}_2$  clathrate (a white solid discovered in 1882 by Zygmunt F. Wróblewski, a physicist who first liquefied air,<sup>39,40</sup>), and to disappear from the gas in the air bubbles, at a depth of about 70 m, where the load pressure increases to 5 bars.

On the other hand,  $\text{O}_2$  and  $\text{N}_2$  change into clathrate crystals at much greater depth of about 900 to 1,200 m, where all gases finally enter the clathrate form, or diffuse into liquids and ice crystals. Therefore, at this depth, all air bubbles disappear completely from the ice. Now, what happens when ice cores are decompressed and recovered at the surface of the ice sheet: In the bubble-free ice, new artificially created gas cavities are formed from the clathrate crystals dissociating at the lower pressure (Figure 2). This dramatic phenomenon is played down, (for example, see Reference 41), or ignored, in publications on greenhouse gases.

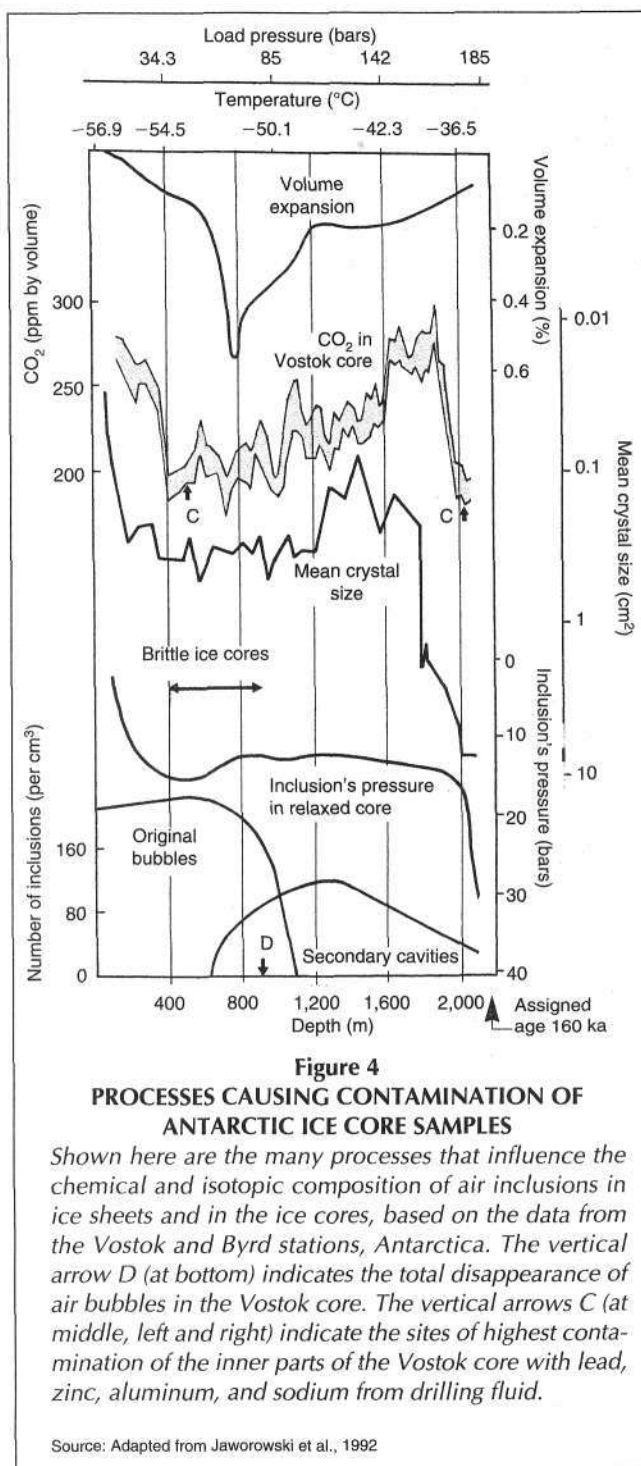
It was found experimentally that the partial pressure of the gas is not a determining factor for the dissociation pressure of clathrates, which become enriched in components that form clathrates readily. In contrast, the free-gas phase becomes enriched with components that do not easily form clathrates.<sup>42</sup> The occurrence of clathrates causes depletion of greenhouse gases in two stages: (1) during clathrate formation in the ice sheet, when greenhouse gases enter the clathrate form and leave the air bubbles earlier than  $\text{N}_2$  and  $\text{O}_2$ ; and (2) in the ice cores after relaxation of the load pressure, when  $\text{N}_2$  and  $\text{O}_2$  clathrates dissociate long before the greenhouse gases, forming secondary gas cavities in the ice.

This latter phenomenon is associated with micro-explosive changes in the core structure<sup>43</sup> (Figure 2), and formation of micro- and macro-cracks, which, together with the stress fracturing of ice, leads to molecular and isotopic fractionation of gases.<sup>44</sup>

As mentioned above, in some gas inclusions from pre-industrial ice, concentrations of greenhouse gases were found similar to, or much higher than, those of the present atmosphere. In some gas inclusions, changes in  $\text{CO}_2$  concentrations of up to 50 ppmv have been measured over distances of only 2.5 cm in the cores.<sup>45</sup> Such inhomogeneous distribution of  $\text{CO}_2$  concentrations obviously does not reflect the changes in the composition of the atmosphere, but is the result of the random character of fractionation processes.

However, as discussed in References 12 and 22, the prevalent effect of fractionation of gases in the ice sheets, and in the recovered ice cores, is the preferential depletion of greenhouse gases in the air bubbles, and in the secondary gas cavities. For this reason, most gas samples recovered from polar ice cores had concentrations of trace gases that were much lower than those of the present atmosphere, even in ice dating from periods when the global surface temperature was higher than the present by 0.5 to  $1.3^{\circ}\text{C}$ —for example, during the Eemian interglacial period, 125,000 to 130,000 years ago; in the mid-Holocene, 5,000 to 6,000 years ago; or during the Medieval warm period, 1,200 years ago.<sup>11</sup>

The  $\text{CO}_2$  concentrations in air bubbles in ice from the years



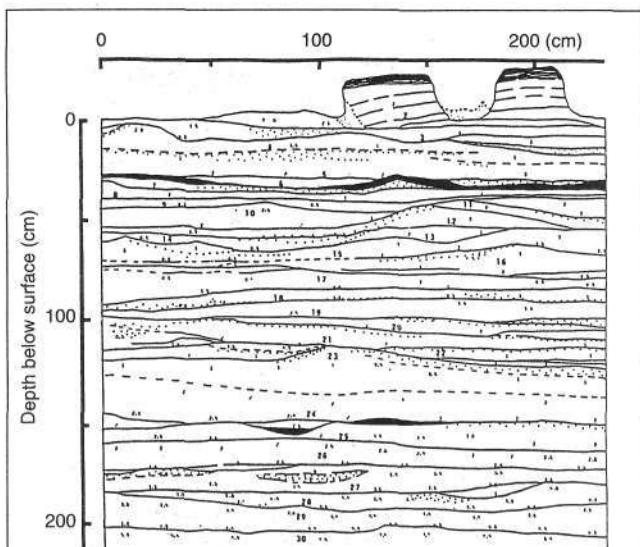
**Figure 4**  
**PROCESSES CAUSING CONTAMINATION OF ANTARCTIC ICE CORE SAMPLES**

Shown here are the many processes that influence the chemical and isotopic composition of air inclusions in ice sheets and in the ice cores, based on the data from the Vostok and Byrd stations, Antarctica. The vertical arrow D (at bottom) indicates the total disappearance of air bubbles in the Vostok core. The vertical arrows C (at middle, left and right) indicate the sites of highest contamination of the inner parts of the Vostok core with lead, zinc, aluminum, and sodium from drilling fluid.

Source: Adapted from Jaworowski et al., 1992

1000 to 1800, remained remarkable stable: 270 to 290 ppmv, even though during the Little Ice Age of the 16th to 19th century, the global temperature decreased about  $1^{\circ}\text{C}$ . Such a long-term drop in global temperature should be reflected as a decrease in the  $\text{CO}_2$  content in the atmosphere, because of higher  $\text{CO}_2$  solubility in the colder oceanic water, and reduced oxidation processes on land and sea (see discussion below).

The lack of this effect in the air bubbles in ice seemed "surprising" for the authors of the Intergovernmental Panel on



**Figure 5**  
**ICE SHEET STRUCTURE BARS**  
**AIR PENETRATION INTO FIRN**

The ice crust evidence indicates that high density ice strata form a multilayer structure that separates the firn into horizontal pockets, a structure that prevents air penetration into the firn. Thus assumptions that air and ice ages are different, used to bolster the global warming theory, are not correct. Shown here is firn stratigraphy in a pit at Mizuho Plateau (East Antarctica), where the mean annual temperature is  $-51^{\circ}\text{C}$ . The solid lines indicate the ice crusts.

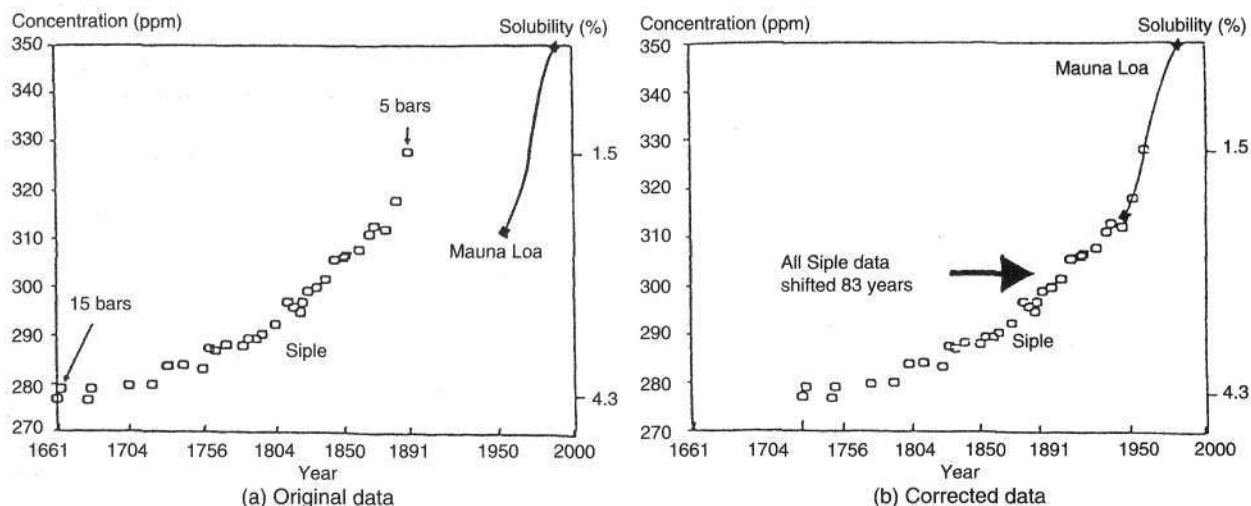
Source: Adapted from Watanabe 1977

Climate Change report in 1990, who deduced from it that the sensitivity of atmospheric  $\text{CO}_2$  to such climatic fluctuations is small. However, the  $\text{CO}_2$  atmospheric content is very sensitive even to short-term and much smaller changes of global temperature, as will be shown below. It is much more plausible that the long-term changes of concentration of greenhouse gases in the gas inclusions from ice sheets represent the cumulative effect of the interplay of many processes occurring in the ice sheet and in the ice cores, rather than composition of the ancient atmosphere (Figure 4).

### The Age of Air in Bubbles

An ad hoc, speculative assumption that the air in bubbles in ice is 90 to 200 years younger than the ice in which the bubbles are entrapped, was posed at a time when the concentrations of greenhouse gases in air bubbles from ice deposited in the 18th and 19th century were found to be similar to those of the present atmosphere.<sup>46, 47</sup>

No experimental evidence was offered in support of this assumption. Instead, Craig et al. offered the circular-logic argument that this speculation must be correct, because the ice core data for a greenhouse gas with the ages corrected in this way "lead rather precisely into the recent atmospheric measurements!"<sup>47</sup> Later, the assumption for the difference between the age of the air and the age of the ice was theoretically, but not experimentally, elaborated, with estimations of this difference for various polar sites ranging between 90 and 2,800 years.<sup>36</sup> These estimations were simply based on the age of the firn/ice transition. It was supposed that in the Greenland and Antarctic sites, where the mean annual temperature is  $-24^{\circ}\text{C}$  or less, the whole column of firn was devoid of ice layers that were impermeable to atmospheric air. Further, it was believed that this air can freely penetrate into the ice sheet, down to the



**Figure 6**

### CORRECTING THE $\text{CO}_2$ ICE DATA TO FIT THE THEORY: AN EXAMPLE FROM SIPLE, ANTARCTICA

The figures here show measurements of  $\text{CO}_2$  in pre-industrial ice (open squares) and  $\text{CO}_2$  as measured in the atmosphere at Mauna Loa, Hawaii (solid line). The original data are shown in (a). The same data appear in (b) after an arbitrary "correction" of 83 years in the age of the air, to make the data accord with the global warming theory. Using the real age of the air, could indicate that the  $\text{CO}_2$  concentrations in the latter 19th century were the same as those in the 1970s. The "corrected" data were published by Neftel et al. 1985; Friedli, et al. 1986; and IPCC, 1990.



firm/ice transition at about 40 to 120 m depth, where final occlusion of the firm pores occurs.

However, as discussed in Reference 12, the formation of ice crusts has been recorded at many sites with mean annual surface air temperature reaching  $-57^{\circ}\text{C}$ . Numerous Japanese, Russian, and Norwegian stratigraphic studies have demonstrated that such high density ice strata (layers) are ubiquitous in the Antarctic ice sheet, where they form a multilayer structure (1 to 15 strata per meter depth), separating firm into horizontal pockets (Figure 5). This structure acts as a barrier to the free penetration of air into firm. The chemical and stable isotope fractionation of  $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2$ , and  $\text{O}_2$  occurring in the air trapped in the porous Greenland firm, indicates that this air in firm is isolated from the atmosphere.<sup>47</sup> On this basis, Craig et al. revoked their earlier estimate of a difference between age of air and ice.<sup>48</sup>

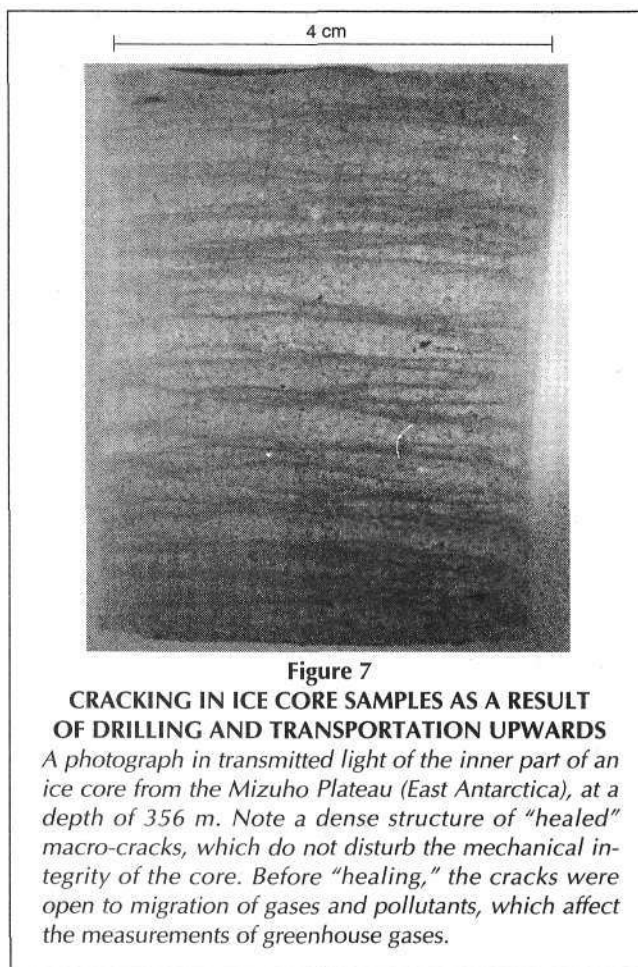
Thirteen years after the age assumption was postulated, and it was accepted on this basis that the level of greenhouse gases was lower in the pre-industrial atmosphere than now, an attempt was made to prove its validity in an experiment carried out in a borehole at Summit, Greenland.<sup>21</sup> At this site, the authors estimated the air/ice age difference as 210 years. As was indicated in Reference 22, the interpretation of the results in this experiment ignored Darcy's law on flow in porous media.  $\text{CO}_2$  concentration measured in air from about 214-year-old firm ranged from 242.3 to 435.7 ppmv; and from 50-year-old firm, it ranged from 347 to 641.4 ppmv. Such concentrations do not represent the composition of atmospheric air, but rather the fractionation processes in the ice sheets, and experimental artifacts.

The consequence of the assumption that the air in bubbles is younger than the ice in which the bubbles are found, is evident in Figure 6(b), which is widely accepted as a "proof" that the level of  $\text{CO}_2$  in the atmosphere has been increased by man's activities.<sup>11</sup> The same erroneous procedure was also used for other greenhouse gases. In the case of  $\text{CO}_2$ , the data from the 19th century ice collected at Siple, Antarctica, were made to overlay exactly the present atmospheric  $\text{CO}_2$  concentrations measured at an active and  $\text{CO}_2$ -emitting volcano, Mauna Loa, Hawaii—by assuming, arbitrarily, that the occluded air is 83 years younger than the ice.

Without this "correction," and using the real age of ice, the Siple and Mauna Loa curves do *not* correspond, and could indicate that  $\text{CO}_2$  atmospheric concentration was the same in the latter part of the 19th century as in the 1970s. One can also note that the  $\text{CO}_2$  concentration in the air bubbles decreases with the depth of the ice for the entire period between the years 1891 and 1661, not because of any changes in the atmosphere, but along the increasing pressure gradient, which is probably the result of clathrate formation, and the fact that the solubility of  $\text{CO}_2$  increases with depth.<sup>12</sup>

#### Cracked and Contaminated Ice Cores

Another area ignored by the global warming advocates concerns the condition of the ice core samples, as a result of the sampling procedure. Drilling the ice cores is a brutal procedure, subjecting the ice to mechanical and thermal stress, drastic decompression, and pollution. These factors cause micro- and macro-cracking of the ice, opening the original air bubbles and forming artificially created secondary air cavities



**Figure 7**  
**CRACKING IN ICE CORE SAMPLES AS A RESULT OF DRILLING AND TRANSPORTATION UPWARDS**  
*A photograph in transmitted light of the inner part of an ice core from the Mizuho Plateau (East Antarctica), at a depth of 356 m. Note a dense structure of "healed" macro-cracks, which do not disturb the mechanical integrity of the core. Before "healing," the cracks were open to migration of gases and pollutants, which affect the measurements of greenhouse gases.*

in the bubble-free, deep ice, and causing internal contamination of cores.

A dense network of horizontal fractures is created in the ice cores by a sheeting phenomenon that occurs as the result of elastic relaxation of load pressure of more than about 8 bars; that is, in cores at a depth below 110 meters. The cracking occurs during the drilling and upward transportation of the core in the borehole, which is filled with a wall-retaining drilling fluid. The small cracks are soon healed by regelation, and their remnants are visible as horizontal stratification of the cores. The effects of this sheeting phenomenon, well known to geologists and glaciologists, are demonstrated in Figure 7. The same horizontal cracking is visible in a similar photograph of Vostok core.<sup>49</sup>

Drilling fluid (diesel oil, jet fuel, and so on, with aggressive organic substances added for density regulation and antifreeze purposes) enters the cracks and penetrates into the central parts of the cores, and into the air bubbles and secondary gas cavities formed by dissociating clathrates. In the classic papers on greenhouse gases in polar ice, the reader is not informed about the method of drilling, or about the use of a drilling fluid (for example, see Reference 50). The gases released by decomposition of clathrates can escape into the drilling fluid before the cracks are healed at the surface of the ice sheet. As suggested by Craig et al., the molecular and isotopic fractionation of gases may occur during this process.<sup>48</sup>

Numerous studies on radial distribution of metals in the cores (for example, Reference 51) reveal an excessive contamination of their internal parts by the metals present in the drilling fluid. In these parts of cores from the deep Antarctic, ice concentrations of zinc and lead were higher by a factor of tens or hundreds of thousands, than in the contemporary snow at the surface of the ice sheet (Figure 8). This demonstrates that the ice cores are not a closed system; the heavy metals from the drilling fluid penetrate into the cores via micro- and macro-cracks during the drilling and the transportation of the cores to the surface.

During this drilling process, the ice cores become porous and open to both inflow and outflow of gases and liquids. The sheeting phenomenon, and about 20 physical and chemical processes that occur in the ice sheets and in the ice cores, make the ice and its gas inclusions an improper material for reconstruction of the levels of greenhouse gases in the ancient atmosphere.<sup>12</sup>

It is astonishing how credulously the scientific community and the public have accepted the clearly flawed interpretations of glacier studies as evidence of anthropogenic increase of greenhouse gases in the atmosphere. Future historians can use this case as a warning about how politics can negatively influence science.

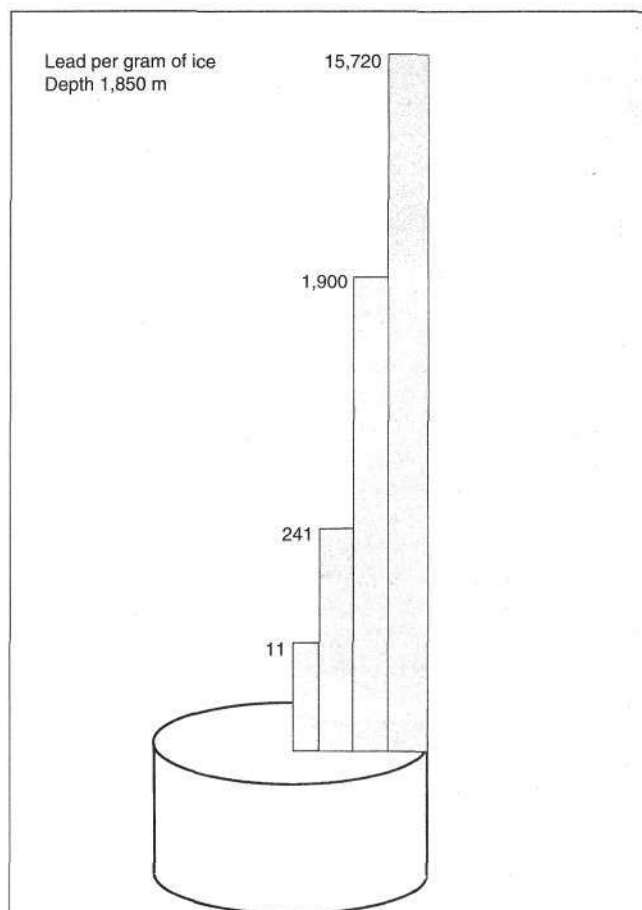
#### Using Carbon Isotope Evidence for CO<sub>2</sub>

Analysis of glacier ice is not the only way to estimate the anthropogenic contribution to the current CO<sub>2</sub> content in the atmosphere. Carbon present in CO<sub>2</sub> is composed of two stable isotopes, carbon-12 and carbon-13. Their ratio is commonly expressed as the δ<sup>13</sup>C (delta carbon-13) value. This value differs in various components of the environment. For average crustal carbon, it is -7 per mill;<sup>52</sup> for atmospheric CO<sub>2</sub> in isotopic equilibrium with marine HCO<sub>3</sub><sup>-</sup> and CaCO<sub>3</sub> (calcium carbonate), it has been estimated to be about -7 per mill;<sup>53</sup> measured in atmospheric CO<sub>2</sub> in 1956, it was -7.00 per mill;<sup>54</sup> and in 1988, -7.807 per mill;<sup>55</sup> and for fossil fuel and biogenic carbon it is -26 per mill.<sup>56</sup> Such great differences in the isotopic signature of fossil fuel and biogenic carbon make possible the estimation of the current and past contributions from this source to the atmosphere, because mixing even relatively small amounts of CO<sub>2</sub> with so low a δ<sup>13</sup>C value should change the average natural δ<sup>13</sup>C of atmospheric CO<sub>2</sub>.

This estimation can be made by carbon isotope mass balance calculations. For example, between 1956 and 1988, the CO<sub>2</sub> concentration in the atmosphere changed from 315.6 ppmv to 351.2 ppmv;<sup>7</sup> that is, by 10.14 percent. If this change were caused solely by anthropogenic emissions of CO<sub>2</sub> with δ<sup>13</sup>C of -26 per mill, then in 1988, the average atmospheric δ<sup>13</sup>C should be

$$(-7 \text{ per mill} \cdot 0.8989) + (-26 \text{ per mill} \cdot 0.1014) = -8.927 \text{ per mill}$$

and not -7.807 per mill, as measured by Keeling et al. at Mauna Loa, Hawaii.<sup>55</sup> With a 21 percent increase in atmospheric CO<sub>2</sub> caused by human activities, as claimed by the IPCC on the basis of glacier studies,<sup>11</sup> and with a preindustrial δ<sup>13</sup>C value of -7 per mill, the current δ<sup>13</sup>C of airborne CO<sub>2</sub> should decrease to about -11 per mill. Such a low



**Figure 8**  
**CONTAMINATION OF ICE CORE SAMPLES BY DRILLING FLUIDS**

*A radial distribution of lead pollution in the Vostok core, at a depth of 1,850 m, shows values of lead per gram of ice that are factors of tens to hundreds of thousands higher than lead concentrations measured in nearby recent surface snow in Antarctica, which ranges from 2.3 to 7.4 lead per gram of ice.*

Source: Adapted from Boutron, et al. 1990.

value was never determined

Such data conflict with the whole structure of the greenhouse warming hypothesis and, in particular, these data conflict with the unrealistically long atmospheric lifetime of CO<sub>2</sub> of up to 200 years assumed by the IPCC.<sup>11</sup> This assumption allows the accumulation of a rather small annual fossil-fuel and land-use increment of about 6 gigatons of carbon (GtC) per year, to about the 150 GtC assumed atmospheric increase between 1869 and 1990. The δ<sup>13</sup>C value measured in 1988, which is much higher than the result of isotopic mass balance calculation, suggests that in 1988, anthropogenic sources contributed only a small fraction to the total of atmospheric CO<sub>2</sub>. This fraction can be quantified in the following way:<sup>57</sup>

In 1991, the author, together with Tom V. Segalstad from Oslo University, calculated the isotopic composition of the December 1988 atmospheric total CO<sub>2</sub> pool of 748 GtC reported by the IPCC in 1990, in which Keeling et al. (1989) measured a

$\delta^{13}\text{C}$  of  $-7.807$  per mill. We made these calculations for three components of the  $\text{CO}_2$  pool: (1) the fraction of natural  $\text{CO}_2$  with  $\delta^{13}\text{C}$  of  $-7$  per mill remaining from the pre-industrial atmosphere (pre-1750); (2) the fraction of natural  $\text{CO}_2$  with  $\delta^{13}\text{C}$  of  $-7$  per mill remaining from the period 1750-1988; and (3) the cumulative  $\text{CO}_2$  fraction remaining from each annual emission of fossil-fuel  $\text{CO}_2$  from 1860 to 1988, with a  $\delta^{13}\text{C}$  of  $-26$  per mill.

For various atmospheric lifetimes of  $\text{CO}_2$ , we calculated the mass  $N$  of each component remaining in 1988 from particular years, using the equation

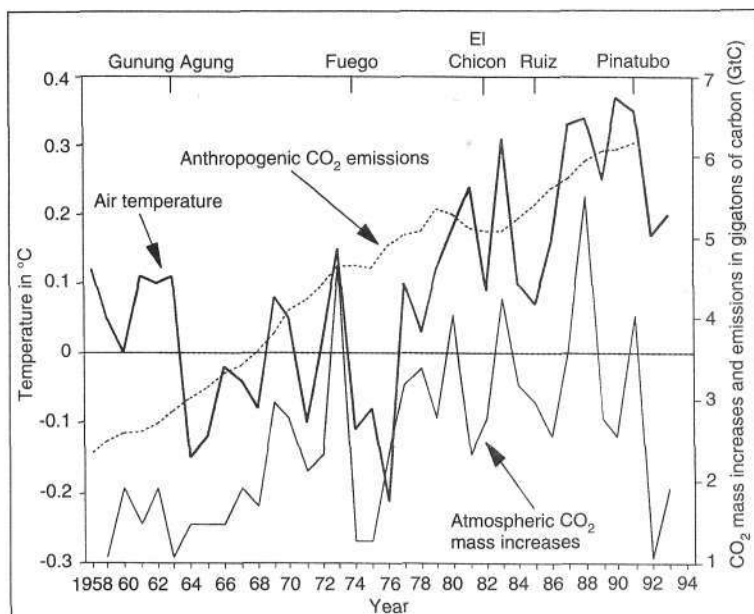
$$N = N_0 e^{-\lambda t}$$

where  $N_0$  is the annual injection of  $\text{CO}_2$  (in GtC) at a time  $t$  (in years) before the end of December 1988 from natural sources or fossil fuel burning, and  $\lambda$  is the removal constant (reciprocal lifetime) for various atmospheric  $\text{CO}_2$  lifetimes between 2 and 200 years. The isotopic mass balance calculations demonstrated that the lifetime fitting the 1988 criteria of  $\delta^{13}\text{C}$  of  $-7.807$  per mill, and of the mass of atmospheric  $\text{CO}_2$  of 748 GtC, is only 5 years. Neither longer nor shorter lifetimes give realistic isotopic mass balance results.

The atmospheric  $\text{CO}_2$  lifetime of about 5 years agrees with numerous estimates based on measurements of atmospheric carbon-14 from natural sources and nuclear tests.<sup>58,59</sup> Significant amounts of carbon-14 from nuclear tests penetrated deep into the ocean, in a relatively short time; 10 years after the most intensive test in 1962, carbon-14 was found at a depth of 5,000 m in the North Atlantic.<sup>60</sup> A similar  $\text{CO}_2$  atmospheric lifetime was also estimated by Starr from the seasonal atmospheric  $\text{CO}_2$  variations.<sup>61</sup> The implication of the 5-year lifetime, is that about 18 percent—that is, 135 GtC, of the atmospheric  $\text{CO}_2$  pool—is exchanged each year. An anthropogenic contribution of about 6 GtC per year pales in comparison with this vast natural flux.

The results of our calculations also indicate that the mass of  $\text{CO}_2$  from all past fossil-fuel emissions remaining in the December 1988 atmosphere was about 30 GtC—that is, about 4 percent (and not 21 percent) of the 1988 atmospheric  $\text{CO}_2$  pool, corresponding to an atmospheric  $\text{CO}_2$  concentration of about 14 ppmv. The content of non-fossil-fuel and non-biogenic  $\text{CO}_2$  with  $\delta^{13}\text{C}$  of  $-7$  per mill in the December 1988 atmosphere was about 718 GtC. This corresponds to a pre-industrial atmospheric  $\text{CO}_2$  concentration of about 339 ppmv. The fossil-fuel component would be less if emissions from terrestrial biota (with similar  $\delta^{13}\text{C}$  to that of fossil fuel) were included in the calculation. The estimate by Guthrie and Smith<sup>62</sup> of 35 GtC remaining from 1860 to 1990 in fossil-fuel  $\text{CO}_2$  emissions, based on (non-isotope) mass balance calculations and a 5.1 year atmospheric lifetime of  $\text{CO}_2$ , is close to our result.

The current atmospheric  $\text{CO}_2$  pool is dominated by the natural  $\text{CO}_2$  with  $\delta^{13}\text{C}$  of  $-7$  per mill degassed from the ocean. The 4 percent anthropogenic contribution to this pool is probably smaller than the variations of  $\text{CO}_2$  flux from natural sources caused by climatic instabilities.



**Figure 9**  
**ANNUAL CHANGES IN ATMOSPHERIC  $\text{CO}_2$  FOLLOW TEMPERATURE CHANGES, NOT MAN-MADE EMISSIONS**

*The increases in man-made emissions of  $\text{CO}_2$  (dotted line) are not coupled to the fluctuations in the atmospheric  $\text{CO}_2$  (thin solid line). Instead, zig-zags of changes in atmospheric  $\text{CO}_2$ , seem to closely follow changes in temperature (heavy solid line). The largest decreases in  $\text{CO}_2$  occur after volcanic eruptions reach the stratosphere. Volcanic eruptions are noted at top.*

*The source of temporal trends in anthropogenic  $\text{CO}_2$  emissions from fossil fuel burning and cement production is taken from Boden, et al., 1990; Andres, et al., 1993. The data for atmospheric  $\text{CO}_2$  mass increases are calculated from  $\text{CO}_2$  air concentrations measured at Mauna Loa, Hawaii, and are taken from Boden, et al., 1990; Keeling, et al., 1995. The global surface air temperature is taken from Boden, et al., 1990; Keeling, et al., 1995.*

### **$\text{CO}_2$ Increases Not the Result of Human Activity**

Atmospheric  $\text{CO}_2$  concentration increased from 315.6 ppmv in 1958, to 359 ppmv in 1994.<sup>7,63</sup> As these concentrations correspond to an atmospheric  $\text{CO}_2$  mass of 669 GtC and 761 GtC, respectively, the cumulative increase during 37 years was 92 GtC; that is, about 14 percent of the 1958 atmospheric mass of  $\text{CO}_2$ . The average annual increase in this period was then about 2.5 GtC.

Each year about 12 percent (that is, 92 GtC) of the total atmospheric mass of  $\text{CO}_2$  exchanges with the ocean, and about 13 percent (102 GtC) with the land biota (IPCC 1990). It is possible that the observed  $\text{CO}_2$  increase is the result of a small change in this annual natural  $\text{CO}_2$  flux, caused by increased degassing from the warmer ocean, and increased oxidation processes at land and sea, resulting from natural climatic fluctuation. This possibility was not discussed in the IPCC's 1990 document.

The IPCC estimated that the temperature of the surface waters increased between 1910 and 1988 by about  $0.6^\circ\text{C}$ . A similar increase was observed in the surface air temperature in this period. Increasing the average temperature of the surface of the



oceanic waters (15°C) by 0.6°C, would decrease the solubility of CO<sub>2</sub> in these waters (0.1970 g CO<sub>2</sub> per 100 g) by about 2 percent. The CO<sub>2</sub> flux from the ocean to the atmosphere should be increased by the same factor; that is, by about 1.9 GtC/year. This is similar to the observed average increase of atmospheric CO<sub>2</sub> in the years 1958 to 1968, of 0.73 ppmv/year,<sup>7</sup> which corresponds to 1.6 GtC/year. The measured annual atmospheric CO<sub>2</sub> increases were higher in the next two decades (2.5 GtC/year and 3.4 GtC/year),<sup>7</sup> which indicates that changes in CO<sub>2</sub> solubility in oceanic water were responsible only for a part of observed CO<sub>2</sub> increases. Inorganic processes on land and changes in marine and terrestrial biota could also contribute to these increases.

The atmospheric air and sea surface temperatures did not increase smoothly during this period, but were rather irregular, zig-zagging from year to year (Figure 9). The annual changes in atmospheric CO<sub>2</sub> mass closely followed the temperature changes. This was probably the result of rapid equilibration between CO<sub>2</sub> concentration in the atmosphere, and the dissolved inorganic carbon in the sea in about three quarters of a year.<sup>64</sup>

The greatest cooling and largest decreases in the rate of atmospheric CO<sub>2</sub> increase occurred after volcanic eruptions which reached the stratosphere, characterized by high dust veil index: Gunung Agung in 1963, Fuego in 1974, El Chichon in 1982, Nevado del Ruiz in 1985, and Pinatubo in 1991.

On the other hand, the smoothly and steadily growing annual increases in anthropogenic emissions of CO<sub>2</sub> from fossil-fuel burning and cement production, do not match the atmospheric CO<sub>2</sub> fluctuations. Since 1988, these sharply growing anthropogenic emissions have not been associated with decreasing values of δ<sup>13</sup>C of atmospheric CO<sub>2</sub>,<sup>63</sup> for 7 years between 1988 and 1994, this latter value remained remarkably stable. If the observed changes in CO<sub>2</sub> concentration were man-made, a decrease in δ<sup>13</sup>C should be observed.

During the famous "energy crisis" in 1974-1975, there was practically no decrease in anthropogenic CO<sub>2</sub> emissions, but there was a dramatic drop in annual mass increase of atmospheric CO<sub>2</sub> associated with atmospheric cooling; in 1983, the decreasing anthropogenic CO<sub>2</sub> emission rate was associated with a peak in the rate of atmospheric CO<sub>2</sub> mass increase, preceded by a cooler air temperature in 1982; in 1992, the highest rate of anthropogenic CO<sub>2</sub> emission was associated with one of the deepest drops in atmospheric CO<sub>2</sub> mass increase, and air cooling.

The data in Figure 9 suggest that CO<sub>2</sub> atmospheric mass increases were *not* related to man-made emissions of this gas, but rather that these increases depended on volcanic eruptions and other causes of natural climatic fluctuations.

#### Notes

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# What Man-Induced Climate Change?

by Hugh W. Ellsaesser, Ph.D.

*The claims of human-caused global warming are not corroborated, even by the scientific studies on which they are supposedly based.*

**T**he key statement from the 1995 report of the Intergovernmental Panel on Climate Change (IPCC), the group responsible for the science behind the global treaty on climate, is as follows: "The balance of evidence suggests that there is a discernible human influence on global climate."

This pronouncement has been most frequently supported, both in Section 8 of the IPCC 1995 report, and in *Science* magazine (Kerr 1995a and b), by references to Hegerl et al. (1994), Mitchell et al. (1995), and Santer et al. (1995 and 1996). An analysis of these referenced articles, however, shows that the cited studies do *not* support the IPCC's suggestion.

This article summarizes the relevant material from the cited studies, and the evidence that the spatial pattern of the 0.5°C warming of the past century has steadfastly disagreed with that predicted by climate models, in that it has *not* been amplified in polar regions, and it has not led to higher maximum temperatures.

At the outset, it should be noted that additional greenhouse warming is just what we need to prevent or delay the next glacial cycle. By current understanding, the Holocene, our current period of interglacial climate, is due to end, and a period of 90,000 years of cooling is due to begin—taking us back to conditions of the last glacial period about 18,000 years ago, when the temperature was 5° to 7°C cooler than now (Figure 1). Why don't we ever hear the argument that additional greenhouse warming is just what we need to prevent or delay the next glacial cycle?

## The Hegerl et al. Report

Hegerl et al., in a report published by the Max Planck Institute for Meteorology in Hamburg in 1994, used two, long-term



climate model runs to obtain an estimate of the natural variability of surface temperature. Using this as an estimate of natural climate variability, Hegerl et al. concluded that the warming observed over the period of record exceeds natural variability and is therefore unnatural, or forced.

In their words: ". . . under the caveat that we have correctly estimated natural [climate] variability [from models] . . . [our] conclusion that a significant warming has been observed can be given with some confidence. . . . However,

we caution that we cannot yet decide if the observed abnormal [non-natural] warming in the last few decades can be uniquely attributed to anthropogenic greenhouse gas forcing."

Hegerl et al. (1994) thus specifically deny the very point for which their report is cited by the IPCC.

Hegerl et al. (1994) was cited in the 1995 IPCC report, Sec-

tion 8, as: Hegerl et al. (1996), *J. Climate* (in press), but no record could be found of the 1996 reference having been published.

### The Little Ice Age Factor

Use of this report to suggest "a discernible human influence

on global climate" also directly conflicts with the statements from the IPCC's 1990 report concerning the Little Ice Age, which occurred circa 1450-1850. The IPCC writes: "The Little Ice Age, in particular, involved global climate changes of comparable magnitude to the warming of the last century. It is possible that some of the warming since the 19th century may reflect the cessation of Little Ice Age conditions" (IPCC 1990, p. 233).

Further, the same report notes, "The size of the observed warming is broadly consistent with predictions of climate models, but it is also of the same magnitude as natural climate variability" (IPCC90, p. xii).

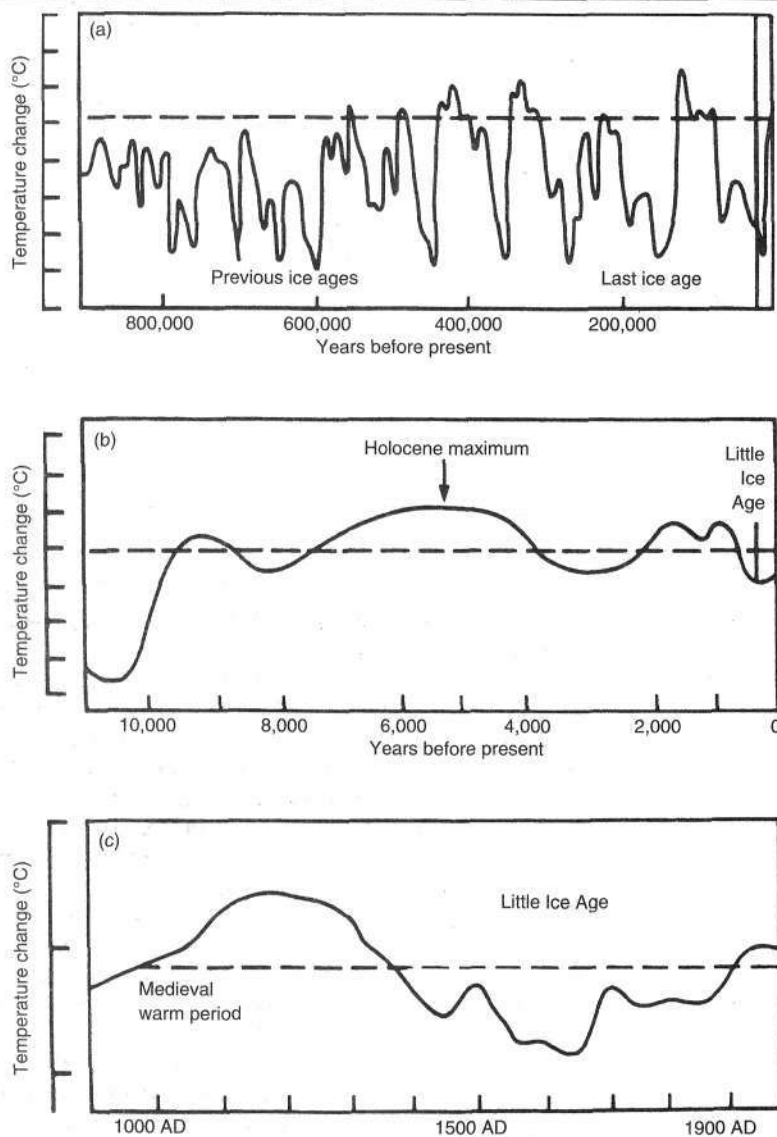
The 1995 IPCC report contains nothing to suggest that these earlier statements are no longer valid.

During the Little Ice Age, the rivers of London, St. Petersburg, and Moscow froze solid enough to hold public fairs; the Nordic colony in Greenland perished, and many farms and villages in Scandinavia and Switzerland had to be abandoned because of glacier advances. By present estimates, we have moved about halfway from the coldness of the Little Ice Age to the warmth of the preceding Medieval Climatic Optimum, circa 900-1300, when the Norse were able to colonize Greenland and to explore Labrador.

### The Mitchell et al. Study

Mitchell et al., writing in *Nature* magazine in 1995, used the British Meteorological Office Hadley Center's advanced climate model to run three experiments, starting from 1860: a control with constant CO<sub>2</sub>; an experiment known as GHG, with CO<sub>2</sub> increasing, as recorded historically to 1990 (+ 2.5 watts per square meter at this time, and at 1 percent/year thereafter); and an experiment known as SUL, with both CO<sub>2</sub> and sulfate aerosol increasing, as recorded historically until 1990 (-0.6 W/m<sup>2</sup> at this time) and thereafter following the IPCC scenario designated IS92a in the IPCC 1992 report.

Results were given in decadal averages of GHG and SUL, minus control



**Figure 1**  
**RECONSTRUCTION OF THE EARTH'S CLIMATE OVER**  
**THE MOST RECENT 850,000 YEARS**

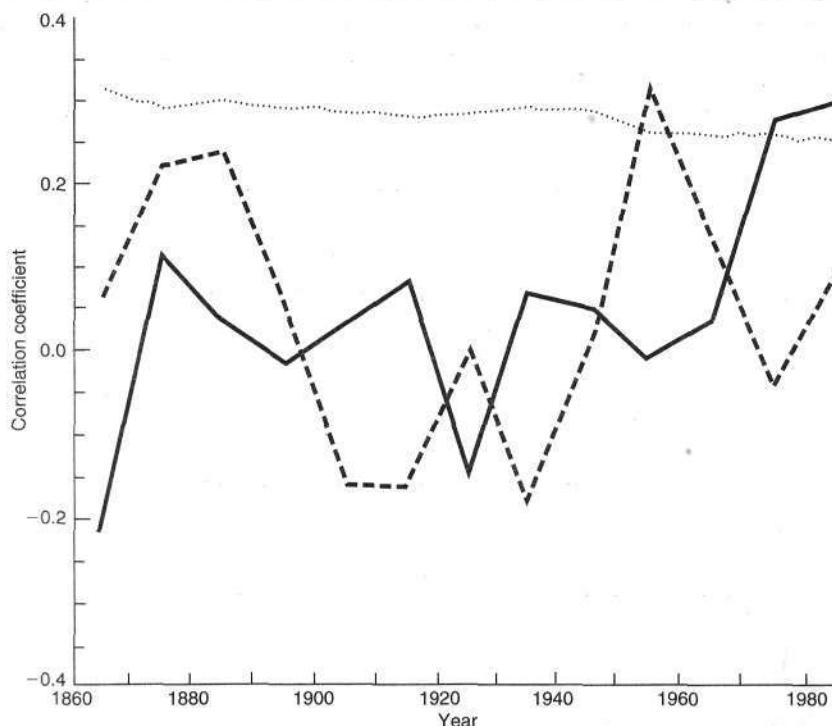
A long-range view of climate indicates that the Holocene, our current period of interglacial climate, is due to end and a period of 90,000 years of cooling is due to begin, taking us back to temperatures 5° to 7°C cooler than those of the present. This schematic shows the mean global temperature for the past million years (a), and in more detail for the past 10,000 years (b), and the past 1,000 years (c). There were at least three cyclic warmings and coolings in the past 10,000 years, lasting about 2,500 years each. The dashed line represents conditions near the beginning of the 20th century.

Source: IPCC, 1990, Figure 7.1



**Figure 2**  
**CORRELATION OF SIMULATED**  
**AND OBSERVED TEMPERATURE**  
**CHANGES RELATIVE TO THE**  
**1860-1990 MEAN**

The spatial correlation between simulated and observed decadal temperature changes is shown relative to the 1860-1990 mean. The dashed line is the GHG experiment, which had CO<sub>2</sub> increasing as recorded historically to 1990. The solid line is the SUL experiment, which had both CO<sub>2</sub> and sulfate aerosol increasing, as recorded historically until 1990. The dotted line gives the 10 percent level of significance, which varies with data coverage. Note that the normally used 5 percent level of significance would be well above the correlation curves. Mitchell et al. make no claim that an anthropogenic climate change signal had been identified in the observational data.



and centered spatial (on the map) correlations for each decade, between the model experiments and the observed temperature anomalies. (The global means are subtracted from each map before the correlations so that the correlation pattern shows only the predicted change versus the observed change.) The decadal correlations are reproduced in Figure 2.

The GHG experiment gave correlations exceeding 0.2 in the 1870s, 1880s, and 1950s. The other decades were near or below zero. For the SUL experiment, the correlations varied about zero through the 1960s, and rose to about 0.275 for the 1970s, and 0.3 for the 1980s. That is, the strongest upward trend was from the 1960s to the 1970s—essentially the same period in which Santer et al. (1995) (see below) found the strongest upward trend.

However, the use of non-overlapping decadal means (where there is only one point mapped for each decade), averaged out both the negative correlations of 1945-1955 and the rapid drop in correlations after 1985, as shown by Santer et al. (1995).

The *Nature* article by Mitchell et al. (1995) described these results as follows: "For the decades since 1950, the magnitude of the pattern correlation between SUL and the observations increases steadily, rising above the 10 percent significance level in the two most recent decades. This recent trend is consistent with what could also be an emerging greenhouse gas/sulphate aerosol signal in the observations."

No claim was made in this article that an anthropogenic climate change signal had been identified in the observational data.

**The Santer et al. Experiment**

Santer et al., in a 1995 report published by Lawrence Livermore National Laboratory, compared the model integrations (extended) of Taylor and Penner (as published in *Nature* in 1994), with an updated version of the observational data series

of Jones et al., published in conference proceedings on global warming by Elsevier in 1991.

Four equilibrium integrations were performed: a control run (designated CTL) with nominal pre-industrial CO<sub>2</sub> at 275 parts per million volume (ppmv); a sulfate-only run (designated S) with near-present-day anthropogenic sulfur emissions, 78 teragrams of sulfur per year, providing a forcing of  $-0.95 \text{ W/m}^2$ , and pre-industrial CO<sub>2</sub>; a CO<sub>2</sub>-only run (designated as C) with no sulfur emissions and nominal present-day CO<sub>2</sub> (345 ppmv, providing a forcing of  $1.26 \text{ W/m}^2$ ) and a combined run (designated SC) with near-present-day CO<sub>2</sub> and sulfur emissions.

In the analysis, a 13-year filter was passed over the 1854-1993 observational data series to produce smoother values. (In other words, the data were smoothed, by taking a 13-year weighted mean, where the center point carries more weight than the distant points.) These results were then subtracted from those of a reference year, normally 1954, in order to produce seasonal and annual mean temperature change maps for the period 1910 to 1993. These temperature changes were then correlated, year-by-year, with the change patterns predicted by the model. These were constructed by averaging the last 20 years of each model run and subtracting the control run from each of the three perturbed runs.

The correlations computed were of two types: a centered (or pattern) correlation, designated as  $R(t)$ , in which the global mean is first subtracted from the respective fields each year; and an uncentered (or trend) correlation, designated as  $C(t)$ , in which global means are not removed. (If the global means are removed from each field, then the mean becomes zero, before the correlation is made.) Note also that the data coverage in the reference year,  $t_0$ , also served as a grid mask, to determine which observational grid points were included in the correlations.

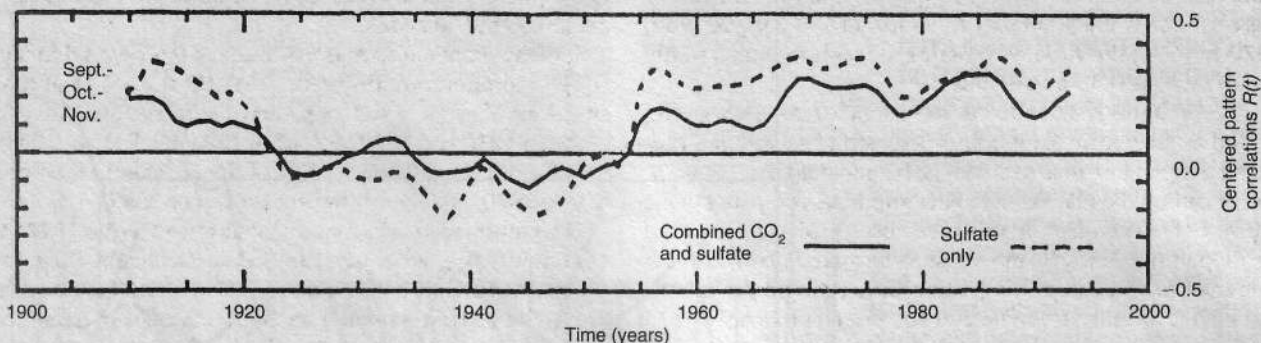


Figure 3

**OBSERVED VS. MODEL-SIMULATED PATTERNS OF NEAR-SURFACE TEMPERATURE CHANGE (1900-1993)**

Centered pattern correlations  $R(t)$  between model and observed near-surface temperature changes for fall (Sept.-Oct.-Nov.). Model changes are taken from the combined  $\text{CO}_2$  and sulfate aerosol experiments (solid line) and sulfate-only experiments (dashed line). Note that the addition of  $\text{CO}_2$  reduces both the correlation and its upward trend after 1945. In other words,  $\text{CO}_2$  degrades the results.

Source: Adapted from Figures 7 and 8 of Santer et al., 1995

The stated strategy was “to search for a long-term, positive trend in the pattern correlation statistic, which would indicate an increasing expression of the [model-predicted] signal in the observations.”

**The Santer Results**

Santer et al., writing in *Climate Dynamics* (1995b), found their best results in the summer and fall data: “Our results indicate that over the last 50 years, in summer [June-July-August] and fall [Sept.-Oct.-Nov.], observed patterns of near-surface temperature change show increasing similarity to the model-simulated response to combined sulfate aerosol/ $\text{CO}_2$  forcing.”

Their fall combined sulfate- $\text{CO}_2$   $R(t)$  results, selected for display in their Figure 10, are reproduced here as the solid curve in Figure 3; the dashed curve is their comparable S (sulfate-only)  $R(t)$  curve.

Note the following:

- (a) The observed temperature change pattern becomes increasingly dissimilar to the combined, sulfate- $\text{CO}_2$  experiment-predicted change, from the 1910 starting point until 1945—that is,  $R(t)$  drops from +0.2 to -0.12. The dissimilarity became even greater over this period for the sulfate-only experiment.
- (b) The rise in  $R(t)$ , or “increasing similarity” between observed and predicted temperature change patterns, is essen-

## An Anthropogenic Signal in the Temperature Record

The question of whether a man-induced climate change has been identified in the temperature record can be answered with a confident “no.” But there is one point that should be mentioned. There was an abrupt drop in ship temperatures of about  $0.35^\circ\text{C}$ , circa 1901-1905, with no immediate recovery, as pointed out in Ellsaesser et al. (1986). This drop is almost certainly an artifact—that is, man-induced.

As noted by Ellsaesser et al. (1986), this abrupt cooling of ship temperatures occurred at a time of transition from sailing ships to steam ships—a transition made more abrupt by the rapid increase in total shipping at the time. A cooling would be expected for this transition. On sailing ships, stormy periods are generally colder than normal and all hands are busy, so fewer weather observations are recorded. Under becalmed conditions, which are generally warmer than normal, there is little to do, so weather observations were regularly recorded. With steam ships, this selectivity disappeared.

Note how little this behavior is reflected in the land-only temperature curves in Figures 4(b) and (c). This abrupt drop

is clearly evident even in the smoothed analyses of Figures 4(d) and (e), and is still more evident in the most recent update of the NMAT (nighttime marine air temperature) data series of Parker et al. (1996), shown in Figure 5.

As stated by the IPCC in its 1990 report: “Smoothed night global marine air temperature showed the largest apparent change around 1900, with a maximum [observed decadal] cooling of  $0.32^\circ\text{C}$  between 1898 and 1908, though this value is very uncertain.”

No one has yet suggested a credible explanation for this perturbation that would provide a basis for correcting the record.

This hiatus in the ship observational record has very definitely placed an anthropogenic signal (non-climatic, insofar as can now be determined) in the hemispheric and global temperature records. The combination of these ship records, without correction, with the land record, has moved the coldest period of the observational record from the early 1880s into the early 1900s, as can be seen by comparing the land-and-sea curves of Figure 4(a) with the land-only curves in Figures 4(b) and (c).

tially restricted to the period 1945-1970, and the bulk of this merely returns the similarity to its initial 1910 value; from 1970 to 1993, the  $R(t)$  linear trends for both the sulfate-only and the sulfate- $\text{CO}_2$  are negative.

(c) Even if the positive linear trends for 1945-1993 are accepted as "increasing similarity" between observed and predicted temperature changes, it must be admitted that the addition of carbon dioxide degraded the response, compared to the sulfate-only experiment in this best case. Thus, as pointed out by a report published by the Marshall Institute (1996), if this is evidence of "a discernible human influence on global climate," it is a result of sulfate aerosol alone and is not due to carbon dioxide.

### Interpreting Experimental Results

In the updated analysis by Jones et al. (1991), as shown here by Figure 4(a), the Northern Hemisphere becomes warmer than the Southern Hemisphere after about 1920, and reaches a maximum temperature difference circa 1950. After 1950, this temperature difference decreases; then it reverses, and, in about 1970, the Southern Hemisphere reaches a maximum in warmth over the Northern Hemisphere.

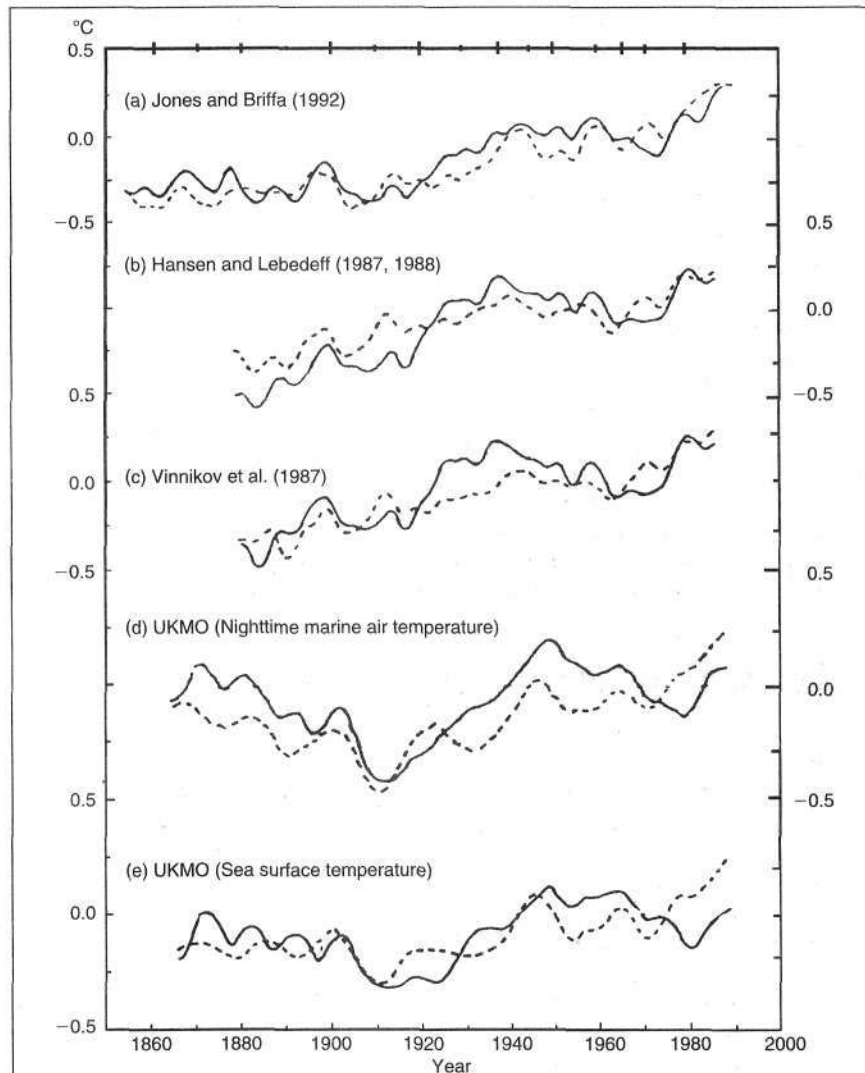
This difference in hemispheric temperature then decreases, returns to about the same value circa 1985, and then decreases rapidly to the end of the record. As noted in the IPCC's 1992 report: "The difference in mean decadal anomaly changed markedly between 1946-1955 and 1971-1980 corresponding to a relative warming of the Southern Hemisphere compared to the Northern of nearly  $0.3^\circ\text{C}$  between these decades. This relative warmth of the Southern Hemisphere was greatest around 1975-1980 and the mean difference in anomalies in the last five years has returned to near zero" (IPCC 1992, pp. 146-7).

Anthropogenic sulfur emissions are concentrated in the Northern Hemisphere. Thus, their primary effect in the models, as shown by the two experiments cited above, is to cool the Northern Hemisphere relative to the Southern Hemisphere. Because the analyses of both experiments are based primarily on centered correlations of spatial patterns (with the global means removed) of model-predicted and observed temperature change fields, it is no surprise that the correlation statistics for both the sulfate-only and the combined experiments show marked positive trends from 1950 to 1970. This is the period in which the observed hemispheric temperature difference reversed, and the Northern

Hemisphere became colder than the Southern Hemisphere in the Jones et al. analyses.

The important question is the cause of this reversal in hemispheric temperature difference. Was it the result of man's emissions of sulfur, which apparently increased about two-fold between 1950 and 1990 (according to Mitchell et al., 1995)? If so, why did the relative cooling of the Northern Hemisphere stop in 1970, and rapidly reverse itself after 1985?

The pronounced Arctic warming observed in the 1920s and 1930s, noted by Scherhag (1939), and statistically isolated by Mann and Park (1994), is a more likely cause of the Northern Hemisphere being warmer than the Southern Hemisphere until 1950. (The winter temperature in Spitsbergen, for example,



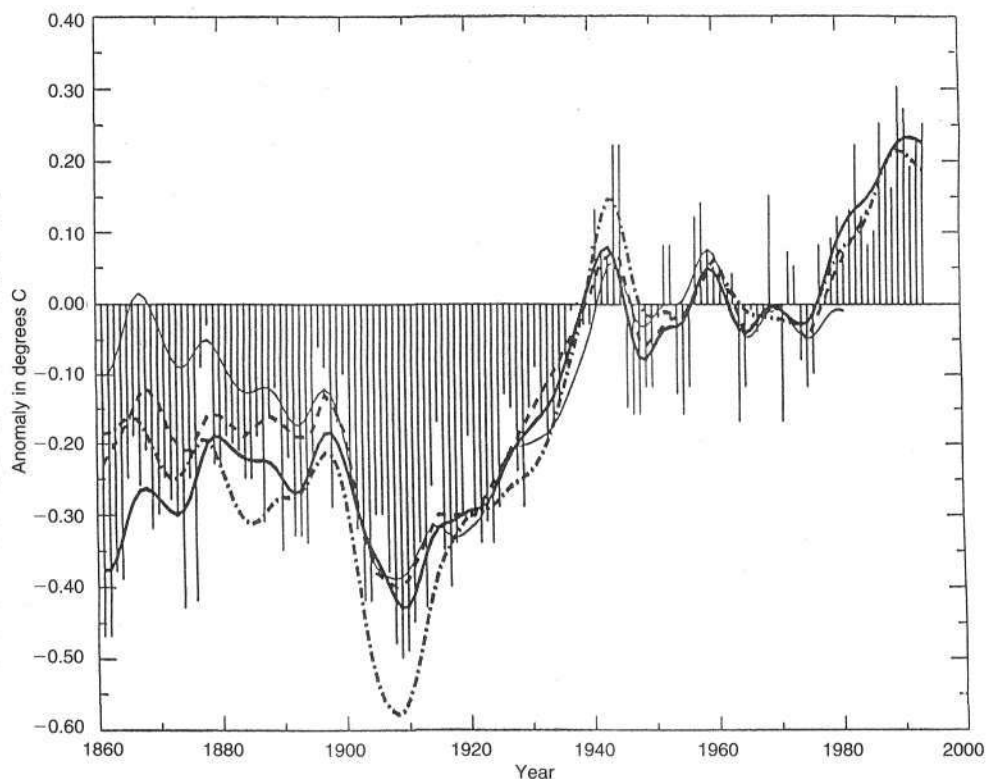
**Figure 4**  
**COMPARISON OF VARIOUS NORTHERN AND SOUTHERN HEMISPHERE MEAN SURFACE TEMPERATURE CURVES (1860-1990)**

Comparisons of Northern Hemisphere (solid) and Southern Hemisphere (dashed) smoothed mean surface temperature curves as compiled by the sources noted. Since the pattern correlations of both Mitchell et al. (Figure 2) and Santer et al. (Figure 3) depend on how far the Southern Hemisphere curve lies above the Northern Hemisphere curve, their results would vary greatly with the observational data set used.



**Figure 5**  
**GLOBAL ANOMALIES OF**  
**SMOOTHED SURFACE**  
**SHIP TEMPERATURES**  
**(1860-1994)**

Four sets of data are combined in the figure. The light solid line is from Folland et al. (1984). The light dashed line is from Bottomley et al. (1990); the Folland and Parker (1995) corrections to this are shown in the heavy solid line and in the annual bars. The dash-dot smoothed curve is nighttime marine atmospheric temperature (NMAT) from Parker et al. (1995). Note how all of the ship data, and particularly the NMAT data, show the abrupt 1900-1903 cooling, with delayed recovery, even after smoothing.



warmed by 12°C.) Stocker and Mysak (1992), Mann and Park (1994), and others have related the Arctic warming to a century-scale variability in deep-water production in the North Atlantic.

The fading away of the Arctic warming during 1940-1960, could be expected to reduce this difference to zero, but would it reverse it? The colder isopleths moving toward the equator, out of the Arctic, circa 1970 (see Figure 7.12b in the IPCC 1990 report) suggest that it did. Thus, we have one indication that the increasing trends in  $R(t)$  from 1950 to 1970 is, therefore, also an artifact, caused by the waning of the Arctic warming, rather than by any effect of man-induced sulfate aerosols on mean hemispheric temperatures.

From the differences in the relative hemispheric temperatures shown by the different analyses in Figure 4, we have another indication that these results may simply be an artifact, resulting from the data analyses being inadequate to define hemispheric temperatures relative to each other.

The results of Mitchell et al. (1995) and Santer et al. (1995) would appear to have been stronger if they had used one of the ship data series in Figures 4(d) and (e) for verification of their models.

#### Further Evidence

There are several additional points that must be weighed in the "balance of evidence," to use the IPCC's term:

(a) Any attribution scenario attempting to explain the evolution of hemispheric temperature differences over this period, 1950-1970, in the Jones et al. (1991) analysis has to invoke a large variability caused by natural but unknown forcing functions, because it has to reverse itself twice after 1950. As soon

as such natural variability is admitted, it cannot be eliminated as the cause of all the variability, leaving none to be attributed to anthropogenic forcing.

(b) All combined sulfate-CO<sub>2</sub> experiments, including the Mitchell et al. (1995) experiment with a full ocean model, have shown strong polar amplification of the temperature change response. In both these studies, the areas of largest temperature change were eliminated by the observed data masks, and therefore did not affect the computed correlations.

Because the satellite data show that these large, predicted polar temperature changes have failed to appear, these areas would have seriously degraded the correlations of these studies if they had been included. As shown in Table 3 of Santer et al. (1995), the annual mean  $R(t)$  between the sulfate only and the combined sulfate-CO<sub>2</sub> cases is 0.10 for the full field, and 0.60 when the observed data mask is used. For the CO<sub>2</sub> and combined sulfate-CO<sub>2</sub> correlation,  $R(t)$  is 0.63 for the full field, and 0.01 with the data mask.

Obviously, inclusion or omission of the areas of polar amplified model responses can make or break the correlation.

(c) Observational data show that the sulfate content of air over the Arctic is highly seasonal, being greatest in late winter and spring. Also, this sulfate, in the form of Arctic haze, "forces a warming of the Arctic atmosphere," according to Shaw (1995), and thus should amplify rather than negate greenhouse warming in the Arctic.

(d) Jones's (1994) latest update of the land-only data reduced the Southern Hemisphere trend since 1861 by about 0.2°C. The new trends in degrees Celsius per century are

Northern Hemisphere 0.47, and Southern Hemisphere 0.26, for 1861-90; and Northern Hemisphere 0.56, and Southern Hemisphere 0.47, for 1901-1990. Because the effects of both sulfate aerosol and CO<sub>2</sub> are calculated to be greater over land than sea, this would further reduce observational support for these combined model results.

### Conclusions

From this analysis, I conclude that the only suggestion of a human influence on climate is the warming of the past century. This warming itself is significantly less than predicted, its time evolution does not match that of the rise in CO<sub>2</sub>, and its spatial pattern in latitude and altitude does not match the fingerprint given by current climate models. Furthermore, recovery from the Little Ice Age provides a natural, and no more controversial, explanation for the warming observed to date.

It would appear that the IPCC 1995 statement—"... the balance of evidence suggests that there is a discernible human influence on climate"—was studiously crafted to induce the media to broadcast to the citizens and policy makers of the world a message that few, if any, of the researchers on whose work it was based, are yet willing to defend before the scientific community.

As Santer et al. (1995) stated: "We have not shown conclusively that the signal identified can be attributed to the unique cause of anthropogenic sulfate aerosols and CO<sub>2</sub>."

After publication of the IPCC 1995 report, J.T. Houghton, the chairman of the IPCC, stated (1996) that neither the IPCC nor anyone "who is informed is claiming certainty of detection or attribution."

My conclusion is that the question of whether a man-induced climate change has been identified in the temperature record can be answered with a confident "no."<sup>1</sup>

*Hugh W. Ellsaesser, an atmospheric scientist, is a member of the scientific advisory board of 21st Century. He retired from the U.S. Air Force after 20 years as an Air Weather Service Officer, and from the Lawrence Livermore National Laboratory after 23 years of atmospheric and climate research.*

### Notes

1. A recent article in *Science* magazine by Richard Kerr, titled "Greenhouse Forecasting Still Cloudy," appears to say that my conclusion is now generally accepted.

### Acknowledgments

Helpful comments from J.T. Houghton, R. Jastrow, M.E. Mann, P.J. Michaels, B.D. Santer, F.S. Singer, K.E. Taylor, and H. Van Loon are gratefully acknowledged. This work was performed at the Lawrence Livermore National Laboratory under the auspices of the U.S. Department of Energy under Contract W-7405-Eng-48.

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# Global Warming, Ozone Depletion— Where's the Evidence?

by Dr. Dixy Lee Ray

*A leading scientist urges Americans to fight for the truth on environmental issues.*

Dr. Ray, who died in January 1994 at age 79, was a marine biologist, who headed the Atomic Energy Commission from 1972 to 1975 and served as governor of Washington from 1977 to 1981. But her toughest job came after her retirement, when she became a leading spokesman for science and reason, and against environmental hoaxes and fear. Ray campaigned tirelessly for the truth, and wrote two books on environmental issues, *Trashing the Planet: How Science Can Help Us Deal with Acid Rain, Depletion of the Ozone, and Nuclear Waste (Among Other Things)* and *Environmental Overkill: Whatever Happened to Common Sense*.

This article was adapted from a talk given to a meeting of the Jefferson Energy Foundation in Washington, D.C., Oct. 15, 1991, and published in *21st Century Science & Technology*, Spring 1992, pp. 16-22.

If you assume from the title of my talk that I have a somewhat skeptical and irreverent attitude toward such popular environmental scenarios as "global warming" and "ozone depletion," you are correct. Yet it appears that nearly everyone believes that these are important problems from which the Earth must be saved! Why? Well, because everyone says so. But what of the evidence? What are the data that support these issues—and are there any contrary facts?

First, global warming. The claim is that the Earth is warming up and that it is human activity, burning fossil fuels that increase the CO<sub>2</sub> content of the atmosphere, that is the cause. Moreover, the consequences of global heating are claimed to be disastrous, including changes in weather—rainfall, agricultural crops, sea level, etc.

Before examining the evidence, let us pause and look back to a similar set of claims made a decade and a half ago. Then the issue was not global warming, but global cooling!

Listen to what they said:\*

- "An ice age would result in droughts, a shorter growing season, and worldwide hunger at first, and later in extensive glaciation. The deliberate melting of polar ice, strict pollution regulation, and the stockpiling of food were commonly proposed solutions to the crisis. . . ."

"The cooling has already killed hundreds of thousands of people in poor nations. It has already made food and fuel more precious, thus increasing the price of everything we buy. If it continues, and no strong measures are taken to deal with it, the cooling will cause world famine, world chaos, and probably world war, and this could all come by the year 2000" (Lowell Ponte, *The Cooling*, 1976).

- "The facts have emerged, in recent years and months, from research into past ice ages. They imply that the threat of a new ice age must now stand alongside nuclear war as a likely source of wholesale death and misery for mankind" (Nigel Calder, former editor of *New Scientist*, "In the Grip of New Ice Age," *International Wildlife*, July 1975).

- "There are ominous signs that the Earth's weather patterns have begun to change dramatically and that these changes may portend a drastic decline in food production—with serious political implications for just about every nation on Earth" (Peter Gwynne in *Newsweek*, April 28, 1975).

- "According to the academy [National Academy of Sciences] report on climate, we may be approaching the end of a major interglacial cycle, with the approach of a full-blown 10,000-year ice age of a real possibility . . . with ice packs building up relatively quickly from local snowfall that ceases to melt from winter to winter" (*Science*, March 1, 1975).

- "The continued rapid cooling of the Earth since World War II is also in accord with the increased global air pollution associated with industrialization, mechanization, urbanization, and an exploding population, added to a renewal of volcanic activity. . . ." (Reid Bryson, "Environmental Roulette," in *Global Ecology: Readings Toward a Rational Strategy for Man*, John P. Holdren and Paul R. Ehrlich, eds., 1971).

- "The sensitivity of climate was pointed up independently by a Soviet and an American scientist, who concluded that a permanent drop of only 1.6 to 2 percent in energy reaching the Earth 'would lead to an unstable condition in which continental snow cover would advance to the equator . . . [and] the oceans would eventually freeze,' according to a recent U.S. scientific advisory report" (Samuel W. Matthews, "What's Happening to Our Climate?" *National Geographic*, November 1976).



### Short Memories

How similar these warnings sound to what is being said today about global warming! Are our memories so short? Are they as serious and as frightening as the activists in these areas would have us believe? I think not, but let me explain why.

For more than 20 years, the American public has been subjected to a barrage of criticism about the way we live, about what we eat, about how we manufacture the materials that mark our incredibly productive society in the age of high technology, about how much and what kind of energy we use, and about how we handle the inevitable waste products of our activities.

Most recently we are told that we are destroying the Earth and its capacity to support life. These scoldings include predictions of catastrophe unless we make fundamental, unpleasant, and costly changes in the way we live. They have become a virtual litany of impending disaster. They have become a crusade to "Save the Planet." The charges are very serious; the question is, are they right? What is the evidence that supports them, and is there contrary evidence?

With respect to global warming there are two situations that are not in dispute:

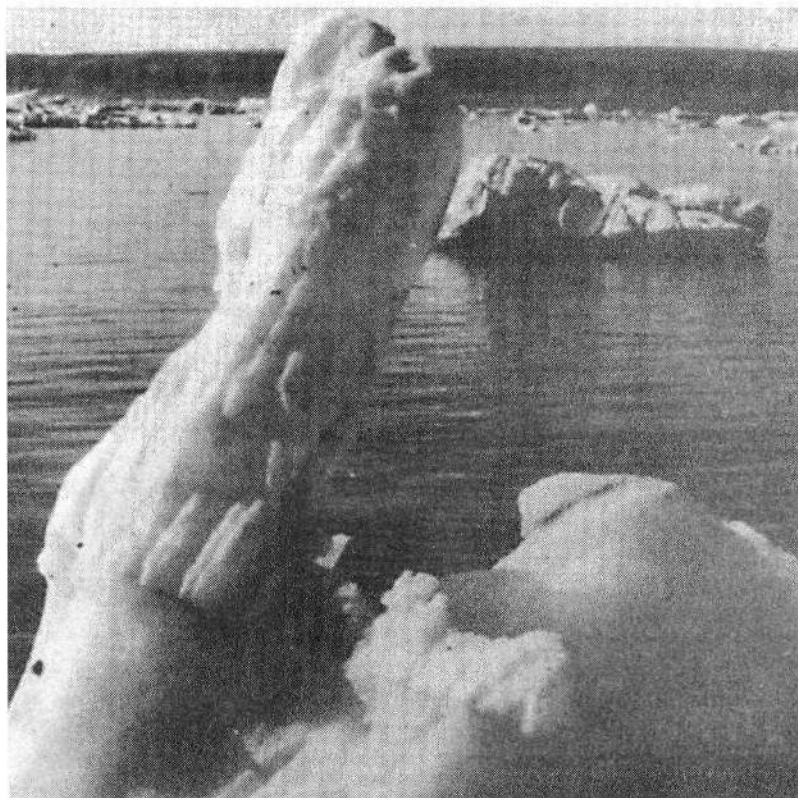
First, the Earth and its atmosphere constitute a "greenhouse"; our air is a porous blanket. If that were not the case, our planet would respond to the Sun's radiation the same as does the Moon, whose temperature during the lunar day may reach +121°F and drop to -270°F during the lunar night. On Earth, roughly 30 percent of the incoming solar radiation is reflected back into space by the atmosphere, 20 percent is absorbed in the atmosphere, and 50 percent penetrates to the Earth's surface to cause warming.

Of this latter, some fraction is reflected back as infrared radiation which in turn may be absorbed by certain constituents of air, the so-called greenhouse gases—carbon dioxide, methane, hydrocarbons, and above all, water vapor. Increase in the relative amount of any of these gases will, theoretically, result in elevated surface temperatures.

The theory is well established and well supported, by both theoretical and experimental evidence. There's only one problem—the theory doesn't appear to work in so simple a cause-and-effect manner in nature. If it did, the Earth would have warmed 2 to 4°C over the past 100 years. It has not. At best, there might have been about 0.5°C increase in temperature, but that took place before 1940, and there has been about the same amount of cooling since then. Temperature records taken in the Northern Hemisphere over the past century show no upward trend. Further:

- Analysis of 135 years of surface ocean temperatures taken by ships at sea shows no upward trend (Prof. Reginald Newell, MIT).

- Analysis of 10 years (1978-88) of satellite measurements (TIROS II) taken continuously, day and night over land and sea



Katz/U.S. Coast Guard

*The ice age cometh? Just 20 years ago, doomsayers warned of the dangers of a global cooling caused by industrialization. Pictured are Arctic icebergs.*

shows no consistent change—up or down (published in *Science*).

- Analysis of certain plant species in the United States give an interesting picture. For example: It used to be possible to grow citrus fruit in the southeast region of America as far north as the Carolinas. Now oranges will not ripen north of Orlando, Florida. In Florida, there have been 24 "Arctic breakouts," that is, episodes of severe killing frosts in the last 30 years. There had been only 6 in the previous 50 years.

Further, in 1990 the U.S. Department of Agriculture put out its first revised hardiness report for commercial crops since 1965. Taking temperature data from 14,500 measuring stations, the new map shows that the area where crops can be grown without certain danger of a killing frost has moved 100 miles south in the last 50 years.

### Climate Change History

Such data should come as no surprise. The whole history of Planet Earth is one of weather and climate change. There have been warm years and there have been cold ones. There have been 17 ice ages in the last 100 million years. Each ice age, lasting several million years, is followed by an abrupt warming with glacial retreat and a period of moderate temperatures in the Northern Hemisphere that lasts from 10,000 to 12,000 years. It has been about 11,000 years since the end of the last ice age! From a purely statistical basis, and assuming that the Earth continues these cycles of temperature change, we are indeed due for another ice age!

We should recall that ice ages are not really a global phe-



Bill Rose/Michigan Technological University

*Guilty of emitting 1,000 tons of chloride per day into the stratosphere: Mt. Erebus in Antarctica, located just 10 kilometers upwind of McMurdo Sound, where the ozone measurements are taken.*

nomenon—they are characteristic of the Northern Hemisphere. During the ice ages past, great continental ice sheets did not form in South America, Africa, Southeast Asia, or Australia. The temperatures in the tropics remained relatively unchanged.

Moreover, during the current interglacial age there have been significant climate shifts in the Northern Hemisphere. There are temperature oscillations of about 2,500 years in duration, with warmer periods centered about 1,000, 3,500, and 6,000 years ago and colder periods in between. Recall the medieval “little optimum” (900 to 1100 A.D.). The Vikings sailed across an iceberg-free North Atlantic Ocean, settling Greenland and probably Labrador as well. This was followed by the “little ice age” (1430 to 1850). Cold was then so intense that trees froze and exploded from internal ice buildup in southern England, and the Thames River froze solid at London (1814).

About 6,000 years ago the Sahara Desert was very different; cave paintings dating from that time show elephants, giraffes, crocodiles, and hippopotamus.

Conclude from this that *data* do not support temperature rise. Claims based on computer projections cannot be accu-

rate for the next five days; how can we expect them to be accurate in determining weather patterns for the next 50 years? (See accompanying box.)

That brings us to the second situation: rise in the atmospheric concentration of CO<sub>2</sub>.

So what do we know about CO<sub>2</sub>? Quite a bit, including some little-discussed data. And yet, not enough. We know, with considerable certainty, that the CO<sub>2</sub> concentration in air has increased roughly 25 percent since the beginning of the industrial age—from 280 parts per million to 365 parts per million (0.035 percent). It is an easy conclusion to trace that increase to modern man’s burning of fossil fuels—and that is what most people believe. But the situation is not so simple. Consider:

- Prehistoric CO<sub>2</sub> levels also changed—100 million years ago there were not 350 parts per million, but 3,000 to 5,000 ppm!! This was obviously not due to industry.

- Measuring instruments and techniques for detecting CO<sub>2</sub> in air and glacial ice have been critically reviewed by Jaworowski and Hisdal of the Norwegian Polar Institute (1990) and they find the range of error to approach 100 percent of the 19th-century carbon dioxide measurements. They conclude that atmospheric heating by anthropogenic releases of CO<sub>2</sub> has not been proved.

- Estimates show that humans pump about 7 billion tons of CO<sub>2</sub> into the atmosphere every year; nature produces in the same period about 200 billion tons of CO<sub>2</sub>.

- In a remarkable, keenly analyzed paper (1990) Freeman Dyson of the Princeton

Institute for Advanced Study has examined the sources and sinks for CO<sub>2</sub> and concludes that fully 50 percent cannot be accounted for. This corroborates previous conclusions derived by oceanographers. There is clearly much that is still not understood.

- Finally, we should remember that plants love carbon dioxide. A doubling of the CO<sub>2</sub> content under controlled conditions results in a 30 percent increase in growth and yield. It also results in a plant that has stronger, larger leaves and stems and is more resistant to drought and disease.

From all the above, we can only conclude that both the temperature regime and the CO<sub>2</sub> picture deserve greater study and understanding before trillions of dollars are spent to mitigate a problem that may not exist, or if it does, may not be very important.

Yet the supporters of the global warming theory are adamant. Here is what Dr. Stephen Schneider of the National Center for Atmospheric Research says:

“We need to get some broad-based support, to capture the public’s imagination. That, of course, entails getting loads of media coverage. So we have to offer up scary scenarios, make simplified, dramatic statements, and make little mention of any



doubts we may have. Each of us has to decide what is the right balance between being effective and being honest" (*Discover*, October 1989, p. 47).

### That Notorious 'Hole'

Now we must tackle the stratospheric ozone layer and its notorious "hole." What do we know for sure about this situation?

- The ozone layer is not stable; it is in a state of constant turbulence.
- Incoming radiation from the Sun—especially the UV spectrum—both creates and destroys ozone.
- Variations in the thickness of the ozone layer occur on a seasonal basis and vary according to latitude. Annual fluctuations are up to 25 percent.
- Greater thinning (up to about 50 percent) can occur at the South Pole. Thinning takes place at both poles but is greater in the Antarctic.
- The so-called "hole" or thinning over the Antarctic appears annually at the end of the Antarctic winter; it lasts about three to five weeks and is then reconstituted. There is no permanent "hole."
- There is no overall loss of ozone.
- Polar thinning is related to the polar vortex—a cyclonic-type storm that forms each year in Antarctica at winter's end.
- Besides extreme cold ( $-85^{\circ}\text{C}$ ) for several weeks and return of the sunlight (and radiation), ozone "depletion" appears to require presence of the chloride ion.

• The belief persists that the chloride comes from the CFCs (chlorofluorocarbons)—mainly freons, but there is no documented proof of this—only theory.

• Chloride is one of nature's most abundant ions, with major sources in volcanic eruptions and oceanic storms.

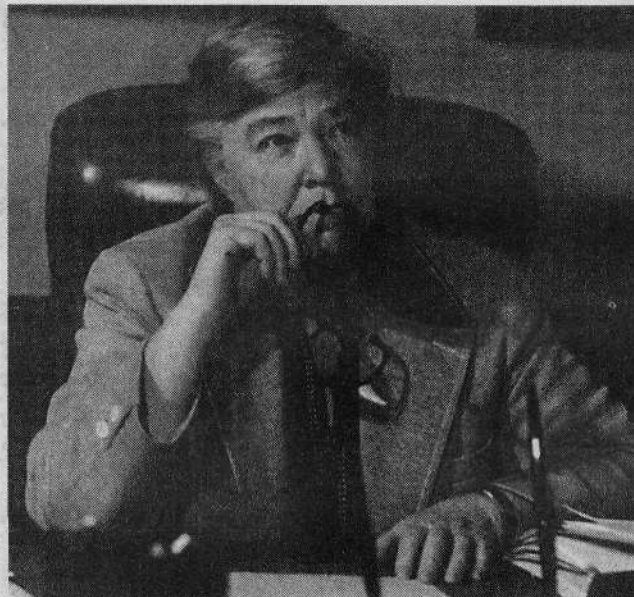
Consider the following:

- The world production of chlorofluorocarbons is 1.1 million tons per year. This accounts for roughly 750,000 tons of chloride.
- Evaporation of seawater provides the atmosphere with 600 million tons of chloride per year.
- Passive outgassing from the Earth accounts for 36 million tons of chloride per year.
- Volcanic eruptions emit a few million to hundreds of millions of tons of chloride. Tambora erupted in 1813 with 211 million tons of chloride—at the present rate of production of CFCs, it would take humans about 282 years to produce as much chloride as this one eruption.

We are living in a period of greatly increased volcanism; Mt. Erebus produces 1,000 tons of chloride daily and has been doing so for a 100 years. It is located in Antarctica, 10 kilometers upwind of McMurdo Sound and injects its chlorides directly into the stratosphere.

Again, how much chloride comes from CFCs? About 0.75 million tons annually. Yet the amount of chloride calculated to be in the stratosphere at any one time is 50 to 60 times this figure.

If indeed chloride is necessary to the stratospheric breakdown of ozone, whose chloride is it, man or nature's? There is no documented evidence of CFC molecules in the stratosphere. There are no measurement data, only theory. We can hope that the recently launched instruments to measure the



Ray: "Careful scrutiny of the evidence shows that supporting data for both global warming and ozone depletion are sparse and questionable."

composition of the ozone layer will remedy this.

### The Ozone Hole Occurs Naturally

Recall that the so-called ozone hole was discovered in 1956 by the Cambridge meteorologist Gordon Dobson. It was Dobson who devised the instrumentation and techniques of measuring the stratospheric ozone. He considered the Antarctic ozone thinning to be an anomaly until the phenomenon occurred again in 1957, when he reported it as a natural annual event.

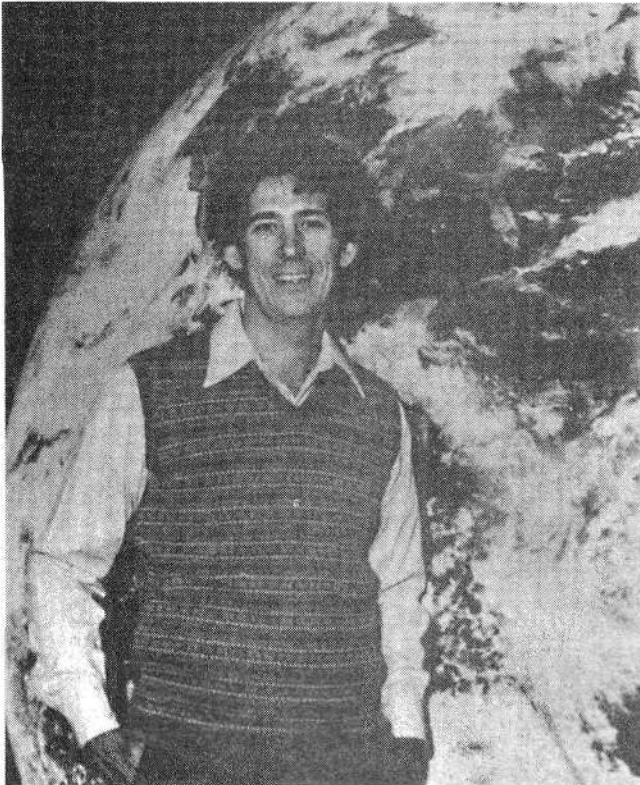
The French investigators P. Rigaud and B. Leroy also reported French measurements of the "hole" in 1958 when it was thinner than at any time since—and this was 30 years ago, before the widespread use of CFCs. Their conclusion briefly stated was that "[T]he thinning [is] related to the polar vortex . . . and the recovery is sharp and complete."

French scientists also related the ozone "depletion" to increased solar activity: "We are now living in a period of greater solar flares and sunspots than at any time since Galileo's day."

Concern about the loss of stratospheric ozone relates to penetration of ultraviolet radiation. The thinner the ozone shield, the greater ultraviolet penetration to the Earth's surface. But, measuring instruments set up in the United States in 1974 show *no* increase in surface ultraviolet radiation. Moreover, it should not be forgotten that all people, and especially light-skinned ones, require some direct exposure to sunlight (ultraviolet) to prevent the development of rickets and/or later onset of osteoporosis or other bone-thinning maladies.

Of course, overexposure to ultraviolet radiation can cause skin cancer; this is well established. But people have been unduly frightened by not being told that there are two different kinds of skin cancer. One, related to too much ultraviolet (or sunbathing or tanning salons) is unsightly, irritating, and annoying, but curable in 99 percent of the cases. The other, more rare form is malignant melanoma. This cannot be correlated





Bill Rose/Michigan Technological University

*Global warming proponent Stephen Schneider: ". . . [W]e have to offer up scary scenarios, make simplified, dramatic statements, and make little mention of any doubts we may have. Each of us has to decide what is the right balance between being effective and being honest."*

with exposure to ultraviolet, is usually fatal, and appears to be genetically determined. To imply that ozone loss (even if it occurred) would lead to an increase in malignant melanoma is a false and malicious misuse of science.

On April 4, 1991, William Reilly, the administrator of the U.S. Environmental Protection Agency, said, "The ozone has thinned 4 to 6 percent, which doubles the previous estimate. This means 200,000 more cancer deaths over the next 50 years."

He called the situation "grim." His statement is wrong, both as the purported thinning and the skin cancers. Even if he were right, a 4 to 5 percent increase in exposure to ultraviolet is far less than a simple shift to a lower latitude. Moving from Washington, D.C., to south Florida increases one's ultraviolet exposure about 22 percent, and a journey from either pole to the equator subjects a person to a natural increase in ultraviolet radiation of 5,000 percent!

Finally, those who would ban the production and use of CFCs on the basis of computer simulations and undocumented theory, choose to overlook the reasons why chlorofluorocarbons were developed and put into use in the first place. They are nonvolatile, nontoxic, and present no direct hazards to living organisms. CFCs are used in refrigeration and air-conditioning equipment, in fire-fighting (halon foams), and in degreasing and cleaning electronic components. Despite many promises to the contrary, no substitutes have been developed

and put into production.

All of the proposed substitutes have turned out to be toxic, flammable, corrosive, and inefficient. Use of any of them, or return to cumbersome, ineffective refrigerants like ammonia or sulfur dioxide, would require total redesign of equipment. In the United States alone there are 5,000 companies that use CFCs; the value of the goods they produce is \$28 billion per year. There are millions of individual and commercial refrigerating and air-conditioning units. The capital investment exceeds \$150 billion. The entire food transportation and marketing system throughout the Western world depends upon refrigeration.

Is it sensible to throw all this away on the flimsy evidence so far offered as a reason to ban CFCs? Why not simply seal the units better and recycle the freon?

### Enormous Costs

In conclusion, careful scrutiny of the evidence shows that supporting data for both global warming and ozone depletion are sparse and questionable. Yet the United States has already entered into an international agreement to ban the production of CFCs—and the cost of freon has already gone up 30 percent.

Dr. Richard Benedick, who negotiated the CFC ban on behalf of the United States, has acknowledged that this action sounded the "death knell" for an important part of the chemical industry. Yet he insists the ban was necessary even though the scientific basis for it has not been established.

I believe that we are entitled to ask "Why?" The costs are enormous, yet they pale by comparison with the financial burden put upon the American people if the "global warming" advocates prevail. And the United States is now preparing its position for the United Nations Conference on the Environment to take place in Brazil in June 1992. The conference will propose to reduce the emissions of carbon dioxide to 1988 levels and to bring about a further 25 percent reduction by the year 2000.

This cannot be accomplished without serious curtailment of industry and without severe reduction in our standard of living. Estimates place the cost at more than \$3 trillion. Does our firm knowledge of the problem and its possible consequences justify such a sacrifice?

My answer is *no*.

Remember, too, that our very liberty depends upon a strong and vigorous economy. Destroy that economy and we will also destroy our liberty. Consider the following quotation: "When one is deprived of one's liberty, one is right in blaming not so much the man who puts on the fetters as the one who had the power to prevent him, but did not use it. Why are we still considering whether we have enemies instead of how we can resist them?"

Who said this? It was the Corinthian emissaries to Sparta in the year 432 B.C.—but it is still applicable today.

We still have to fight for what we believe.

*Reprinted from 21st Century Science & Technology, Summer 1997, pp. 61-67.*

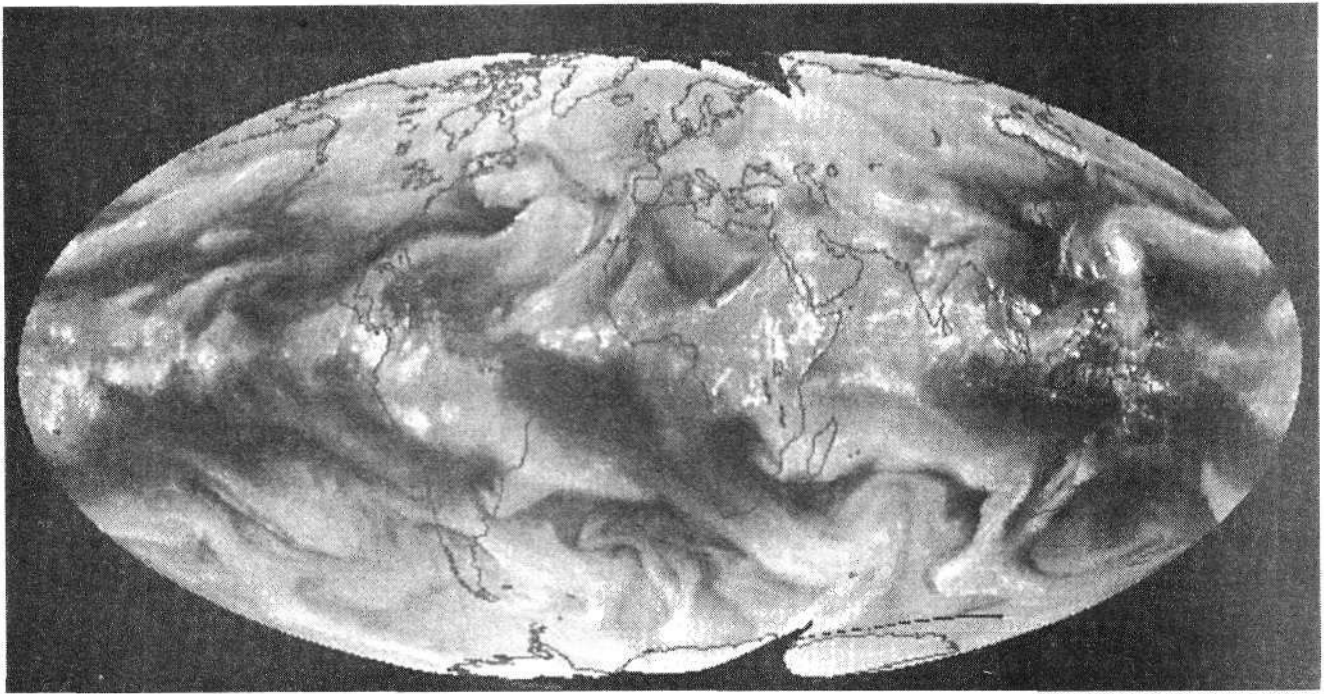
### Notes

\* These quotations were taken from "The Ice Age Cometh: Remembering the Scare of Global Cooling" by Anne J. Bray in *Policy Review*, Fall 1991, pp. 82-84.

# What You Never Hear About Greenhouse Warming

by Hugh W. Ellsaesser, Ph.D.

*A comprehensive review of facts and fiction in the global warming fraud.*



Space Science and Engineering Center

*Water vapor, shown here in a global satellite composite, is the most important greenhouse gas, and one which will give negative feedback to any CO<sub>2</sub> warming—it tends to keep the temperature stable. The climate models, however, assume that it will be a temperature amplifier. This composite was compiled from GOES, Meteosat, and GMS satellite data.*

*Hugh Ellsaesser, an atmospheric scientist, retired from 21 years of service in the U.S. Air Force as a Weather Service Officer, and after 23 years with the Lawrence Livermore National Laboratory in weather and climate research and consultation. He is a member of the scientific advisory board of 21st Century Science & Technology magazine.*

*This paper was prepared in September 1997 at the request of the Center for the Study of American Business at Washington University in St. Louis, Missouri.*

## (1) INTRODUCTION

**T**he issue of greenhouse warming has now reached the stage at which mandatory goals for reductions in the use of fossil fuels are being considered for incorporation in the 1992 "Rio Climate Treaty." One of the principal provisions of this treaty is to stabilize "greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."<sup>1</sup> While

"dangerous level" remains undefined, negotiations are under way to adopt mandated reductions, in 1997, in the use of fossil fuels by developed countries that range up to 20 percent below 1990 levels by the year 2005.

These developments make greenhouse warming an important issue, even if greenhouse warming itself never actually materializes. The incongruity of this statement reveals the degree to which I believe the public has been misled on greenhouse warming.

My disillusionment with the largely climate-model-produced image of greenhouse warming began around 1980. As a meteorologist who had served as a U.S. Air Force Weather Officer for 20 years, and who had performed atmospheric research at the Lawrence Livermore National Laboratory for a similar period at that time, I wrote then that "my strongest reason for doubting climate model estimates of the carbon dioxide warming are the gross differences I see between how the atmosphere works and how it is modelled to work."<sup>2</sup>

These differences will be illustrated as I review the following:

- the greenhouse concept,
- the temperature history of the Earth, as we know it,
- the missing greenhouse "fingerprint,"
- the consistent bias toward bad news,
- our limited understanding of the carbon budget,
- whether there is a discernible human influence on global climate, and
- international efforts to control greenhouse warming.

## (2) THE GREENHOUSE CONCEPT

Anyone who has stepped into a greenhouse on a sunny day immediately senses a rise in air temperature. It is from this experience that the concept of an atmospheric greenhouse effect derived its name. Frequent reference to Figure 1 should help the reader to follow this discussion of atmospheric dynamics.

### Blackbody Emission

The concept of a warming, or a greenhouse effect, caused by the presence of an atmosphere, or certain atmospheric constituents, is quite simple, and is intuitively appealing to freshman physics classes. It rests on the empirical and theoretical law that all bodies radiate energy at a rate proportional to the fourth power of their absolute temperature.<sup>3</sup> The absolute temperature determines not only the total energy output, but also its spectral distribution and, in particular, the wavelength or color at which the radiated energy is at a maximum.<sup>4</sup>

Although color is detectable by eye only in the visual range from red to violet, the concept is at times extended to equate color and wavelength throughout the electromagnetic radiation spectrum. For most solid and liquid bodies, there are relatively small departures from the energy output predicted by the so-called blackbody curve<sup>5</sup> given by Planck's law. The Sun, at a temperature of 5,800 kelvin, radiates energy from the ultraviolet (shorter than 0.38 microns) through the visible (0.38 to 0.7 microns), and into the near-infrared, with the peak radiation reaching the Earth's surface near 0.55 microns. The Earth absorbs solar energy, but because of its much lower temperature, it re-radiates this energy at a longer wavelength in the infrared (Figure 1).

### Gaseous Emission

In contrast to solids and liquids, gases tend to absorb and radiate energy only at discrete wavelengths, or bands. However, the intensity of the radiation emitted at each permitted wavelength remains within the limit of the blackbody curve given by Planck's law for the temperature of the radiator. Different gases within the atmosphere absorb and emit at different wavelengths. Oxygen absorbs strongly in the ultraviolet and shields the Earth's surface from rays very detrimental to life. In the process of absorbing ultraviolet, part of the oxygen is disassociated and converted to ozone, forming the ozone layer of the stratosphere.<sup>6</sup> Ozone strongly absorbs ultraviolet shorter than about 0.29 microns, which is near the shortest wavelength of sunlight ever observed at the Earth's surface.

Minor constituents of the atmosphere such as carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide, and the largely man-produced chlorofluorocarbons (CFCs or freons) absorb at specific wavelengths or bands, primarily in the infrared. Carbon dioxide has a strong absorption band near 15 microns and weaker bands at shorter wavelengths. The others have absorption bands primarily between 6 and 12 microns. Ozone also has a strong absorption band at 9.6 microns.

The principal greenhouse gas, by far, in our atmosphere is water vapor. This is true partly because of the greater amount of water vapor. It averages 2 to 3 centimeters of precipitable liquid water in the atmospheric column and up to 5 or more parts-per-thousand in surface tropical air. The other greenhouse gases are present at parts-per-trillion to parts-per-million.

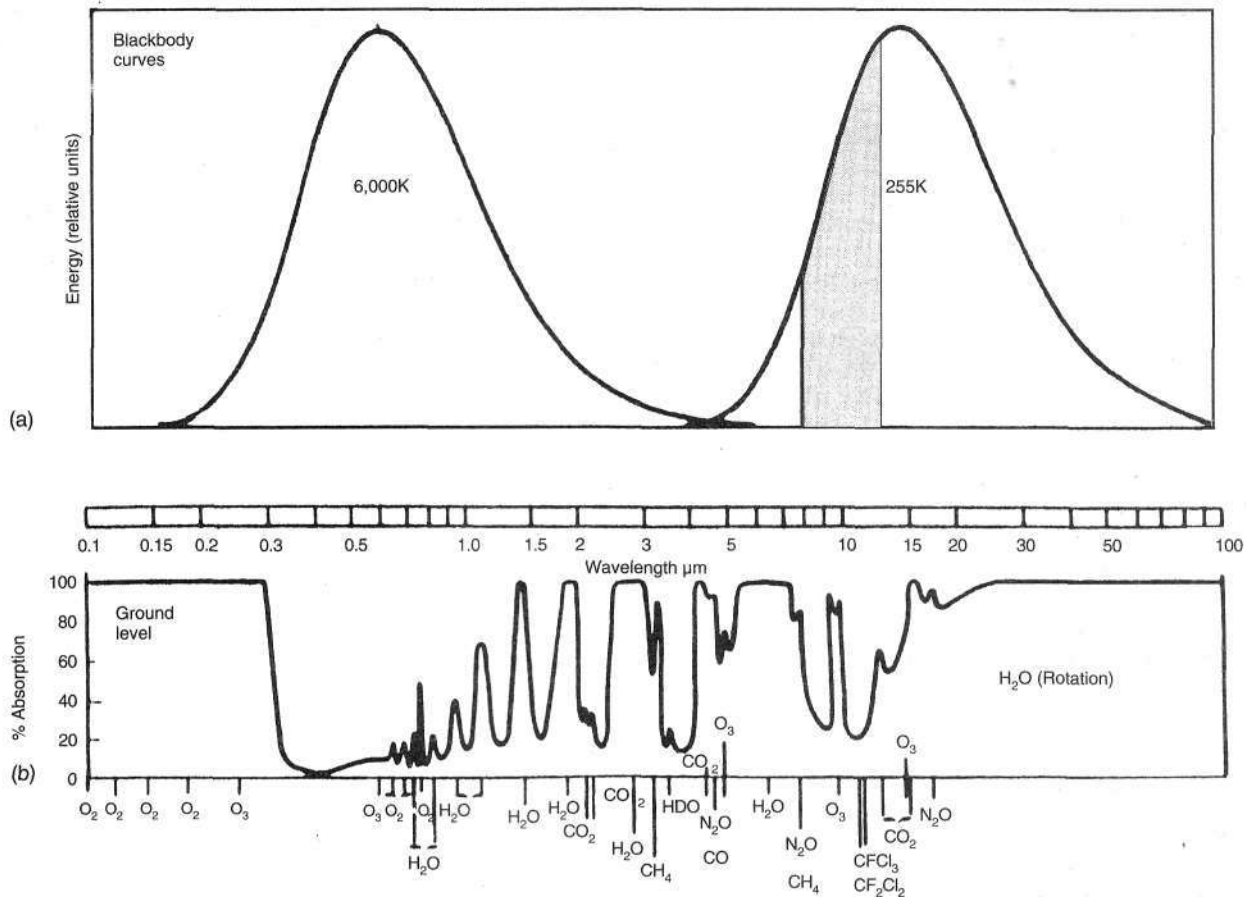
Water vapor, as shown in Figure 1, also absorbs over most of the terrestrial infrared spectrum, except for the so-called atmospheric window from 8 to 12.5 microns. It is the transparency of water vapor in this spectral region that creates the atmospheric window in which there is little atmospheric absorption of infrared radiation, except for the 9.6 band of ozone.

### Vertical Structure of the Atmosphere

As any frequenter of the mountains knows, air temperature decreases with altitude; this drop in temperature is known as lapse rate, and averages about 6°C per kilometer (3.3°F per 1,000 feet). Most of the 240 watts per square meter (W/m<sup>2</sup>) of solar energy absorbed by the Earth and its atmosphere, is absorbed at the surface. Because the annually and globally averaged surface temperature is observed to be 288K (15°C, 59°F), the Earth's surface emits radiation very nearly as a blackbody at this temperature, as illustrated in Figure 1. The bulk of this radiation is absorbed by the infrared-absorbing gases of the atmosphere and clouds, although some 5 to 10 percent of the surface emission escapes directly to space through the atmospheric window. The absorbers re-radiate the absorbed energy in all directions, in particular, upward and downward, but at an intensity appropriate to their temperature, which is less than that of the surface. This is because of the lapse rate, or cooling of the air with altitude, in the troposphere.

The energy radiated upward can again be absorbed, and again re-radiated, both upward and downward, and again at a still-lower temperature. This process of emission, absorption, and re-emission continues, not layer by layer, but continuously, until there is no longer enough absorber above to prevent the radiation from escaping to space. Thus, it is only from the outer optical depth<sup>7</sup> of an infrared-absorbing gas that it





**Figure 1**  
**RADIANT ENERGY AND ABSORPTION OF SUNLIGHT**

Radiant energy as a function of wavelength from the Sun is shown in (a), calculated as a 6,000 K blackbody at the Earth-Sun distance, absorbed by the Earth. At right is the infrared radiation emitted by Earth to space, calculated as a 255 K blackbody.

The percentage of absorption of sunlight as it traverses the atmosphere to the surface, and of the infrared radiation emitted by Earth as it traverses the atmosphere to space is shown in (b). At the bottom are the principal wavelengths or bands at which atmospheric gases absorb. Note the reduced infrared absorption by water vapor between 8 and 12.5 microns, creating the "atmospheric window," the shaded part shown in (a).

Source: Adapted from Luther and Ellingson, 1985 (See Note 65.)

emits appreciable radiation to space. Clouds, which consist of water or ice particles, radiate as blackbodies, that is, at all wavelengths. Thus, the 8 to 12.5 micron portion of their radiation has a reasonable chance of escaping through the atmospheric window. However, the intensity of their radiation is determined by the cloud-top temperature, which can be well below the surface temperature—as much as 100°C.

#### The Difficulty of Computing Radiation Transport

In addition to reflection, absorption, and transmission, atmospheric molecules and particulates also scatter radiation—a process again strongly dependent on wavelength. The blue of the sky is the result of the greater scattering of blue light out of the direct beam of sunlight into the direction of the observer. The redness of sunsets and sunrises is the result of the lesser

scattering of red light, compared to all other colors, on the long atmospheric path lengths, when sunlight reaches the observer from near the horizon.

It should be obvious from the omni-directional nature of radiation, and its variations dependent on wavelength and on the temperature of the last radiator, that the computation of radiative flux is very arduous. All atmospheric models must make simplifying approximations and parameterizations to keep radiation calculations economically feasible. The accuracy of current models is not easily determined, because observation of key aspects of radiation transport is also sorely lacking.

#### The Planetary Energy Budget

The Sun radiates with a color temperature of about 5,800 K (see Note 4). At the Earth-Sun distance, this appears as a beam

of radiation containing  $1,360 \text{ W/m}^2$ . Because of the Earth's spherical shape and its rotation, the annual average per unit of Earth's surface is one-fourth as much, or  $340 \text{ W/m}^2$ . As we now know from satellites, the Earth is quite bright and reflects away about 30 percent of the incoming solar energy, leaving  $240 \text{ W/m}^2$  as the amount of solar energy absorbed.

If the Earth's temperature is to remain constant, this then is also the amount of energy the Earth must re-radiate back to space. If we apply the Stefan-Boltzmann law (given in Note 3) in reverse, we find that the blackbody temperature required to radiate  $240 \text{ W/m}^2$  is  $255 \text{ K}$  ( $-18^\circ\text{C}$ ,  $0^\circ\text{F}$ ). This is also the radiation temperature of the Earth as determined by satellite. As can be determined from the lapse rate given above, this is the average temperature of the atmosphere at about 6 kilometers (20,000 ft) above the surface.

### **The Greenhouse Effect of Our Present Atmosphere**

The  $33^\circ\text{C}$  ( $59^\circ\text{F}$ ) difference between the radiating temperature (255K) and the surface temperature (288K) is attributed to the greenhouse effect of our present atmosphere. The actual greenhouse effect of our atmosphere is only about half this nominal  $33^\circ\text{C}$  ( $59^\circ\text{F}$ ) given above because, without an atmosphere, the Earth would also have no clouds or aerosols, and eventually no ice caps or oceans. So its albedo, or reflectivity, would be more like that of the Moon, or about half of the present 30 percent. Thus, a bare Earth would absorb about 15 percent more solar energy and have to adjust to a radiation temperature that could re-radiate this back to space, rather than to the 255K calculated from the present albedo.

### **The Effect of Additional Greenhouse Gases**

The effect of adding additional greenhouse gases to the atmosphere is generally explained in one of the following ways:

(1) A simplistic view, is that the increased concentration of greenhouse gases will further close the atmospheric window. Thus the Earth's surface will warm until its increased temperature can pump enough radiation through the narrowed atmospheric window to balance the radiation received from the Sun. Because even now, only 5 to 10 percent of the radiation to space passes up through the atmospheric window directly to space without reabsorption, this mechanism can have no effect on the bulk of the outgoing radiation to space.

(2) A more plausible mechanism is the following: Increasing the concentration of greenhouse gases will force the layer from which radiation is emitted to space, that is, the outer optical depth of the radiating gas (see Note 7), to a higher altitude and, therefore, because of the lapse rate, to a temperature below 255K. However, radiation from this lower temperature will be insufficient to reject all of the absorbed solar radiation. Thus, the atmosphere will accumulate solar energy and warm until the new, lifted radiating layer reaches 255K, the level required to reject solar energy at the rate at which it is absorbed.

Assuming that the lapse rate is unchanged, this warming will have extended up from the surface. That is, the process results in a warming of the mean surface temperature.

Although the second mechanism of greenhouse warming is probably closest to reality, it brings up another issue. As noted above, for any radiating atmospheric gas, it is only the outer optical depth that emits appreciable energy to space. But the level of the outer optical depth varies both with the gas species

and with the wavelength being considered. This greenhouse warming mechanism only makes sense for greenhouse gases whose outer optical depth lies within the troposphere, where the temperature decreases with altitude and where the lapse rate is maintained at a relatively constant value by convection. For any emission wavelength of a species, for which the outer optical depth is in the stratosphere, where temperature increases with altitude, the effect on surface temperature would be reversed, if the argument remained valid.<sup>8</sup>

This is of little concern for water vapor, because its concentration decreases rapidly with altitude (or temperature) ensuring that the outer optical depth at all wavelengths lies in the troposphere. For carbon dioxide's principal absorption band at 15 microns, the outer optical depth lies in the stratosphere. This is probably true for most of the other well-mixed greenhouse gases because they are computed to be orders of magnitude more effective than carbon dioxide, on a molecule for molecule basis. The absence of any discussion of this issue in climate model literature raises questions as to how well this mechanism is being modelled in current models.

### **Problems with the Greenhouse Warming Mechanism**

As can be seen from the above, the concept of greenhouse warming is simple and intuitively appealing. But, as has already been hinted, this is an oversimplified picture. Doubling the concentration of  $\text{CO}_2$  alone is calculated to increase the surface temperature by about  $1.2^\circ\text{C}$  ( $2.16^\circ\text{F}$ ). The bulk of the model-predicted 1.5 to 4.5 degree C ( $2.7$  to  $8.1^\circ\text{F}$ ) warming comes from positive feedbacks, the major one of which is from water vapor. That is, any warming of the atmosphere increases its ability to hold water vapor, and it is the greenhouse effect of this presumed increase in water vapor that leads to the major part of the predicted warming. But, as noted above, it is only the outer optical depth of a radiator that radiates appreciably to space. Thus, if water vapor is to have a positive feedback, its concentration must be increased in the layer of its outer optical depth. Increases at lower levels, or even in the total water vapor in an atmospheric column, may have little, if any, effect.

A more important overlooked factor is the fact that the bulk of incoming solar energy absorbed at the surface is transported to higher levels in the atmosphere, not by the tedious process of radiation transport outlined above, but by deep convection. And this is particularly true over the tropics, the warmest and most moist half of the Earth's surface.

The tropical atmosphere, approximately  $30^\circ\text{N}$  to  $30^\circ\text{S}$  latitude, is dominated by the Hadley circulation. This consists of the northeast and southeast trade winds, which sweep the warm moist surface air of the tropics into narrow converging and convectively uprising zones, called the intertropical convergence zones. In these deep convective zones the air rises and cools,<sup>9</sup> condensing the contained water vapor into cloud and rain drops, which then fall as the heavy precipitation of the intertropical convergence zones and monsoons. The released latent heat of condensation maintains the buoyancy and updraft of the air until nearly all of the contained water vapor has been precipitated. This convectively dried air then spreads horizontally toward the poles, primarily the winter pole, and subsides.

It is this subsiding dry air that creates our subtropical deserts and also opens holes, or "windows of dry air," downward into

the water-vapor greenhouse blanket of the tropics, allowing infrared radiation to escape to space from lower and warmer levels of the atmosphere. That is, the Hadley circulation forces the outer optical depth of water vapor to lower and warmer layers of the atmosphere. As a result, when we look at Earth from space, the strongest infrared radiation from Earth emanates from these windows created in the subtropical belts by Hadley cell downwelling of convectively dried air. The subtropical belt in the winter hemisphere, opposite the active intertropical convergence zone of the summer hemisphere, is the strongest infrared emitter of the planet.

Any surface warming in the tropics will lead to acceleration of the Hadley circulation, including acceleration of the subsiding downdrafts of convectively dried air.<sup>10</sup> This means that the subtropical windows of convectively dried air in the water-vapor greenhouse blanket will be enlarged or deepened, allowing easier escape of infrared radiation to space. That is, any warming of the tropics from the greenhouse effect of additional CO<sub>2</sub> will lead to no, or even to a negative, feedback from water vapor over the tropics, the warmest and most moist half of the atmosphere. And without a positive water-vapor feedback in the tropical half of the atmosphere, the global warming from a doubling of CO<sub>2</sub> will be "at least 2- to 3-fold"<sup>11</sup> less than that predicted by current climate models.

### (3) THE EARTH'S TEMPERATURE HISTORY, AS WE KNOW IT

Most readers no doubt have images of a warmer Earth at the time of the dinosaurs, some 100 million years before the present (YBP). It is currently estimated that the mean global surface temperature then was about 10°C (18°F) warmer than now. However, the greatest differences were in high latitudes, with a much smaller change in low latitudes. Since the time of the dinosaurs, the Earth appears to have cooled. About 3 million YBP, an ice age set in, marked by a glacial-interglacial cycle with an average global temperature fluctuation currently estimated at 5 to 7°C (9 to 12.6°F).

*A capsulation of Earth's climatic history.* The entire climatic history of the Earth can be summarized as follows: During 90 percent of the last 4.5 billion years the Earth's climate was warmer than it is at present; while during 90 percent of the last 3 million years, it was colder than it is at present.

*The glacial-interglacial cycle.* The current best estimate of the reconstruction of the last million years of this temperature fluctuation is shown in Figure 2,<sup>12</sup> taken from the Intergovernmental Panel on Climate Change (IPCC, 1990).<sup>13</sup> As can be seen in the upper panel of this figure, for the past 700,000 years we have had a relatively regular 100,000-year cycle, with 90,000 years of staged cooling followed by an abrupt warming back to an interglacial warm period lasting 10,000 to 12,000 years.

We are currently in an interglacial period, called the Holocene, which is believed to have begun about 10,700 YBP. The nadir of the last cold period, the last glacial maximum, is estimated to have been only 18,000 to 20,000 YBP. At that time, mean global surface temperature was 5 to 7°C (9 to 12.6°F) colder than now, and 3-kilometer-deep (10,000 ft) ice sheets were centered over Hudson Bay and Scandinavia. These glacial ice sheets extended down to Long Island and the

Great Lakes in America, and down to Scotland and the Baltic Sea in Europe.

As of now we have no reason to believe that the glacial-interglacial cycle of the last 700,000 years will not continue. Since the Holocene began 10,700 YBP, by current estimates we are now due to enter the next cycle of 90,000 years of cooling and glaciation. Given that this is our current state of knowledge with regard to climate evolution, why do we never hear the argument that adding greenhouse gases to the atmosphere is exactly what man should be doing—in order to delay, and thereby hopefully to prevent, the onset of the next glacial? Have you heard of any hazards of greenhouse warming comparable to glacier ice building to a depth of 3 kilometers over Hudson Bay and creeping down to the Great Lakes, as it was just 18,000 to 20,000 YBP?

*The Holocene.* The middle and lower panels of Figure 2 show the most recent 10,000 and 1,000 years of our temperature history on expanded scales. These show oscillations about the mean temperature of the Holocene by about plus or minus 1°C (1.8°F). Note that the most recent cold period, about 1450 to 1900 A.D., is called the Little Ice Age, and that the preceding warm period, about 1000 to 1350 A.D., is generally called the Medieval Climatic Optimum. From our history, we know that around 900 to 1200 A.D., the ice in the North Atlantic retreated and the Norsemen were able to colonize Iceland and Greenland and to explore Nova Scotia. About 1300 A.D., the ice re-advanced, and the Greenland colony died out. Mountain glaciers advanced in Switzerland and Scandinavia, causing abandonment of previously occupied and tax-paying farms and villages. Also the rivers of London, St. Petersburg, and Moscow froze over sufficiently for the people to hold winter fairs on the ice.

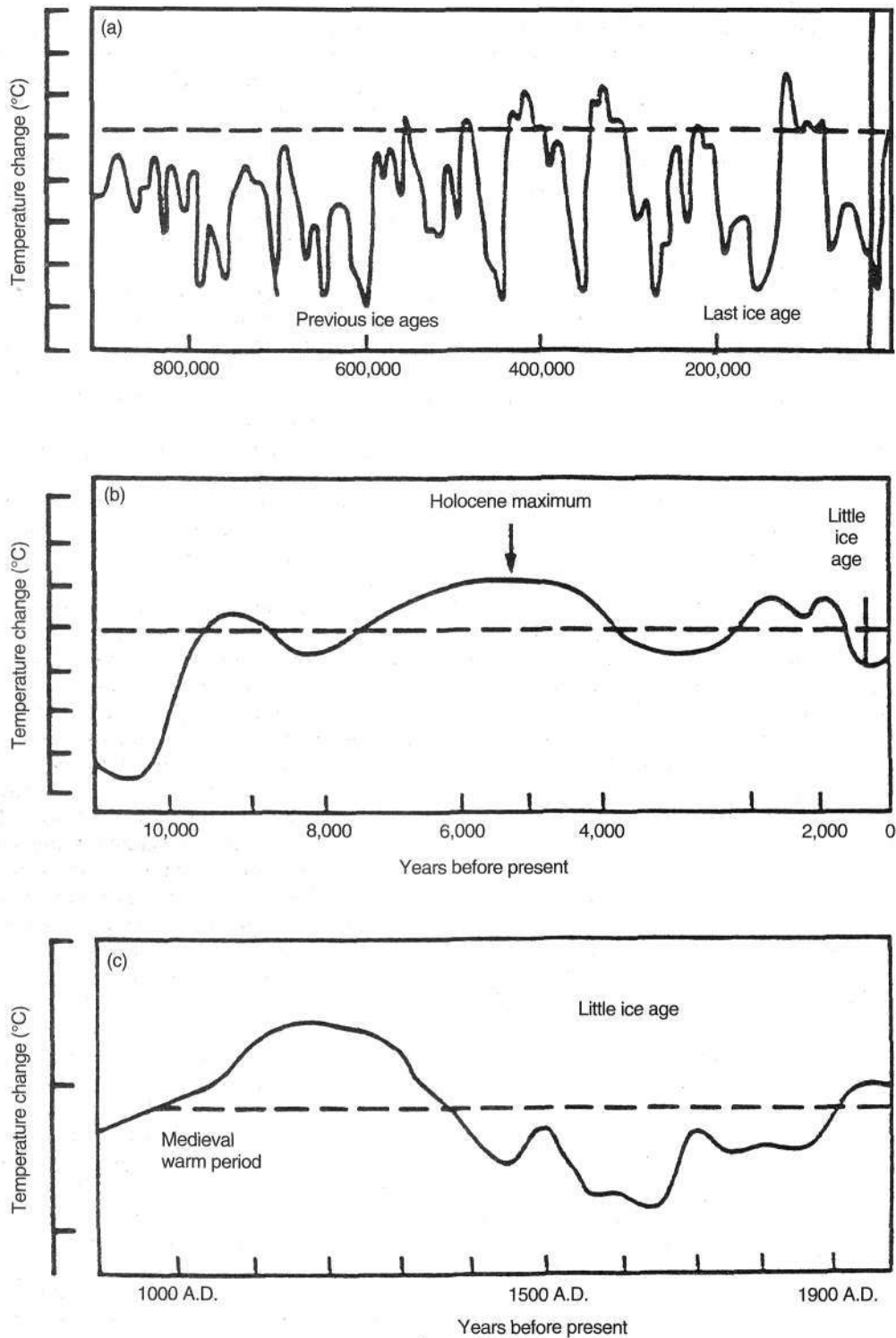
That is, we have both paleo-climatological and historical evidence for the Medieval Climatic Optimum and the Little Ice Age temperature excursions shown in Figure 2.

Although the causes of these temperature oscillations remain unknown, as far as we know at present they were not the result of any change in the greenhouse gas content of the atmosphere<sup>14</sup> and, certainly, they are unlikely to have been triggered by man. In other words, the fact that the mean global temperature has warmed by about 0.5°C (0.9°F), over the past 130 years for which we have recorded temperatures, does not provide any proof that we are witnessing either greenhouse warming or a "discernible human influence on global climate,"<sup>15</sup> to use the words of the IPCC.

*The least controversial explanation of the warming observed to date.* I and a few others maintain that the least controversial explanation of the warming that we have seen over the past 130 years or so, is that it is a return to normal from the Little Ice Age and, possibly, an entry into the next warm period following the Little Ice Age. Even the IPCC concluded:<sup>16</sup> "The Little Ice Age came to an end only in the 19th century. Thus some of the global warming since 1850 could be a recovery from the Little Ice Age rather than a direct result of human activities."

Because we are ignorant of the causes of the past temperature oscillations of the Holocene, we have no reason to believe that they will not continue until overpowered by the onset of the next glacial. And if they are continuing, then we are now near the inflection point of the temperature curve, the





**Figure 2**  
**GLOBAL TEMPERATURE VARIATIONS ON THREE TIME SCALES**

These are schematic diagrams of global temperature variations since the Pleistocene on three time-scales: (a) the last million years, (b) the last 10,000 years, and (c) the last 1,000 years. The horizontal dashed line nominally represents conditions near the beginning of the 20th century.

Source: IPCC, 1990. Figure 7.1. See Note 13.

point of most rapid rise, and can also look forward to an additional warming of about 1 degree C (1.8°F) over the next couple of centuries—regardless of what man does. In this connection, it should also be noted that these warm periods of the past were usually designated “climatic optima.” Certainly they must have appeared so circa 1350 A.D., to the remnants of the Greenland colony and to the farmers and villagers forced out by advancing glaciers in Switzerland and Scandinavia. However, one would never get this impression from current establishment utterings on the subject.

#### (4) THE MISSING GREENHOUSE ‘FINGERPRINT’

From the beginning of model predictions of greenhouse warming in 1967,<sup>17</sup> it has been apparent that the model-predicted warming that should have occurred to date, substantially exceeded the actual warming identifiable in the observational record. In the late 1960s and early 1970s, when the global mean temperature was actually declining, there was a concerted attempt to explain this as the result of man’s release of increasing amounts of particles into the atmosphere. These particles were presumed to be reflecting away increasing amounts of sunlight, thus cancelling greenhouse warming.

Next, there was introduced the concept that the enormous thermal capacity of the oceans was delaying the appearance of warming at the surface. Most recently, the concept has been introduced that man is putting a steadily increasing amount of particles in the atmosphere, mainly of sulfate, from emissions of sulfur dioxide. These, through their reflection of increasing amounts of sunlight, are causing the observed warming to lag behind the predicted warming. A cooling effect, or a reduced rate of warming, is possible via this mechanism only if the amount of sulfate aerosol in the atmosphere is steadily increasing with time.

*The concept of a “fingerprint” of greenhouse warming.* Because there was so little agreement between the predicted and observed change in the global mean surface temperature, efforts were directed toward identifying a “fingerprint” of greenhouse warming. This was to include as many parameters as possible, so that there could be some confidence that any warming that occurred was identifiable as caused by increases in greenhouse gases, rather than some other cause. In particular, it includes the spatial pattern of changes. The fingerprint as determined from model predictions includes global mean surface warming of 1.5, 2.5, or 4.5°C, for “low,” “best,” or “high” model sensitivities for a doubling of CO<sub>2</sub>.

The surface warming will be greater over land than over water; least near the equator and increasing toward the poles and will be substantially greater near the winter pole. In the tropics the warming increases with altitude, and in high latitudes it decreases with altitude. The warming of the troposphere will be accompanied by cooling of the stratosphere, increasing with altitude and being greatest near the stratopause. It is also predicted that there will be an increase in precipitation outside the tropics.

This fingerprint has so far been of little help in trying to identify greenhouse warming in the observational record. In their comparison of the details of the instrumental record with model predictions, the IPCC found some areas of agreement,

but many areas of disagreement. The IPCC concluded:<sup>18</sup>

Thus, it is not possible at this time to attribute all, or even a large part, of the observed global-mean warming to enhanced greenhouse effect on the basis of the observational data currently available.

In its summary statement, the IPCC went even further, admitting, “we do not yet know what the detailed “signal [fingerprint]” looks like because we have limited confidence in our predictions of climate change patterns.”<sup>19</sup> This raises the immediate question: if the model-predicted fingerprint or pattern of greenhouse warming is not credible, why is the model-predicted degree of warming credible?

*Increasing discrepancy between predicted and observed warming.* Meanwhile, the magnitude of this disagreement between predicted and observed warming has continued to increase, for three reasons:

(1) The CO<sub>2</sub> in the atmosphere has continued to increase without a corresponding increase in temperature; (2) it has been recognized that man is emitting greenhouse gases other than CO<sub>2</sub> such as methane, nitrous oxide, and the HFCs or hydrofluorocarbons, which should have amplified the effective increase in CO<sub>2</sub> to date by about 50 percent; and (3) reanalyses of the observational record have somewhat lowered the estimates of the actual warming to date.

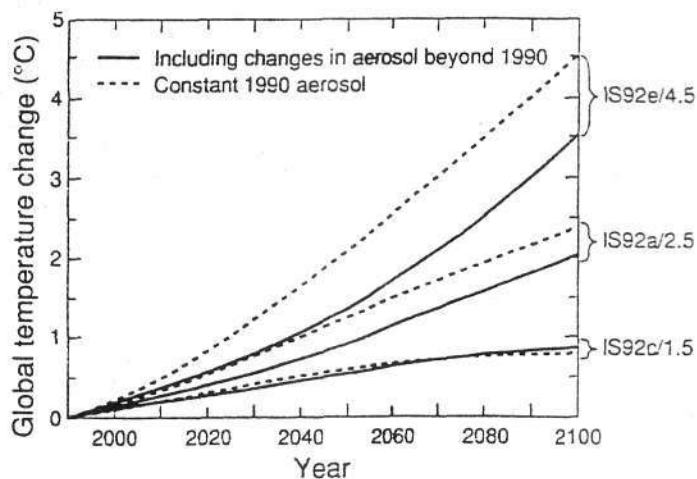
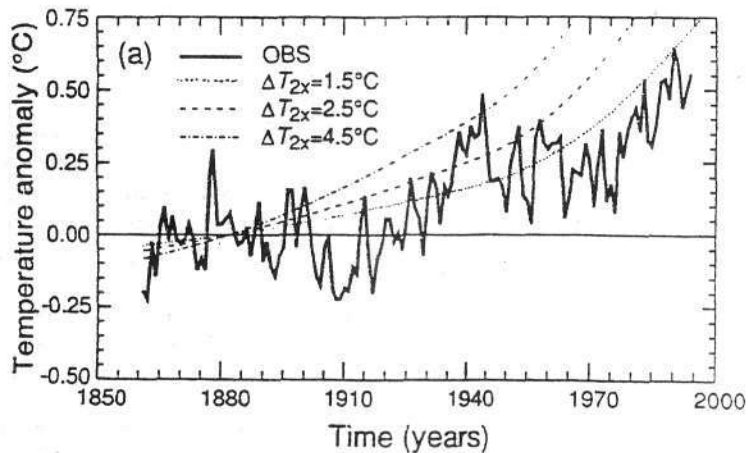
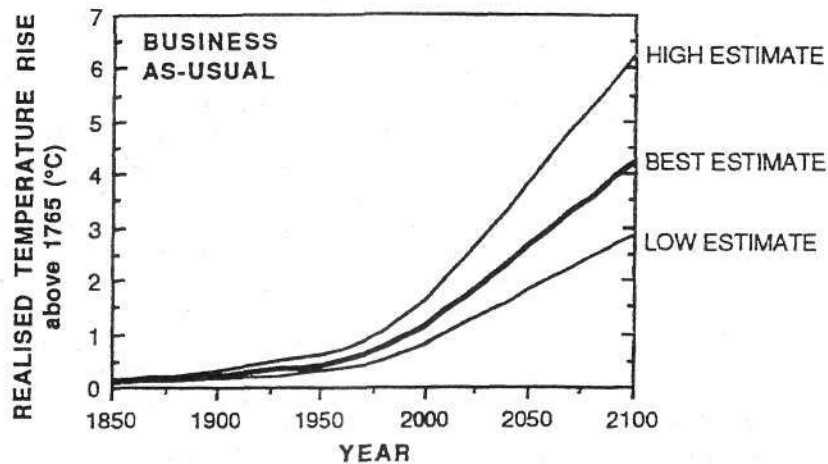
*The meaning of “broadly consistent.”* The three successive reports of IPCC<sup>20-22</sup> give the observed warming over the past century as 0.3 to 0.6°C (0.54 to 1.08°F). Although the amount of warming predicted to have occurred to date was not specified, the graphs in the IPCC reports for model predictions before the reintroduction of sulfate particles,<sup>23</sup> gave warmings of 0.7, 1.0 and 1.4°C (1.26, 1.8 and 2.52°F) by 1990 (top panel of Figure 3).<sup>24</sup> It is readily apparent that the ranges of the observed and predicted warmings do not even overlap. However, the IPCC reports (1990<sup>25</sup> and 1992<sup>26</sup>) both claimed that “the size of this [observed 0.3 to 0.6°C] warming is broadly consistent with predictions of climate models [0.7 to 1.4°C].”

Since cooling by man-produced sulfates has been reintroduced, the IPCC described the above discrepancy as follows:<sup>27</sup>

When increases in greenhouse gases only are taken into account in simulating climate change over the last century, most GCMs [General Circulation Models] and energy balance models produce a greater warming than that observed to date, unless a lower climate sensitivity than that found in most GCMs is used.

What does this imply for the earlier claims that observed and predicted warmings were “broadly consistent”?

*On a hemispheric basis, sulfates do not improve agreement with observations.* With the reintroduction of man-produced sulfates, modellers have been able to achieve any degree of agreement they want globally. This is because of the large uncertainties in the rates of emission; the fraction of the man-emitted sulfur contributing to airborne particles; plus the atmospheric lifetimes and the optical and cloud-modifying properties of such particles, once they are formed.<sup>28</sup> However, man-emitted sulfates are restricted primarily (about 90 percent) to the Northern Hemisphere, so that matching predicted and



**Figure 3**  
**MODEL SIMULATED TEMPERATURES VS. OBSERVED**

Shown in (a) are the IPCC's 1990 model-simulated global mean temperatures from 1850-1990, based on observed increases in greenhouse gases, and predictions for the rise in 1990-2100 resulting from the business-as-usual emissions scenario. (See Figure 8, IPCC, Note 13.) In (b) are the IPCC's observed changes in global mean temperature over 1861 to 1994, compared with those simulated using an upwelling diffusion-energy-balance climate model forced with greenhouse gases only. (See Figure 16a, IPCC, Note 15.) In (c) are the IPCC's 1996 projected global mean surface temperatures from 1990 to 2100, for the three model sensitivities and increasing sulfate aerosols (solid lines) and for the high, moderate, and low emissions scenarios indicated and 1990 sulfate emissions (dashed lines). (See Figure 19, IPCC, Note 15.)



observed warming by hemisphere provides a more meaningful test.

Earlier analyses of the observed data have generally shown comparable warming in the two hemispheres or, perhaps, slightly greater warming in the Southern Hemisphere. However, recent reanalyses of the land observations (the most credible) of the Southern Hemisphere have reduced the estimate of the Southern Hemisphere warming over the period of record to about half that of the Northern Hemisphere. Jones got 0.26°C per century for the Southern Hemisphere versus 0.47°C per century for the Northern Hemisphere.<sup>29</sup> Hughes and Balling obtained a similar result from a reanalysis of the observational data from South Africa.<sup>30</sup> This is a serious discrepancy for the argument that sulfates are reducing greenhouse warming.

*The absence of polar amplification.* Another troubling discrepancy is the failure of the model-predicted polar amplification of the warming to appear in the observational data. There was a strong pulse of warming in the Arctic, particularly in the Atlantic portion of the Arctic, between 1920 and 1940. But this so-called "Arctic Warming" went away quite abruptly between 1958 and 1964. Other than this pulse, there has been essentially no indication of polar amplification of the warming observed to date at either pole.

*Absence of warming since satellite observations began.* A new discrepancy has appeared since we began to measure the temperature of the lower atmosphere from satellites in 1979. We now have 18 years of these data showing a slight cooling (0.06°C per decade), rather than the 0.2°C per decade of warming predicted by the models. The worldwide radiosonde balloon measurements of atmospheric temperature over the past 18 years agree with the satellite data, while our observations of surface temperature appear to show a global warming of 0.13°C per decade.

This leaves us two discrepancies to solve: that between the observed and predicted warming and that between our surface observations and upper air satellite and balloon soundings.

*The "precautionary principle" is the only remaining argument.* About the only argument left for the establishment is the "precautionary principle," that is, we can't afford to wait until we know what we are doing. This was recently reiterated by the German researcher Hasselmann in the following words:<sup>31</sup>

It would be unfortunate if the current debate over this ultimately transitory issue [absence of model-predicted warming] should distract from the far more serious problem of the long term evolution of global warming once the signal has been unequivocally detected above the background noise.

## **(5) THE CONSISTENT SUPPRESSION OF GOOD NEWS**

Throughout the greenhouse warming debate, there has been a reluctance on the part of the establishment to call attention to any possible benefits of greenhouse warming—or to any new information or changes in interpretation undermining, lessening, or casting doubt on the validity of the threat of greenhouse warming, such as the disparity between model-predicted and observed warming to date, noted above.

Under President Bush, the U.S. environmental research budget passed the \$2 billion level. This huge fund has been, and is, very damaging to scientific objectivity; it has imposed a strong bias on the range of scientific inquiry. It has been administered as though it were immoral, if not illegal, to expend public funds to look for, or attempt to document or quantify any possible *beneficial consequences of man's activities*. How can the consequences of an activity be evaluated objectively by examining only its detrimental aspects? Beyond this, the scientists and institutions contending for this largess of public funds have never before experienced the public and media attention—including three Nobel Prizes in 1995—that they are now receiving. Can you imagine the career and peer pressure on these individuals to avoid any hint that greenhouse warming has been overblown, or that it might possibly have beneficial consequences?

Literally hundreds of non-governmental organizations, plus environmentalists, the media, United Nations organizations, and others have been, and are, exploiting greenhouse warming and other issues to advance their own agendas. Currently planned "remedies" for global warming, in particular, would lead to transfers of trillions of dollars from the developed to the developing world, a transfer that would have to be funneled through United Nations organizations. This offers powerful incentives for the United Nations, its clients and supporters, and all the underdeveloped nations to climb aboard this particular bandwagon.

*There has been no acknowledgement that the most probable estimate of greenhouse warming was reduced.* Through three successive National Research Council/National Academy of Sciences studies,<sup>32</sup> the equilibrium warming for a doubling of CO<sub>2</sub> was estimated at 3.0° ± 1.5°C (5.4° ± 2.7°F). The IPCC kept the same range but reduced the "best estimate," or most probable value, from 3.0 to 2.5°C (5.4 to 4.5°F).<sup>33</sup> However, anyone not familiar with the previous reports would not have realized that this very critical value had been reduced. The authors of the report did not call attention to the reduction, or give any reason for it.

*There has been only grudging admission of the fertilizer effect of increased CO<sub>2</sub>.* In the U.S. Department of Energy State-of-the-Art Reports on the CO<sub>2</sub> issue, the executive summary of the volume "Direct Effects of Increasing Carbon Dioxide on Vegetation," provides a typical example of suppression of good news.<sup>34</sup> It clearly states that CO<sub>2</sub> is essential to plant life and that "it is possible that some fraction of the increased agricultural yield that has occurred in this century is due to increased atmospheric CO<sub>2</sub> concentration." However, more attention is given to detrimental effects, or unknown threatening possibilities, such as the following: Weeds "could have a comparatively larger growth response to increased CO<sub>2</sub> than some desirable crop species." "Soybean leaves [under increased CO<sub>2</sub>] became carbon rich and nitrogen poor." An insect pest, the soybean looper "had to consume more leaf tissue to gain an equal amount of protein nitrogen."

In contrast to the above, Dr. Sherwood B. Idso's summary of this subject reads as follows:<sup>35</sup>

Results from hundreds of laboratory and field experiments demonstrate that increasing the carbon dioxide content of the air helps plants grow faster, bigger,

and more profusely. A large body of data also indicates that the percentage growth enhancement due to atmospheric CO<sub>2</sub> enrichment [about 30 percent for a doubling of CO<sub>2</sub>] is generally greater when plants are subjected to various environmental stresses, or when essential resources such as light, water, or nutrients are less than adequate for optimal growth. It has additionally been observed that there is typically no decline in the growth-enhancing effects of elevated levels of atmospheric CO<sub>2</sub> when plants are grown for long periods of time in natural settings out-of-doors; and it appears that the growth rates of trees and shrubs are generally more responsive to increases in the air's CO<sub>2</sub> content than are the growth rates of herbaceous plants.

These experimental observations suggest three things that should have occurred as the air's CO<sub>2</sub> content rose in tandem with the burning of fossil fuels that powered the engines of the Industrial Revolution. First, there should have been concurrent increases in the growth rates of nearly all of Earth's plants. Second, trees and shrubs [C3 type plants<sup>36</sup>] should have gained a competitive advantage over non-woody vegetation [C4 type plants]. And third, as the rate of rise of the air's CO<sub>2</sub> content has accelerated over the past few decades, so also should these biospheric changes have been greatest in recent years.

Numerous studies have produced three impressive pillars of support for this "greening of the Earth" scenario. First, they reveal the existence of a worldwide invasion of grasslands by trees and shrubs that began approximately two centuries ago and has closely followed the upward trend in the air's CO<sub>2</sub> content. Second, they demonstrate that the growth rates of many forests around the globe have increased concurrently, with the past few decades exhibiting the greatest responses. And third, they indicate that the amplitude of the seasonal oscillation of the air's CO<sub>2</sub> concentration—which is driven primarily by the metabolic activity of the terrestrial biota—has risen hand in hand with the air's CO<sub>2</sub> content over the past three and a half decades, thereby demonstrating that the vitality of the entire biosphere has also risen hand in hand with the air's CO<sub>2</sub> content over this period.

In fact, the carbon dioxide emitted by our energy-consuming activities can actually enhance both the quantity and quality of life on Earth.

This analysis by Idso was recently confirmed by Jolly and Haxeltine.<sup>37</sup> With a process-based vegetation model they found that at "the last glacial maximum [18,000 YBP], the change in atmospheric carbon dioxide concentration alone could explain the observed replacement of tropical montane forest by a scrub biome." This shrinkage of the tropical rain forests had previously been attributed to a tropical cooling of about 5°C (9°F), a cooling which was inconsistent with indications from other data sources.

*Disappearance of the effect of previously released CO<sub>2</sub>.* One of the developments of this biased selection of information presented by study panels is misleading and rather disturbing, as can be seen in Figure 3. This figure is a composite of three graphs of model-predicted temperatures reproduced from

IPCC reports.<sup>38-40</sup>

The top graph shows model predictions for the "low," "best," and "high" model sensitivities of global mean temperatures from 1850 to 2100, for observed increases in greenhouse gases to 1990, and the business-as-usual projections thereafter. The predictions were begun in 1765 to include all man-produced greenhouse gases. This is the figure from which the predicted warmings for 1990 of 0.7, 1.0, and 1.4°C were scaled in Section 4 above.

The middle graph shows observed global mean temperature along with model-predicted temperatures, again for the three model sensitivities for a doubling of CO<sub>2</sub>. Note that the predicted curves do not start from zero in the year 1765, as in the top graph. From the slopes of the predicted curves, where they cross the zero ordinate circa 1880, it is obvious that they would have to be raised significant amounts to place their ordinates on zero in 1765. And, it is equally obvious that the disagreement with observations would be enhanced if this were done.

The bottom graph shows an even more flagrant example of this misleading figure construction. This figure shows model-projected global mean surface temperatures for the three model sensitivities and for three different future emission scenarios. The misleading aspect of the figure is the fact that all projected curves start from zero in 1990. This implies that there were no man-emitted greenhouse gases before 1990, or that any such emissions had no effect on the global mean temperature. The reader can surmise from the two upper graphs how different this third graph would look if the ordinate of each curve started from zero in 1765. This is what would be necessary to include the model-predicted effect of man's emissions of greenhouse gases prior to 1990.

The question arises: Is this an admission that greenhouse gases released prior to 1990 have had no effect on global mean temperatures, or is it an attempt to hide the fact that they have had no effect on global mean temperature?

## (6) OUR LIMITED UNDERSTANDING OF THE CARBON BUDGET

*Man-induced increase in greenhouse gases to date.* Precise measurements of CO<sub>2</sub> in the atmosphere began in 1958 at Mauna Loa, Hawaii. At that time, the atmospheric concentration was 315 parts per million by volume, ppmv, and it has steadily increased since, reaching a concentration of 354 ppmv in 1990. The pre-industrial level has now been found to have been about 278 ppmv. This was determined by analysis of air bubbles in ice cores from Greenland and Antarctica. By the same method, the level in 1850, the beginning of most data tabulations, was 287 ppmv.

This means that man's consumption of fossil fuels and clearing of forests has increased the atmospheric concentration of CO<sub>2</sub> approximately 30 percent. Other man-produced greenhouse gases such as methane, nitrous oxide, and freons have also increased. All of the greenhouse gases combined are now estimated to have produced a greenhouse effect equivalent to a 50 percent increase in CO<sub>2</sub> to date. Under equilibrium conditions,<sup>41</sup> this should have produced a warming exceeding half of the model-predicted 2.5°C.<sup>42</sup>

*Fluxes of CO<sub>2</sub> to the atmosphere and the seasonal cycle.*

Since 1 ppmv of CO<sub>2</sub> mixed throughout the atmosphere is equivalent to 2.13 gigatons of carbon (GtC),<sup>43</sup> the carbon content of the atmosphere from CO<sub>2</sub> has gone from an 1850 level of 612 GtC, to a circa 1990 level of 755 GtC, an increase of 143 GtC. Man's emissions of CO<sub>2</sub> from fossil-fuel consumption are now up to 6.1 GtC per year in 1990; 6.5 GtC per year in 1996.<sup>44</sup> This seems like a large number, but it amounts to only 2.5 to 4 percent of the yearly natural transfers of CO<sub>2</sub> between the atmosphere and the oceans (90 to 120 GtC), and between the atmosphere and the biosphere (60 to 120 GtC).<sup>45</sup> However, these latter transfers are two-way transfers, resulting in little net transfer over a year.

In the oceanic case, the CO<sub>2</sub> is emitted by the warmer waters near the equator and taken up by the colder waters near the poles. In the biospheric case, the CO<sub>2</sub> is removed from the atmosphere by plants during the summer growing season, and returned to the atmosphere by the decomposition through oxidation—including by fire, of leaves, litter, and decaying plant debris. Because of the greater landmass, and therefore plant mass, in the Northern Hemisphere, this transfer imposes a seasonal cycle on the atmospheric concentration of CO<sub>2</sub>, with a maximum in April and a minimum in September. The amplitude of this cycle is about 6 ppmv in the global mean and at Mauna Loa, Hawaii. It is more than double this at Point Barrow, Alaska.

In the Southern Hemisphere it is much weaker and is six months out of phase due to the lesser amount of land vegetation and to the reversed seasonal cycle.

The amplitude of this seasonal cycle in CO<sub>2</sub> concentration has increased by 18.7 percent, in the 37 years from 1958 through 1994. This appears to be a direct result of deeper seasonal "breathing" by the biosphere due to an increase in the total biomass or to more rapid and larger expansion during each growing season, as a result of the fertilizer effect of the increasing concentration of CO<sub>2</sub> in the atmosphere.

*The airborne fraction and the "missing carbon dioxide."* Returning to man's emissions of CO<sub>2</sub> as a result of the consumption of fossil fuels: the total emissions from 1850 to 1990 have been estimated at 219 GtC.<sup>46</sup> Comparing this with the actual increase in the atmosphere, given above as 143 GtC, suggests that the atmospheric fraction, the fraction remaining in the atmosphere, is 65.3 percent. Surprisingly, this is higher than the usually quoted 58 percent airborne fraction determined from fossil fuel emissions alone.

However, man has also perturbed the carbon cycle by the clearing of forests and cultivation of the soil, thus exposing them to oxidation. The amount of man-induced release of CO<sub>2</sub> to the atmosphere from these processes was estimated to be 122 GtC, for the period 1850 to 1990. If we add the fossil fuel (219 GtC) and biospheric (122 GtC) emissions, the atmospheric fraction for the period 1850-1990 drops to about 42 percent. Alternatively, if we use the IPCC carbon budget (shown in Table 1) and divide the atmospheric storage (3.3 GtC), by total anthropogenic emissions (7.1 GtC), we obtain an atmospheric fraction of 46.5 percent. In its 1990 report, the IPCC gave the airborne fraction for the decade of the 1980s as 48 ± 8 percent of total emissions.<sup>47</sup> Bert Bolin, then IPCC Chairman, calculated airborne fractions of 50 ± 15 percent for 1850-1980 and 38 ± 4 percent for 1958-1982.<sup>48</sup>

On page three of the Department of Energy's State of the At-

mosphere Report appears the statement,<sup>49</sup> "In general, the higher the release rate [of CO<sub>2</sub>] the higher the airborne fraction is predicted to be." This is definitely not what the figures given above suggest, but they are influenced by the estimates of man-induced biospheric emissions of CO<sub>2</sub> to the atmosphere. However, Figure 2.1 of the Department of Energy Report plots yearly fossil fuel input and atmospheric CO<sub>2</sub> increases by year, from 1958 through 1979. Francey et al. plot the same data for 1982 through 1992.<sup>50</sup> Although these contain unexpectedly large variations (23 to 88 percent), they show that yearly atmospheric increases of CO<sub>2</sub> as a percentage of fossil fuel emissions have been steady, if not declining, over this 34-year period. If biospheric emissions have increased over this period, then the airborne fraction of total man-induced emissions of CO<sub>2</sub> has clearly been declining.

Historically, the concern for rain forest destruction, or tropical deforestation of the 1970s and 1980s, had an impact on our concept of the carbon budget, before the earlier biospheric source from the clearing of mid-latitude forests to create farm land. The early estimates of the CO<sub>2</sub> emission rates from destruction of rain forest were quite large. They were impossible to include without unbalancing our reconstructions of the carbon budget. That is, to balance the estimates of the carbon emissions to the atmosphere, required unidentifiable sinks. This led to the concept of "missing carbon dioxide" which persisted for some time.

As stated at that time in the Department of Energy report cited above:<sup>51</sup>

As a first approximation in the validation of [carbon] models, we should be able to compute a balanced global carbon budget for the contemporary period; we currently cannot do this and we are uncertain why not. This obviously has some impact on our ability to project future atmospheric CO<sub>2</sub> content with existing models.

*Recent recognition of mid-latitude forest regrowth.* The current estimate of the carbon budget derived by IPCC is reproduced in Table 1.<sup>52</sup> Note that an inferred, or "missing," sink of 1.3 ± 1.5 GtC is still required. However, it is now presumed that this is the result of unmeasured—and largely unmeasurable—regrowth or enhanced growth of the natural biosphere as the result of fertilization by man's emissions of nitrogen and carbon dioxide, and the climatic stimulation from warmer temperatures and greater precipitation.

In their model study of the carbon budget for IPCC, Sarmiento et al. ran scenarios for eventual stabilization of CO<sub>2</sub> in the atmosphere at levels from 350 to 750 ppmv.<sup>53</sup> The "missing CO<sub>2</sub>" required to balance their model was re-identified as "annual terrestrial uptake," and attributed to the same causes as the "inferred sink" in line 7 of Table 1. That is, the establishment, represented by IPCC, is finally admitting what Idso<sup>54</sup> and Wittwer<sup>55</sup> have claimed for some time: Mid-latitude forests, because of CO<sub>2</sub> fertilization and regrowth, are a significant and growing sink for CO<sub>2</sub>. An even stronger admission was just given by Moffat.<sup>56</sup> Whether this accounts for the apparent decrease in airborne fraction of CO<sub>2</sub> emissions over time, remains to be determined. However, no other explanation appears likely at present.

It should be noted that in the 450 and 750 ppmv stabilization



**Table 1**  
**ANNUAL AVERAGE ANTHROPOGENIC CARBON BUDGET FOR 1980 TO 1989**

*Carbon dioxide sources, sinks and storage in the atmosphere are expressed in gigatons of carbon (GtC) per year.*

<b>Carbon dioxide sources</b>		<b>GtC</b>
(1)	Emissions from fossil fuels, cement production, etc.	5.5 ± 0.5 <sup>1</sup>
(2)	Net emission from tropical land uses	1.6 ± 1.0
(3)	Total anthropogenic emissions: (1) + (2)	7.1 ± 1.1
<b>Carbon dioxide sinks</b>		
(4)	Storage in the atmosphere	3.3 ± 0.2
(5)	Ocean uptake	2.0 ± 0.8
(6)	Uptake by Northern Hemisphere forest regrowth	0.5 ± 0.5
(7)	Inferred sink: + (3) - (4) + (5) + (6)	1.3 ± 1.5 <sup>2</sup>

Source: IPCC, 1996. Table 2.1. See Note 15.

1. For comparison, emissions in 1994 were 6.1 GtC/year.

2. This inferred sink includes estimates of enhanced carbon uptake due to nitrogen fertilization (0.5 ± 1.0 GtC/yr), plus the range of other uptakes (1 ± 1 GtC/yr) due to carbon dioxide fertilization and climate warming and increased precipitation.

runs presented by Sarmiento et al. in their Figure 7, the model-computed airborne fraction decreased consistently from the beginning of the runs in 1795, except for the last 40 years of the 20th century when actual and projected emissions were beginning their steepest rise. Even during this period, the computed increases in airborne fraction were less than 10 percent, and had again reversed before emission rates reached their peaks.

The model-computed "missing CO<sub>2</sub>" or "annual terrestrial uptake" reached a peak of about 2.2 GtC per year around 1970, and then dropped a bit. For 1850 to 1990, it totalled nearly 100 GtC.

*Man-induced carbon storage.* To my knowledge, no one to date has estimated how much carbon man has put into storage by the lumber used in permanent structures, and by paper and fibers preserved in libraries, museums, and so forth. While this is unlikely to be a major fraction of the estimated 122 GtC biospheric source, 25 to 50 GtC does not appear an unreasonable estimate. The quickest and most economical means of increasing this type of carbon storage, thereby preventing or delaying its return to the atmosphere, is to adopt a policy requiring priority use of wood and other plant products in all permanent structures. This would speed harvesting and regrowth of biospheric mass at minimum cost, and without requiring diversion of any additional farm land to forests.

*Atmospheric concentration of CO<sub>2</sub> from the geological record.* Around 500 million YBP, the concentration of CO<sub>2</sub> in the atmosphere is estimated to have been near 20 times the pre-industrial level. With the spread of rooted vascular plants in 400 to 360 million YBP, which led to increased erosion and carbon burial, the concentration was reduced to near the pre-industrial level. This persisted from 340 to 260 million YBP—during the best documented previous ice age. By 240 million YBP, CO<sub>2</sub> had again risen to about 5 times the pre-industrial level. Since then, the CO<sub>2</sub> level has dropped rather steadily to the beginning of the present ice age. Analysis of air bubbles from polar ice caps indicates that over the last 160,000 years, at least, the CO<sub>2</sub> level varied with tempera-

ture, dropping to 190 to 200 ppmv during the glacials, and rising to 280 to 300 ppmv during the interglacials.

Although these data are not definitive, they suggest that temperature changes preceded the CO<sub>2</sub> changes. It would also be easier to explain the CO<sub>2</sub> changes as a consequence of the temperature changes, than to devise a mechanism to drive the CO<sub>2</sub> changes, prior to the temperature changes, in step with the glacial-interglacial cycle.

Since most of our present plants evolved and thrived under much higher concentrations of CO<sub>2</sub> than at present, we have little information on which to determine a "dangerous level" of CO<sub>2</sub>. From the botanical point of view, the most dangerous level of CO<sub>2</sub> was probably that of the last glacial maximum, 18,000 to 20,000 YBP. At the CO<sub>2</sub> levels around 190 ppmv at that time, the newer C4 type plants, such as grasses, which are better adapted to low levels of CO<sub>2</sub>, by competitive advantage replaced the C3 type woody plants. This caused the living biospheric mass to shrink some 25 percent, from 610 GtC to around 450 GtC.<sup>57</sup>

### **(7) IS THERE A DISCERNIBLE HUMAN INFLUENCE ON CLIMATE?**

The chief phrase from the most recent IPCC Report, known as IPCC95,<sup>58</sup> provoked headlines, letters to the editor, and scientific rebuttals. The statement, given as a section heading in the Summary for Policymakers, bluntly states: "The balance of evidence suggests an anthropogenic influence on global climate." This statement is presumably based on Section 8 of IPCC95 titled, "Detection of Climate Change and Attribution of Causes." However, the nearest Section 8 comes to such a statement is the following: "Taken together, these results point towards a human influence on global climate."<sup>59</sup>

Substantiation of such a statement requires both that a non-natural climate change be identifiable in the observational record, and that it be of such a nature that it can be attributed to the actions of man. Rather than review the many details of the evidence contradicting such a claim, I shall pursue an

easier path: I have assembled below some of the subsequent public utterances denying this IPCC claim, made by some of the principal proponents and defenders of the claim itself.

"No one to my knowledge who is informed is claiming certainty of detection or attribution [of an anthropogenic influence on global climate]; certainly the IPCC is not. . . ."

—John T. Houghton, *Leading Editor of IPCC95*<sup>60</sup>

"We say quite clearly that few scientists would say the attribution issue was a done deal."

—Benjamin D. Santer,  
*Lead Author of Section 8 of IPCC95*<sup>61</sup>

". . . many climate experts caution that it is not at all clear yet that human activities have begun to warm the planet—or how bad greenhouse warming will be when it arrives."

—Richard A. Kerr,  
*Research News & Comment Writer for Science magazine*<sup>62</sup>

"However, the inherent statistical uncertainties in the detection of anthropogenic climate change can be expected to subside only gradually in the next few years while the predicted signal is still slowly emerging from the natural climate variability noise. It would be unfortunate if the current debate over this ultimately transitory issue should distract from the far more serious problem of the long-term evolution of global warming once the signal has been unequivocally detected above the background noise."

—Klaus Hasselmann,  
*Max-Planck-Institute for Meteorology*<sup>63</sup>

(The reader should note that greenhouse warming has been predicted to rise above the noise of the climate record *within the coming decade* for at least two decades.)

From these confessions by its supporters, it seems quite clear that the IPCC95 statement, "The balance of evidence suggests a discernible human influence on global climate," was studiously crafted to induce the media to broadcast to the citizens and policymakers of the world a message that few, if any, of the researchers, on whose work it was based, are yet willing to defend before the scientific community.

## (8) INTERNATIONAL EFFORTS TO CONTROL GREENHOUSE WARMING

Under the provisions of the 1992 Framework Convention on Climate Change (FCCC) Treaty (the "Rio Climate Treaty"), there are efforts going on to limit the emissions of CO<sub>2</sub> by restricting the consumption of fossil fuels—"to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. . . ." Failing a consensus at the First Conference of the Parties (COP-1) in Berlin in April 1995, FCCC adopted instead the "Berlin Mandate," an agreement to negotiate a new set of targets for reducing greenhouse gas emissions to be adopted as *mandatory for developed countries only* in Kyoto, Japan, in December 1997. Proposed targets have ranged from 3 to 20 percent reduction in emissions below 1990 levels by 2005.

Until mid-1996, the Clinton administration had relied on voluntary reductions in the use of fossil fuels to meet U.S. commitments under the FCCC Treaty. But at the COP-2 in Geneva, July 17, 1996, U.S. Undersecretary of State for Global Affairs, Timothy E. Wirth, announced: "The United States recommends that future negotiations focus on an agreement that sets a realistic verifiable and binding medium-term emissions target."

A year later, at a special session of the U.N. General Assembly in New York City, President Clinton told the meeting that he would take action "to convince the American people and the Congress that the climate change problem is real and imminent."<sup>64</sup> He added that he would bring to December's meeting at Kyoto, Japan, where countries hope to negotiate a treaty on greenhouse gas emissions, "a strong American commitment to realistic and binding limits that will significantly reduce our emission of greenhouse gases."

It should be noted that the IPCC estimated that halting the rise of CO<sub>2</sub> in the atmosphere would require a global reduction in the consumption of fossil fuels by 60 to 80 percent! If all nations are permitted equable consumption, this would mean a reduction for developed nations, such as the United States, of well over 80 percent. Can you imagine any responsible government starting down this road toward virtual elimination of fossil fuels, using conservation measures alone? Why are we hearing so little about replacing fossil fuels with other energy sources?

### Notes and References

1. The principal man-produced greenhouse gases are carbon dioxide, methane, nitrous oxide, ozone and freons (chlorofluorocarbons).
2. Hugh W. Eillsaesser, 1984. "The climatic effect of carbon dioxide: a different view," *Atmospheric Environment*, Vol. 18, No. 2, pp. 431-434.
3. Absolute temperature is expressed in degrees Kelvin (K), these are the same units as degrees Celsius, but are measured from absolute zero, that is, from minus 273 degrees Celsius. The energy radiated by an ideal (black) body is given by the Stefan-Boltzmann Law: radiant energy [in watts per square meter] = constant  $\times$  K<sup>4</sup>.
4. These are given by Planck's Law for the distribution of radiant energy as a function of wavelength, and by Wien's displacement or color temperature law for the wavelength of peak radiation ( $\lambda_{max}$ ) as a function of temperature. The latter is expressed as:  $\lambda_{max}$  [in microns] = 2,897/K. For the Sun at 5,800 K,  $\lambda_{max}$  = 0.5 microns; for the Earth's surface at 288 K,  $\lambda_{max}$  = 10 microns.
5. A blackbody by definition has an emissivity of one, that is, the radiant energy output is given directly by Planck's law; no scaling by an emissivity factor (less than one) is required. Planck's law is a detailed statement of the Stefan-Boltzmann law giving radiant energy output in terms of both temperature and wavelength.
6. The stratosphere is the region of the atmosphere above the lowest region, or troposphere, in which most clouds and weather systems are generated. These two regions are separated by the tropopause which is near 17 kilometers altitude in the tropics and 8 to 10 kilometers at the poles. The stratosphere extends from the tropopause to the stratopause, which lies near 50 kilometers altitude. In contrast to the troposphere, the temperature in the stratosphere increases with altitude. This upper level warming is primarily the result of the absorption of solar ultraviolet by oxygen and ozone.
7. One optical depth is the amount of an absorber required to absorb 63 percent of the impinging radiation being considered.
8. This mechanism for greenhouse gases to affect surface temperature is probably invalid in cases for which the bottom of the outer optical depth of the absorber lies in the stratosphere. If temperature above this level increases with altitude, the argument states that increased absorber should lead to surface cooling. However, we know of no mechanism by which stratospheric temperature or lapse rates uniquely affect the surface temperature.
9. As air rises, it expands because the pressure, or weight of the air column above it, decreases. As anyone who has felt the air escape from a tire knows, as air expands because of depressurization, it cools. This so-called adiabatic cooling is the result of the consumption of energy in expanding against its environment. Conversely, air which descends or subsides is compressed by the higher pressure, or greater weight of the air column above it. This compression represents work done on the air by the environment and raises its temperature. The rate of change of temperature with al-

- titude, or adiabatic lapse rate, is 10°C per kilometer (5.5°F/1000 ft).
10. That is, the area of lowering of the outer optical depth of water vapor over the subtropics will be enlarged or pushed to lower and warmer levels of the atmosphere, allowing more rather than less radiation to escape from these regions directly to space without reabsorption by overlying gases. This will constitute a negative feedback from water vapor, at least over these regions.
  11. Hugh W. Eilisaesser, 1984. See Note 2.
  12. The warm periods designated Holocene maximum and the Medieval warm period on Figure 2 have different names. Among other names, the first has generally been called Postglacial Climatic Optimum, Holocene Climatic Optimum, or simply the Climatic Optimum since it is recognized as the warmest period of the Holocene. The second is usually called the Medieval Little Optimum or the Medieval Climatic Optimum.
  13. IPCC (Intergovernmental Panel on Climate Change), 1990. *Climate Change, the IPCC Scientific Assessment*, Eds. J. T. Houghton, G. J. Jenkins, and J. J. Ephraums (Cambridge: Cambridge University Press).
  14. IPCC, 1990, p. 202. See Note 13.
  15. IPCC (Intergovernmental Panel on Climate Change), 1996. *Climate Change 1995, The Science of Climate Change*, Eds. J. T. Houghton, L. G. Melra Filho, B. A. Callander, N. Harris, A. Kattenberg, and K. Maskell (Cambridge: Cambridge University Press).
  16. IPCC, 1990, p. 203. See Note 13.
  17. S. Manabe and R. T. Wetherald, 1967. "Thermal equilibrium of the atmosphere with a given distribution of relative humidity," *Journal of the Atmospheric Sciences*, Vol. 24, No. 3, pp. 241-259.
  18. IPCC, 1990, p. 254. See Note 13.
  19. IPCC, 1990, p. xxix. See Note 13.
  20. IPCC, 1990. See Note 13.
  21. IPCC (Intergovernmental Panel on Climate Change), 1992. *Climate Change 1992, The Supplementary Report to The IPCC Scientific Assessment*, Eds. J. T. Houghton, B. A. Callander, and S. K. Varney (Cambridge: Cambridge University Press).
  22. IPCC, 1996. See Note 15.
  23. IPCC, 1990. Figure 8. See Note 13.
  24. The three different numbers are for the model sensitivities producing the minimum, most probable, and maximum temperatures changes of 1.5, 2.5, and 4.5°C (2.7, 4.5, and 8.1°F) of warming for a doubling of carbon dioxide.
  25. IPCC, 1990. See Note 13.
  26. IPCC, 1992. See Note 21.
  27. IPCC, 1996, p. 295. See Note 15.
  28. S. E. Schwartz and M. O. Andreae, 1996. "Uncertainty in climate change caused by aerosols," *Science*, Vol. 272, pp. 1121-1122.
  29. P. D. Jones, 1994. "Hemispheric surface air temperature variations: A reanalysis and an update to 1993," *Journal of Climate* Vol. 7, No. 11, pp. 1794-1802.
  30. W. S. Hughes and R. C. Balling, Jr., 1996. "Urban influences on South African temperature trends," *International Journal of Climatology*, Vol. 16, pp. 935-940.
  31. K. Hasselmann, 1997. "Are we seeing global warming?" *Science*, Vol. 276, pp. 914-915.
  32. National Research Council, National Academy of Sciences, 1979. *Carbon Dioxide and Climate: A Scientific Assessment*. (Washington, D.C.: National Academy of Sciences).  
National Research Council, 1982. *Carbon Dioxide and Climate: A Second Assessment* (Washington, D.C.: National Academy of Sciences).  
National Research Council, Board of Atmospheric Sciences and Climate, 1983. *Changing Climate* (Washington, D.C.: National Academy of Sciences).
  33. IPCC, 1990. See Note 13.
  34. B.R. Strain and J. D. Cure, 1985. Eds. *Direct Effects of Increasing Carbon Dioxide on Vegetation*, DOE/ER-0238 (Springfield, Va.: NTIS).
  35. Sherwood B. Idso, 1995. "CO<sub>2</sub> and the Biosphere: The Incredible Legacy of the Industrial Revolution" (St. Paul, Minn.: University of Minnesota, Department of Soil, Water & Climate).
  36. Our most common plants, the C3 plants, use a 3-carbon molecule in photosynthesis. They also give back part of their photosynthetic production in subsequent dark respiration, which is suppressed under higher CO<sub>2</sub> concentrations. C3 plants include most woody plants, trees, and shrubs, and cultivars such as wheat, rice, cotton, and soybeans.
  - C4 plants use a 4-carbon molecule in photosynthesis. They cope better with low levels of CO<sub>2</sub> because they have a CO<sub>2</sub> concentrating mechanism in their leaves. They are mostly grasses and cultivars such as corn, maize, sorghum, and sugarcane. It is not surprising that C4 plants have a competitive advantage at levels of CO<sub>2</sub> below about 300 ppmv, and C3 plants have a competitive advantage at higher levels.
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  39. IPCC, 1996. Figure 16a. See Note 15.
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  41. The warming is expected to take some time to come to equilibrium because of the large amount of energy required to heat the oceans. The actual delay depends very much on whether the heat is deposited only in the mixed layer of the ocean, at about 70 meters, or throughout the depth of the ocean. It is hard to imagine warm, and therefore lighter, surface water being mixed to the bottom of an ocean with a mean depth of 4 kilometers and a bottom temperature below zero C. In the tropics today, we find 30°C surface water overlying water near the freezing point of seawater at the bottom.
  42. 2.5°C is the most probable equilibrium warming for a doubling of carbon dioxide. The range is 1.5 to 4.5°C.
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# Global Cooling and Scientific Honesty

by Lee Anderson Smith, Ph.D.  
and C. Bertrand Schultz, Ph.D.

**W**ithout a doubt, the environmentalists' plans for saving the planet will wreck an already unhealthy global economy, in itself a more frightening and immediate threat than global warming. For this reason, it is urgent that the scientific community take an aggressive role in an objective examination of climate history, climate prediction, and future human ecology.

A sound basis for ecological planning depends on an accurate prediction of future climate. This, in turn, warrants integrated, multiple-discipline research, which need not be costly and can be done in a relatively short time. The primary objective of this research will be determination of the timing of the event sequence of global cooling, as outlined below.

## The Case for Global Cooling

That the Earth is cooling, rather than warming, is the thesis of many scientists, who contend that continued chilling will eventually result in glacial advance and sea-level lowering. Following a phase of increased climate instability, during which weather extremes intensify, gradual and cyclic cooling will increase rainfall, bringing much-needed relief to the parched middle latitudes long before cooling has shortened the growing season to any great extent. The result will be a prosperous time for agriculture and a recharge of all aquifers with exposed intake areas.

The predicted increase in rainfall is and has been the natural way in which ice is added and glaciers advance. The mechanism involves the atmospheric transport of moisture from lower to higher latitudes and precipitation, much of it in the form of rain south of the ice front.

The global cooling premise is not new and, unlike global warming, has ample evidence to support it. As early as 1975, the National Academy of Sciences reported that the next full-blown 10,000-year ice age was upon us, citing as evidence the duration of the Arctic snow cover, animal migrations, sea-surface temperature trends, and global decline in average annual temperatures. The Academy was looking carefully at climate history in making its prediction. More recent support for global cooling comes from several phenomena:

- (1) A prediction of a Little Ice Age for early in the 21st century (Fairbridge and Saunders 1987),
- (2) Documented advance of existing glaciers (Wood 1989),
- (3) The actual decline of drought maxima since 1912 for

western North America (Currie 1987),

(4) A current cooling trend as evidenced in Arctic and Antarctic ice cores (Zeller and Dreschhoff 1988),

(5) Cooling of the southern United States with increased precipitation (Maul and Hanson 1990), and

(6) The demonstration of urban bias in the 100-year CO<sub>2</sub> temperature data (Karl and Jones 1989) used to promote the greenhouse effect theory and the greenhouse global warming hypothesis, as if they were one and the same.

The estimated overall cost of catering to the advocates of global warming exceeds \$3 trillion.

Where would the \$3 trillion come from, given our ailing economy? Most certainly from the taxpayer.

The primary problems with the assertion of greenhouse global warming stem from the lack of valid scientific supporting data, the use of a questionable geologic model, and the promulgation of a highly unreliable computer model before administration officials, Congress, and other scientists.

There is, on the other hand, multidisciplinary, integrated support for the theory of global cooling. Fred Wood (1988) published a paper on glacial trends, followed by another in 1990, with hard questions concerning current environmental monitoring as a basis for greenhouse warming models. He cites a several-thousand-year cooling trend of one or two degrees C, accompanied by the lowering of tree lines, the expansion of permafrost, and the extension of existing Alpine-type glaciers.

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*When this article was first published, Smith and Schultz were co-directors of TER-QUA, the Institute for Tertiary/Quaternary Studies and the Center for Climate-Change Research and Water Resources.*

*This article is excerpted from 21st Century Science & Technology magazine, Winter 1992, pp. 9-12.*

Charles Bentley at the University of Wisconsin at Madison reports that the Antarctic ice sheet is not melting. Instead, he says, "The accumulation of snow is outpacing the rate at which the ice is discharged into the ocean [so that] the polar cap, if anything, is getting bigger" (personal communication). To support this view, we were sent a photograph of the McMurdo Sound, Antarctica, radio antenna, 120 feet high, with only 15 feet now protruding above the ice.

George Maul and Kirby Hanson of the National Oceanic and Atmospheric Agency (NOAA), reported the documentation of cooling in the southern United States-Gulf of Mexico region since 1940, in a presentation at the 1990 meeting of the American Association of Advancement in Science in New Orleans. Then in March 1990, NASA released data refuting the idea of global warming during the preceding decade. Karl and Jones (1989) documented "urban bias in area-averaged surface air temperature trends."

Maduro (1989) went even further, claiming that "the greenhouse effect is a fraud." He quotes Pat Michaels (University of Virginia, Charlottesville), Jeremy Namias (Scripps Institute of Oceanography, La Jolla), and Fred Wood (Office of Technology Assessment, U.S. Congress) to back up his claim.

Kerr (1989) shows just how much the colleagues of Jim Hansen, director of the Goddard Institute, in climate modeling at NASA and NOAA, disagree with Hansen's claim that "we are 99 percent certain that greenhouse global warming is here." Kerr concluded: "Apocalypse sells well in the media and even better on Capitol Hill. And that is why fears of the greenhouse effect threaten to push the U.S. into a costly environmental mistake."

In the best summary article at the time, Lochhead (1990) pieced together the pros and cons, concluding that "global warming forecasts may be built on hot air." She added that the costs of cutting greenhouse emissions may far outweigh any benefits. "Writer and philosopher of science Alston Chase," Lochhead points out, "says the media may pick up premature and sensational scientific claims, sweeping many grant-seeking scientists along with it, gaining bandwagon momentum."

#### **NSF and Scientific Integrity**

If available solid interdisciplinary scientific data suggest a cooling Earth, why are so many workers in the field promulgating the frightening idea of greenhouse global warming? Is it possible that the bureaucratization of science has trampled integrity along with removing the task of teaching as the primary goal of a sciences faculty? Perhaps expertise in "grantsmanship" has displaced scientific honesty as a method of keeping an academic position. It is not provable that the establishment of the National Science Foundation (NSF) has excised scientific objectivity and rendered useless the self-verifying system that once characterized scientific investigation. But the juxtaposition of these two events makes one suspicious.

Broad and Wade (1982) blame what they call the "rise of the careerist" and "power of the elite" for the proliferation of "fraud and deceit in the halls of science." We have to wonder if both cannot be traced back to Sputnik and the U.S. government's decision to try to buy a higher rate of scientific innovation. Funding through the NSF directly to the scientist rather than through the university enlarged the scientific-research careerist's territory and intruded him into the academic arena.

There was suddenly much more money, but universities were paid to stay out of the selection process.

The university gave up control of research coordination and emphasis. It could no longer reward teaching excellence; it turned over the ranking of faculty to outsiders; it admitted a new breed of scientist who cared little about teaching; and it fired faculty who were merely excellent teachers, not successful money-getters. . . .

The bureaucratization of science—through the growth of NSF control and the proliferation of federal departments with scientific research needs—has weakened the role of the university, making whole campuses and faculties dependent on grants. It also created a scientific elite, made "publish or perish" a way of life, and made the "buddy system" the heart of scientific review. As John B. Conlan, former congressman from Arizona, put it, "The peer review system operated by the National Science Foundation is incestuous, and it stifles new ideas and breakthroughs, while carving up the multi-million-dollar federal research-and-education pie in a Monopoly game of grantsmanship" (Broad and Wade 1982). . . .

If we then look at the atmosphere of permissiveness in which bureaucratized science has flourished, it is not surprising that the pseudoscientific elite have manipulated the data when huge budgets were threatened by recent economic downturn. That it is not surprising, does not make it any more acceptable, however.

Furthermore, manipulation of data, such as the claims that the recent drought is evidence of global greenhouse warming, cannot be allowed to go unchallenged.

#### **The Linear Model Fiction**

The climate-history (geologic) model of the global warming theorists is highly suspect, to put it in the kindest terms. As proposed by the DOE CO<sub>2</sub> group's environmental chemists, it suggests a 600-million-year linear decline in CO<sub>2</sub> levels to the day the Ice Ages (Pleistocene) began, followed by a 600-million-year linear projection of CO<sub>2</sub> increase. The group has only 100 years of CO<sub>2</sub> data, but they supposedly fit that line, thereby providing "evidence" of the short-term drastic changes the DOE group predicts. Even if this model of climate history were accurate, where is there reflected any effect by man or the industrial revolution?

The authors' combined 80 years of research have produced a concise model of geologic (including climate) history (Smith 1965, 1985; Schultz 1968; Schultz and Stout 1977; Schultz and Hillerud 1978; and Schultz and Schultz 1985). That model consists of glacio-eustatic (warm/high sea-level to cold/low sea-level) cycles throughout all of geologic history. There has never been a 600-million-year straight-line trend dominating climate history.

The linear model, used as a basis for warming prediction, is fiction. Predictions of future climate are no better than the climate history model upon which they are based. Objective predictions based on multidiscipline investigation concerning the future of climate are an absolute necessity in planning for water-resource management, agriculture, waste disposal, and human ecology. We are seeking modest funds for that purpose. Further, we invite every scientist who can contribute to an understanding of past climate or to the prediction of future cli-

*Continued on page 103*

# Climate Modelling: Linearization in the Small and the Large

by Elisabeth M. Pascali

*Why climate models fail to approximate reality.*

Climate modelling should be viewed as a “back of the envelope” calculation of a highly nonlinear process. For this “science” to be used to determine the fate of millions on this planet, because of its dire predictions of global warming, is nothing short of a deliberate crime against humanity.

From the advent of computers, it was tempting to use such powerful calculating machines to try to mathematically model physical problems. The paths of spaceships and numerous other situations have been successfully predicted by computers. However, it must be remembered that the calculations are only as good as the understanding of the underlying physical process. A good programmer’s motto is always, “garbage in, garbage out.” Computers can never discover new principles, or causes, of processes that man did not already understand before he sat down in front of the terminal. All that a computer can do is take our mathematics to its extreme limits and test our understanding, our model, against the real world.

However, in the field of climate modelling, this maxim has often been forgotten. Perhaps because their area of study is so vast, some researchers expect to be able to discover the mechanisms that drive climate and weather through statistical analysis and linearized approximations, called parameterizations, much more rapidly than through improved observations, or the kind of higher-level hypothesizing that Kepler used to discover the true form of our solar system. In fact, Kepler’s method has been all but lost today by modern scientists.

Computer climate modelling was begun by a Russian scientist, Michael Budiko, in the 1950s. Using a “zero dimensional model,” where the Earth is treated as nothing but a point being exposed to varying solar irradiation, he forecast that the Earth was heading for an ice age. This calculation used the assumption that the most important force driving the global average climate was solar irradiation; a theory first put forward by Yugoslav climatologist Milutin Milankovitch. The temperature predicted was a globally, and annually averaged, temperature of the top of the atmosphere; there was

no attempt to calculate the atmospheric motions or interactions with the surface of the planet. This was an interesting result; however, no one thought of using this result to make political policy.

From there, Budiko and many others began to develop first 1-, then 2-, and finally 3-dimensional models, at a time when computer time was still at a premium. For the 1-dimensional model, the dimension the climate modellers considered most important in determining variations in climate was, up! The operative hypothesis of these models is that the most important interaction that happens in atmospheric processes, is the transfer of solar radiation from the top of the atmosphere to the Earth’s surface.

Calculations of the absorption and re-radiation of different types of gases making up the Earth’s atmosphere were worked out in great detail. The heat generated by this, and the final absorption of solar energy by the ground-created conditions of convection, were also calculated. These models are able to create thermal inversions and other phenomena seen in a column of air. But can we assume, on a globe approximately 25,000 miles in circumference, with a skin of an atmosphere of around 25 miles, that there is any real effect being forecast by studying only the interactions in one column of air?

Two-dimensional models, using height and latitude, were first able to examine the effect on the calculations being made of varying solar irradiation by latitude. The effect of seasonal variation of solar irradiation was also studied. However, the great assumption in these models was that the atmospheric motions were determined by conservation of energy and momentum equations, with given initial conditions. The effect of such things as oceans and land topography, as well as cloud formation and precipitation, were approximated by very crude, usually linear, approximations.

## **The General Climate Model**

Finally, the 3-dimensional model was developed—what came to be known as the General Climate Model, or GCM.



The hope was that these models could begin to calculate realistic, planet-wide forecasts of how climate would change over the coming decades and centuries.

How is the typical GCM organized? The atmosphere is broken up into grid boxes. A typical GCM from the 1980s, which performed the groundbreaking work on the "greenhouse effect," had grid boxes that each covered 8 degrees of latitude and 10 degrees of longitude, with 9 layers in the atmosphere. It was assumed that the values of air flow, temperature, cloud cover, humidity, and so on—all climatically significant variables—either could be averaged across these grid boxes, or could have a linear change from one side of the box to the other.

These are like black boxes that interact on the edges; there is a calculation which shows the airflow, based on sources and sinks of new energy and conservation of energy and momentum, which will come out of the left side, right side, top, bottom, front, and back of the box. The flows, together with incoming solar irradiation, change the conditions in the neighboring boxes, which, in turn, change the conditions in the boxes surrounding them.

A numerical integration over time and space is performed, to project from given initial conditions how the atmospheric conditions, and therefore climate, will change over a long period of time. Numerical integration must assume that the process that it is integrating is linear, over the step that it is integrating. Thus, the modellers are assuming that the processes that drive climatic change can be linearized in the small, over a time-step (typically one-half an hour in GCM's) and space (that is, gridboxes).

### Underlying Assumptions

Now, look for a minute at the consequences of such an assumption. The average size of the gridbox along the equator is about 675 miles in the East-West direction, by 500 miles in the North-South direction: more than 325,000 square miles. At 75 degrees latitude, it will be 175 miles by 500 miles: only 88,000 square miles. This means that the entire continental United States is modelled with a  $2 \times 5$  array, 10 data points. The average size of a hurricane is in the tens of miles across. Thunderstorms and tornados are minute, relative to the gridbox. Is it safe to assume that we can smooth all of this over and still accurately capture what is fundamentally changing climate?

Although climatologists are pretty well convinced that planetary atmospheric circulation can be explained on this scale, they do recognize that there are highly nonlinear processes that contribute significantly to changing climate (such as cloud cover, potential precipitation, vegetation, interaction with the ocean, and so forth) that are not well enough understood to mathematically model. Therefore, these processes are "parameterized" by the modellers. Parameterization means that the modellers use a set of measurements of the phenomena that they are interested in, together with measurements of a variable that they can calculate which has an "obviously" close relation to the parameterized value (for example, temperature should be related to snow cover). After plotting the one variable they want to determine as a function of the other, using statistical analysis, the modellers create a "function" (usually a straight line, or some-

times a parabola or exponential curve, if that seems more intuitively reasonable) to calculate the unknown variable. This function will then be used throughout the model.

This methodology assumes that the unknown quantity is only a function of *one* other variable. How can we know that this will be applicable over all latitudes and longitudes and, especially, under climatic conditions that have never been experienced, such as the mooted doubling of CO<sub>2</sub>?

Another type of approximation is that of a fixed data set, which is based on observations of a value that is known to vary, but is assumed to be relatively constant from year to year. Vegetation cover is often "modelled" this way. A value of percentage of vegetation cover, and its albedo per month and per gridbox, is derived from a limited set of measurements that is linearly smoothed out over the surface. The amount of vegetation does not change from year to year (the vegetation does not "grow") and evapotranspiration is very crudely modelled.

### Global Warming Assumptions

Of course, other assumptions must then be made in order to model particular scenarios. The global warming scenario is based on the assumptions that: (1) mankind's production of CO<sub>2</sub> is the largest source of CO<sub>2</sub> in the world, (2) there are no significant sinks for this CO<sub>2</sub>, and (3) there will not be any compensating reaction to the CO<sub>2</sub> doubling (for example, by vegetation or the ocean), which might either counter the warming, or even change the climate for the better (stabilize it). All of these "parameterizations" are assumed to be accurate over these major changes. Are we willing to risk our lives on such assumptions?

The work done by very competent scientists, some of whom are represented in this report, shows that it would definitely not be safe to risk our lives on the climate modellers' assumptions.

To take one example: The work of Dr. Sherwood Idso of Arizona and his colleagues devastates the greenhouse effect hypothesis itself. Idso shows that vegetation will thrive in double, or even quadruple, the current CO<sub>2</sub> pressure. CO<sub>2</sub> is the limiting input for photosynthesis. At current CO<sub>2</sub> levels, plants must leave their stomatas open a certain amount of time in order to collect enough CO<sub>2</sub>. During that time, they are losing water, and this gives a limit to the aridity of a climate that a given plant can tolerate. If there were twice the CO<sub>2</sub>, one effect might be that we literally green the deserts, because plants would be able to collect the CO<sub>2</sub> they need to live on in a shorter time, and therefore could potentially live in a drier area. How is that taken into account with the modellers' fixed vegetation database?

### Squeezing the Life Out of Science

In addition to the evil purposes to which climate modelling has been put in terms of anti-human Malthusian policy-making, there has been great damage done to science itself, in trying to study the motions and changes of our atmosphere using computer modelling. In trying to tackle a large problem with a large calculating machine, the scientist must use his creativity thinking of ways to break down the problem that he wants to solve into byte-size, logical terms that even a computer can understand. This squeezes the life out of the

science, literally.

Science is subjective. Forcing our minds to make nonlinear leaps to solve paradoxes that confront us in the observations that we make, shows us how the universe is organized. This is why Carl Gauss, the man who invented the least-squares method that many modellers use today to calculate their parameterizations, needed only three observations of an asteroid to accurately forecast the orbit of it. Gauss had an understanding, built on the work of Johannes Kepler, that the underlying causality of the motion of the bodies in our solar system is determined by the overall structure of the universe in which it is situated.

## Global Cooling and Scientific Honesty

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mate individually or as a part of our TER-QUA Research Consortium team to contact us for information about the TER-QUA '93 Symposium or submission of a subproject to become a part of our research effort.

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It is this scientific tradition of studying the One, from which the Many flow, that has been responsible for every fundamental breakthrough in mankind's understanding of the Universe. If there is real concern about what an increase in CO<sub>2</sub> will do to our climate, we should shut down our computers and open our minds to the many indications available that Man is a wonderful, positive development in our universe who is able to re-create the workings of the Creator's mind, thereby gaining a much better understanding of the processes of nature than any computer ever can.

*Elisabeth Pascali worked on climate models in the early 1980s.*

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