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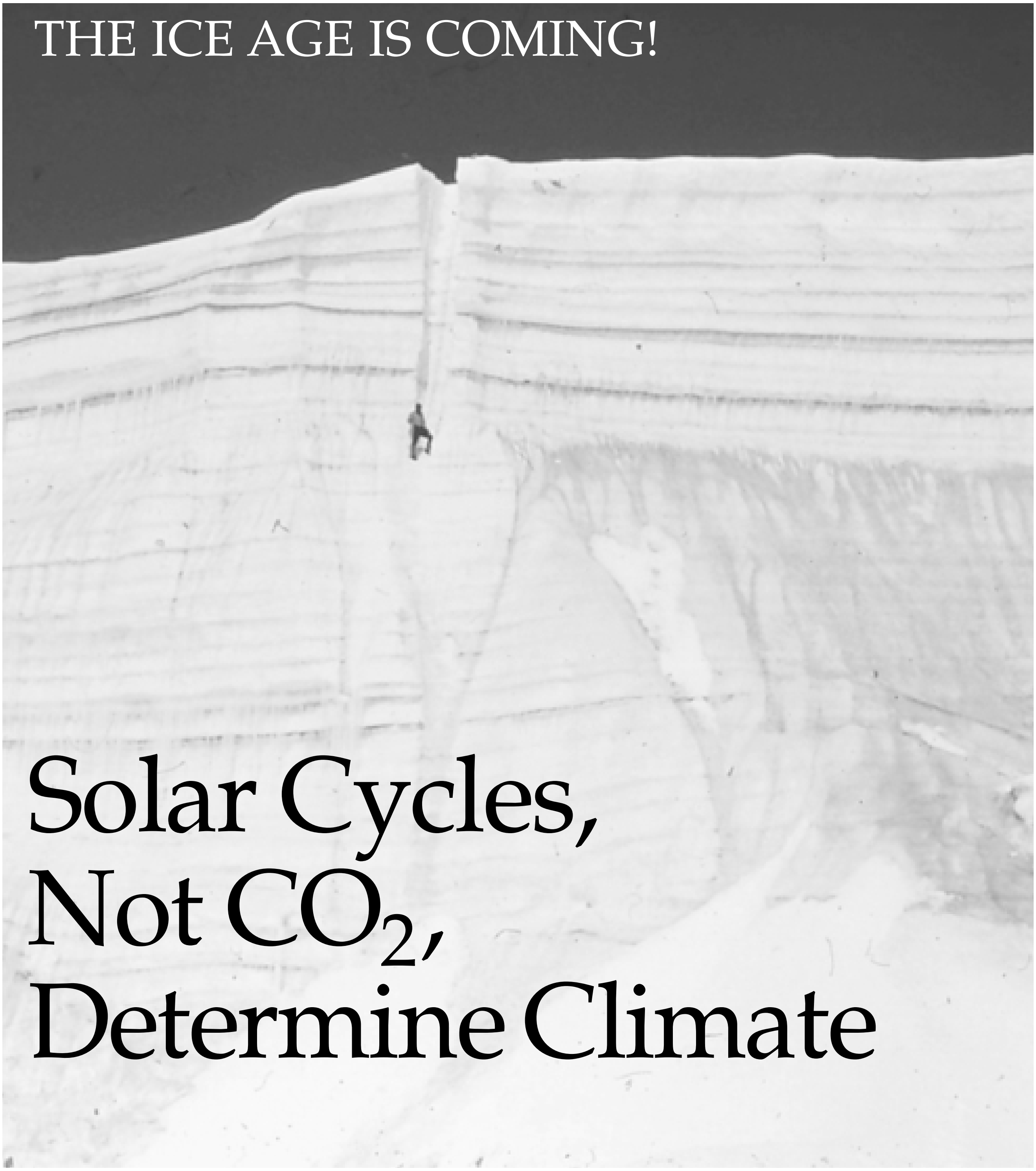
THE MYTH OF FALLOUT CANCER

The Ice Age Is Coming!

- LaRouche on the Pagan Worship Of Newton
- Youth Movement: The Fight to Master Gauss

THE ICE AGE IS COMING!

Solar Cycles, Not CO_2, Determine Climate



Courtesy of Zbigniew Jaworowski

by Zbigniew Jaworowski, M.D., Ph.D., D.Sc.

The author's colleague, K. Cielecki, excavating an ice sample from a shaft in the middle of an ice cliff at Jatunjampa Glacier in the Peruvian Andes. The black lines reflect a summer deposition of dust on top of particular annual ice layers. The black layer near the top of Cielecki's head was formed after the 1963 eruption of volcano Gunung Agung in Bali, Indonesia, causing the highest volcanic dust veil in the atmosphere since 1895. Some of the other black lines reflect local eruptions.

Get out the fur coats, because global cooling is coming! A world-renowned atmospheric scientist and mountaineer, who has excavated ice out of 17 glaciers on 6 continents in his 50-year career, tells how we know.

Since the 1980s, many climatologists have claimed that human activity has caused the near-surface air temperature to rise faster and higher than ever before in history. Industrial carbon dioxide emissions, they say, will soon result in a runaway global warming, with disastrous consequences for the biosphere. By 2100, they claim, the atmospheric carbon dioxide concentration will double, causing the average temperature on Earth to increase by 1.9°C to 5.2°C, and in the polar region by more than 12°C.

Just a few years earlier, these very same climatologists had professed that industrial pollution would bring about a new Ice Age. In 1971, the spiritual leader of the global warming prophets, Dr. Stephen H. Schneider from the National Center for Atmospheric Research in Boulder, Colorado, claimed that this pollution would soon *reduce* the global temperature by 3.5°C.[1] His remarks were followed by more official statements from the National Science Board of the U.S. National Science Foundation, ". . .[T]he the present time of high temperatures should be drawing to an end . . . leading into the next glacial age." In 1974, the board observed, "During the last 20 to 30 years, world temperature has fallen, irregularly at first but more sharply over the last decade."[2]

Courtesy of *Polityka* magazine

The Polish-language weekly Polityka *featured a shorter version of this article as a cover story, July 12, 2003.*

No matter what happens, catastrophic warming or catastrophic cooling, somehow the blame always falls upon "sinful" human beings and their civilization—which is allegedly hostile and alien to the planet.

In 1989, Stephen Schneider advised: "To capture the public imagination . . . we have to . . . make simplified dramatic statements, and little mention of any doubts one might have. . . . Each of us has to decide the right balance between being effective and being honest."[3] This turned out to be an "effective" policy: Since 1997, each of approximately 2,000 American climate scientists (only 60 of them with Ph.D. degrees) received an average of $1 million annually for research;[4, 5] on a world scale, the annual budget for climate research runs to $5 billion.[6] It is interesting that in the United States, most of this money goes toward discovering the change of global climate and its causes, while Europeans apparently believe that man-made warming is already on, and spend money mostly on studying the effects of warming.

Governments of many countries (but not the United States, Australia, or Russia) signed the infamous Kyoto Protocol, which is aimed at the mandatory reduction of oil, coal, and gas combustion. Should this convention be universally implemented, the drop in world temperature would be hardly perceptible, but there would be a drastic and very noticeable regression in the economy. In 2100, under the mandatory emission restrictions of the Kyoto Protocol, the temperature would be diminished by 0.2°C, or, to use the figures of the global warmers, with Kyoto, the temperature increase that we would experience in the year 2094, would be postponed until the year 2100. Thus, the Kyoto Protocol buys the world six years.[7]

But the losses resulting from the compliance with the Kyoto Protocol would reach $400 billion in the United States alone. The reduction of the world domestic product, when added up across the whole century, would reach $1.8 trillion, while the so-called benefits of the emissions reduction from the Kyoto Protocol are around $0.12 trillion.[8] By 2050, in Western Europe and in Japan, the Gross National Product would be reduced by 0.5 percent in comparison with 1994; in Eastern Europe, this reduction would reach 3 percent, and in Russia 3.4 percent.[8] Experts working for the Canadian government concluded that the implementation of the Kyoto Protocol would necessitate energy rationing, which would resemble the gasoline rationing during World War II.[9]

Climate Change Reflects Natural Planetary Events

In fact, the recent climate developments are not something unusual; they reflect a natural course of planetary events. From time immemorial, alternate warm and cold cycles have followed each other, with a periodicity ranging from tens of millions to several years. The cycles were most probably dependent on the extraterrestrial changes occurring in the Sun and in the Sun's neighborhood.

Short term changes—those occurring in a few years—are caused by terrestrial factors such as large volcanic explosions, which inject dust into the stratosphere, and the phenomenon of El Niño, which depends on the variations in oceanic currents. Thermal energy produced by natural radionuclides that are present in the 1-kilometer-thick layer of the Earth's crust, contributed about 117 kilojoules per year per square meter of the primitive Earth. As a result of the decay of these long-lived radionuclides, their annual contribution is now only 33.4 kilojoules per square meter.[10]

This nuclear heat, however, plays a minor role among the terrestrial factors, in comparison with the "greenhouse effects" caused by absorption by some atmospheric gases of the solar radiation reflected from the surface of the Earth. Without the greenhouse effect, the average near-surface air temperature would be –18°C, and not +15°C, as it is now. The most impor-

The author (right) working with ion exchange columns in a laboratory tent at Kahiltna Glacier, Alaska, 1977.

tant among these "greenhouse gases" is water vapor, which is responsible for about 96 to 99 percent of the greenhouse effect. Among the other greenhouse gases (CO_2, CH_4, CFCs, N_2O, and O_3), the most important is CO_2, which contributes only 3 percent to the total greenhouse effect.[11, 12] The man-made CO_2 contribution to this effect may be about 0.05 to 0.25 percent.[13]

Now we are near the middle of the Sun's lifetime, about 5 billion years since its formation, and about 7 billion years before its final contraction into a hot white dwarf,[14] the heat of which will smother the Earth, killing all life. At the start of Sun's career, its irradiance was about 30 percent lower than it is now. This probably was one of the reasons for the Precambrian cold periods. In 1989, Joseph Kirschvink found 700 million-year-old rocks, near Adelaide, Australia, holding traces of the past glaciers. However, the magnetic signal of these rocks indicates that at that time, the glaciers were located at the Equator. This means that the whole of the Earth was then covered with ice. In 1992, Kirschvink called this stage of the planet the "Snowball Earth," and found that this phenomenon occurred many times in the Precambrian period. One such Snowball Earth appeared 2.4 billion years ago.

Although large glaciations drastically decreased biological productivity, the successive melting of vast amounts of oceanic ice caused an enormous blooming of cyanobacteria, which produced vast amounts of oxygen. This was highly toxic for most of the organisms living in that time. Consequently, 2.4 billion years ago, living organisms were forced to develop defense mechanisms against the deadly effects of oxygen radicals.[15] These same mechanisms protect us against the effects of ionizing radiation. Without these mechanisms, life could not have developed in the past, and we could not live with the current flux of spontaneous DNA damages produced by the oxygen radicals which are formed in metabolism of this gas. In each mammalian cell, about 70 million spontaneous DNA damages occur during one year, but only 5 of those DNA damages are the result of the average natural radiation dose.[16, 17]

Both the oxygen atmosphere and the incredibly efficient mechanism of DNA protection and repair, developed in this ancient epoch, were probably induced by dramatic changes of climate.

During the Phanerozoic (the past 545 million years), the Earth passed through eight great climate cycles, each lasting 50 to 90 million years. Four of them ("Icehouses") were about 4°C colder than the four warmer ones ("Greenhouses").[18] These long cycles were likely caused by passages of our Solar System through the spiral arms of the Milky Way. On its way, the Solar System passed through areas of intensive star creation, with frequent explosions of novas and supernovas. In these regions, the intensity of galactic cosmic radiation reaching the Earth is up to 100 times higher than average. The higher level of cosmic radiation in the Earth's troposphere causes greater formation of clouds, which reflect the incoming solar radiation back into space. This results in a cooler climate (see below). Then the Solar System travels to quieter areas where cosmic radiation is fainter, fewer clouds are formed in our troposphere, and the climate warms.[18]

Upon these enormously long climate cycles, counting tens of millions years each (Figure 1), are superimposed shorter cycles, which strengthen or weaken the long ones. During the past million years,there were 8 to 10 Ice Ages, each only about 100,000 years long, interspersed with short, warm interglacial periods each of about 10,000 years' duration.

Over the past thousand years, multiple 50-year periods have been much warmer that any analogous period in the 20th Century, and the changes have been much more violent than those observed today. Such are the findings of an analysis of more than 240 publications, performed by a team of CalTech and Harvard University scientists.[19, 20] In this study, thousands of assay results for the so-called proxy temperature indicators have been examined. They included historical records; annual growth ring thickness measurements; isotope changes in ice cores, lake sediments, wood, corals, stalagmites, biological fossils, and in cellulose preserved in peat; changes in ocean sediments; glacier ranges; geological bore-hole temperatures; microfauna variations in sediments; forest line movement, and so on.

Similar evidence comes also from more direct measurements of the temperature preserved in the Greenland ice cap (Figure 2). These studies stand in stark contradiction to the much smaller study,[21b] which shows a "hockey stick" curve, with the outstanding high temperature in the 20th Century, and a rather flat and slightly decreasing trend during the rest of the past millennium. The study, by Mann et al., is in opposition to the multitude of publications supporting the evidence that during the past 1,000 years, the phenomena of Medieval Warming and the Little Ice Age had a global range, and that the contemporary period does not differ from the previous natural climatic changes. However, the Mann et al. study was incorporated into the IPCC's 2001 (TAR) report, as a main proof that the 20th Century warming was unprecedented, and it was enthusiastically used by aficionados of the Kyoto

Protocol to promote their case.

In their meticulous study, Soon and Baliunas[19, 20] criticized, in passing, the Mann et al. publications for improper calibration of the proxy data, and for statistical and other methodical errors. More in-depth and crushing criticisms of the work of Mann et al. were presented recently by McIntyre and McKitrick[22] who demonstrated that the conclusions of Mann et al. are based on flawed calculations, incorrect data, and biased selection of the climatic record. Using the original data sets supplied to them by author Michael Mann, McIntyre and McKitrick discovered many mistakes in the Mann et al. papers—for example, allocating measurements to wrong years, filling tables with identical numbers for different proxies in different years, using obsolete data that have been revised by the original researchers, and so on. Typical of these "errors" was, for example, their stopping the central England temperature series, without explanation, at 1730, even though data are available back to 1659, thus hiding a major 17th Century cold period. McIntyre and McKitrick not only criticized the work done by Mann et al., but also, after correcting all errors, analyzed their data set using Mann's own methodology. The result of this superseding study demonstrates that the 20th Century temperature has not been exceptional during the past 600 years. Further, it demonstrates the falsity of the IPCC's statement in its 2001 report, based on Mann et al., that the 1990s was "likely the warmest decade,"

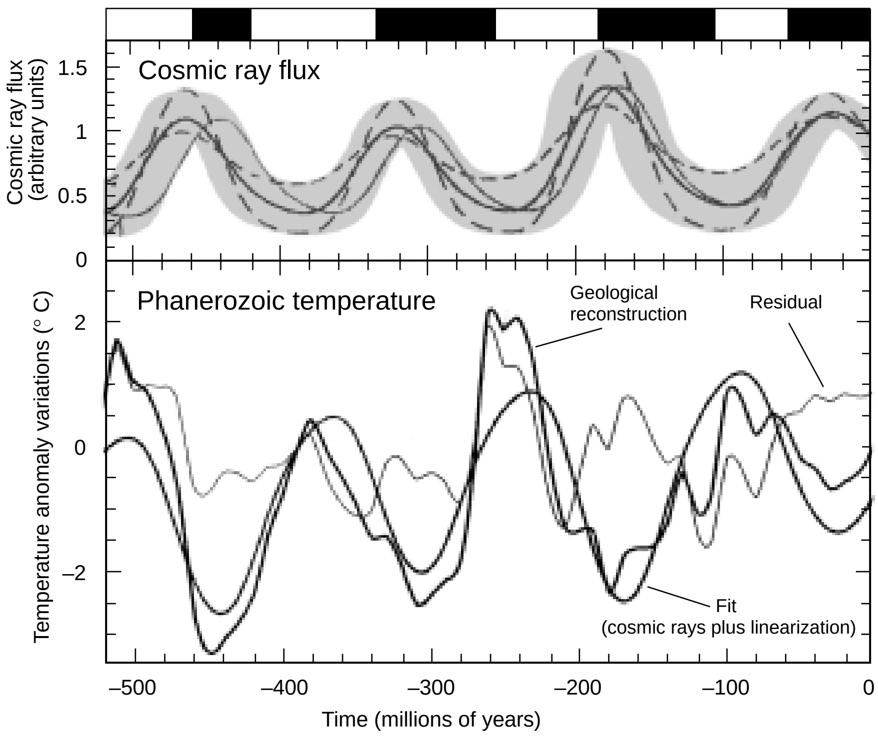
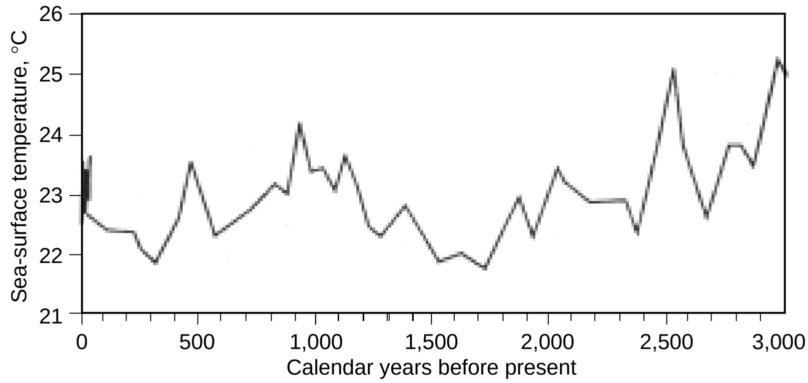


Figure 1
COSMIC RAY FLUX AND CLIMATIC CHANGES
For the past 545 million years, cosmic ray flux has been correlated with temperature.

Source: Adapted from N.J. Shaviv, and J. Veizer, 2003. "Celestial Driver of Phanerozoic Climate?" *GSA Today* (July), pp. 4-10

Figure 2
TEMPERATURE VARIATIONS FOR THE PAST 3,000 YEARS
Temperature can be inferred from the isotope ratios for carbon (carbon-12 and carbon-13C) and oxygen (oxygen-16 and oxygen-18) in the skeletons of sea foraminifers, in the bottom deposits in Sargasso Sea (Northern Atlantic). These indicate that in the last 3,000 years, the climate on Earth has been constantly changing, and the scope of changes in modern times does not differ from those of the past.

Shown are the Medieval Optimum (1,000 years ago) the beginnings of the Holocenic Optimum (2,500 years ago), and also the Little Ice Age (ca. 500 years ago) from which we are still emerging. The Early Middle Ages also witnessed a strong climate cooling, which had an impact on Europe's economic and cultural decline in this period.



Source: Adapted from L.D. Keigwin, et al., 1994. "The Role of the Deep Ocean in North Atlantic Climate Change between 70 and 130 kyr Ago." *Nature*, Vol. 371, pp. 323-326

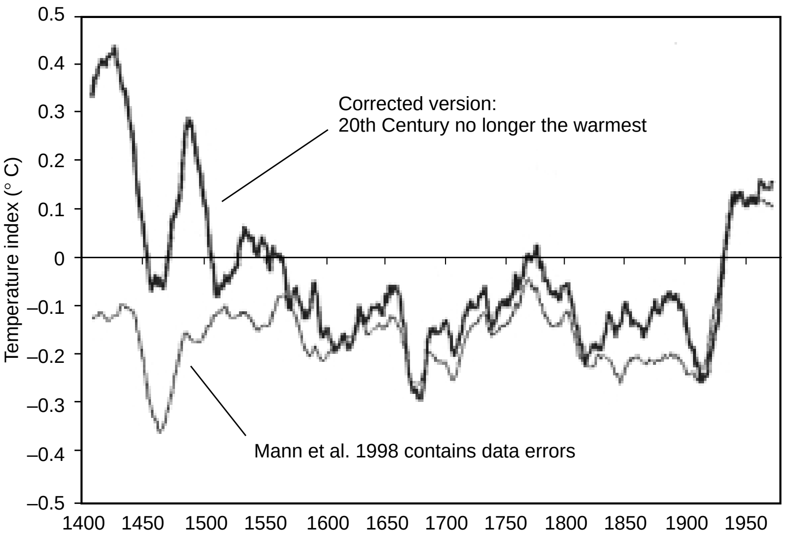


Figure 3
THE SO-CALLED 'HOCKEY STICK' TEMPERATURE CURVE AND ITS CORRECTED VERSION

The thin line is the "hockey stick" curve allegedly showing recent temperatures (the handle of the stick at right) as the highest since 1400. Authors of the curve, Mann, Bradley et al. (see Reference 21), claimed that "temperatures in the latter half of the 20th century were unprecedented," that "even the warmer intervals in the reconstruction pale in comparison with mid-to late 20th-century temperatures," and that the 1990s was "likely the warmest decade." The IPCC adopted the Mann et al. analysis, calling 1998 the "warmest year" of the millennium.

The thick line is the corrected curve, which is derived from the same data set, showing the 20th Century temperatures to be colder than those of the 15th Century, and actually emerging from the Little Ice Age around the turn of the 20th Century.

Source: Adapted from S. McIntyre and R. McKitrick, 2003. "Corrections to the Mann et al. (1998) Proxy Data Base and Northern Hemispheric Average Temperature Series." *Energy & Environment*, Vol. 14, No. 6, pp. 751-771

and 1998 the "warmest year of the millennium" (Figure 3).

The McIntyre and McKitrick paper was reviewed before its submission for publication by leading experts in mathematics and statistics, geology, paleoclimatology, and physics (among them were R. Carter, R. Courtney, D. Douglas, H. Erren, C. Essex, W. Kininmonth, and T. Landscheidt), and it was then peer-reviewed by the reviewers of the prestigious British journal *Energy & Environment*.

Two questions arise in this respect. How could the 1998 Mann et al. paper, with all those errors, have passed peer review for *Nature* magazine? And how could it pass the reviewing process at the IPCC? This affair sadly reflects upon the quality of science being performed in this body.

The Mann et al. papers had a political edge: They served as a counterweight against President George W. Bush's negative stand toward the Kyoto Protocol as "fatally flawed," and his attempt to lessen the economic global catastrophe that Kyoto would induce. An unexpected contribution in this fight recently came from President Vladimir Putin, his chief economic advisor Andrei Illarionov, and from many scientists attending the World Climate Change Conference that was held in Moscow between September 29 and October 3, 2003. Opening the conference, Putin stated that the Kyoto Protocol was "scientifically flawed," and that "Even 100 percent compliance with the Kyoto Protocol won't reverse climate change." And in response to those calling for quick ratification of the Kyoto Protocol, Putin mentioned half jokingly: "They often say that Russia is a northern country and if temperature get warmer by 2 or 3 degrees Celsius, it's not such a bad thing. We could spend less on warm coats, and agricultural experts say grain harvests would increase further."

Putin also stated that Moscow would

> be reluctant to make decisions on just financial considerations. Our first concern would be the lofty idea and goals we set ourselves and not short-term economic benefits. . . . The government is thoroughly considering and studying this issue, studying the entire complex and difficult problems linked with it. The decision will be made after this work has been completed. And, of course, it will take into account the national interests of the Russian Federation.

Putin's chief advisor, Andrei Illarionov, was blunt: "The Kyoto Protocol will stymie economic growth. It will doom Russia to poverty, weakness, and backwardness." To the experts gathered in Moscow he posed 10 thoughtful questions, all of which shake the man-made global warming hypothesis. The proponents of global warming did not provide satisfying answers. Even the basic questions posed by the chairman of the organizing committee, Professor Yuri Izrael, were not answered: "What is really going on this planet—warming or cooling?" and "Will ratifying the Kyoto Protocol improve the climate, stabilize it, or make it worse," he asked.

At the end of the conference two things became clear: (1) the scientific world is far from any "consensus," so often vaunted by the IPCC, on man-made climatic warming. (The chairman of the conference acknowledged that the scientists who questioned the Kyoto "consensus" made up 90 percent of the contribution from the floor.) (2) Without ratification by Russia, the Kyoto Protocol will collapse.

From what President Putin said at the Moscow conference, it seems that Russia will succumb neither to short-term, seemingly lucrative proposals of selling spare Russian CO_2 emission quotas for about $8 billion per year, nor to the saber-rattling by the European Union Environmental Commissioner Margot Wallstrom, who warned Russia during the conference that it "would lose politically and economically by not ratifying the Kyoto Protocol." It seems that now Russia may stop global restrictions in CO_2 emissions, and save the world from what Sir Fred Hoyle correctly defined in 1996 as "ruining the world's industries and returning us all to the Dark Ages."

Nature Likes Warmth

Cold periods have always meant human calamities and ecosystem disasters. For example, the last cold period, the so-called Little Ice Age, brought famine and epidemics to Europe and in Finland that contributed to the extinction of two thirds of the population. On the other hand, during the warm periods, plants, animals, and human communities thrived and prospered.

For many years we have been taught that climate warming will cause a series of disasters: ocean level rise, Arctic ecological disaster, droughts and floods, agriculture catastrophes, rising numbers and violence of hurricanes, epidemics of infectious and parasitic diseases, and so on. The impacts of warming, so it seems, must be always negative, never positive. But is it really so?

Let's take a look at the Arctic. At the request of the Norwegian government's Interdepartmental Climatic Group, together with three colleagues from the Norsk Polar Institute, I have studied the impact of a possible climate warming on the Arctic flora and fauna in the region of Svalbard. Special concerns involved possible polar bear extinction. Our report [23] states that in the period from 1920 to 1988, the temperature on Spitsbergen and on adjacent Jan Mayen isle *dropped* by nearly 2°C, contrary to the predictions by Dr. Schneider and his followers. For the study's sake, however, we made an assumption that, by some miracle, the Arctic climate would be warmed up by a few degrees Celsius, with a higher carbon dioxide concentration in the air. Under this assumption, we investigated the fate of plants, sea plankton, fish, bears, reindeer, seals, and millions of birds inhabiting this region.

It turned out that at higher CO_2 concentration and higher temperatures, the productivity of the Arctic ecological system always rises. Historic records and modern statistics show that in warmer periods, more fish have been caught in the Barents Sea, and the populations of reindeer, birds, seals, and bears also expanded. Over land, the mass of vegetation for reindeer increased, and in the sea, plankton became more plentiful. This allowed the fish population to increase, expanding food resources for birds and seals, which, in turn, are eaten by polar bears. In conclusion: Climate warming would be beneficial for the whole system of life in the Arctic, and polar bears would be more numerous than today.

Our interdepartmental sponsors then gave us a piece of their minds: "That's not the way to get the funds for research!" They were right.

Fear Propaganda

The strongest fears of the population concern the melting of mountain glaciers and parts of the Greenland and Antarctic continental glaciers, which supposedly would lead to a rise in the oceanic level by 29 centimeters in 2030, and by 71 cm in 2070. Some forecasts predict that this increase of ocean levels could reach even 367 cm.[24] In this view, islands, coastal regions, and large metropolitan cities would be flooded, and whole nations would be forced to migrate. On October 10, 1991, *The New York Times* announced that as soon as 2000, the rising ocean level would compel the emigration of a few million people.

Doomsayers preaching the horrors of warming are not troubled by the fact that in the Middle Ages, when for a few hundred years it was warmer than it is now, neither the Maldive atolls nor the Pacific archipelagos were flooded. Global oceanic levels have been rising for some hundreds or thousands of years (the causes of this phenomenon are not clear). In the last 100 years, this increase amounted to 10 cm to 20 cm,[24] but it does not seem to be accelerated by the 20th Century warming. It turns out that in warmer climates, there is more water that evaporates from the ocean (and subsequently falls as snow on the Greenland and Antarctic ice caps) than there is water that flows to the seas from melting glaciers.[17]

Since the 1970s, the glaciers of the Arctic, Greenland, and the Antarctic have ceased to retreat, and have started to grow. On January 18, 2002, the journal *Science* published the results of satellite-borne radar and ice core studies performed by scientists from CalTech's Jet Propulsion Laboratory and the

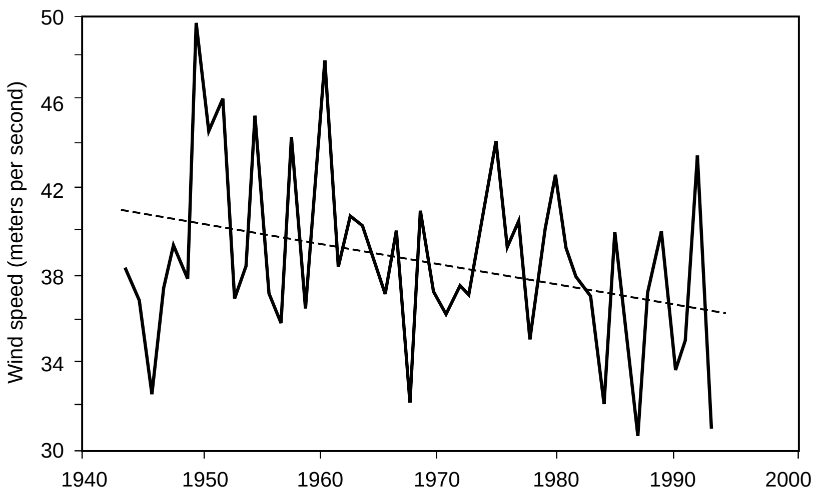


Figure 4

MEAN ANNUAL MAXIMUM WIND SPEED IN ATLANTIC HURRICANES

The maximum wind velocity for hurricanes over the Atlantic Ocean in 1940-1993 has decreased by 5 km per hour, that is, by approximately 12 percent. The dotted line shows the linear trend.

Source: Adapted from C.W. Landsea et al., 1996. "Downward Trends in the Frequency of Intense Atlantic Hurricanes during the Past Five Decades." *Geographical Research Letters*, Vol. 23, No. 13, pp. 1697-1700

University of California at Santa Cruz. These results indicate that the Antarctic ice flow has been slowed, and sometimes even stopped, and that this has resulted in the thickening of the continental glacier at a rate of 26.8 billion tons a year.[25]

In 1999, a Polish Academy of Sciences paper was prepared as a source material for a report titled "Forecast of the Defense Conditions for the Republic of Poland in 2001-2020." The paper implied that the increase of atmospheric precipitation by 23 percent in Poland, which was presumed to be caused by global warming, would be detrimental. (Imagine stating this in a country where 38 percent of the area suffers from permanent surface water deficit!) The same paper also deemed an extension of the vegetation period by 60 to 120 days as a disaster. Truly, a possibility of doubling the crop rotation, or even prolonging by four months the harvest of radishes, makes for a horrific vision in the minds of the authors of this paper.

Newspapers continuously write about the increasing frequency and power of the storms. The facts, however, speak otherwise. I cite here only some few data from Poland, but there are plenty of data from all over the world. In Cracow, in 1896-1995, the number of storms with hail and precipitation exceeding 20 millimeters has decreased continuously, and after 1930, the number of all storms decreased.[26] In 1813 to 1994, the frequency and magnitude of floods of Vistula River in Cracow not only did not increase but, since 1940, have significantly decreased.[27] Also, measurements in the Kolobrzeg Baltic Sea harbor indicate that the number of gales has not increased between 1901 and 1990.[28] Similar observations apply to the 20th Century hurricanes over the Atlantic Ocean (Figure 4, p. 57) and worldwide.

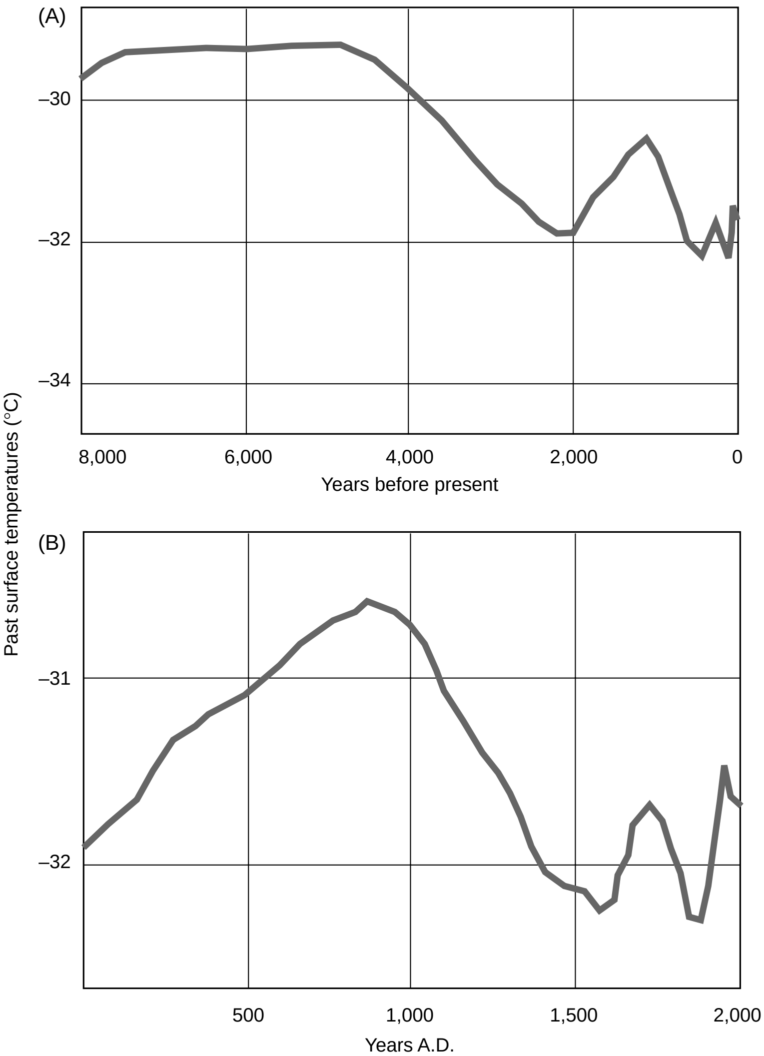


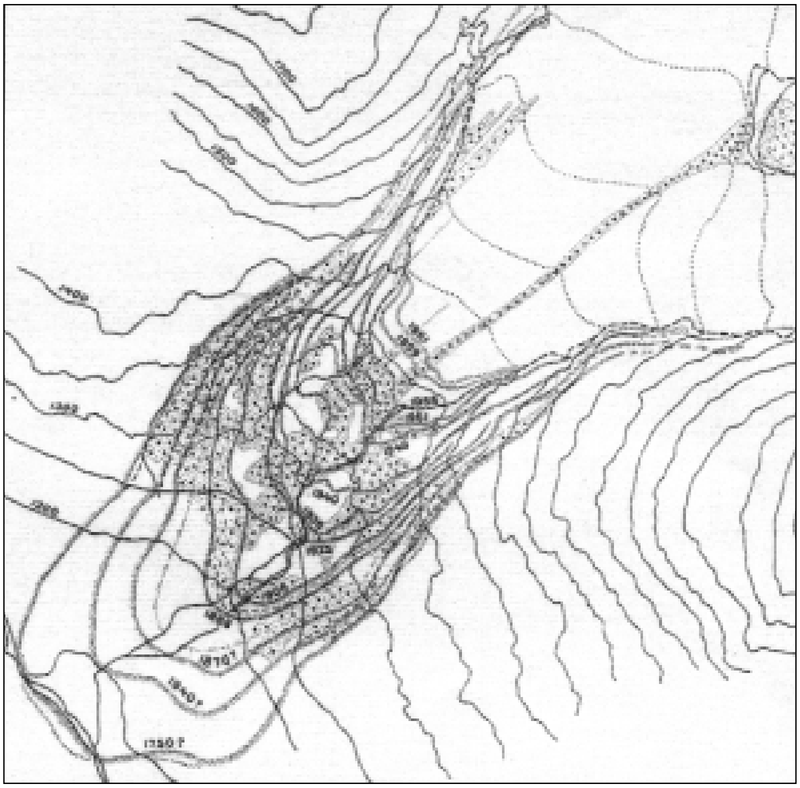
Figure 5
DIRECT TEMPERATURES MEASURED IN A GREENLAND GLACIER BORE HOLE

Snowflakes falling through the atmosphere have the same temperature as the surrounding air. The ice formed from these snowflakes conducts heat very badly, and its original temperature is retained for thousands of years. Shown are (A) The temperature of air over Greenland in the last 8,000 years where the so-called Holocenic Warming (3,500 to 6,000 years ago) is visible; (B) Our epoch, showing the Middle Ages Warming (900-1100) and the Little Ice Age (1350-1880).

Source: D. Dahl-Jensen, et al., 1998. "Past Temperatures Directly from the Greenland Ice Sheet." *Science*, Vol. 282, No. 9 (October), pp. 268-271

Computer Predictions Overturned

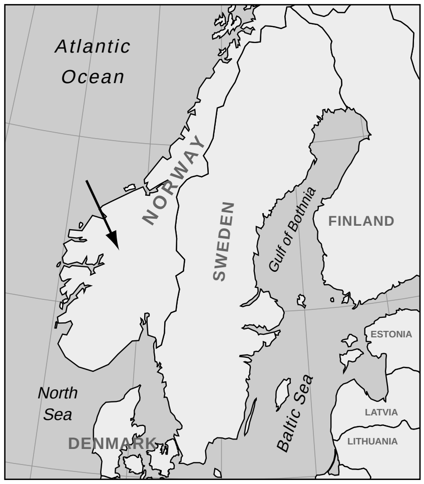
Contrary to the global warmers' computer predictions, the concentrations of carbon dioxide in the atmosphere, the most important among the man-made greenhouse gases, were out of phase with the changes of near-surface air temperature, both recently and in the distant past. This is clearly seen in Antarctic and Greenland ice cores, where high CO_2 concentrations in air bubbles preserved in polar ice appear 1,000 to 13,000 years after a change in the isotopic composition of H_2O, signalling the warming of the atmosphere.[29] In ancient times, the CO_2 concentration in the air has been significantly higher than today, with no dramatic impact on the temperature. In the Eocene period (50 million years ago), this concentration was 6 times larger than now, but the temperature was only 1.5°C higher. In the Cretaceous period (90 million years ago), the CO_2 concentration was 7 times higher than today, and in the Carboniferous period (340 million years ago), the CO_2 concentration was nearly 12 times higher.[30] When the CO_2 concentration was 18 times higher, 440 million years ago (during the Ordovician period), glaciers



Source: Adapted from O. Liestol, *Storbreen Glacier in Jotunheimen, Norway.* Oslo: Norsk Polarinstitutt. 1967, pp. 1-63

Figure 6
RETREAT OF THE STORBREEN GLACIER IN NORWAY

The Storbreen Glacier front was in retreat between 1750 and 1961. The retreat started long before the onset of carbon-dioxide-linked global warming.



The Storbreen glacier is located in southern Norway, in the western part of Jotunheimen, a mountain area.

existed on the continents of both hemispheres.

At the end of the 19th Century, the amount of CO_2 discharged into the atmosphere by world industry was 13 times smaller than now.[31] But the climate at that time had warmed up, as a result of natural causes, emerging from the 500-year-long Little Ice Age, which prevailed approximately from 1350 to 1880. This was not a regional European phenomenon, but extended throughout the whole Earth[19, 20] During this epoch, the average global temperature was 1°C lower than now. Festivals were organized on the frozen Thames River, and people travelled from Poland to Sweden, crossing the Baltic Sea on sleighs and staying overnight in a tavern build on ice.

This epoch is well illustrated by the paintings by Pieter Breughel and Hendrick Avercamp. In the mountains of Scotland, the snowline stretched down 300 to 400 meters lower than today. In the vicinity of Iceland and Greenland, the sea ice was so extensive that the access to a Greenland Viking colony, established in 985, was completely cut off; the colony was finally smashed by the Little Ice Age.

All this was preceded by the Middle Ages Warming, which lasted for more than 300 years (900 to 1100), and during which the temperature reached its maximum (1.5°C more than today) around the year 990. Both the Little Ice Age and the Middle Ages Warming, were not regional phenomena as implied by Mann and his co-authors,[32] but were global and were observed around the North Atlantic Ocean, in Europe, Asia, South America, Australia, and Antarctica.[33, 34]

During the Medieval Warming, the forest boundary in Canada reached 130 kilometers farther north than today, and in Poland, England, and Scotland vineyards for altar wine production flourished—only to be destroyed by the Little Ice Age. Still earlier, 3,500 to 6,000 years ago, a long-lasting Holocene Warming took place, when the average air temperature exceeded the current one by 2°C (Figure 5).

The Little Ice Age is not yet completely behind us. Stenothermal (warm-loving) diatom species, which reigned in the Baltic Sea during the Medieval Warming, have not yet returned.[35] Diatom assemblages obtained from sediment core from the seabed of the north Icelandic shelf indicate that during the past 4,600 years the warmest summer sea-surface temperatures, about 8.1°C, occurred at 4,400 years before the present. Thereafter the climate cooled, with a warmer interlude of about 1°C near 850 years before the present. This was followed again by a cold span of the Little Ice Age, which brought mean summer sea-surface temperatures down by about 2.2°C. Today's temperature of only 6.3°C still has not reached the Holocene warming level of 8.1°C.[36]

The fastest temperature growth occurred in the early 20th Century, and the maximum was reached around 1940. It was then that the mountain and Arctic glaciers were shrinking violently, but their retreat from the record sizes (during the coldest part of Little Ice Age) had started 200 years earlier, around 1750, when no one even dreamed of industrial CO_2 emissions. An illustration of this process is a map of glacier front changes between 1750 and 1961, at what is probably the best studied Storbreen Glacier in Norway, in which the first meas-

clipart.com

The 500-year-long Little Ice Age prevailed from about 1350 to 1880, throughout the entire Earth, with temperatures averaging 1° lower than today's. The Baltic Sea could be traversed by sleigh from Poland to Sweden, staying overnight in taverns built on the ice! The paintings by Pieter Breughel and Hendrick Avercamp illustrate the period. Here, Breughel's "The Hunters."

urements of CO_2 in ice were performed in 1956 (Figure 6). The attack of glaciers on Swiss villages in the 17th and 18th centuries—sometimes the velocity of ice movement reached 20 meters annually, destroying homes and fields—was perceived as a calamity. Yet, the withdrawal of glaciers in the 20th Century has been deemed, somewhat foolishly, to be a disaster.

Since the exceptionally hot 1940s, until 1975, the Earth's climate cooled down by about 0.3°C, despite a more than three-fold increase of annual industrial CO_2 emission during this period. After 1975, meteorological station measurements indicated that the average global temperature started to rise again, despite the decline in "human" CO_2 emissions. However, it turns out that it was probably a measuring artifact, brought about by the growth of the cities and resulting "urban heat island" effect. Meteorological stations, which used to be sited outside of urban centers, have been absorbed by the cities, where the temperature is higher than in the countryside.

Outside the cities of the United States and Europe, the observed temperature is lower, rather than higher, as demonstrated by the data of NASA's Goddard Institute, reviewed recently by J. Daly.[37]

The same is true also for the polar regions, where the models predict the largest increase in air temperature. As stated by Rajmund Przybylak, a climatologist from the Nicolaus Copernicus University in Torun, Poland, in polar regions "warming and cooling epochs should be seen most clearly. . . and should also occur earlier than in other parts of the world." Therefore, these regions, he says, "should play a very important role in the detection of global changes."[38]

Przybylak collected data covering the period 1874 to 2000, from 46 Arctic and subarctic stations managed by Danish, Norwegian, American, Canadian, and Russian meteorological and other institutes. His study demonstrates the following: (1) In the Arctic, the highest temperatures occurred clearly in the 1930s; (2) even in the 1950s, the temperature was higher than in the 1990s; (3) since the mid-1970s, the annual temperature shows no clear trend; and (4) the temperature in Greenland in the last 10 to 20 years is similar to that observed in the 19th Century. These findings are similar to temperature changes in the Arctic found in data collected by NASA,[37, 38] and in earlier studies reviewed by Jaworowski.[13]

In a new study covering the air surface temperature and sea level pressure data from 70 stations in the circum-Arctic region northward of 62°N, over the period from 1875 to 2000, Polyakov et al.[39] found that the temperature data consist of two cold and two warm phases of multidecadal variability, at a time scale of 50 to 80 years, superimposed on a background of a long warming trend. This variability appears to originate in the North Atlantic, and is likely induced by slow changes in oceanic thermohaline circulation, and in the complex interactions between the Arctic and North Atlantic.

The two warm periods occurred in the Arctic in the late 1930s through the early 1940s, and in the 1980s through the 1990s. The earlier period was warmer than the last two decades. Since 1875, the Arctic has warmed by 1.2°C, and for the entire recorded temperature record, the temperature warming trend was 0.094°C per decade. For the 20th Century alone, the warming trend was 0.05°C per decade; that is, close to the Northern Hemispheric trend of 0.06°C per decade. Because the temperature in the 1930s-1940s was higher than in recent decades, a trend calculated for the period 1920 to the present actually shows cooling.

The Arctic Sea Ice Changes

The Polyakov study (Reference 39) also concludes that the warming trend alone cannot explain the retreat of Arctic sea ice observed in the 1980-1990s, which was probably caused by the shift in the atmospheric pressure pattern from anticyclonic to cyclonic.

The mechanism of sea ice changes is incredibly complex, and it is extremely difficult to identify the rather short-term anthropogenic influence from the background of natural phenomena, which are both long and short term. Depending on the period of time studied, the records containing only a few years to a few decades of data, yield different trends. For example, Winsor[40] reported that six submarine cruises between 1991-1997, transecting the Central Arctic Basin from 76°N to 90°N and around the North Pole (above 87°N), found a slight increasing trend in sea ice thickness. Vinje in 1999, 2001, and 2003[41, 43] reviewed observations of the extent of ice in the Nordic Seas measured in April 1864-1998, and also back in time for a full 400 years. Sea-ice extent has decreased there by 33 percent over the past 135 years. However, nearly half of this decrease was observed over the period 1864-1900. The first half of this decline occurred over a period when the CO_2 concentration in air rose by only 7 parts per million volume (ppmv), whereas for the second half of the decline, the CO_2 content rose by over 70 ppmv. This suggests that the rise of CO_2 content in the air has nothing to do with the sea-ice cover.

Vinje[42] stated that the "annual melt-backs of the magnitude observed after about 1930 have not been observed in the Barents Sea since the 18th Century temperature optimum," which was followed by "a fall in the Northern Hemisphere mean temperature of about 0.6°C over the last few decades of the 18th Century," which temperature has just now been finally erased by "a rise of about 0.7°C over a period 1800-2000." Consequently, the Northern Hemisphere would appear to be not much warmer now (and the extent of Barents Sea ice cover not much less now) than it was during the 1700s, when the CO_2 air concentration was claimed to be 90 to 100 ppmv less than it is now. (The validity of this claim was criticized by Jaworowski in References 29 and 44.)

Even high-sensitivity short-term determinations of surface air temperature or sea-ice, covering one or two decades (for example, satellite observations between 1981 and 2001, appearing in the Nov. 1, 2001, issue of the *Journal of Climate,* showing a 9 percent per decade decline of Arctic sea-ice), are not the best basis for the determination of man-made impact on the climate of polar regions. This is valid also for Antarctic studies, where over the past 18 years the net trend in the mean sea-ice edge has expanded northward by 0.011 degree of latitude per year, indicating that the global extent of sea-ice may be on the rise.[45]

Courtesy of Zbigniew Jaworowski

Collecting ice samples at the Elena Glacier, a tributary of the Stanley Glacier, Ruwenzori Mountains, Uganda, 4,755 meters above sea level.

Antarctic Cooling

Also, in the interior regions of Antarctica after 1941, either cooling or no temperature trend was observed. At the South Pole Amundsen-Scott Station, from 1957 to 2000, the temperature decreased by approximately 1.5°C,[37, 46] although the CO_2 concentrations increased there during this period from 313.7[31] to less than 360 ppmv (Figure 7). The decrease of temperature may be related to the El Niño oscillation,[47] and to the decline in the amount of solar radiation reaching Antarctica (0.28 watt per square meter per year between 1959 and 1988).[48]

On the global scale, the most objective measurements of the temperature in the lower troposphere, conducted since 1979 by American satellites (with no interference from "heat islands"), indicated up to 1998 not a climate warming, but rather a modest cooling (–0.14°C per decade—see Figure 8). In 1999, the temperature rose because of the El Niño effect (cyclic variations in the sea current flowing from the Antarctic, along Chile and Peru, to the equator), changing the 1979-2003 trend into a slight

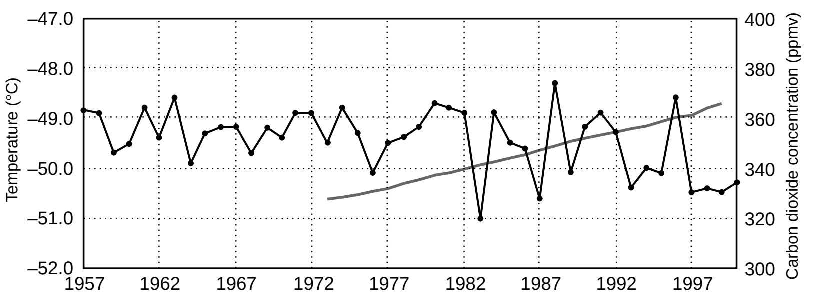


Figure 7
SURFACE TEMPERATURE AND CARBON DIOXIDE AT THE SOUTH POLE (1957-2000)

What's the connection between CO_2 and temperature at the South Pole? Either cooling or no correlation. The upper line graphs changes of the surface temperature at Amundsen-Scott Station at the South Pole between 1957 and 2000. The line starting in 1973 graphs concentrations of CO_2 in air between 1973 and 1999.

Source: J.L. Daly, 2003. "What the Stations Say."

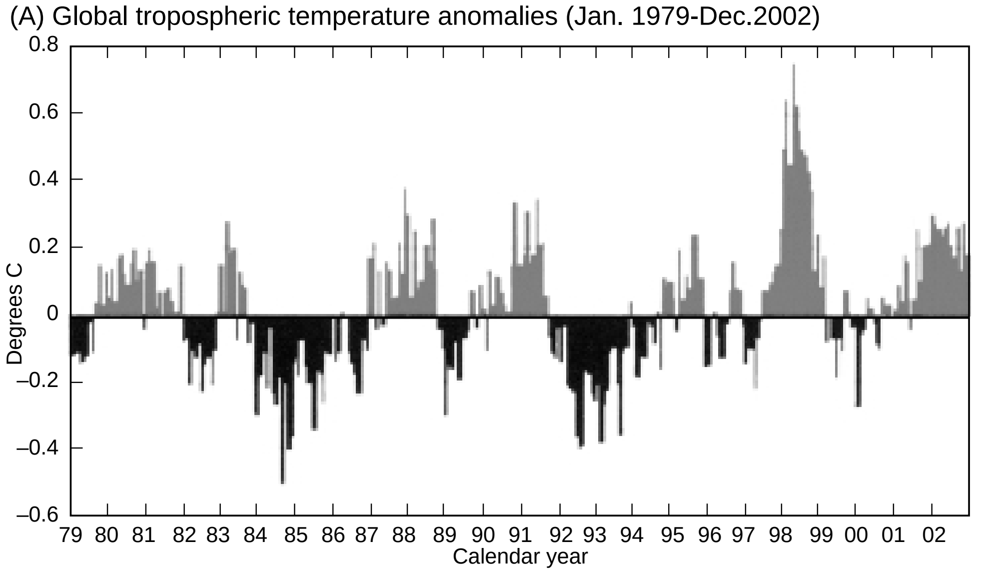
warming. However, since 1994, the satellite data show a deep cooling of the stratosphere.

The Cosmic Ray Connection

The atmospheric temperature variations do not follow the changes in the concentrations of CO_2 and other trace greenhouse gases. However, they are consistent with the changes in Sun's activity, which run in cycles of 11-year and 90-years' duration. This has been known since 1982, when it was noted that in the period 1000 to 1950, the air temperature closely followed the cyclic activity of our diurnal star.[49] Data from 1865 to 1985, published in 1991, exhibited an astonishing

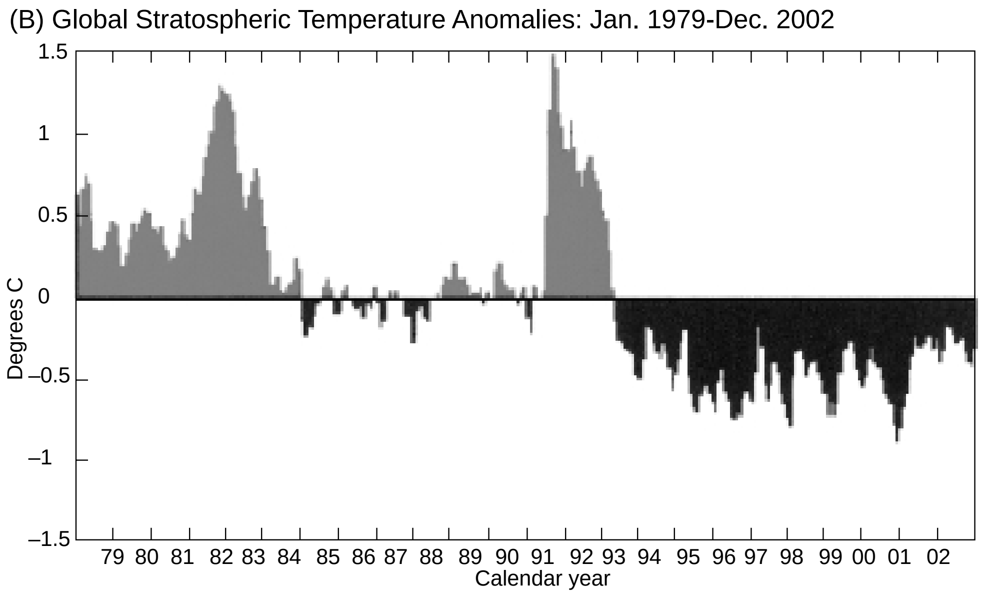
Figure 8
GLOBAL TEMPERATURE ANOMALIES (1979-2002)

Since 1979, the equipment deployed by NASA on 9 TITOS-N satellites has performed 270,000 measurements daily of the temperature in the lower troposphere (from the Earth's surface up to 8 km) and in the lower stratosphere (14 to 22 km). The measurements are taken every 12 hours, virtually all over the globe, with no disturbance from local effects, such as urban "heat islands."



(A) shows average monthly temperatures of the lower troposphere, which have alternately warmed and cooled in the last 24 years. The more sizable temperature rise in 1998 was caused by the El Niño effect. In the entire period, there is a weak cooling of approximately –0.06°C per decade.

(B) shows the deviations in temperature from the seasonally adjusted average in the lower stratosphere. The 1982 temperature rise was caused by the pollution of the stratosphere with sulfuric acid aerosols from the eruption of volcano El Chichon; similarly, the rise in 1991 was caused by the eruption of Mt. Pinatubo in the Philippines. The coldest month recorded in the stratosphere occurred in September 1996.



These measurements are in conflict both with the results of ground measurements, which indicate a sharp rise in temperature, and with the computerized models, which predicted that the lower troposphere would be heated more than the Earth's surface.

Source: Adapted from R. Spencer and J. Christy, 2003. "What Microwaves Teach Us About the Atmosphere," http://www.ghcc.msfc.nasa.gov/overview/microwave.html, 2003.

correspondence between the temperature of the Northern Hemisphere and the 11-year cycles of the sunspot appearances, which are a measure of Sun's activity.[50, 51] The variations in solar radiation observed between 1880 and 1993 could account for 71 percent of the global mean temperature variance (compared to 51 percent for the greenhouse gases' part alone), and correspond to a global temperature variance of about 0.4°C.[34]

However, in 1997, it suddenly became apparent that the decisive impact on climate change fluctuations comes not from the Sun, but rather from cosmic radiation. This came as a great surprise, because the energy brought to the Earth by cosmic radiation is many times smaller than that from solar radiation. The secret lies in the clouds: The impact of clouds on climate and temperature is more than a hundred times stronger than that of carbon dioxide. Even if the CO_2 concentration in the air were doubled, its greenhouse effect would be cancelled by a mere 1 percent rise in cloudiness: The reason is simply that greater cloudiness means a larger deflection of the solar radiation reaching the surface of our planet. (See Figure 9.)

In 1997, Danish scientists H. Svensmark and E. Friis-Christensen noted that the changes in cloudiness measured by geostationary satellites perfectly coincide with the changes in the intensity of cosmic rays reaching the troposphere: The more intense the radiation, the more clouds.[52] Cosmic rays ionize air molecules, transforming them into condensation nuclei for water vapor, where the ice crystals—from which the clouds are created—are formed.

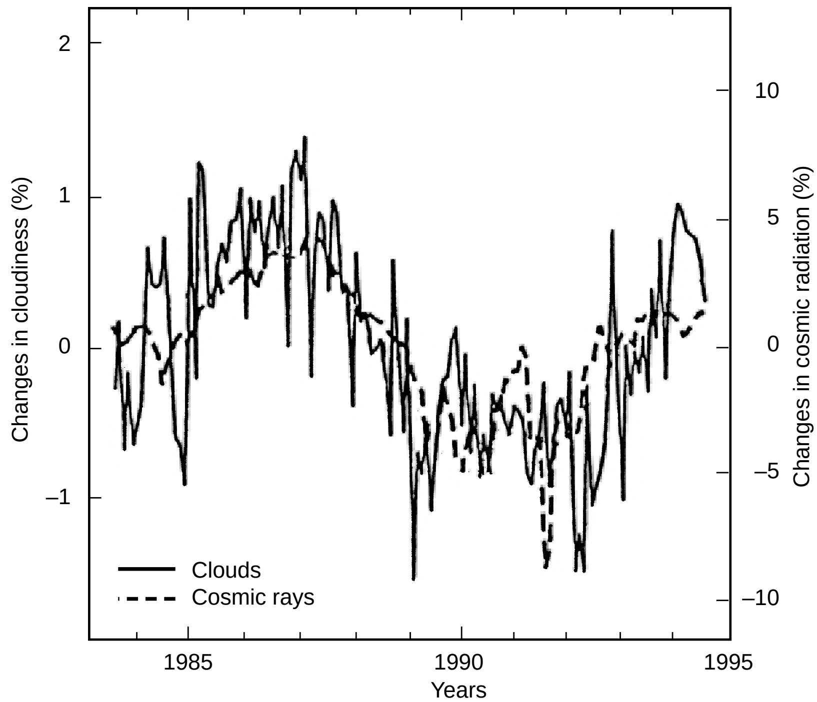


Figure 9
VARIATIONS IN COSMIC RAY INTENSITY AND CLOUD COVER (1984-1994)

Cosmic radiation comes to the Earth from the depths of the Universe, ionizing atoms and molecules in the troposphere, and thus enabling cloud formation. When the Sun's activity is stronger, the solar magnetic field drives a part of cosmic radiation away from the Earth, fewer clouds are formed in the troposphere, and the Earth becomes warmer.

The figure shows an astonishing coincidence between the changes in the cloud cap in the troposphere and the changes in cosmic radiation intensity in the period 1984-1994.

Source: N.D. Marsh and H. Svensmark, 2000. "Low Cloud Properties Influenced by Cosmic Rays," *Physical Review Letters*, Vol. 85, pp. 5004-5007

The quantity of cosmic radiation coming to the Earth from our galaxy and from deep space is controlled by changes in the so-called solar wind. It is created by hot plasma ejected from the solar corona to the distance of many solar diameters, carrying ionized particles and magnetic field lines. Solar wind, rushing toward the limits of the Solar System, drives galactic rays away from the Earth and makes them weaker. When the solar wind gets stronger, less cosmic radiation reaches us from space, not so many clouds are formed, and it gets warmer. When the solar wind abates, the Earth becomes cooler.

Thus, the Sun opens and closes a climate-controlling umbrella of clouds over our heads. Only in recent years have astrophysicists and physicists specializing in atmosphere research studied these phenomena and their mechanisms, in the attempt to understand them better. Perhaps, some day, we will learn to govern the clouds.

The climate is constantly changing. Alternate cycles of long cold periods and much shorter interglacial warm periods occur with some regularity. The typical length of climatic cycles in the last 2 million years was about 100,000 years, divided into 90,000 years for Ice Age periods and 10,000 years for the warm, interglacial ones. Within a given cycle, the difference in temperature between the cold and warm phases equals 3°C to 7°C. The present warm phase is probably drawing to an end—the average duration of such a phase has already been exceeded by 500 years. Transition periods between cold and warm climate phases are dramatically short: They last for only 50, 20, or even 1 to 2 years, and they appear with virtually no warning.

What Will Be the Earth's Fate?

It is difficult to predict the advent of the new Ice Age—the time when continental glaciers will start to cover Scandinavia, Central and Northern Europe, Asia, Canada, the United States, Chile, and Argentina with an ice layer hundreds and thousands of meters thick; when mountain glaciers in the Himalayas, Andes, and Alps, in Africa and Indonesia, once again will descend into the valleys. Some climatologists claim that this will happen in 50 to 150 years.[53, 54]

What fate awaits the Baltic Sea, the lakes, the forests, animals, cities, nations, and the whole infrastructure of modern civilization? They will be swept away by the advancing ice and then covered by moraine hills. This disaster will be incomparably more calamitous than all the doomsday prophecies of the proponents of the man-made global warming hypothesis.

Similarly, as the study of Friis-Christensen and Lassen[50] shows, observations in Russia established a very high correlation between the average power of the solar activity cycles (of 10 years to 11.5 years duration) and the surface air temperature, and "leave little room for anthropogenic impact on the Earth's climate."[55] Bashkirtsev and Mashnich, Russian physicists from the Institute of Solar-Terrestrial Physics in Irkutsk, found that between 1882 and 2000, the temperature response of the atmospheric air lagged behind the sunspot cycles by approximately 3 years in Irkutsk, and by 2 years over the entire globe.[56] They found that the lowest temperatures in the early 1900s corresponded to the lowest solar activity, and that other temperature variations, until the end of the century, followed the fluctuations of solar activity.

The current sunspot cycle is weaker than the preceding cycles, and the next two cycles will be even weaker. Bashkirtsev and Mishnich expect that the minimum of the secular cycle of solar activity will occur between 2021 and 2026, which will result in the minimum global temperature of the surface air. The shift from warm to cool climate might have already started. The average annual air temperature in Irkutsk, which correlates well with the average annual global temperature of the surface air, reached its maximum of +2.3°C in 1997, and then began to drop to +1.2°C in 1998, to +0.7°C in 1999, and to +0.4°C in 2000. This prediction is in agreement with major changes observed currently in biota of Pacific Ocean, associated with an oscillating climate cycle of about 50 years' periodicity.[57]

The approaching new Ice Age poses a real challenge for mankind, much greater than all the other challenges in history. Before it comes—let's enjoy the warming, this benign gift from nature, and let's vigorously investigate the physics of clouds. F. Hoyle and C. Wickramasinghe[58] stated recently that "without some artificial means of giving positive feedback to the climate . . . an eventual drift into Ice Age conditions appears inevitable." These conditions "would render a large fraction of the world's major food-growing areas inoperable, and so would inevitably lead to the extinction of most of the present human population." According to Hoyle and Wickramasinghe, "those who have engaged in uncritical scaremongering over an enhanced greenhouse effect raising the Earth's temperature by a degree or two should be seen as both misguided and dangerous," for the problem of the present "is of a drift back into an Ice Age, not away from an Ice Age."

Will mankind be able to protect the biosphere against the next returning Ice Age? It depends on how much time we still have. I do not think that in the next 50 years we would acquire the knowledge and resources sufficient for governing climate on a global scale. Surely we shall not stop climate cooling by increasing industrial CO_2 emissions. Even with the doubling of CO_2 atmospheric levels, the increase in global surface air temperature would be trifling. However, it is unlikely that permanent doubling of the atmospheric CO_2, even using all our carbon resources, is attainable by human activities.[29] (See also Kondratyev, Reference 59.)

Also, it does not seem possible that we will ever gain influence over the Sun's activity. However, I think that in the next centuries we shall learn to control sea currents and clouds, and this could be sufficient to govern the climate of our planet.

The following "thought experiment" illustrates how valuable our civilization, and the very existence of man's intellect, is for the terrestrial biosphere. Mikhail Budyko, the leading Russian climatologist (now deceased), predicted in 1982 a future drastic CO_2 deficit in the atmosphere, and claimed that one of the next Ice Age periods could result in a freezing of the entire surface of the Earth, including the oceans. The only niches of life, he said, would survive on the active volcano edges.[60]

Budyko's hypothesis is still controversial, but 10 years later it was discovered that 700 million years ago, the Earth already underwent such a disaster, changing into "Snowball Earth," covered in white from Pole to Pole, with an average temperature of minus 40°C.[15]

However let's assume that Budyko has been right and that everything, to the very ocean bottom, will be frozen. Will mankind survive this? I think yes, it would. The present technology of nuclear power, based on the nuclear fission of uranium and thorium, would secure heat and electricity supplies for 5 billion people for about 10,000 years. At the same time, the stock of hydrogen in the ocean for future fusion-based reactors would suffice for 6 billion years. Our cities, industrial plants, food-producing greenhouses, our livestock, and also zoos and botanical gardens turned into greenhouses, could be heated virtually forever, and we could survive, together with many other organisms, on a planet that had turned into a gigantic glacier. I think, however, that such a "passive" solution would not fit the genius of our future descendants, and they would learn how to restore a warm climate for ourselves and for everything that lives on Earth.

Professor Zbigniew Jaworowski is the chairman of the Scientific Council of the Central Laboratory for Radiological Protection in Warsaw. In the winter of 1957-1958, he measured the concentration of CO_2 in the atmospheric air at Spitsbergen. During 1972 to 1991, he investigated the history of the pollution of the global atmosphere, measuring the dust preserved in 17 glaciers—in the Tatra Mountains in Poland, in the Arctic, Antarctic, Alaska, Norway, the Alps, the Himalayas, the Ruwenzori Mountains in Uganda, and the Peruvian Andes. He has published about 20 papers on climate, most of them concerning the CO_2 measurements in ice cores.

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