

---

## Orbital cycles, not CO<sub>2</sub>, determine Earth's climate

---

*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 reports.*

---

*This article is an edited version of a speech given on Feb. 16 at a Schiller Institute conference in Reston, Virginia. 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 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 precession 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

FIGURE 1

## Glaciation in North America



Source: U.S. Geological Survey.

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.

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.

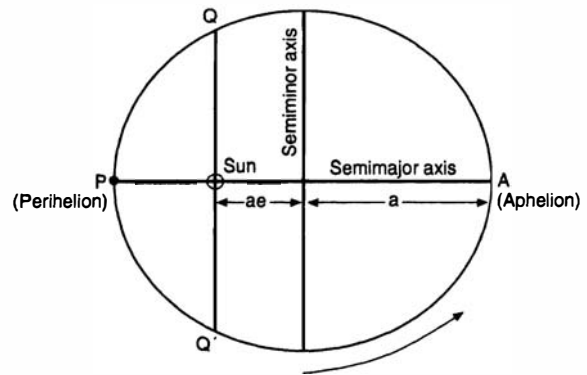
It took about 40 years of very intense debate in the geological community to accept the existence of ice ages. There was still no explanation of why the ice ages came into being, and why there were so many of them.

### 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 dem-

FIGURE 2

## Orbital motion of the Earth around the Sun.



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

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.

onstrated, strongly affect the intensity of radiation the Earth receives from the Sun during a given *season*, a factor known as insolation.

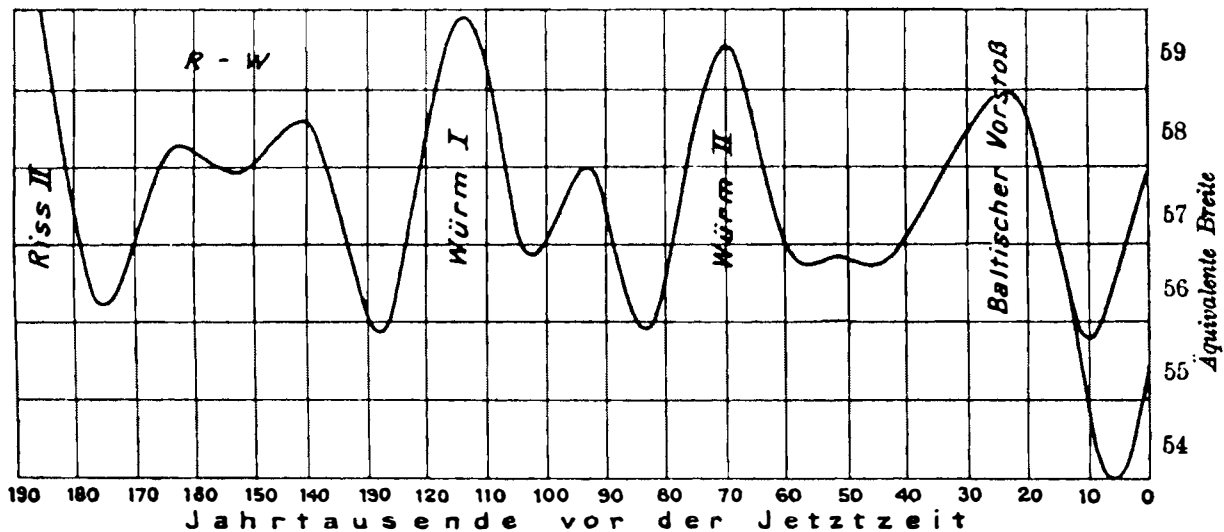
Johannes Kepler had discovered, more than 300 years ago, that the Earth's orbit was not a circle around the Sun, but an ellipse (**Figure 2**), with the Sun at one focus of the ellipse. Therefore, at certain points, the Earth is farther away from the Sun, than at other points on the ellipse. Croll calculated 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, 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.

FIGURE 3

**Milankovitch's radiation curve for the last 190,000 years**



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

*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.*

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.

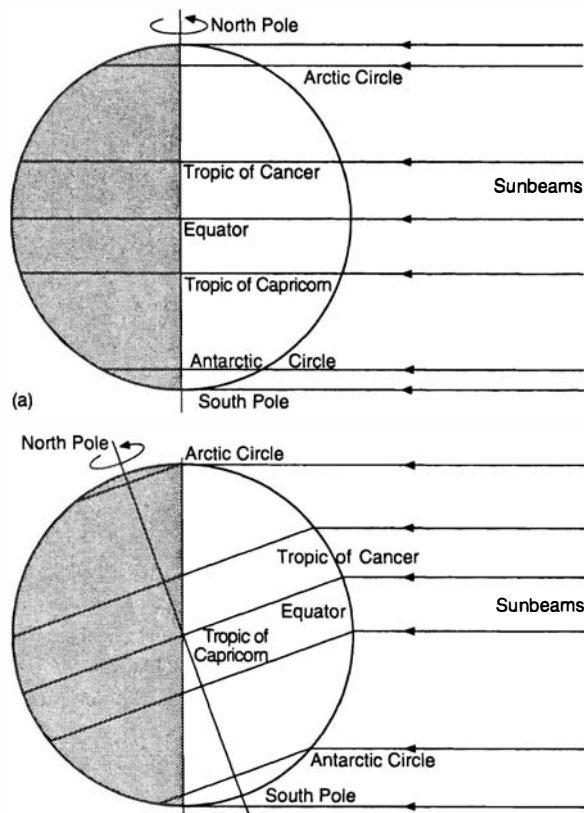
This is an extremely important astronomical calculation, which can be determined astronomically with great accuracy, and was determined as far back as the Vedics. If you take the summer solstice, now June 21, the Northern Hemisphere is tilted completely toward the Sun, and there is sunlight all the way 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

FIGURE 4

### Obliquity and intensity of the Sun's rays



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

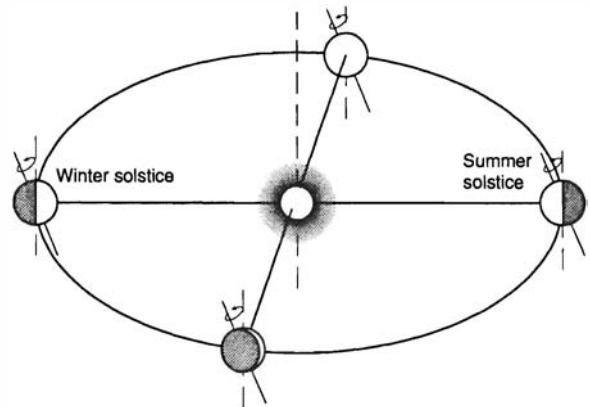
Even without a tilt of the Earth's axis, the variation in angle of the incidence of the Sun's rays (a) would cause the poles to be cooler. Increasing the angle of tilt intensifies the effect (b).

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 cycle 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

FIGURE 5

### The seasons and obliquity



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

Seasonal change results from the combined effect of the orbital inclination and the yearly revolution of the Earth around its elliptical orbit. When the Earth's spin axis is pointed away from the pole of the ecliptic (dotted line through Sun), the Northern Hemisphere has its shortest day (winter solstice), while the Southern Hemisphere has its longest day.

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.

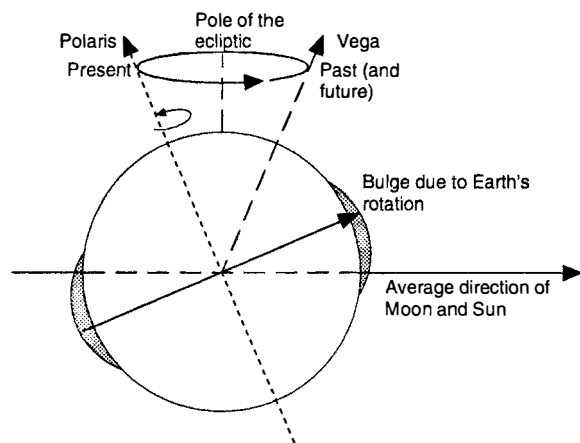
So, in terms of the three cycles that Milankovitch determined, first, the eccentricity of the Sun today indicates that we are now going into another ice age. The second cycle is the combination of the equinoctial and orbital precessions, a 22,000-year cycle, and again, you can see that we are entering 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

FIGURE 6

### Precession and change of the pole star



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

*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.*

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.

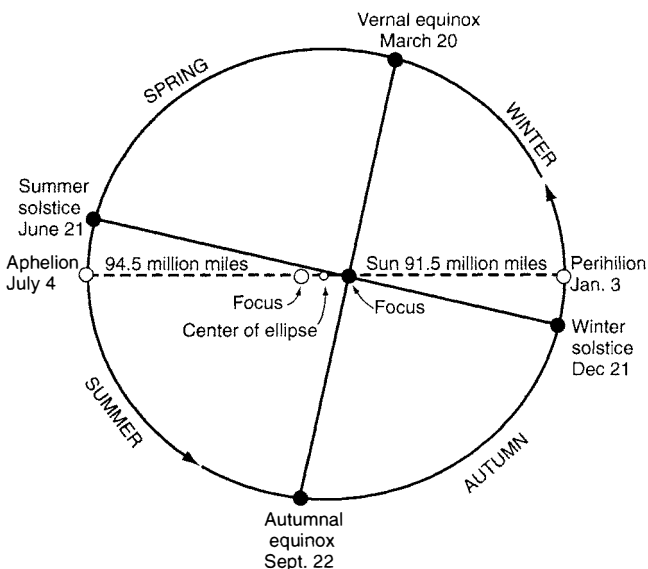
Milankovitch wrote his papers, and published them, saying that because of the astronomical evidence we have of the Earth's orbit, the ice ages occurred at these specific intervals, and on these dates. And, almost everyone in the scientific community thought he was nuts. "How can you prove that?" they 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 Project," 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

FIGURE 7

### Earth's distance from the Sun and position of solstice on the ellipse



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

*The summer solstice, June 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.*

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.

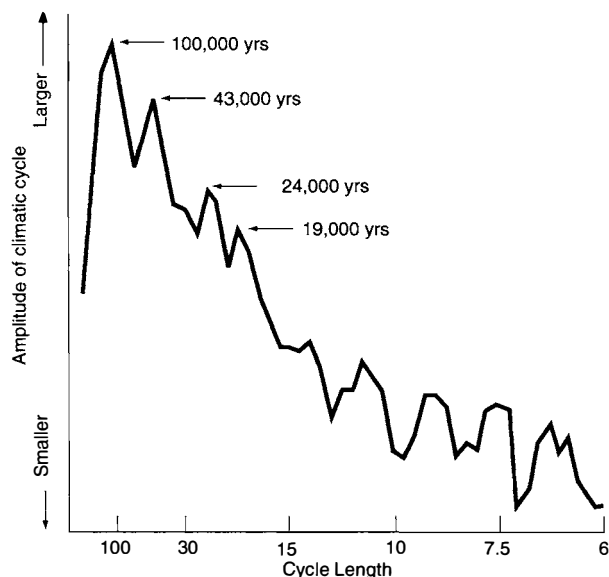
The Climate Project, which included oceanographers, paleontologists, limnologists, and geologists, each one an expert in his field, put together all the data from around the world. They spent several years collecting more data internationally, and then did some spectral analysis, which produced the so-called 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 import-

FIGURE 8

## Climatic cycles from the isotopic record of Indian Ocean cores

(thousands of years)



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

*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.*

ant cycle. The second cycle, 43,000 years, is of the change in tilt of the 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.

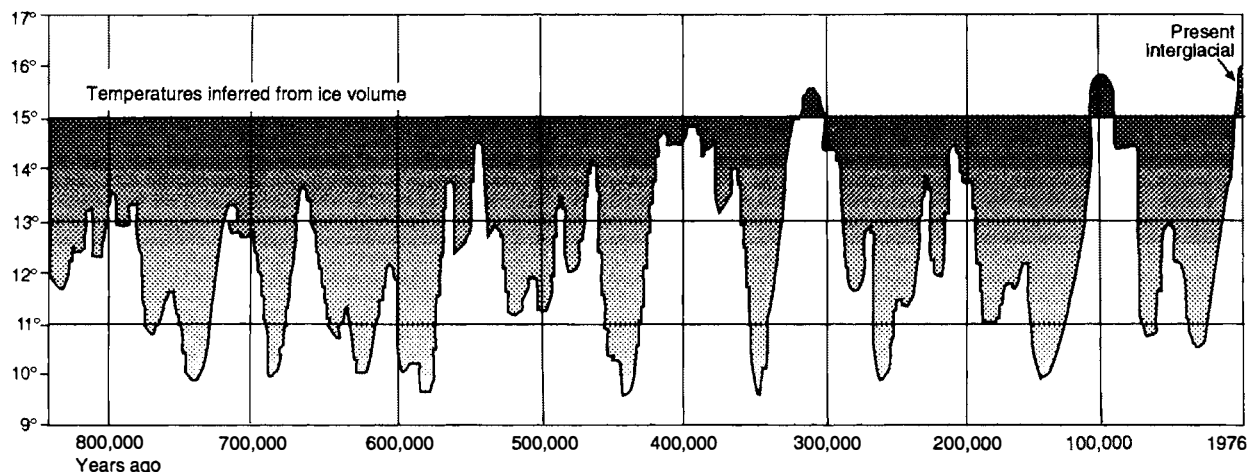
The issue here, however, is that there is no scientific evidence, behind anyone who promotes the global warming theory. Any *scientist* who promotes it, knows that he is lying, because they know what the astronomical cycles are. So it is axiomatically a lie for scientists to say that we are now facing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

FIGURE 9

## The Earth's climate over the last eight cycles



Source: *21st Century Science & Technology*, Winter 1993-1994; data adapted from Samuel W. Matthews, "What's Happening to Our Climate," *National Geographic* (November 1976).

*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.*

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 1975-76. 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.

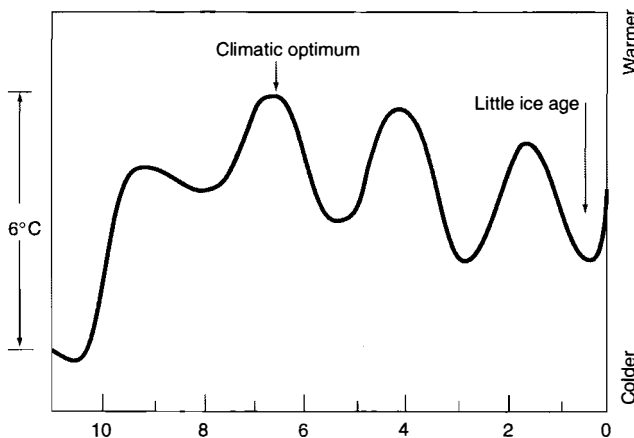
The scientific conference at which this switch occurred was in November 1975. Chaired by Dame Margaret Mead, it was called "The Atmosphere: Endangered or Endangering." Mead told the assembled scientists, most of whom were the media science stars that you see today promoting global warming:

"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

FIGURE 10

## Climate of the past 10,000 years



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

*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.*

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, what actually may be happening, is that by releasing more carbon dioxide into the air, perhaps we are preventing the onset of the next 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, before man appeared, where the levels of carbon dioxide were getting so low, that most plant life around the world was about to die. We have just about the lowest levels of carbon dioxide ever recorded in history at the present time. So, by burning fossil fuels, putting out all these industrial emissions, and so forth, we’ve done a very funny thing. We are actually *increasing* the amount of food available for plants around the world. We are far from the point where it poses any danger to anybody. We are actually at the point where the biomass of the Earth is increasing.

Probably the world’s greatest living climatologist, 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.