Studies May Alter Insights Into Global Warming

By Curt Snyder
Washington Post Staff Writer

Two new studies of the Earth's ancient atmosphere may alter the way scientists understand the relationship between airborne carbon dioxide and climate change—and hence the dynamics of future "greenhouse" global warming.

In one paper, published in the March 11 issue of the journal Nature, researchers said they found that during the past 11,000 years—the period known as the Holocene epoch that began around the end of the last ice age and extends to the present—levels of carbon dioxide, a potent greenhouse gas, did not remain constant until the onset of the industrial revolution, as many had long supposed.

Instead, although average global temperatures stayed relatively stable, carbon dioxide levels fluctuated considerably during the Holocene, according to a team from the Scripps Institution of Oceanography and the University of Bern, Switzerland. "The system was not in equilibrium because the carbon dioxide levels never stabilized," said Martin Halsen of Scripps, part of the University of California at San Diego.

Presumably, this occurred because of still-unexplained changes in the amount of carbon dioxide taken up by oceans and vegetation, especially short-term variations of 10 percent or more in the quantity absorbed by plants. "This suggests that the terrestrial biosphere may also exhibit changes in the future," said Thomas F. Stocker of the University of Bern. "What they might be, however, is uncertain."

In the other study, reported in the March 12 issue of the journal Science, Scripps investigators addressed one of the most vexing "chicken-and-egg" questions in climate research. Namely, when the Earth shifts from glacial to warm periods (as it does every 100,000 years or so), which comes first— an increase in atmospheric carbon dioxide levels, or an increase in global temperature?

Contrary to what many believe, the team concluded that the temperature rise comes first, followed by a carbon dioxide boost 400 to 1,000 years later.

That's what the researchers found at glacial-interglacial transitions from 240,000, 140,000 and 13,000 years ago. That sequence of events appears to contradict the fundamental logic of simple greenhouse warming theories, which argue that increases in heat-trapping gases will be followed by higher surface temperatures.

The analysis also points to vegetation as a major source of the carbon dioxide. "Previously, it was thought to have originated primarily in the ocean biosphere," said Julie Pahn of the National Science Foundation, which supported both studies. "But this work suggests that the terrestrial biosphere played a significant role. . . . There are clearly implications for the future, considering the rate at which the rain forests in South America are currently being destroyed."

Both research projects used evidence from hundreds of ice specimens, or "cores," taken far below the surface of Antarctica. Each layer contains tiny bubbles of air trapped in the ice when it formed from snow. Investigators placed the samples in vacuum chambers, released the traces of air, and analyzed them for carbon dioxide content and an isotope of carbon that indicates where the gas was last.

Carbon, a ubiquitous element in the Earth's surface and atmosphere, exists in three isotopes. Photosynthesis, the process whereby plants use sunlight to turn carbon dioxide into organic matter, favors the uptake of the lightest, carbon-12 atom, leaving the atmosphere with a relative preponderance of carbon-13, the next heaviest isotope. When plants die and rove, they release that carbon-12 back into the atmosphere. So the ratio between the two isotopes at any time indicates how much carbon dioxide is being absorbed by plants.

That quantity may be critical to future climate changes. In general, civilization releases about 6 billion tons of carbon (in the form of carbon dioxide) into the atmosphere every year. But only 3 billion tons stay there; the rest is absorbed into what are called carbon "sinks." Half dissolves into the ocean; the remainder is taken up by vegetation. Consequently, the performance of these sinks is an important variable in how much carbon dioxide is left in the air to trap heat and possibly raise global temperatures.

The Scripps-Bern authors writing in Nature found that at the beginning of the Holocene, the atmosphere contained about 288 parts per million by volume of carbon dioxide, up from 180 to 200 ppm in the depths of the last ice age about 18,000 years ago. By the late 1700s, it had risen to 285 ppm. (Since then, the concentration has climbed to 364 ppm and is still growing. That is, it rose by the same amount—80 ppm—in the past 200 years that it took from the coldest part of the previous ice age to the late 1700s.)

In accordance with orthodox notions, "one commonly referred to the (preindustrial) CO2 concentration of 285 ppm," as if it were constant, Stocker said. But now "this has been altered," he noted.

As the world warmed its way out of the last ice age, carbon dioxide levels first dipped to 260 ppm about 20,000 years ago, probably because receding glaciers made way for the increasing vegetation that took up a lot of gas. But then the carbon dioxide content began to creep back up because temperatures rose (decreasing the amount of dissolved gas oceans can hold) and land masses cooled and dried out (decreasing the carbon-trapping activity of photosynthesis).

"The direct relevance of this finding," said Jean Lynch-Stieglitz of Lamont-Doherty Earth Observatory at Columbia University, "is that we can expect that as climate warms, the terrestrial biosphere will probably be capable of holding more carbon than it can today."

But uncertainty is high. Over the past few thousand years, there have been dramatic, but still abnormal, climate events. But most of those involved a rate of CO2 change like that occurring now," said Lamont-Doherty's Gerard Holm, and that is "a measure of how serious the problem might be."

As for the carbon dioxide long-time findings, "the crux of the issue" for nonscientist is that "if the observation that increases in temperature lead increases in CO2, in the natural system, then industrialization is forcing the natural system, and our natural analogues deduced from past behavior might not be good models for predicting what's going to happen in the future," said Joan J. Fitzpatrick, technical director of the U.S. Geological Survey's National Laboratory in Denver.

"That's a sobering thought."

Indeed, despite the sizable margin of possible error in this analysis, "greenhouse skeptics will probably jump on this as "proof" that there is no necessary causal relation between carbon dioxide levels and temperatures," said Anthony J. Broccoli of the National Oceanic and Atmospheric Administration's Geophysical Fluid Dynamics Laboratory in Princeton, N.J. But in fact, he said, the new findings are completely consistent with a "positive CO2-temperature feedback" system in which changes in one prompt changes in the other.
Ex-Clinton aides admit Kyoto treaty flawed

Climate pact costlier than they thought
By Jonathan Weisman
USA TODAY

WASHINGTON — As President Bush headed off Monday to face environmental critics in Europe, he fired a parting shot at the global warming treaty he has rejected. He called the Kyoto Protocol unrealistic, costly and "fatally flawed.

In that assessment, he has some unexpected supporters: Clinton administration experts.

Economists from the Clinton White House now concede that complying with Kyoto's mandatory reductions in greenhouse gases would be difficult — and more expensive to American consumers than they thought when they were in charge.

That reassessment helped fuel Bush's decision to reject the Kyoto treaty, said Lawrence Lindsey, the president's economic adviser. Instead of embracing binding limits on greenhouse gases, Bush pledged on Monday a modest package of actions to combat global warming. They include a research initiative to fill gaps in scientists' understanding of climate change and increased use of renewable energy. But he didn't call for new money.

"America's unwillingness to embrace a flawed treaty should not be read by our friends and allies as any abdication of responsibility," said Bush, who is expected to hear vociferous complaints about his approach during his five-nation tour of Europe. Bush said the treaty would do nothing to curb the world's use of fossil fuels and would increase energy prices for American consumers.

"Save the climate": A tourist poses by protest banners in Madrid, Spain, which President Bush visits today.

The treaty, negotiated in Kyoto, Japan, in 1997, aimed to combat emissions of carbon dioxide and other gases that most scientists believe trap heat in the atmosphere.

The treaty required the United States to reduce its emissions by 2012 to 7% below its 1990 levels. At the time, the Clinton White House estimated that the cost of reaching that target was relatively low: about $7 billion to $12 billion a year starting in 2008, when binding reductions would begin phasing in. An average household's energy bills would rise $70-$110 a year, and gasoline prices would inch up no more than 6 cents a gallon, the White House said.

Other government cost estimates were far higher. The Department of Energy estimated that gasoline prices would have to rise 66 cents a gallon — or 53% over a projected 2010 price — to meet Kyoto's emissions targets.

To keep his cost estimates down, President Clinton envisioned an emissions-trading system in which countries unable to meet the greenhouse-gas reduction targets would get credits for helping other nations exceed the standards. The idea was that when all the treaty's members averaged out their emissions, the world's total output would meet a global target.

For example: If the United States wanted to emit more carbon dioxide one year, it could help Russia get below its emissions standard by paying high-polluting Russian industries to adopt technologies to clean up their dirty plants.

Clinton administration economists say that, in retrospect, their low-cost estimates were unrealistic. They assumed that:

- China and India would accept binding emission limits and would fully participate in the emissions-trading system, even though they never signed the treaty.
- European opposition to emissions trading would be overcome.
- Most industries and consumers would quickly adopt new, energy-efficient technologies, such as advanced air conditioning systems and gas-electric "hybrid" cars, which would lower overall costs.

Since 1997, however, it has become clear that consumers love their gas-guzzling sport-utility vehicles and aren't embracing energy-efficient technologies. China has no intention of participating in the treaty; and Europe still wants to limit emissions trading as a partial solution to global warming.

Todd Stern, Clinton's global warming coordinator, says that the Europeans would likely go along with an unlimited trading system if the Bush administration were to return to the negotiating table to produce a revised treaty it could sign. However, he concedes that China won't participate for now.

Leaving China out of a trading scheme would double the Clinton cost estimate, says Joseph Aldy, who helped develop the estimates for Clinton. "We always thought the (emissions) targets were very ambitious," he says. "But the thing that made us really uneasy about our analysis was that if our assumptions didn't come true, you could come out with costs that were much higher, maybe 20 times higher."

Another problem is that energy-efficiency breakthroughs have stalled as governments argue over the treaty, says a supporter of the treaty. "As the clock ticks, this becomes a more and more difficult job," says Kathleen McGinty, who chaired Clinton's Council on Environmental Quality.

Even so, Clinton economists say Bush could have tried to revise the treaty to reflect these new realities. By simply walking away from it, he is allowing the Europeans to portray the United States as the villain, even though they privately admit that they, too, may be unable to comply with the treaty. "George Bush has done all the work for the Europeans," says Robert Lawrence, a Clinton administration economist now at Harvard University's Kennedy School of Government.

Lindsey, however, insists that the Kyoto Protocol is beyond repair. "The models are not even close in suggesting Kyoto was the right approach," he says. "It was wrong. I think we did the right thing."

Contributing: Laurence McQuillan and Traci Watson
Satellite study shows ice shrinking

The Seattle Times, Friday, February 2, 2001

By Dave Vanston

Did global warming cause a 2-foot drop in ice levels in the North Pole region?

Washington — Scientists who discovered what appeared to be shrinking ice in the North Pole region say they now have evidence that global warming could be to blame.

The study, which was published in the journal Nature, found that the ice level in the North Pole region was about 2 feet lower in 1999 than it was in 1992.

The researchers say the decline is likely due to global warming, which has been causing ice to melt in the Arctic region.

The study was led by scientists from the University of Washington and the National Snow and Ice Data Center.

The findings suggest that global warming is contributing to a decrease in ice levels in the Arctic, which could have implications for sea level rise and the health of marine ecosystems.

The team used satellite data and models to track ice levels in the region over time.

They found that ice levels in the North Pole region have been declining at a rate of about 2 feet per decade since the 1990s.

The study is significant because it provides new evidence that global warming is affecting the Arctic region, which has been warming at a faster rate than the rest of the world.

The researchers say their findings support the idea that global warming is causing ice to melt in the Arctic, which could have implications for sea level rise and the health of marine ecosystems.

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Global warming, as reported by the UN, has effects now and could raise the American"
A lack of consensus on global warming

Pete Du Pont

1. The average annual temperature in the USA over the past 100 years has increased. The average temperature in 2000 was higher than it was in 1800.

2. The average annual temperature in the USA over the past 100 years has decreased. The average temperature in 1900 was lower than it was in 2000.

3. The average annual temperature in the USA over the past 100 years has remained relatively constant. The average temperature in 1950 was similar to the average temperature in 2050.
Campaigning in Saginaw, Mich.: George W. Bush stumbled over a pledge to cut power plant emissions.

CO₂ puts heat on Bush

Emissions reversal sets up quandary for White House

By Mimi Hall
USA TODAY

WASHINGTON — It was a throwaway line in a fall campaign speech — and after he delivered it, candidate George W. Bush asked one of his domestic policy aides why the line was in there in the first place.

"We have to talk about that," he said to the aide.

But in the fast-paced atmosphere of the race for the White House, Bush's promise to seek reductions in carbon dioxide emissions at power plants was simply forgotten. The campaign and the candidate moved on.

Then Bush became president. Environmentalists concerned about global warming reminded him of his pledge. Coal and oil industry advocates pressured him, warning that emissions reductions would mean higher electricity prices.

Last week, Bush decided to reverse his position. Aides didn't want the issue to fester, so they made a decision: Get the news of Bush's reversal out, take some hits from environmentalists and get the controversy behind them. Tuesday, Bush sent a letter to Republican senators informing them he would not seek reductions in emissions of carbon dioxide, CO₂.

Now, Bush is facing the political fallout from a decision critics are portraying as evidence he is exactly the kind of man he says he's not: a typical politician who says what voters want to hear on the campaign trail and then fails to make good on his promises.

The questions being debated in Washington are these: Is Bush a political opportunist who is captive to big business? Or is he simply being honest when he says an energy crisis — which has worsened since the campaign — forced him to change his mind?

The White House bets voters will believe the latter. Bush's promise came in a speech Sept. 29 titled "A Comprehensive National Energy Policy." Near the end, he said: "With the help of Congress, environmental groups and industry, we will require all power plants to meet clear air standards in order to reduce emissions of sulfur dioxide, nitrogen oxide, mercury and carbon dioxide within a reasonable period of time."

"What was that CO₂ line?" Bush, who had stumbled over the words in the speech, asked an adviser.

On Wednesday, spokesman Ari Fleischer told reporters that "including CO₂ as a pollutant" in Bush's speech had been "a mistake."

Karl Rove, Bush's political adviser, says Bush hasn't lost the right to say he'll fulfill his campaign promises, because curbing CO₂ emissions was never one of the six big promises he made over and over: a tax cut, education reform, Social Security reform, restructuring the military, a prescription drug program for poor seniors and a "faith-based" initiative to allow religious groups to use government money for social programs.

"The president ran on six big things, and people know what those six big things are, and he's pursuing them," Rove says.

But Republicans hold only a slim majority in Congress, and to fulfill his promises, Bush needs help from Democratic lawmakers. His decision on CO₂ could make negotiations more difficult.

"The Democrats want to get something done and work in a bipartisan way," says Rep. Nita Lowey, D-N.Y., head of the Democratic Congressional Campaign Committee. She says Democrats already were angered by Bush's decisions to roll back workplace-safety regulations, cut off funding for overseas groups that counsel on abortion and allow a House vote on his tax-cut plan without hearings. The CO₂ decision, she says, is creating more tension: "It certainly doesn't contribute to the civility the president has talked about."

And previewing a likely Democratic theme in the elections of 2002 and 2004, Sen. Harry Reid, D-Nev., recalled a broken promise that helped cost Bush's father re-election. In the future, he says, "Maybe we'll need to read the president's lips more carefully."

Contributing: Judy Keen