



2007 Another Near-Record Warm Year

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Associated Press

WASHINGTON —

A vast swath of the United States was warmer than usual this year, leading to severe drought conditions and wildfires in the West and Southeast.

Texas, the Lone Star state, stood alone, the only one to record below average temperatures.

Preliminary data released Thursday by federal scientists predict the annual average temperature for 2007 across the contiguous United States at near 54.3 degrees Fahrenheit — making the year the eighth warmest since records were first kept in 1895.

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Worldwide, the average temperature for the year, expected to be near 58 degrees Fahrenheit, is on pace to be the fifth warmest ever, said the report by NOAA's National Climatic Data Center.

"Within the last 30 years, the rate of warming is about three times greater than the rate of warming since 1900," said Jay Lawrimore, chief of the climate monitoring branch at the center. "The annual temperatures continue to be either near-record or at record levels year in and year out."

In the United States, the months of March and August were the second warmest in more than 100 years. Six states — Kentucky, Tennessee, South Carolina, Georgia, Alabama and Florida — had the warmest August month on record.

In 113 years of record keeping, all but four states — Texas, Maine, New Hampshire and Vermont — experienced either above average or significantly above average temperatures from January through November.

Wyoming had its second warmest year; Idaho and Utah had the fifth-warmest years on record.

North Carolina had the driest year so far. From midsummer into December, more than three-quarters of the Southeast was in drought, the report said.

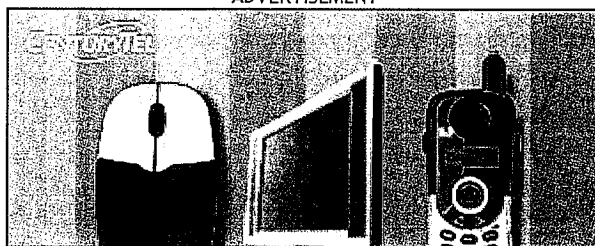
The problem in Texas, Lawrimore said, was too much rain that led to flooding and the wettest summer on record. The cloudy and rainy weather for much of the year contributed to the cooler temperatures for the state, he said.

Globally, seven of the eighth warmest years on record have occurred since 2001, and the 10 warmest years have all occurred since 1997, said the report.

"When you see these numbers, it's screaming out at you, 'This is global warming,'" said climate scientist Andrew Weaver of the University of Victoria in Canada. "It's the beginning and it's unequivocal."

Weaver said previous warm weather records probably would have been broken this year were it not for some cooling toward the end of the year because of La Nina — a cooling of the mid-Pacific equatorial region.

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At a U.N. climate conference on Bali this week, delegates from nearly 190 nations, including the United States, have been trying to hammer out a roadmap for negotiations for a new global warming pact that would take effect in 2012 after the current one expires.

Former vice president and Nobel laureate Al Gore told delegates Thursday that the United States was "principally responsible" for blocking progress toward an agreement on launching negotiations to replace the Kyoto Protocol.

Gore won this year's Nobel Peace Prize for helping alert the world to the danger of climate change.

As the world warms, scientists fear an increase in disease, killer weather and the extinction of vast numbers of species.

Globally, the greatest warming took place in high-altitude regions of the Northern Hemisphere, the NOAA report said.

The impact of that can be seen in the large reductions in Arctic sea ice, which is melting so rapidly that some scientists have predicted it could disappear entirely by the summer of 2040.

The U.S. National Snow and Ice Data Center in September estimated the surface area of the Arctic sea ice nearly 23 percent below the previous record set in 2005.

The National Oceanic and Atmosphere Administration will update its data in early January to reflect the last few weeks of December.

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SCIENCE JOURNAL
 By ROBERT LEE HOTZ


Tracking Carbon Trail To Find Why So Much Fills the Atmosphere

December 28, 2007; Page B1

One mystery of global warming underlies all others: Nobody knows precisely where all the world's carbon dioxide ends up every year.

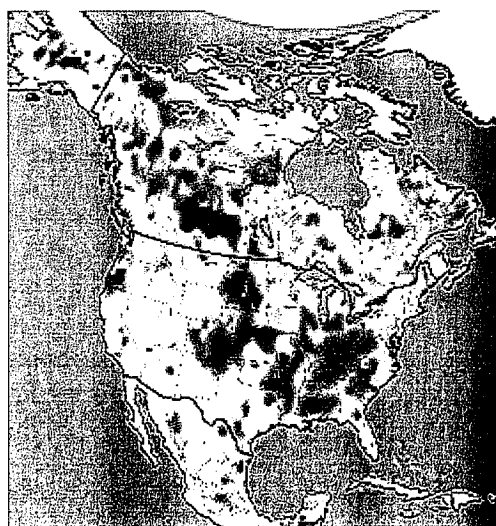
Much of this heat-trapping greenhouse gas stays aloft, promising to make 2007 one of the warmest years on record. Levels of CO₂ in the atmosphere have surged 35% in recent centuries, scientists have calculated. Still, that reflects barely half of all the emissions from human activities. Some of it seeps into soil, vegetation and the oceans, where it can't affect climate so immediately.

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LOOKING FOR CARBON



Carbon Tracker National Oceanic and Atmospheric Administration

A prolonged drought in North America during 2002 left millions of tons of extra carbon in Earth's atmosphere, cutting the continent's natural uptake of carbon dioxide in half, researchers at NOAA's Earth System Research Laboratory recently reported. Red areas denote reduced carbon dioxide absorption in the summer of 2002 with blue areas showing enhanced absorption.

Recently, however, federal researchers discovered that severe droughts and wildfires have disrupted these natural storehouses of carbon, sometimes venting CO₂ equal to annual emissions from millions of cars.

So far, scientists have no reliable way to measure all these fluctuating carbon emissions. Temperature predictions based on future CO₂ levels, therefore, could overestimate the risk of greenhouse warming -- or dangerously understate it. "A quarter of all the CO₂ that is emitted is going somewhere, and we don't know where," said David Crisp at NASA's Jet Propulsion Laboratory, where he is senior scientist for the \$270 million Orbiting Carbon Observatory, set for launch next December. "That raises a lot of red flags."

Moreover, as governments try to prevent climate change through emissions trading -- where buying and selling emissions rights is expected to top \$70 billion by the end of next year -- regulators must track CO₂ no matter where it comes from or where it goes, to verify transactions.

To pinpoint the places where the planet naturally absorbs CO₂ emissions, researchers have turned North

Since the beginning of the Industrial Revolution 250 years ago, roughly 315 billion tons of carbon have been added to the air from the use of fossil fuels, land use changes and cement production, according to the U.S. Department of Energy's online calculation of **global CO2 trends**¹.

Even so, that's only about half of the total from human activities during that time. The rest was absorbed by the oceans, forests, grasslands, soil, peat and other natural carbon "sinks." The U.S. Environmental Protection Agency's **National Greenhouse Gas Inventory**² presents estimates of U.S. greenhouse gas emissions and sinks.

The U.S. Climate Change Science Program recently released its first **State of the Carbon Cycle Report**³, offering a scientific summary of the carbon cycle in North America, which releases much more CO2 into the air than it naturally absorbs.

A new federal data analysis system called **CarbonTracker**⁴ offers the first systematic glimpse into how the continent of North America naturally recycles this critical greenhouse gas.

Scientists at the National Oceanic and Atmospheric Administration, who developed the CarbonTracker system, reported their most recent findings in **The Proceedings of the National Academy of Sciences**⁵.

These **online animations of CarbonTracker data**⁶ illustrate the global ebb and flow of carbon dioxide and the rapid mixing of the atmosphere. CO2 emitted in the US, for example, can reach Asia in a couple weeks.

Almost a quarter of all the world's CO2 ends up in the oceans, but in May scientists reported in **Science**⁷ that recent climate change has weakened one of the Earth's natural carbon 'sinks' -- the Southern Ocean around Antarctica.

The largest natural carbon storehouse on land is the **Canadian Boreal Forest**⁸, which contains 22 percent of the total carbon stored on the earth's land surface, and almost twice as much carbon per unit area as tropical forests.

America into a test lab. No other region is so thoroughly monitored; nor does any other area emit as much carbon dioxide -- about 27% of the world's annual total.

The U.S., Mexico and Canada together release about 2 billion tons of carbon as CO2 into the air every year -- 85% from the U.S. alone -- but only about a third of it typically is absorbed by so-called carbon sinks, such as new forests, grasslands, crops and soil. The rest is either in the air or unaccounted for. That is according to a new study of 28,000 measurements collected every week from 2000 through 2006 and analyzed by the National Oceanic and Atmospheric Administration's online CarbonTracker system.

The CarbonTracker offers a portrait of the continent in carbon dioxide, locating where greenhouse-gas upwellings are strongest and where new plant growth and soil most readily remove it from the air. Greenhouse-gas emissions were highest in the Midwest, which released more CO2 than any country except Russia, China, India, and the U.S. as a whole. By the same token, CO2 was absorbed mostly east of the Rocky Mountains and in northern Canada, where vast boreal forests hold twice as much carbon as tropical woodlands.

These detailed calculations reveal a countryside where these natural carbon-storage zones are failing, the NOAA researchers determined. The higher temperatures that result can, through more frequent wildfires and prolonged droughts, further interrupt ancient cycles of carbon storage, spilling even more carbon into the air.

Such comprehensive climate studies have begun persuading many skeptics. The U.S. Climate Change Science Program, which released its first State of the Carbon Cycle Report for North America last month, documented the same troubling trend. NASA and the Japanese Space Agency expect to launch satellites next year to track global CO2 concentrations almost half a million times a day, in a more precise diagnosis of this planetary carbon catch-and-release system.

No one can say with certainty when growing emissions of carbon dioxide, methane and other greenhouse gases will tip the balance of the atmosphere into dangerous climate changes. But recent events have shown how vulnerable the world's ability to recycle carbon can be to even moderate increases in temperatures. "Climate extremes can have a major effect on the amount of carbon dioxide in Earth's atmosphere," said NOAA atmospheric chemist Wouter Peters.

An unusually severe U.S. drought in 2002, the NOAA researchers discovered, left an extra 360 million tons of carbon in the atmosphere -- an amount equal to the annual emissions of 200 million cars -- by stunting plant growth that normally might have absorbed the gas. "We lost half

our natural sink," said NOAA geochemist John Miller. In Europe, a severe drought in 2003 left more than 500 million tons of carbon in the air.

In turn, the dry weather from higher temperatures also has made wildfires in the western U.S. more frequent, longer-burning and harder to extinguish. Large-scale fires in western and southeastern states can release as much carbon dioxide in a few weeks as motor-vehicle traffic there does in a year, University of Colorado researchers reported this past October in Carbon Balance and Management.

In a single week this fall, they reported, wildfires in Southern California released 7.9 million metric tons of CO₂ -- equal to 25% of the monthly fumes from every car, truck, factory and power plant in the state.

• Email me at sciencejournal@wsj.com⁹.

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