

Home > News > Boulder & County News

## NOAA: Drought hinders CO2 uptake

Study finds 2002 dry weather left extra carbon in atmosphere

By Rebecca Cole, For the Camera  
Tuesday, November 27, 2007

A new study by the National Oceanic and Atmospheric Administration in Boulder shows that millions of extra tons of carbon dioxide were left in the Earth's atmosphere as a result of the 2002 drought across North America.

The findings, the first from NOAA's atmospheric monitoring and modeling system called CarbonTracker, show that the amount of carbon dioxide absorbed by vegetation and soil dropped from an annual average of 650 million metric tons to 330 million metric tons. The excess amount of the heat-trapping greenhouse gas remaining in the atmosphere that year was equivalent to the annual emissions of more than 200 million U.S. automobiles.

"Everyone here has been surprised about how big an impact the drought had on the variability of the carbon cycle," said Andy Jacobson, a University of Colorado research scientist working with NOAA and a co-author of the study. "This is the first time we've been able to get a picture of year-to-year variability and also spatial variability within the continent."

Conducted by scientists from NOAA's Earth System Research Laboratory and based on 28,000 global observations, the study used a weekly estimate of the carbon exchange across North America from 2000 to 2005. Jacobson said nearly half of the observations were directly over the continent.

"Although the analysis uses data from all over the globe, our estimates are focused in North America because that's where we have the most data," Jacobson said.

According to NOAA, North Americans release about two billion tons of carbon dioxide into the atmosphere each year through burning fossil fuels and manufacturing cement. About one-third is absorbed by forests, grasslands, crops and soil, called "carbon sinks."

Drought and other climatic variations impact sinks and disturb the natural uptake of carbon by changing regional temperatures, rainfall, soil moisture and even the length of the growing season.

In 2002, 45 percent of the United States was classified as being in "extreme" or "exceptional" drought, a fact that, when corroborated with evidence from reduced crop yields and independent modeling efforts, helped NOAA scientists pinpoint drought as the prime factor in the reduced uptake.

"With the CarbonTracker, we get enough detail to see that there's some relationship between this very large drought and that we had less carbon uptake by natural ecosystems during that year," said John Miller, a co-author and CU research scientist. "The kind of analysis that CarbonTracker provides can really link what we mean by net fluxes — the bottom line of how much carbon is being taken up or released. From there we can

look at anomalies in terms of climate — drought, extra rain, extra heat, unusually cold events — and how they might impact the bottom-line carbon uptake for a year."

Miller said there's a cyclical relationship between the climate system and the carbon cycle.

"We're pretty confident that if you suddenly get a lot of drought, you get more plant decomposition and less absorption of carbon," Miller said. "As a result, carbon dioxide is higher in the atmosphere, and the more carbon in the atmosphere the more warming. So you have a positive, vicious cycle building up."



Photo by Marty Caivano

Farmer Bruce Schlagel walks through a drought damaged barley field on his farm near Mead in July 2002. That year's drought, which covered much of the United States, left millions of extra tons of carbon dioxide in the Earth's atmosphere, according to a new study by Boulder scientists.