Hurricanes not likely to disrupt ocean carbon balance

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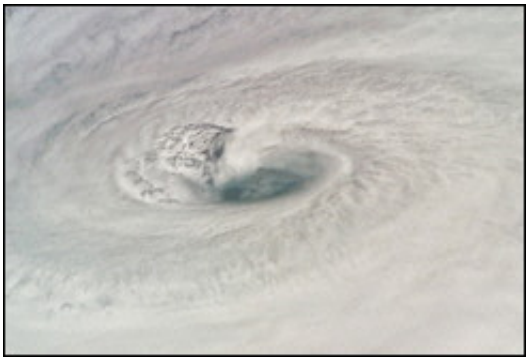

(PhysOrg.com) -- Hurricanes are well known for the trail of damage and debris they can leave on land, but less known for the invisible trail left over the ocean by their gale-force winds — a trail of carbon dioxide.

Observations in Bermuda and the Caribbean in the 1990s noted that hurricanes' powerful winds and the resultant water mixing can trigger enhanced carbon dioxide release from the ocean into the air. Large-scale extrapolations of these observations suggested that increasing numbers of hurricanes could significantly alter the overall carbon balance of the ocean and atmosphere.

However, a new study from the University of Wisconsin-Madison indicates that storm-induced carbon release is local and temporary and

does not seem to affect the long-term ability of the tropical Atlantic to absorb atmospheric carbon dioxide. The study has been accepted to publish in an upcoming issue of the journal Geophysical Research Letters.

"The suggestion was that an increase in hurricanes might reduce the ocean's effectiveness in being a carbon sink, and therefore enhance global warming," says Galen McKinley, a professor of atmospheric and oceanic sciences and affiliate of the Center for Climatic Research at UW-Madison.

Her new study suggests otherwise.

Some carbon dioxide is naturally released from the ocean each year and the amount varies over space and seasons, McKinley says. With colleagues Jennifer Koch, Val Bennington and David Ullman, she adapted an ocean circulation model to capture this variability and ask whether total carbon release increased in years with high hurricane activity.

When they applied their model across a 15-year time period (1992-2006) and the entire subtropical North Atlantic basin, where most hurricanes develop, they found no relationship between the number of hurricanes and amount of carbon dioxide released in a year.

"There is a large efflux of carbon locally during a hurricane," McKinley explains. "But when we think about that at a large scale and over the entire year, the effect goes away."

The ocean is the single largest carbon sink on the planet, meaning it absorbs and stores more atmospheric carbon long-term than anything else.

"Since the Industrial Revolution, about half of the carbon humans have emitted has gone into the ocean, which has significantly damped global warming to date," says McKinley. "However, now the ocean can only take up about 25 percent of our emissions and this rate appears to be declining, so we need to understand in detail the processes that control the ocean carbon budget."

Based on their modeling results, McKinley believes a potential increase in hurricanes — currently forecasted by many climate scientists — would not have much effect on the ocean's ability to absorb atmospheric carbon. Other factors, such as wind, biological activity, and the total amounts of carbon present in the ocean and air will likely play a larger role in determining the overall carbon balance.

"We still have a lot to learn about how natural climate variations affect things like the ocean's uptake of carbon," McKinley says. "We need to understand that if we're going to understand and predict future global warming."

Provided by UW-Madison

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