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UH researchers puzzle over oxygen output from oceans

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University of Hawaii oceanographers and colleagues have uncovered some puzzling findings about the ocean's ecological balance at a research site about 60 miles north of Oahu.

In a paper published in the journal Nature this month, the scientists point to one of the controversies about the ocean's balance -- whether the ocean is a net producer or consumer of oxygen. On Earth, the rate of oxygen production by green plants through photosynthesis is balanced by the rate of oxygen consumption by respiration, explained UH oceanographer David Karl.

"The net result of these two processes is sometimes called the 'metabolic balance of the open ocean,'" which is the title of the Nature article, he noted.


"Despite the fact that we have been able to sample the ocean for more than 100 years, we are still lacking a robust general understanding of the rates and controls of these processes," he said.

The scientists have been monitoring the ocean location, called Station Aloha, in regular monthly trips since 1988.

The study, called the Hawaii Ocean Time series, recently received \$8 million to run another five years for a total of 20 years through 2008.

Many scientists expect the ocean to help absorb carbon dioxide put into the atmosphere, mostly through fossil fuels, said UH oceanographer Edward Laws.

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"The logic of that assumes the ocean is the net consumer of carbon dioxide, that it's producing more organic matter than it's consuming and storing it in the bottom sediments of the ocean."

However, a number of studies in the past five to 10 years indicate that isn't the case, he said, "and, in fact, the ocean is consuming organic matter.

"The geochemical information says no, the ocean is a producer of organic matter. But short-term studies are saying otherwise. That's the controversy."

At Station Aloha, Laws said, scientists are seeing water super-saturated with oxygen, which is produced by photosynthesis. "So if it's consuming organic matter, why would it be super-saturated with oxygen?"

He said a substantial amount of organic matter is produced over relatively short periods when surface water is fertilized with nutrients.

If oceanographers only go out once a month to sample the water they may miss those temporary events that account for significant production, he said.

"We really need to have some continuous monitor out there so these things don't get overlooked," Laws said.

Karl has a mooring at the site monitoring oxygen concentrations, which influenced the paper in Nature, Laws said.

Other authors of the paper were Paul Morris, UH research assistant in oceanography; Peter Williams of the University of Wales School of Ocean Sciences, and Steven Emerson of the University of Washington School of Oceanography.

Hawaii Ocean Time series
Nature

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