UC SANTA BARBARA

THE Current

April 25, 2002
Gail Gallessich

Color of Ocean Yields Global Warming Clues

A green ocean is a productive ocean; the light from the sun helps the phytoplankton -- tiny ocean plants -- to be productive. This production in turn drives ocean food webs. New research, published in Science on April 26, assesses the color of the ocean and finds that many key ecosystem parameters describing marine food web function are nearly constant across the entire North Atlantic Ocean. The research is also expected to yield clues about the carbon cycle and global warming.

David Siegel, professor of geography at the University of California, Santa Barbara, and first author on the paper, analyzed satellite ocean color data from the 'Sea-viewing Wide Field of view Sensor' called "Sea WiFS" to address the factors regulating the spring bloom of phytoplankton in the North Atlantic Ocean.

"When viewed from space, the North Atlantic spring bloom is among the largest mass greenings observed on the Earth surface extending over scales of more than 2000 kilometers," states the article. The blooming propagates to the north at speeds of 20 kilometers per day, leaving a green wake in its path.

"The productivity of the ocean is well established," said Siegel. "What we don't know is how it gets recycled, how the food chain works. We're trying to get at these loss processes, which will tell us how the ocean's biological pump works."

The biological pump is the mechanism by which carbon dioxide is exported from the surface ocean into the deep ocean via sinking particles. It is a critical factor in the carbon cycle and global warming.

The satellite data showed light flux and greenness or chlorophyll. From this information Siegel and colleagues were able to deduce the conditions required to start a "spring bloom."

The data also showed that the partitioning of ecosystem function is constant. "It shows the resilience of open ocean communities," said Siegel, "and that simple models may indeed work."

Previously this research on spring blooms was done at sea with microscopes and other tools. But with the satellite, Siegel was able to evaluate the process using tens of thousands of data points.

"This opens the door to using satellite measurements to study grazing and respiration," said Siegel. "These important loss processes have not yet been well characterized."

Jim Yoder, a co-author of the report, and currently division director of ocean sciences at the National Science Foundation, commented, "We used satellite and other data to observe the start of the phytoplankton growth period (bloom) in the North Atlantic ocean. We were able to confirm that a simple model developed many years ago, based on observations in coastal waters can be used to explain the timing of the spring growth period in the entire North Atlantic. We also quantified the role that plankton animals and bacteria play in determining the timing of the phytoplankton bloom and its duration."

The work was funded by NASA and the National Science Foundation.

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the

edge of the Pacific Ocean.