

A Forest Blooms in the Marine Desert: Implications for mitigating climate change.

In the open ocean most surface waters are considered by scientists to be a biological desert, yet satellite imagery provides evidence that massive blooms of microscopic plants, called phytoplankton, often occur. How this happens has perplexed scientists for decades. Now a multi-disciplinary team called E-Flux, led by University of South Carolina researcher Dr. Claudia Benitez-Nelson from the Department of Geological Sciences and the Marine Science Program suggests that large-scale eddies may solve this conundrum.

Their findings reported in the May 18 issue of the journal *Science* suggest that these elusive swirling currents bring deep water rich in nutrients to the surface, fueling a biological explosion. This report is published in combination with another article by Dr. McGillicuddy et al. and a Perspectives piece by Dr. Michaels regarding the role of eddies in ocean productivity.

Funded by the National Science Foundation, a team of international scientists from over 14 institutions traveled to a region of the Hawaiian Islands where these mysterious eddies are known to exist. In March 2005 they studied a 200 km-wide eddy subsequently named “Cyclone *Opal*”. “It was like finding a rainforest in the desert. The waters were teeming with life!” says Dr. Benitez-Nelson.

These researchers had the opportunity to examine how the phytoplankton bloom evolved with time and they noticed a surprising result. “We expected that once the phytoplankton bloom started to decay that the biomass would sink rapidly from the surface ocean, but this simply did not happen” states Benitez-Nelson. Contrary to expectations, most of the organisms were rapidly eaten and recycled in surface waters. Only their empty opal shells sank to depth.

These findings have important implications for understanding how carbon dioxide is taken up by phytoplankton and eventually transported to the deep ocean where it can reside for thousands of years, a process known as “the biological pump”. Dr. Benitez-Nelson states, “In essence, what these eddies reveal is that abrupt pulses of nutrients may not always result in significant carbon export to the deep ocean.” Therefore projects involving fertilization of the oceans to capture carbon dioxide from the atmosphere may prove unsuccessful without a deeper understanding of ocean ecology.

For More Information:

Dr. Benitez-Nelson’s Website

<http://www.geol.sc.edu/cbnelson/>

E-Flux Program Website:

<http://www.soest.hawaii.edu/oceanography/eddy/>