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BLACK WATER TURNS THE TIDE ON FLORIDA CORAL

Research Findings Released by USF St. Petersburg and NASA Reveal Effects of Local Black Water Phenomena

A single phone call placed to the College of Marine Science at the University of South Florida St. Petersburg was the catalyst that led to a NASA-backed research project exploring an anomaly that would have far-reaching consequences in our coastal waters.

“Our research actually got started by accident,” said Dr. Chuanmin Hu, a research assistant professor at the Institute for Marine Remote Sensing at USF St. Petersburg’s College of Marine Science. In early 2002, “we received a phone call from a local fisherman who reported seeing ‘black water’ off the southwestern coast of Florida,” said Hu. Using the university’s satellite antenna and the college’s state-of-the-art equipment, Hu and his associates pulled satellite images that “clearly showed a large area of dark water.”

The patch of “black water” spanning over 60 miles in diameter formed off southwestern Florida and contributed to severe coral reef stress and death in the Florida Keys, according to results published from research funded by NASA, the U.S. Environmental Protection Agency and the National Oceanic and Atmospheric Administration (NOAA). The “black water” contained a high abundance of toxic and non-toxic microscopic plants.

Floridians may be accustomed to the yearly “blooms” of red tide that plague their coast, but in the summer and fall of 2001, everyone was taken off guard by the massive red tide that left our beaches strewn with dead fish and negatively impacted other sea life. “It was the largest red tide we had seen in many years,” said Hu. He went on to explain that red tide is the result of microscopic plants that, due to pervasive conditions, multiply and permeate the water.

Another marine occurrence of particular interest to researchers is the formation of ‘plumes’ that develop when terrestrial runoff deposits large amounts of dissolved minerals into the ocean. “When a ‘bloom’ and a ‘plume’ occur simultaneously, the plants are stimulated by the high concentration of nutrients in the terrestrial runoff,” explains Hu. This is precisely what happened in 2002, thereby forming the large anomaly of dark water that traversed our coastline.

When Hu and his colleagues examined the data collected by divers from the dark water area in the Florida Keys, they discovered a 70 percent decrease in stony coral cover, a 40 percent reduction of coral species, and a near-elimination of sponge colonies at two reef sites after the dark water passed. By examining satellite images and field survey data, the authors concluded that the coral reef ecosystem was stressed by microscopic organisms and toxins contained in the dark water.

The “black water” event caused alarm among local fishermen, divers, and the public, as the color of the water was unusual and fish seemed to avoid this large area of dark water. Satellite instruments such as the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) aboard Oceanica’s SeaStar satellite and the Moderate Resolution Imaging Spectroradiometer (MODIS) aboard NASA’s Terra and Aqua satellites provide information on ocean color that allows scientists to monitor the health of the water and the shallow benthic (ocean bottom) environment. The SeaWiFS and MODIS measurements of the dark water led to a number of investigations to help clarify the issues and to provide answers to the public’s concerns.

Co-authors on the research article included Serge Andrefouet and Frank E. Muller-Karger of USF; Keith E. Hackett, Michael K. Callahan, and Jennifer L. Wheaton of FFWCC, St. Petersburg, Fla.; and James W. Porter of the University of Georgia, Athens, Ga.

NASA funded part of this research as part of NASA’s Earth Science Enterprise mission, which is to study the changes in the Earth system forced by various natural and manmade processes.

For more information and images, see:

SeaWiFS website:
http://seawifs.gsfc.nasa.gov/

MODIS website:
http://modis.gsfc.nasa.gov/

University of South Florida St. Petersburg
http://cfpl.usf.edu

USF St. Petersburg, College of Marine Science
http://www.marine.usf.edu/

For additional information or interview with Dr. Hu © USF St. Petersburg
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