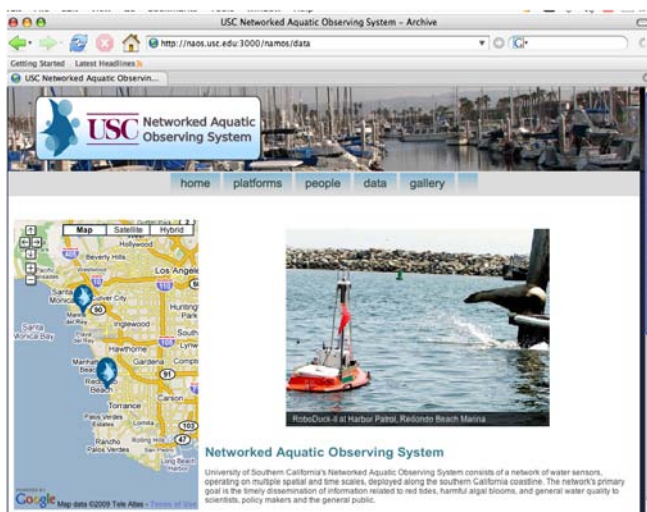


## **CENS Aquatic Application: Science, Education and Outreach of the Networked Aquatic Microbial Observing System**

Networked Aquatic Microbial Observing System (NAMOS) is a CENS-supported application to develop autonomous sensors networks in support of monitoring and experimental studies of coastal water quality. Coastal municipalities nationwide have struggled to maintain high levels of water quality in their harbors and on their beaches in the face of an onslaught of chemical and biological contaminants originating from the activities within their own communities, or via the transport of various contaminants from inland sources via storm drains, rivers or effluent pipes. The threat of anthropogenic inputs to the coastal waters of urbanized regions of the country, in particular, has increased dramatically in recent decades. Efforts by municipalities to provide responsible environmental stewardship of their coastal waters are often thwarted by a lack of water quality data and inadequate scientific understanding.



NAMOS has established a strong collaboration with the City of Redondo Beach to develop an in-situ sensor network (wireless sensor buoys and a robotic surface vehicle). This network provides water quality monitoring of environmental parameters (dissolved oxygen, temperature, salinity, algal biomass) towards the long-term goal of developing an understanding of the factors leading to recent adverse environmental events (fish kills) and guiding management decisions to prevent future events.

Accomplishments to date have included the design, build-out and deployment of an environmental monitoring network within the harbor to characterize pertinent parameters within the harbor to correlate increases in phytoplankton blooms with water quality chemistry and physics. The network is being used to establish the immediate factors leading to fish kills within the harbor. Plans for the immediate future are to develop a 'real-time' web-based portal for dissemination of this information to the scientific community, city officials and the public.

The NAMOS scientists and staff have conducted extensive outreach on this project to the city and to a broader community to disseminate research findings, to stimulate interactions with the public, and to augment science education of students from local middle schools. In addition, NAMOS' scientists and staff have conducted numerous press releases to radio, television and newspapers that highlight the CENS-related work as it pertains to harmful algal bloom research and toxic events in local waters. Examples are given on the following pages.

## Outreach/Education:

### Redondo Beach Clean Waterfront Festival (October 11, 2008):

The Clean Waterfront Festival was held at a favorite local community area, Seaside Lagoon. The all-day event focused on coastal ocean stewardship. It was open to the public and featured invited speakers, booths by local schools, environmental and governmental groups.



Photos above: The CENS NAMOS exhibit at the Redondo Beach Clean Waterfront Festival showcased state-of-the sensing equipment for water quality profiling and monitoring, and description of network-based approaches for its application. The public examined sensor instrumentation (above, left), and got a chance to direct the robotic boat (above, left) inside the lagoon. Councilman Chris Cagle of the city noted of the CENS program "...it's a great example of how you can get government and the academic scientific community working together to solve a problem..."

Photos below: Mayor Michael A. Gin of the City of Redondo Beach (center of photo at left), and middle school students from the city (right), visit the NAMOS exhibition at the Festival.



The History Channel: *The History Channel* visited the NAMOS research crew in summer of 2008 to film and conduct interviews on the role of sensor networks in monitoring coastal waters for harmful algal blooms such as ‘red tides’.

Below left, graduate student Beth Stauffer (seated) and Marie-Ève Garneau (standing) explain the sensor network and water sampling in King Harbor of the City of Redondo Beach to a crew from *The History Channel*. Below right, a cameraman films the movement of RoboDuck, an robotic surface vehicle that carries a vertically profiling sensor package.



The Weather Channel: *The Weather Channel* filmed operation of the robotic boat in 2007. A segment on climate change, and the role of sensor-equipped, robotic vehicles in study of climate-ocean interactions, was aided later that year.



## **Some recent news releases from our research group:**

### Television

- National CBS Evening News: “Sea Creatures in Trouble” and “The Spread of Toxic Algae”. February 12<sup>th</sup>, 2007
- ABC, KCal9 News: “Toxic Algae Poisoning Los Angeles pelicans”. April 13<sup>th</sup>, 2006

### Newspapers

- Los Angeles Times: series on “Altered Oceans Part I: A Primeval Tide of Toxins”. Five-day feature on ‘Altered Oceans’, summer 2006). LA Times reporters Kenneth R. Weiss and Usha Lee McFarling were named recipients of the 2007 American Society for Microbiology (ASM) Public Communications Award. "Altered Oceans," was a result of their 18-month investigation into human-caused microbiological changes that are creating a biological imbalance in the world's oceans.
- The Daily Breeze: ‘Tackling A Toxic Tide’. June 10<sup>th</sup>, 2006
- Mercury Press: “Sea lions stranded on SoCal beaches likely poisoned by algae”. March 17<sup>th</sup>, 2006
- The Beach Reporter: “Red Tide research to start”. January 18<sup>th</sup>, 2007
- The Beach Reporter: “Deploying Sensors”. January 26<sup>th</sup>, 2007
- The Log Newspaper: “USC Scientists Join Forces With Redondo Beach to Shed Light on Toxic Algae Blooms”. February 8, 2007.
- The Log Newspaper: “Robotic Boat Being Used to Study Red Tide”. March 23, 2007.

### Radio

- KPCC 89.3 National Public Radio, Spring, 2006

### Other releases

- “In Harm’s Way: Toxic Algae in our Coastal Waters”. Documentary video, Directed and composed by Lauren Farrar, USC, School of Cinema-Television).