

2008 Annual Report: Cooperative Institute for Climate and Ocean Research (CICOR)

A 1998 agreement between WHOI and NOAA (the National Oceanographic and Atmospheric Administration) established at WHOI a unique center for climate research – CICOR, the Cooperative Institute for Climate and Ocean Research. For over a decade, CICOR has drawn on the leadership and research excellence at WHOI, in service of NOAA's mission and goals.

With its founding agreement renewed in 2001, CICOR has been a global and national resource for scientists and has strengthened the relationship between WHOI and NOAA, enabling long-term research partnerships in key areas of climate observations and analyses, marine policy, seafloor mapping and harmful algal bloom research. CICOR has come to be known as a catalyst and incubator of ideas for collaborative climate, coastal and ecosystems research.

As NOAA's focus on regional activity has increased, so too has CICOR's role in regional and planning efforts. In 2008 CICOR supported 82 projects, totaling nearly \$8.5 million in funding. Since 1998, CICOR has supported more than 188 research, education, outreach and program development projects, bringing its ten-year activity to more than \$46.8 million.

2008 was a decisive year programmatically for CICOR. Anticipated a competition for a regional Cooperative Institute (CI), NOAA extended the CICOR agreement an additional year until June 2009, and in October 2008 requested proposals for a new cooperative institute in the Northeast region. With a focus on regional ecosystems and a call for multiple partners, the model of the new CI will look significantly different than CICOR, so CICOR itself has entered a transition stage.

To support some continuing projects, NOAA has extended the cooperative agreement through June 2010, and we anticipate a further no-cost extension until June 2011. In addition to maintaining certain research and educational activities, the office has continued to bring together regional and international investigators. CICOR principal investigators and WHOI researchers have deepened their familiarity with NOAA strategic goals for the region, and have strengthened collaborative relationships with NOAA officials and colleagues from other institutions to further these goals. CICOR scientists are actively engaged in ocean observing and regional coordination in this region and around the globe.

CICOR continued to make strong contributions to WHOI academic programming in 2008: CICOR supported three summer student undergraduate fellows, one in each of the theme areas, and was instrumental in placing NOAA Hollings Scholars with WHOI and NOAA PIs for summer internships. Ricardo De Pol Holz completed his research as a Post Doctoral Investigator with Lloyd Keigwin (Geology and Geophysics Department), studying paleoceanography and the role of the ocean in global climate change. CICOR also supported Post Doctoral Investigator Tobias Kukulka who, together with Albert J. Plueddemann from the Physical Oceanography (PO) Department and John Trowbridge from the Applied Ocean Physics and Engineering (AOPE) Department, investigated the influence of surface waves on the oceanic boundary layer. Post Doctoral Investigator Philip Wallhead is investigating phytoplankton population dynamics on Georges Bank by testing models with *in situ* observations from the GLOBEC (GLobal Ocean ECosystems Dynamics) program, with advisor Dennis McGillicuddy (AOPhysicsEngineering.)

Through technological developments in observations and modeling and through collaborative planning in the region, CICOR has forged advances toward many of NOAA's goals, including these highlights:

- CICOR contributions to major elements of the global ocean climate observing system – including profiling ocean floats (ARGO), ocean gliders, ocean reference stations, and collection of high quality surface meteorology from Volunteer Observing Ships (VOS) – are improving the quality and quantity of climate observation.
- CICOR is proud of its scientists and data managers who partner with NOAA to build NOAA's Integrated Ocean Observing System (IOOS.) The IOOS marks a major shift in the traditional approach to ocean observing, drawing together many networks of disparate, Federal and non-Federal observing systems to produce data, information, and products at the scales needed to support decision making.
- CICOR Fellow, Dr. Bob Beardsley and his UMASS Dartmouth colleague Dr. Changsheng Chen continue their cutting edge collaborative work on coastal modeling that brings climate and weather data to the shoreline. In 2008 they set up the Northeast Coastal Forecast System (NECOFS), which provides 3-day forecasts (and hindcasts) of the surface weather and ocean currents and water properties for the New England/Gulf of Maine coastal region – now being posted on the NECOFS website. The regional Taunton, Mass. NOAA National Weather Service Weather Forecast Office is using NECOFS forecast data for winter icing warnings and inundation due to storm and hurricane activity. Beardsley and Chen are working with the Boston U.S. Coast Guard Station to provide NECOFS forecast data in formats useful in their search and research planning efforts. The Massachusetts Water Resource Authority and Massachusetts Coastal Zone Management Office are other government users of NECOFS forecast information.
- In 2008 CICOR Fellow Andrey Proshutinsky coordinated a CICOR Distinguished Lecture Series on “The Arctic future under the



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WHOI biologist Don Anderson (left) and oceanographer Dennis McGillicuddy review the results of a computer simulation of the 2008 harmful algae season in New England waters. The model predicted a large regional outbreak of harmful algae that materialized later in the spring. (Photo by Tom Kleindinst, Woods Hole Oceanographic Institution)

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influence of an ice-free summer ocean," consisting of four lectures:

- "Implications for Globalization and Access Change in the Maritime Arctic," by Lawson W. Brigham, PhD Deputy Director, U.S. Arctic Research Commission Chair, Arctic Marine Shipping Assessment of the Arctic Council.
- "Penetration of wind energy into the Arctic Ocean: impact of a changing ice cover" by Harper Simmons.
- "State of Fate of Permafrost on a Changing Planet" by Vladimir Romanovsky, Geophysical Institute, University of Alaska Fairbanks.
- "The forcings and feedbacks of rapid Arctic sea ice loss" by Marika Holland, Climate and Global Dynamics Division, National Center for Atmospheric Research, Boulder, CO.

Also in 2008, the CICOR office sponsored events including:

- An April workshop, informal talks and round table discussion moderated by Ray Schmitt (WHOI PO Department) on "Change in the Global Freshwater Cycle: The Ocean's Role," with Graeme Stephens (Department of Atmospheric Science, Colorado State University) and Lisan Yu (WHOI PO Department) participating.
- The October 2008 Connecticut River Science Workshop at the Connecticut River Museum in Essex, CT provided a forum for over 50 scientists active in the Connecticut River basin to share their work and ideas and to foster collaborations for future research on the Connecticut River and its drainage basin.

Finally, WHOI biologist Don Anderson and modelers Dennis McGuillicuddy and Ruoying He conducted computer simulations of the spread of harmful algal blooms along New England's coast, providing useful data to NOAA Fisheries and coastal managers. In 2008 they successfully predicted a widespread bloom that materialized in New England coastal waters. The forecasting method offers officials and shellfish harvesters a new early-warning tool to help minimize health risks and economic losses caused by shellfish tainted by the toxic algae, *Alexandrium fundyense*.

—[Robert Weller](#), CICOR Director

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