

The College of Marine Science at the University of South Florida

FRANK MULLER-KARGER, KENT FANNING, ALBERT HINE, WILLIAM HOGARTH



Fig. 1. Saint Petersburg Training Station circa 1942. View of training station from the sea. Vessel on left is the TV T a a; the TV V g is on the right.

the department an SUS “Center of Excellence.” Each state university received one—and only one—of these designations. For us, it led to the near doubling of the faculty because it prompted the Florida legislature to give us permission and funds to hire eight new faculty.

Another milestone came in 1982, when the Florida Board of Regents established our independent Ph.D. program (we could only grant M.S. degrees before then). That program per-

mitted us to recruit higher caliber graduate students and thus greatly enhance the level of our oceanographic research. The ensuing expansion rapidly revealed a lack of laboratory and office space, and, after much effort, the State of Florida was persuaded to create a unique facility that nearly doubled the laboratory and office space available to the Marine Science Department. The resulting structure was jointly constructed by the SUS and the General Services Administration of Florida and would be jointly shared by the Marine Science Department and the state’s Department of Environmental Protection’s (DEP) Florida Marine Research Institute (which then became the Florida Fish and Wildlife Conservation Commission’s [FWC] FWRI in 2004 by legislative rearrangement of the FWC and the DEP) (Figure 2).

A prime component of the “joint” research facility was a satellite data facility that led, among other things, to our being able to take a leading position in U.S. satellite oceanography and coupled physical–biological numerical modeling. This greatly expanded research on the functioning of marine ecosystems. Completed and occupied in 1994, the space allotted to marine science was designated as the Knight Oceanographic Research Center (KRC) to honor the support of the William Knight family (see below). The additional space allowed us to hire more faculty and enhance student research efforts.

In 1993, CMS set up physical oceanography real-time system (PORTS) in partnership with NOAA and the Tampa Bay Harbor Pilots Association. This system of moorings and instrumented locations around Tampa Bay has provided critical data on currents, winds, tides, and other parameters to all marine interests. This program is valuable to the shipping industry as well as to the science of ocean monitoring—



Fig. 2. The C.W. (Bill) Young Marine Science Complex in the City of Saint Petersburg, FL. CMS of the University of South Florida is housed in the large T-

leading, for example, to a greater than 60% reduction in the frequency of vessel groundings in the bay. After the west coast of Florida was ravaged by an undetected (“no-name”) severe storm in 1993, the experience of USF Marine Science in monitoring physical circulation and meteorological processes helped to persuade the State of Florida to fund the West Florida Shelf Coastal Ocean Monitoring and Prediction System (COMPS). In 1993, the department installed its first satellite-tracking antenna to download real-time imagery from space-based ocean-observing instruments; a second antenna was built on the Bayboro Peninsula in 1998, providing the capability to track NOAA and National Aeronautics and Space Administration (NASA) satellites covering the Gulf of Mexico, Caribbean Sea, U.S. East Coast, and part of the eastern tropical Pacific Ocean. These programs provide real-time imagery and data to researchers and the public on a 24 hour a day, 7 day a week basis.

Combined with our faculty’s impressive scientific credentials and scientific leadership, this infrastructure greatly facilitated our participation in the Southeast Coastal Ocean Observing Regional Association (SECOORA), the Gulf of Mexico Coastal Ocean Observing System (GCOOS), and the Caribbean Sea Regional Association (CaRA). The data produced in near real time also serve these elements of the U.S. Integrated Ocean Observing System.

In 1994, the Florida legislature provided funding for engineering positions at the Center for Ocean Technology (COT). This center is now a premier site for the development of ocean sensors for use in moorings and underwater vehicles. Its expansion included the establishment of a national center for microelectromechanical systems technology (MEMS) and the development of ocean sensors for Homeland Security. Because of the success of COT, the renowned SRI Corporation, located near Stanford University, established SRI International in Saint Petersburg to develop marine-related research and pursue marine technology solutions. SRI International thus became part of the C.W. (Bill) Young Marine Science Complex.

In 2009, CMS acquired Florida’s newest oceanographic research vessel, the R/V *Wendell B. Red II* (Fig. 3). This 115-foot, 194-ton vessel was purchased by USF for \$2.1 million for use by the FIO, a consortium of Florida’s public universities, private higher education institutions, and state agencies involved in marine research.

In 2010, the college further expanded its science footprint on the USF Saint Petersburg campus with a new Science and Technology facility planned jointly with the USF Saint

Petersburg campus and CMS. Approximately one half of the laboratory space in this new building is reserved for the college, and the college shares the classroom space with USF Saint Petersburg. Laboratory space for a new program in Marine Resource Assessment in the college will be mainly located in the new structure. Also the CMS outreach program, Oceanography Camp for Girls, will have storage and classroom space in the new structure.

These are only a few of the highlights of the very dynamic evolution of CMS. Over the years, our faculty members, staff, and students have led and participated in many prestigious national and international research expeditions and programs. We have provided leadership in scientific education at the graduate level using this infrastructure and capacity and we have established important workforce training and public outreach programs that link our scientific endeavors with resource management and public education. Among the scientific programs that CMS has participated in and remains engaged in

tem Dynamics (GLOBEC), the National Ocean Partnership Program, the Tropical Ocean-Global Atmosphere and Tropical Atmosphere-Ocean program, the Carbon Retention in a Colored Ocean (CARIACO) Time-Series project, the Bermuda-Atlantic Time-Series Study, and many more. The CMS also was funded to provide nutrient analyses for the hydrography portion of the World Ocean Circulation Experiment.

In addition to the fundamental research conducted around the globe on shelf waters, coastal and estuarine waters, the deep ocean, and watersheds, CMS also researches socially relevant issues such as long-term sea-level rise, coral reef demise, recent paleoclimate change, ocean acidification, harmful algal blooms, fisheries management, water quality, shoreline change, oil drilling and the *Deep Sea H₂S*, Gulf of Mexico crisis, navigation, and various aspects of national and international security. Many of these investigations have led to the invention of new technologies and methodologies at the College's Center of Ocean Technology. Of particular note is the development of new technologies for moorings, unmanned underwater vehicles such as gliders and remotely operated vehicles, and data gathering via satellites. Our very active real-time satellite data system receives and processes data and then distributes it to the public. Our program has been at the forefront of marine environmental monitoring since the early 1980s.

Our faculty are active contributors to international and national proposal review panels, workshops, and investigation teams including the Ocean Studies Board; various National Research Council committees; NASA, NOAA, and USGS Earth observing planning teams (i.e., MODIS, SeaWiFS, GRACE, *T₁ & P ed*, *Ja*); the University National Observatory System; and the presidential blue-ribbon U.S. Commission on Ocean Policy.

FUNDING THE RESEARCH

Research funding in marine science has grown since the Marine Science Institute was established in 1967. After growing slowly to \$7 million/yr in 1995–96, it increased to \$9–11 million/yr in 1999–2000, and then nearly doubled in 2000–01. The college now receives a significant portion (over 85%) of its research funding from federal sources and has established itself as a premier research entity within the university. Overall, the university receives about 48% of its external funding from federal sources, and CMS is one of the largest recipients of federal funding at USF.

CMS offers M.S. and Ph.D. degrees with specializations in biological, chemical, geological, and physical oceanography, as well as a brand-new additional focus area in marine resource assessment. Students are trained in an interdisciplinary manner. Both M.S. and Ph.D. candidates are required to complete a core course program covering the four basic oceanographic disciplines. Requirements for the M.S. degree include 32 credit hours of course and research work and defense of a thesis that makes an original contribution to oceanography. Can-

Sciences. The college also awards Gulf Oceanographic Fellowships, the Coastal Science Fellowship, and the Sanibel-Captiva Shell Club Fellowship. Von Rosenstiel Fellowships are reserved for first-time marine science graduate students. There is also the Murtagh Fellowship and the Parrot-Head Fellowship. The Riggs Fellowship was named to honor the late Carl Riggs, a past USF vice-president for academic affairs and a champion of marine science at USF. The Wachovia Bank Fellowship is reserved for an outstanding first-year student.

The endowed Sackett Prize, named in honor of the late Department of Marine Science Chair William Sackett, is given to a Ph.D. alumnus in recognition of outstanding research achievement.

CMS also has implemented several fellowship programs to recruit underrepresented minorities. Particularly relevant are the Bridge to the Doctorate fellowships funded by the NSF and the fellowships provided by the Alfred P. Sloan Foundation Minority Ph.D. Program to students who are beginning their doctoral work. The college has dedicated additional funds as a match to these programs to attract even more underrepresented minority students.

Since its inception, the Marine Science program at USF (first as a department and then as a college) has produced 483 graduates (145 Ph.D. and 337 M.S.). In 2003, the university administration committed funds to support a review of the Marine Science Ph.D. program. As part of that review, a self-study was conducted that provided some interesting results concerning our Ph.D. graduates, who numbered 92 at the time. Of the 92 graduates, professional information was obtained on 87 (or 95%). Thirty-three (or 36%) had become faculty members or researchers at universities. The institutions where they worked were quite diverse: Penn State, Cal Tech, University of Mississippi, Eckerd College, Saint Petersburg College, University of California at Irvine, University of Georgia, University of West Florida, Skidaway Institute, Florida Gulf Coast University, East Carolina University, University of Maine, University of Maryland, University of North Carolina (Wilmington), and SUNY, among others. Four of these universities were in foreign countries (three in Korea and one in Brazil). Eleven of the more recent graduates had postdoctoral positions (five at USF, and six external). Seven graduates were research associates (six at USF, one external). Three worked at private research institutions. Twenty (or 22%) worked in research-oriented agencies such as NOAA, Environmental Protection Agency (EPA), USGS, and

the state's FWRI; 15 of those 20 worked in federal agencies, and 5 in state agencies (in Florida and elsewhere). Eleven graduates worked in private businesses, most of which were oriented toward environmental research. Two had gone on to become licensed in and practice other professions. We learned that the majority of graduates moved out of state to achieve their professional goals, but 40 (or 43%) remained in Florida. In summary, it was clear that the vast majority of marine science Ph.D. graduates were indeed professionally applying their education. They continued to make original contributions to knowledge as well as transmit their knowledge to students and colleagues. A respectable number of them have become involved with practical applications of ocean science.

OUTREACH

In 1991, the Department of Marine Science established its Oceanography Camp for Girls. This summer program recruits girls transitioning from middle school to high school for a summer camp focused on coastal and ocean sciences. Its goal is to engage these girls in the wonders and vitality of science at a critical time in their lives, when they are developing lifelong interests. This ongoing science outreach project has been very successful, with hundred of girls experiencing the thrill of research in a supportive environment. It led to a much larger outreach effort involving telecasts to middle schools around the world (Project Oceanography) and establishing a Center for Ocean Sciences Education Excellence (COSEE), which were active during much of the 1990s through 2005. In 2010,2005.

- 1970. The first set of midwater micronekton and zooplankton are taken from a standard station in the open Gulf of Mexico by Tom Hopkins. This food web has been studied for over 30 yr, making it one of the most intensely studied food webs in the ocean.
- 1970. First NSF grant awarded to the department.
- 1971. Formation of the Marine Science Department complete.
- 1972. First contract from the Office of Naval Research (ONR) is awarded to the department.
- 1978. Florida Board of Regents designates the department as a "Center of Excellence."
- 1979. Florida legislature allocates funds for eight new faculty positions.
- 1980. Robert M. Garrels (geochemist and member of the National Academy of Sciences) joins the faculty.
- 1982. Florida Board of Regents approves stand alone Ph.D. program in marine science at USF.
- 1982. Saint Petersburg Progress endows a faculty chair in marine science.
- 1982. First fellowship for a marine science graduate student established by Nelson Poynter Fund in honor of John B. Lake, publisher of the *Sa Pe e b , g T e*.
- 1985. William Knight family provides department with its first endowed fellowship for a marine science graduate student. Subsequently,

- 2003. Faculty reaches 30, including two African Americans.
- 2003. College becomes a member of the Consortium for Oceanographic Research and Education and the Joint Oceanographic Institutions.
- 2006. CMS receives \$8.5 million grant for advanced instrumentation from the Florida Technology, Research, and Scholarship Board

Pamela Hallock-Muller (Professor), Ph.D., Uni-

William Sackett (Distinguished University Professor, Marine Science Chair, deceased), Ph.D., Washington University, St. Louis. Stable and radioactive isotope geochemistry in the marine environment.

Sang-Ik Shin (Physical Oceanography, Assistant Professor), Ph.D., University of Wisconsin—Madison, 2002. Climate and climate change modeling.

Christopher D. Stallings (Assistant Professor), Ph.D., Oregon State University, 2007. Marine ecosystem-based resource assessment and modeling.

Sarah F. Tebbens (now at Wright State University, Assistant Professor), Ph.D., Columbia, 1994. Marine geophysics, aeromagnetism, plate boundary processes, triple junction evolution, natural hazard assessment.

Joseph J. Torres (Professor), Ph.D., University of California—Santa Barbara, 1980. Biological oceanography, deep-sea biology, bioenergetics of pelagic animals, comparative physiology.

Edward S. Van Vleet (Professor), Ph.D., Rhode Island, 1978. Chemical oceanography, organic geochemistry, molecular biomarkers, hydrocarbon pollution.

Gabriel A. Vargo (retired, Emeritus Professor), Ph.D., Rhode Island, 1976. Biological oceanog-

raphy; phytoplankton ecology, physiology, and nutrient dynamics.

John J. Walsh (Distinguished Professor), Ph.D., University of Miami, 1969. Continental shelf ecosystems, systems analysis of marine food webs, global carbon and nitrogen cycles.

Robert W. Weisberg (Distinguished Research Professor), Ph.D., University of Rhode Island, 1975. Physical oceanography, equatorial ocean dynamics, estuarine and nearshore circulation studies.

Raymond Wilson (Associate Professor, moved to the California State University, Long Beach, 1998), Ph.D., UCSD—Scripps Institution of Oceanography, 1984. Ichthyology, fish population genetics, molecular evolution.

Qingnong Xiao (Physical Oceanography, Associate Professor), Ph.D., Nanjing University, 1994. Meteorology, assimilation of radar and satellite observations in models for improvement of predictions of mesoscale weather systems.

COLLEGE OF MARINE SCIENCE, UNIVERSITY OF SOUTH FLORIDA, 140 SEVENTH AVENUE SOUTH, SAINT PETERSBURG, FL 33701. Send reprint requests to FMK.