Above: Image of the southern Florida Keys, including the Key West Naval Station on Boca Chica Key, captured by FORMOSAT-2. The image shows the tidal channels that provide a daily exchange of water in Florida Bay with the saltier water of the ocean. Credit: Center for Southeastern Tropical Advanced Remote Sensing (CSTARS).

Cover: The eyewall of Hurricane Isabel, taken from NOAA’s hurricane hunter aircraft in September 2003. Photo credit: Tim Akerson

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It's no wonder that our interdisciplinary approach to research and education attracts some of the best marine and atmospheric science students from around the world. In 2007, applications for graduate admission to the Rosenstiel School increased six percent, a testament to the quality of our programs, as well as the relevance our research has in today's society.

Rosenstiel School graduate students are frequently the recipients of coveted awards and fellowships in scientific research. While at the School they conduct important studies and participate in valuable fieldwork in marine and freshwater environments around the globe. In 2007, the Rosenstiel School conferred a total of 47 degrees, which is about 24 percent higher than our ten-year average number of students per class over the last ten years.

The University of Miami enrolled an unprecedented 290 undergraduate students in Marine Science, Marine Affairs and Meteorology in fall 2007. In a precedent-setting move, University of Miami President Donna E. Shalala approved the transfer of the undergraduate marine science program from the College of Arts and Sciences to the Rosenstiel School, effective fall 2008. The shift is part of an effort to provide greater access to the School's graduate and professional level scientific research earlier in a student's academic career and to offer students a bachelor's degree conferred by one of the nation's top-rated marine schools.

Forming Forecasts & Policy

As one of the premier institutions for research into hurricane development and intensification, as well as the study of atmospheric dynamics, our work is inherently linked to national policy. Through our sophisticated modeling, and the images acquired by our state-of-the-art Center for Southeastern Tropical Advanced Remote Sensing (CSTARS), we are supplying important decision-support information to government agencies, and helping to inform policies that can safeguard human life.

Throughout this Annual Report we highlight several of the collaborations the School has established with government entities, non-profit organizations, private and public agencies, and other academic institutions. Sponsored funding in 2007 reached $47.9 million, an increase of 3.7 percent over the previous year, despite an extremely competitive funding environment.

The University of Miami is making tremendous strides in enriching its research capabilities. Our scientists are actively engaged in the University's newly-announced Center for Computational Science which will create a valuable high performance computing core, and serve as a catalyst to enable greater interdisciplinary collaborations. This added data capability, when supplemented with the fiber optic network provided by the Florida LambdaRail, will provide Rosenstiel scientists with direct connectivity to numerous domestic and international research networks for the transfer of critical knowledge about planetary processes.

The Rosenstiel School is also joining forces with other schools, colleges and divisions within the University of Miami to work in an increasingly multidisciplinary manner. This approach affords faculty members and students access to broader perspectives and greater creativity in trying to solve today's most pressing environmental issues. One sterling example of this is the Leonard and Jayne Abeo Center for Ecosystem Science and Policy, which brings together university-wide resources to help promote informed policy making, and supports science-based environmental management for the future.

Sharing The Knowledge

With nearly 60 percent of the world's populations living within 75 miles of a coastal area, understanding the interactions between communities and the ocean has never been more important. The Rosenstiel School has an active outreach program that provides local students, teachers and members of the community with the latest information to help them become more aware of their natural surroundings. Programs range from our popular Sea Secrets lecture series, which this year expanded beyond Miami to Naples, to campus tours for high school students, participation in community-based events, and a wide variety of scientific training sessions for youth and teachers.

Over the next several decades, the School's work will be essential to improving how well we can forecast future states of the Earth system, as well as observe it and validate the underlying models that are currently in place. Regardless of whether these models are physical, biological, chemical, or bio-geochemical in origin, they are the cornerstones of the sensible policy and management approaches that will affect future generations.

Our distinguished faculty, highly-regarded researchers and exceptional students are poised to tackle the emerging environmental issues that affect our lives. Their ongoing research, aided by the latest tools and technologies, will become increasingly imbedded in Earth system models and help to improve our understanding of this dynamic planet.

Sincerely,

Otis B. Brown, Ph.D.
Dean
University of Miami
Rosenstiel School of Marine and Atmospheric Science

“"The truth of the matter is that this field of science is inextricably linked to our daily life and that of future generations. Climate variability and natural disasters are taking a significant toll on our economy, our environment, and our well-being. And that is why we must sustain the Earth observations that underpin national preparedness and response.”

Hurricanes & Forecasting

Recent hurricane seasons have highlighted the urgent need for better understanding of the factors that contribute to hurricane formation and intensity changes, and for developing better predictive models to improve forecasts. Scientists at the Rosenstiel School are engaged in research that is helping to improve and promote better preparation and warnings for areas affected by tropical storms and cyclones.

An Eye For Storms

Forecasters in recent years have learned to predict storm paths with increasing accuracy. However, a hurricane’s ability to evolve from weak atmospheric disturbances into massive natural disasters is a mystery still being dissected by scientists. Researchers constantly look to better predict how a storm might be when it hits land, and where it has the potential to take lives and demolish property. Dr. Shuyi Chen, a professor of Meteorology and Physical Oceanography at the Rosenstiel School, and Robert Houze, Jr., a University of Washington atmospheric science professor, may have found a way of explaining how hurricanes can gain or lose intensity with startling speed.

The team took a first-of-its kind look at the processes of hurricane intensification by flying three Doppler radar-equipped aircraft directly into Hurricanes Katrina, Rita, and Wilma. The project, Hurricane Rainbands and Intensity Change Experiment (RAINEX) supported by the National Science Foundation, collected data in the active 2005 hurricane season and marked the first time two NOAA aircraft and one from the U.S. Navy flew simultaneously in and near a hurricane eye, eyewall, and rainbands to document storm intensification.

A hurricane’s strongest winds generally occur in the walls of clouds surrounding the eye. Chen and Houze found that as the storm moved into a tighter spin, a band of dry air developed around the eyewall, like a moat around a castle. But while a moat protects a castle, the hurricane’s ‘moat’ eventually destroys the existing eyewall. Meanwhile, rainbands form a new eyewall outside and the ‘moat’ merges with the original eye allowing the storm to widen and weaken. As this occurs, the hurricane’s spin is reduced and winds around the eye are slowed temporarily, but soon the storm intensifies as the new eye and eyewall shrink and take shape.

To analyze the data received from the three aircraft, Chen’s group at the Rosenstiel School developed a computer model that provided an exceptionally accurate forecast of eyewall replacement in Hurricane Rita, and also guided the pilots as they helped collect the necessary data.

Chen co-authored a paper published in the journal Science in 2007 that detailed some of this work, along with that of Drs. Houze and Bradley Smull of the University of Washington, and Drs. W.C. Lee and Michael Bell of the National Centre for Atmospheric Research. Their findings could prove very valuable for emergency response agencies and coastal residents deciding whether a storm is powerful enough to warrant their seeking safe inland. As the team continues the analysis phase of the project, the expectation is that they might identify other small-scale areas in a storm where processes are affecting intensity, so additional data can be fed into their high-resolution computer models to further enhance forecasts of storm intensity.

Intense Innovation

Aided by new observations from the Coupled Boundary Layer Air-Sea Transfer (CBLAST) hurricane field program, scientists at the Rosenstiel School are also helping to develop and test a high-resolution coupled atmosphere-ocean-ice-computer model to better understand how air-sea interactions directly affect hurricane intensity, a factor seldom incorporated in current operational forecast models.

The research, featured in the March 2007 issue of the Bulletin of the American Meteorological Society (BAMS), explains that current prediction models used in forecasting hurricane formation and intensity have difficulty accurately representing data like ocean temperature, surface wind, rain and waves. The new fully coupled atmosphere-ocean-wave modeling system is capable of forecasting detailed hurricane inner-core structure, as well as surface temperature, wind, ocean currents and surface waves — elements crucial to improving hurricane intensity forecasts.

The CBLAST-Hurricane field program was conducted using NOAA’s “Hurricane Hunter” aircraft, as well as drafting buoys and subsurface floats deployed ahead of Hurricanes Fabian and Iselle in the Fall of 2004. The program brought together new concepts and techniques, providing insights and results of data that are helping scientists improve their understanding of how hurricanes gain and lose energy. Dr. Willi Drennan, associate professor of Applied Marine Physics and one of the Rosenstiel scientists who participated in the fieldwork, helped to provide unprecedented information about how variations in ocean and sea surface conditions can accelerate or inhibit the intensification of hurricanes.

Dr. Chen led the CBLAST program’s hurricane modeling effort. She and other scientists including Rosenstiel Professor Dr. Mark Donelan, developed the fully coupled high-resolution model, which takes into account the fully interactive nature of the atmosphere and ocean in tropical storms — extremely high winds, intense rainfall, large surface waves, strong ocean currents and sea spray — allowing scientists to predict the structure of a hurricane eye and eyewall at nearly a 1 km resolution. This accomplishment is well within the recommendation for next-generation hurricane-prediction models established by the NOAA Science Advisory Board Hurricane Intensity Research Working Group and the National Science Board.

CBLAST-Hurricane modeling and observation efforts were sponsored by the Office of Naval Research, and involved scientists from several universities, as well as from NOAA. One of the most comprehensive studies of the way the ocean and atmosphere interact in hurricanes, it offered new insights that can now be applied to other tropical storms, including typhoons over the Pacific Ocean.

Shear Energy

There is widespread scientific consensus that the world’s oceans are warming due to human activities, predominantly the burning of fossil fuels. Many scientists have suggested that this warming is responsible for the sudden influx in intense tropical storms and hurricanes. However, a pair of studies conducted by Dr. Brian Soden at the Rosenstiel School, and Dr. Gabriel Vecchi at NOAA’s Geophysical Fluid Dynamics Laboratory (GFDL) in Princeton, N.J. have identified other environmental responses to global warming that may inhibit hurricane activity in the Atlantic Ocean.

One is an increase in wind shear, vertical cross-winds in the atmosphere which are known to interfere with the development and intensification of hurricanes. The team found that climate model simulations for the 21st Century indicate a robust increase in wind shear in the western tropical Pacific, whereas warming away from the tropical Atlantic due to global warming. Based on historical relationships, the impact an hurricane activity of the projected shear change could be as large — and in the opposite sense — as that of the warming oceans.

Another is the vertical structure of temperature changes within the atmosphere, which make the atmosphere more stable in many parts of the tropics. By analyzing climate model projections and observational reconstructions, Soden and Vecchi found that warming oceans do not alone produce a more favorable environment for storms, because the effect of remote warming counteracts, and sometimes overwhelms, the effect of local surface warming. Warming near the storm acts to increase the potential intensity of tropical cyclones, whereas warming away from the storm acts to decrease its potential intensity. As a result, roughly half of the tropics are projected to experience a decrease in the potential intensity of hurricanes over the next century, even though the underlying ocean surface becomes warmer.

Overall, the environmental changes found in these studies do not suggest a strong increase in tropical Atlantic hurricane activity during the 21st century. The impact of climate change on marine environments, ocean heat content and sea surface temperature rise, among others associated with the warming of sea surface temperatures. The wind shear study does, however, identify other regions, such as the western tropical Pacific, where global warming is causing the environment to become more favorable for hurricanes.
Warm Ocean Effects

Dr. Nick Shay, professor of Meteorology and Physical Oceanography at the Rosenstiel School, and his Upper Ocean Processes Laboratory team are also producing high demand scientific results to assist in the understanding of the complex processes involved in hurricane intensification. Based on satellite and in-situ measurements on variations in the oceanic heat content (OHC) throughout the Gulf of Mexico and in the Loop Current, the data have become a valuable source of hurricane prediction and evolution information for the Statistical Hurricane Intensity Prediction Scheme (SHIPS) at the National Hurricane Center (NHC). Variations in the OHC played an important role in hurricane intensification as seen in Hurricanes Katrina, Rita and Wilma which all reached Category 5 strengths in 2005, and more recently during Hurricane Dean’s passage in 2007. Using these OHC variations, improvements in intensity forecasting have been demonstrated by the average of 6 percent over the basin, and in some cases by as much as 22 percent, as was the case with Hurricane Ivan.

The OHC’s importance lies in its accuracy to depict the average heat storage in the upper ocean from the sea surface to a depth where the water temperature is 7°F (26°C). The deeper the warm water, the higher the value of the OHC and vice versa. When these values are high, there is more transfer of heat to the hurricane as these deep warm regimes (such as the Loop Current and Warm eddies) tend to resist wind stirring and mixing that work to decrease the upper ocean’s temperatures. Similarly, Shay’s approach also maps cold features that tend to diminish the available heat transfer to the hurricane.

In collaboration with NOAA’s Hurricane Forecasting Intensity Program, and supported by the Minerals Management Service and the National Science Foundation, the team is working to acquire ocean temperature and current profile measurements from aircraft in the Loop Current, during hurricane passage over the next three years. A grant from NOAA’s Joint Hurricane Testbed is allowing this project to expand its reach into the Eastern Pacific Ocean basin, as well. This novel approach is now being incorporated into SHIPS models at several centers, including the Central Pacific Hurricane Center and the NHC.

Cyclogenesis Short Cut

One of the most important goals of hurricane forecasting is to provide sufficient lead time for coastal communities before a storm’s landfall. While the exact location and intensity of a landfalling hurricane can not be predicted, in most cases there are at least 48-hours of advance knowledge that a significant event is likely to occur. Such was the case for some of the most significant hurricanes in recent history, such as Hurricane Andrew and Hurricane Katrina.

Using a modified version of the Weather Research and Forecasting (WRF) model, Dr. David Nolan, assistant professor of Meteorology and Physical Oceanography at the Rosenstiel School, has been studying hurricane formation and strengthening in “ideal” environments - those with warm ocean temperatures, high humidity, and little or no wind shear.

The models show what radar images of a simulated, rapidly intensifying storm would look like at three and four days after the start of the simulation. After 72 hours, the storm has no discernible eye and is only elongated banding; just 24-hours have a distinct eye and prominent spiral bands are clearly visible. Credit: David Nolan

US Coast Guard

Threat Forecasting

In the aftermath of Hurricane Katrina the U.S. Army Corps of Engineers created Task Force Guardian to begin restoring elements of New Orleans’ battered hurricane-blighted system. The Task Force implemented a plan to close the interim gated structures at the three outfall canals (17th Street, Orleans Avenue and London Avenue Canals) to reduce storm surge water of the Lake Pontchartrain from entering these outfall canals and flooding the area.

In the event that a tropical storm system threatens the Gulf Coast region, and metropolitan New Orleans in particular, the University of Miami, as part of the National Oceanographic Partnership Program (NOPP), has created a project called “Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones,” led by Dr. Hans C. Graber, Applied Marine Physics chairman and professor. The project team provides two critical pieces of information required to determine the need for gate closures: predicted stages in Lake Pontchartrain, and predicted wind speeds at the mouths of the three outfall canals. If a hurricane threatens the Gulf Coast and the storm surge forecast exceeds pre-established safe water stages, gates would be closed to prevent flooding of local parishes. The forecast of water stages alone is not sufficient, because the rate of change to be expected, and closed by cranes that cannot be operated in high wind conditions - making accurately predicted wind time histories of grave importance.

Operational in both the 2006 and 2007 hurricane seasons, the threat forecast of NOPP provides an important tool for emergency management personnel. Predictions from the NOPP are based on the most official track forecasts from the National Hurricane Center, as well as predictions from other weather forecast models used to compute probabilities associated with predicted stages and wind speeds. The results are made available through e-mail text and graphics messages, a dedicated website and in a condensed form for Personal Digital Assistants (PDAs).

Wind-Wave Winner

Applied Marine Physics student Ivan Savelyev was recognized as an Outstanding Student Paper award winner for his presentation at the American Geophysical Union (AGU) meeting held annually in San Francisco, Calif. His paper entitled, “Laboratory Study of Surface Gravity Wave Energy input,” was one of only eight recognized, from a field of 215 paper presentations.

Savelyev, a student of Drs. Mark Donelan and Brian Hous, used the school’s unique Air-Sea Interaction Saltwater Tank (ASIST) for his work. In particular, Savelyev was exploring a new technique to measure the rate of momentum that transfers from wind to waves. Using the tank he was able to simulate different wind and wave conditions in the one-of-a-kind laboratory to measure air pressure fluctuations caused by wind along the surface of a wave. Based on those and other measurements, the student is now able to calibrate the momentum transfer for wind waves for different wind speeds and wave fields, including hurricane force conditions. Ultimately, this science will be incorporated into predictive weather models to help further improve their accuracy.

Beyond the Tropics

In addition to forecasting tropical cyclones, faculty members at the Rosenstiel School are also working diligently to improve forecasts of severe winter weather. Using a mathematical method based on ‘ensembles’ of weather forecasts, Meteorology and Physical Oceanography Professor Dr. Sharman Majmudar and graduate student Kathryn Sellwood have been exploring whether one can accurately identify ‘target’ areas over the Pacific Ocean in which satellite and aircraft measurements can help make better forecasts of heavy rain and winter storms -- up to one week in advance of the actual event.

Their research has found that the ‘targets’ are often reliable, helping to improve the predictive accuracy and extend the time range of winter forecasts. Based on this research, NOAA will be deploying their G-IV jet aircraft out of Japan from January to March 2009, to help improve forecasts of blizzards and other weather phenomena over the continental United States and Alaska.

Pump stations in New Orleans, the site of the levee failure at the 17th Street Canal. Photo credit: Chris Sinigalliano

Dr. Sharman Majmudar and 2007 Dean’s Prize winner Kathryn Sellwood review their predictions of atmospheric ‘target’ areas. Photo credit: Christian Howard
From the use of satellite imagery and high performance computing, to visual counts of fish, the tools employed by Rosenstiel scientists are finding the way for some of marine earth science's most promising work. While many faculty members and students actively employ supercomputers to process the data sets they collect on seagulls, hawks, or comparing satellite imagery to predictive computer models, or tagging endangered marine animals. And when a required tool is not available, our scientists put their heads together and become innovators.

**Cutting-Edge Computing**

The Center for Southeastern Tropical Advanced Remote Sensing (CSTARS) is a high-tech satellite analysis and reception facility in southern Miami Dade County, celebrated its fifth anniversary in 2007. In a handful of years, CSTARS has downlinked more than 120,000 images utilizing 50TB of raw tape storage capacity. Operated by the University of Miami, CSTARS has attracted more than $14 million in federal funding since its launch.

The first image acquired at CSTARS on September 18, 2002, extended from North Carolina to the Bahamas, and was provided by the Canadian-owned and operated RADAR-SAT-1. The image (seen to the left) was taken in ScanSAR mode, using multiple SAR beams to form a single image covering a 400 km wide swatch.

Through the years, CSTARS has expanded its capabilities to collect data from ERS1 and ERS2 (ASAR) SAR satellites, as well as optical data from SPOT-2, SPOT-4, SPOT-5, MODIS on Aqua and Terra, ORBVIEW-3, FORMOSAT-2 and Envisat (MERIS). In 2007, the Center saw the launch of several new SAR satellites, some with extremely high-resolution capabilities, which will soon be added to CSTARS' collection capabilities.

![Image of a satellite image](image1.png)

**Remote sensing of the Everglades wetlands in South Florida.** Latest level: L-band SAR image showing the backscatter amplitude of the coastal area. Second level: SAR interferogram illustrating lateral phase changes between SAR acquisitions four months apart. Third level: map of most likely change occurring between two acquisitions. Top level: high-resolution 3-D map of "shelved" water levels calculated by integrating the space- and ground-based observations. This 3-D map shows dynamic water topography caused predominantly by flood gate operations.

**A team of researchers, led by Dr. Falk Amelung, a Marine Geology and Geophysics associate professor, used InSAR images from 2002 to 2005 to survey ground deformation in Hawaii associated with volcanic activity. Researchers were able to see distinct patterns of magma activity associated with rift zones, along narrow fractures in the Earth's crust from which lava flows. Magna pathways unclamped by past eruptions and earthquakes, leave a channel for the magma to enter. The magma accumulates in rift zones and pushes flanks apart, building stress in the area until ultimately an eruption occurs.**

Amedung and his collaborators were able to precisely infer where magma accumulation occurred and have an explanation of why it occurred in a particular location. This provided them with valuable data on where the next eruption was most likely to occur.

**Flowing Earth**

With near real-time satellite reception, analysis, and turnaround processing, CSTARS provides valuable data to Rosenstiel School researchers and a consortium of scientists from other universities, research groups, and government agencies. The images offer important environmental information about the Gulf of Mexico, southeastern United States, northern South America, Central America, and the Caribbean Basin. These images enhance the capability of scientists not only to observe the planet, but also to support emergency services personnel and monitor zones where there are volcanoes, earthquakes, wild fires, tornadoes and hurricanes.

**Cutting-edge Computing**

By employing interferometric synthetic aperture radar (InSAR), a unique state-of-the-art satellite imaging technique, researchers at the Rosenstiel School are finding ways to more precisely calculate volcanic activity, bringing them even closer to understanding where and when an eruption may occur. A paper in the May 2007 issue of Science titled "Stress Control of Deep Rift Intrusion at Mauna Loa Volcano, Hawaii" profiles how InSAR has proven highly useful in providing critical data to improve warning systems and hazard assessment for the populated areas surrounding volcanoes.

As one of the most active volcanoes on the planet, Mauna Loa provides scientists with a steady stream of opportunities to collect data that may aid in disaster preparedness. Volcanic hazards include lava flows and flanks collapse, pose a significant danger to populated areas. Flank collapse, which can trigger tsunamis, creates an additional risk to the increasingly populated areas surrounding volcano flanks, like those near Mauna Loa.

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**In the continental United States, InSAR imagery has been useful in monitoring sinking and decline to the structural instability of Florida's wetland ecosystems. Using funding from NASA's Earth's Future program and the National Science Foundation's Geophysics program, Drs. Shinnon Welviski, Tim Dixon, Falk Amelung and San-Wang Kim from UM's Geodesy Labo-**
Net Technology Gains

Biological oceanographers constantly struggle to reduce delays between specimen collection, data sorting, and final analysis. Traditionally, biological measurements are made primarily by use of net collections, versus high speed digital imaging. As net technology has become quite sophisticated, enabling vertical resolution coupled with detailed physical data, net samples still require manual processing, which is time-consuming and costly. For many projects, months to years of work must be spent sorting through samples before even beginning analysis.

Dr. Robert Cowen and Cedric Guigand are developing a potential solution to this problem. With the help of Bellmare, LLC, they designed and field-tested an exoskeletal towed vehicle with the capabilities for non-invasive, in situ sampling of both zooplankton and associated water conditions.

The In Situ Ichthyoplankton Imaging System (ISIIS) is composed of two large pressure vessels with a payload capacity sufficient for housing a high-resolution planktonic imaging system and its supporting hardware. ISIIS combines digital line scan cameras and high speed computer data transfer equipment. The imagery, in concert with shadow photographic lighting techniques to record images at 68 micron pixel resolution with up to 20 cm depth of field and 14 cm field of view.

The results are, in a word, stunning. ISIIS is also equipped with various environmental sensors including a conductivity-temperature-depth (CTD) profiler, fluorometer, and others that allow it to map fine scale taxa-specific distributions in relation to ocean environmental conditions. The next generation of ISIIS will incorporate undulating capabilities and integrated image analysis software that can classify specimens based on shape and terminal characteristics. The result of all this high-tech machinery: a revolutionary increase in the speed of biological oceanography.

Extreme Buoy Design

In 2007, scientists at the Rosenstiel School participated in several buoy deployments around the world. They also tested a new high-tech observational buoy designed to provide measurements and information about hurricane intensity in extreme wind conditions. Deployed in Hurricane Alley near Jacksonville, Florida, this buoy was designed to furnish information about air and sea interactions in extreme wind conditions, illuminating what we know about hurricane intensity, and helping to inform predictions in the future.

The buoy was based on a hull designed by the U.S. Navy and utilized NOAA’s National Data Buoy Center for meteorological measurements in high wind and wave environments. To measure heat transfer rates in high winds, Rosenstiel School scientists Dr. William Drennan and Neil Williams redesigned everything above the waterline incorporating the latest sensors, several with special modifications to survive the extreme conditions. The electronics within the buoy hull were refurbished with a unique data acquisition system developed in collaboration with Environment Canada.

Researchers were aiming to garner the first-ever near-surface measurements of the heat transfer rates that allow hurricanes the necessary fuel they need to intensify. During times of high winds, increased sea spray concentrations can be found in the layer of atmosphere directly above the ocean. This layer has been thought to significantly affect evaporation rates and cyclone development, but, without significant data, scientists are still unsure. Indeed, the effect of sea spray on storm intensity remains one of the key unanswered questions in hurricane science.

The buoy project was supported from funding by the National Science Foundation’s Ocean Technology and Interdisciplinary Coordination program. While the successful 2007 ‘shake down’ test was focused on uses for this platform in hurricane applications, the team already plans has to use it for research in a variety of other high sea-state conditions, including typhoons.

Research Resources

The ISIIS and other equipment is often used aboard the R/V F.G. Walton Smith, the Rosenstiel School’s primary research vessel. This state-of-the-art, 96-foot research catamaran was placed into service in February 2000. Named in honor of the Rosenstiel School’s founder, the ship offers 800 square-feet of laboratory space, as well as an additional 800 square feet of multi-use space astern. It is operated as part of the University National Laboratory System (UNOLS) fleet.

In 2007, the Walton Smith was at sea a total of 154 days, and conducted 31 scientific cruises, of which more than a dozen had University of Miami faculty as principal investigators. Funding for voyages came from the National Science Foundation, Office of Naval Research and the National Oceanic and Atmospheric Administration, as well as, private companies, organizations.

Advanced Bookkeeping

The year 2007 marked the addition of the venerable Zoological Record an e-format to the University of Miami’s library collection. First published in 1864, this resource is the world’s leading taxonomic reference database and the oldest continuing resource for animal biology research. Many publications by Rosenstiel researchers have been listed in this publication, including a 1945 article published in Science, written by F. G. Walton Smith. His article records one of the first reports of Coeloplana (comb allies) living along the shorelines of the American continent. The discovery came to his attention after a student, William Sutcliffe, noticed the organisms crowding over the surface of algae and hydroids grown in tanks supplied by the lab’s sea water supply.

The Rosenstiel School Library offers one of the most extensive marine science literature collections in the nation. It continues to broaden its resources and expand the availability of e-publications, increasing the array of subject matters available to faculty members and students – regardless of where their research takes them.
Earth Dynamics

Crustal Considerations

From state-of-the-art satellite imaging, to paleo-oceanographic studies of climate change in the Holocene, and modern-day analyses of pollution impacts on coastal resources, Rosenstiel scientists harbor broad interests in understanding the geology, geophysics and geochemistry of the Earth system. Their work is helping to better understand the complex systems that are at play beneath, within and above the world’s oceans.

The Earth has always been restless—not just above ground, but also below its surface, where years of heat and pressure are stored. But for all the time tectonic plates take to build up stress below the surface, even the slightest shift can trigger massive earthquakes, tsunamis, landslides or volcanic eruptions above ground. For scientists looking to provide accurate disaster assessments before and after these often catastrophic events, slight miscalculations in their modeling can cause inconsistencies that may leave scientists wondering where the forecast was faulty.

In a study published in the April 2007 issue of Geology titled, “Diffuse interseismic deformation across the Pacific-North America plate boundary,” Dr. Shimон Wdowinski, a research associate professor of Marine Geology and Geophysics at the Rosenstiel School, in collaboration with a team of scientists from the Cecil H. and Ida M. Green Institute of Geophysics and Planetary Physics at Scripps Institution of Oceanography, suggests that factoring in crustal changes in fault segments along the San Andreas Fault would improve the accuracy of predictive models used to understand the likelihood and intensity of earthquakes in the region.

The steady motion between the Pacific and North American tectonic plates has deformed a wide region in the western United States, and the 800 mile (1,287 kilometer) San Andreas Fault absorbs most of that deformation. This deformation increases the level of stress on the Earth’s crust, and once the pent up energy of these stresses reaches high enough values that cannot be supported by the planet’s crust, faulting occurs and excess stress is released in the form of an earthquake.

Universities and government agencies have measured crustal movement along the fault using Global Positioning Systems (GPS) and other sophisticated measurement tools that detect movements in millimeters per year. Utilizing funding from NOAA and NASA, Wdowinski and the team used 840 precise measurements of crustal movements collected in southern California over the last 25 years. They employed a geometrical technique, and found a disparity between the recorded observations and a mechanical model. The findings suggest that crustal changes and fault segments which haven’t been included in models until now are important to integrate into future models.

Recording Radon Activity

Halfway across the nation, at Yellowstone National Park, Dr. David Kadko, professor of Marine and Atmospheric Chemistry, is working with Dr. Jacob Lowenstern of the U.S. Geological Survey to launch a pilot program designed to study yet another facet of earthquake prediction and monitoring. The purpose of the initial year’s work was to deploy an in-situ gamma detector to monitor radon-222 variability in spring water from the Steamvave Geyser in the Norris Geyser Basin.

Radon-222, a chemically inert, radioactive gas is generated by the decay of its parent isotope, radium-226. Found within hydrothermal fluids, radon has been used in places like Iceland to help monitor hydrothermal activity and tectonic events, where radon anomalies in crustal fluid flow are seen as precursors to seismic activity.

Kadko and Lowenstern were able to demonstrate that the gamma detector could successfully be deployed in an unobstructive manner and obtain a temporally well-resolved record of radon activity in the waters. These data will then be compared to variability in temperature, air pressure and other parameters being measured by collaborating investigators.

The scientists hope to further research that indicates that variations in hydrothermal radon activity could be related to seismic events stemming from tectonic and magmatic inflation or deflation. They will work further to find the variability in groundwaters through composition arising, for example, through various mixing processes among different aquifers. Such variability could arise from factors affecting crustal strain and permeability, such as earth tides and air pressure.

Atmospheric Accolades

Cheryl Tatum, a Ph.D. student working with Marine and Atmospheric Chemistry Professor Dr. Anthony Hynes, was awarded a highly competitive three-year National Defense Science and Engineering Graduate (NDSEG) Fellowship.

Sponsored and funded by the U.S. Department of Defense, the fellowship is designed to help increase the number of U.S. citizens and nationals trained in science and engineering. Only 200 fellowships are awarded each year, providing awardees with full tuition, stipend, and health insurance.

Tatum is involved in two projects: the first utilizes laser-based diagnostic techniques to understand the kinetics and mechanisms of reactions that contribute to the production, recycling, and removal of HOx in the atmosphere. The second focuses on the development of analytical techniques to examine the behavior of mercury in the atmosphere dependent upon its form, or speciation.

Tatum and members of Hynes’ laboratory joined a field project in Pensacola, Florida with the Electric Power Research Institute (EPRI), Southern Company, Environmental Protection Agency, University of North Dakota, University of Michigan, Atmospheric Research & Analysis, Inc., and Arcadis, to apply the same techniques to study emissions from a coal-fired power plant. The project used bump-blank sample collection along with sampling directly from the power plant stack. This project is the first attempt at determining the mercury speciation from power plant emissions.

Model Scientist

Providing new insights into how Earth’s climate system operates, Clement’s research studies what climate changes of the past can teach us about the future. Focusing on tropical climate, Clement challenged previously held notions about the driving forces behind climate change. Using computer models, she has shown that changes in El Niño were critical to the dramatic changes in climate that occurred in the past. She also extended these ideas about the role of the tropics in climate change to include variations that occurred during the 20th century, and possible future changes as well.

For her insightful advances in understanding the role of the tropical ocean-atmosphere system in past climate variations, Clement has also been recognized by the National Science Foundation with an Early Career Award and has received funding from NASA and NOAA to support her research efforts.

Dr. Amy Clement. Photo credit: American Geophysical Union

Dr. Amy Clement. Photo credit: American Geophysical Union

In only a decade, Dr. Amy Clement, an associate professor of Meteorology and Physical Oceanography at the Rosenstiel School, has established the kind of scientific reputation that often requires an entire career. With a talent for posing innovative and fundamental questions about the coupled climate system, Clement addresses these questions in a way that reveals, very transparently, the processes at work.

In early 2007, Clement was awarded the American Meteorological Society’s 2007 Clarence Leroy Meisinger Award in recognition of “research achievement that is, at least in part, meteorological in character and concerns the observation, theory, and modeling of atmospheric conditions on all scales. The award is given annually to young promising atmospheric scientists who have recently shown outstanding ability.” But for Clement, this was only the beginning of an exceptionally fruitful year.

Clement was also honored at the American Geophysical Union’s annual meeting in San Francisco, Calif. alongside two of the authors of the Nobel Peace Prize–winning IPCC report. During a black tie gala, the AGU acknowledged Clement’s unique approach to climate change theories with the 2007 James B. Macelwane Medal, an award reserved for outstanding young scientists in recognition of their significant contributions to geophysical sciences.
Earth to Air

Our lives are affected by the chemistry and physics of different parts of the atmosphere, which may influence air quality and climate. In the lower atmosphere, emissions of pollutants from human activity can interact with naturally occurring chemicals to have adverse effects on air quality. At higher altitudes and near the equator, chemical and physical processes that occur as the result of tropical convection can have a significant impact on climate. In 2007, scientists from the Marine and Atmospheric Chemistry division had the opportunity to study both of these atmospheric regions in coordinated studies with scientists from other universities and government agencies.

Breaking Through

Long sought after by early European explorers as a convenient passage between Europe and Asia, the Northwest Passage through the Arctic Ocean has been essentially impassable due to thick sheets of sea ice. Attributed to changes in climate, the pack ice is being reduced and this shrinkage is making known waterways increasingly navigable, as new waterways are being charted for the first time.

As part of the 2007-2009 International Polar Year (IPY) research program to investigate global climate change in the Arctic, Sarah Woods, a Ph.D. student under the supervision of Dr. Darek Bogucki in the division of Applied Marine Physics, embarked on a six-week scientific cruise through the Northwest Passage. Woods, who joined the scientific cruise in October 2007 in Resolute, Nunavut, Canada was among the 40 scientists, students and crew members following in the trail blazed by Norwegian explorer Roald Amundsen in 1906.

Dr. Bill Johns dismantling the strobe from a research buoy on a RAPID/ MOCHA cruise aboard the R/V Seward Johnson. Photo credit: Lisa Beal

Aboard the aptly named Canadian icebreaker, the CCGS Amundsen, Woods participated in ArctiCNet and the Circumpolar Flow Lead Study (CFL), two studies investigating the changing Arctic climate and its impacts on local communities. The ship will be at sea for the entire year, with scientists, students, and crew rotating on and off. As part of a NASA-funded project, “Estimates of Arctic air-sea CO2 transfer using QuikSCAT scatterometer,” Woods is collecting data to measure air-sea CO2 transfer, and measurements of mean square wave slope in order to derive estimates of air-sea CO2 transfer from QuikSCAT measurements.

The IPY will involve more than 200 projects, with thousands of scientists from over 60 nations examining physical, chemical, biological and social science research topics. Rosentiel School faculty member, Dr. William Drexler and Ph.D. student Silvia Gremes-Cordero plan to board the ship in summer 2008.

Dr. Xiao-ren Ren and Elliot Atlas from the University of Miami were part of the scientific group making measurements planned in 2009) will help to clarify potential consequences of future anthropogenic development and climate change.

The Tropical Composition, Cloud and Climate Coupling Experiment (TC4), organized by NASA, probed an even more remote region of the atmosphere, the tropical transition layer (TTL). An extremely cold region located in the tropics between about 14 – 18 km altitude, this region of the atmosphere cannot be reached by conventional research aircraft, and satellites have trouble seeing through the often dense clouds. Many facets of the chemical, dynamic and physical processes occurring in the TTL are not well understood. Identifying and quantifying such processes are essential to understanding ozone depletion, tropospheric chemistry and global warming. The experiment, utilizing satellites and airborne observations, addressed several questions.

As part of the scientific team of the WB57 aircraft, the UM team, led by Atlas, collected air samples from the TTL that were later analyzed in his laboratory at the Rosenstiel School. The chemical composition measurements from these samples formed the basis for better understanding of the amount and composition of ozone-depleting substances that enter the stratosphere, as well as providing chemical markers that identify the source of air masses in this region of the atmosphere.

“Current” Research

Off the Atlantic coast of the United States, Rosentiel School Co-Principal Investigators Bill Johns and Lisa Beal are working on the western boundary component of the RAPID/MOCHA (Meridional Overturning Circulation and Heatflux Array) effort; a large-scale, highly collaborative program which monitors modes of Atlantic Ocean heat transport from the equator to the poles. Through continuous monitoring, the project will assess the natural short-term variability of the Meridional Overturning Circulation; leading toward an understanding of its role in rapid climate change.

The basin-wide RAPID/MOCHA array comprises moorings from the National Oceanography Centre in the United Kingdom, placed over the mid-Atlantic Ridge and at the eastern boundary of the subtropical Atlantic, just offshore from North Africa. The University of Miami’s team measures the Antilles Current and Deep Western Boundary Current off Abacos Island. Buoys and ships are equipped with current meters and microCATs to measure the velocity, temperature, and water salinity.

Together with measurements of the Florida Current inferred from submarine cable by NOAA’s Atlantic Oceanic and Meteorological Laboratory, the data capture the 3,000 mile basin-wide Atlantic Meridional Overturning Circulation (AMOC). Until now the real variability of the AMOC has not been studied, even on shorter time scales. Because of the possible role the AMOC plays in rapid climate change, measuring and understanding its variability and sensitivity to atmospheric forcing has truly become a priority.

There is paleoceanographic evidence of rapid climate change events during the last glacial period that have been linked with variability in the AMOC. The AMOC can be described as the circulation of warmer waters poleward at the surface of the ocean, which cool and sink, to return to the equator in the deep ocean. Recent evidence suggests that the AMOC may slow down in response to global warming, and that this could, in turn, rapidly cool northern European climate by reducing the northerly advection of warm surface waters.
As the richest source of biodiversity on the planet, our oceans offer up potential insights into everything from human diseases and genomic mutations, to the potential for the extinction of certain species. From the tiniest microorganisms of the deep ocean, to apex predators, our scientists marvel at the interconnectedness of the marine ecosystem. Through an intricate system of study of oceanic biogeography and the utilization of innovative technology conceived and utilized by Rosenstiel School scientists, we bring new insights into the biodiversity comprised on this planet.

**Gene Expression & Genetic Adaptation**

Marine Biology and Fisheries Professor Douglas Crawford and Martyna Oleksiak’s work has been featured in the Journal of Experimental Biology, BMC Genomics, Nature Genetics and Molecular Ecology. Their functional genomics research uses Fundulus heteroclitus, a small species of killifish found in estuarine and brackish waters between northeastern Florida and the Gulf of St. Lawrence. Different populations and species of these fish have demonstrated an interesting ability to adapt to extreme environmental conditions, including temperature changes, increased salinity, hypoxia and environmental pollutants. By studying how the expression of genes affects health, longevity and physiological performance, we learn how genes are important for human health.

One of the team’s findings was that the natural variation in gene expression affects the fish’s cardiac metabolism. These studies demonstrate how small differences among individuals can create important differences in how a heart works and how well fats or sugars are used to sustain cardiac performance. These results are only possible because this research uses a marine fish with similar population size and structure to humans to provide important biological insights into human health. Data from this research suggests that there is a great complexity regarding how gene expression is related to physiological processes. With further investigation, the goal for Crawford and Oleksiak’s evolutionary approach to help researchers understand how humans are different and why they are affected differently by disease, drugs and stress.

**Bonefish and Tarpon**

Bonefish are one of Florida’s most valuable fish, contributing approximately $3.5 billion annually to the Florida economy. Likewise, tarpon play prominently in the $5.5 billion regional draw that sportfishing brings to the state of Florida. In fact, sportfishing now surpasses the citrus industry in state revenues.

In July 2007, a new Bonefish and Tarpon Research Center (BTRC) was launched through funding from the Wildlife Foundation of Florida, the Florida Fish and Wildlife Conservation Commission, the University of Miami’s Rosenstiel School, and Baptist Health and Tarpon Unlimited, Inc. House at the Rosenstiel School the BTRC will conduct science-based research that supports fisheries management and helps to safeguard the long-term health of bonefish and tarpon.

**Studying and Saving Sharks**

The South Florida Student Shark Program (SFSSP) is a collaborative, multi-disciplinary research and education program that was founded in 2006. The SFSSP is a partnership between the University of Miami Rosenstiel School, the Explorers Club® and the Herbert W. Hoover Foundation that focuses on the study and conservation of Florida’s shark species, mangrove fish habitats and the Florida watershed. Founded by Rosenstiel faculty member Dr. David Dié and Marine Biology and Fisheries graduate student, Neil Hammerschlag, the program offers a full-immersion approach that allows students to participate first-hand in scientific projects, while supporting important ongoing research for shark conservation.

**S.T.R.A. Students**

In 2007, Rosenstiel School students Ed Mager and Deanna Donohue, were awarded the Environmental Protection Agency’s Science to Achieve Results (S.T.R.A.) Fellowship for Graduate Environmental Study.

Mager’s work with Dr. Martin Grassel, associate professor of Marine Biology and Fisheries, centers on the environmental toxicality of lead in two freshwater organisms, the fathead minnow and the daphnid (water flea), commonly used by the EPA in setting water quality criteria. The fellowship allows Mager to further study how lead affects the fish at sub-lethal physiological and biochemical levels. The accumulation of lead in body tissues has been shown to cause varying illness in different organisms, so Mager hopes that his research will ultimately help improve lead-based water regulations.

Donohue’s dissertation focused on the cycling of mercury in the atmosphere, aiming to experimentally measure rate coefficients for reactions of elementary mercury and halogen species. Her research is helping to clarify the unique chemistry observed in Florida, Pollar regions and in the open ocean, ultimately aiding in the development of effective pollution control strategies for this toxic chemical.

**Patterns of gene expression in killifish, where colors represent greater (red) or lesser (green) gene expression. Credit: Doug Crawford**

**Great hammerhead shark. Photo credit: Neil Hammerschlag**

In 2007, the SFSSP conducted more than 75 student research field trips and held over 40 laboratory sessions. The program exposed more than 300 high school, undergraduate and graduate students from six different educational institutions — among them Mait Academy High School, Palmer Trinity High School and South Broward High School — to methods for sampling and studying marine animals. Students helped to sample and tag more than 200 sharks and 20,000 fishes in local waters. Findings based on these studies were presented at three conferences, and six scientific reports based on study results were produced.

**Great hammerhead shark. Photo credit: Neil Hammerschlag**

Under the leadership of Dr. Jared Ault, a Rosenstiel School professor of Marine Biology and Fisheries who has devoted his career to understanding how to best manage some of Florida’s most popular sport fish, the BTRC will focus scientific efforts in critical areas of applied research to support science-based decision support for the sustainability of these species.


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In response to the need for localized efforts to protect and recover coral populations, Dr. Diego Lirman and graduate student James Herlan established an underwater nursery dedicated to the propagation of the threatened staghorn coral. The underwater nursery, located in the waters of Biscayne National Park, is part of a network of Acropora nurseries established with support from The Nature Conservancy, NOAA, and the National Park Service. The goals of the coral nursery program are to develop effective coral fragmentation and propagation methodologies, and to evaluate the role of coral genetics on the resilience of corals to thermal stress. Coral nurseries provide a unique opportunity to learn about coral growth and survivorship, as well as how to stabilize corals damaged by physical disturbances.

A total of 250 staghorn coral fragments were placed on cement platforms where they are individually measured at monthly intervals to assess growth and mortality patterns. The fast growth rate of these species – up to 15 cm per year – makes them ideal candidates for reef restoration programs. It is expected that the staghorn fragments kept in the University of Miami's nursery will provide an expanding coral stock to be used for reef restoration.

Coral Cooldown

Scientists have known that hurricanes reduce sea-surface temperatures upon passage. In fact, Rosenstiel School Professor Peter Glynn was the first to put forth the hypothesis that thermally stressed corals might benefit from cooling due to proximal hurricane passage. But until now, all evidence for this phenomenon has been anecdotal or qualitative, or researchers have chosen to focus solely on the damaging effects of hurricanes on coral reef habitats. As seemingly sensitive animals, corals may seem unlikely candidates to benefit from strong wind and wave conditions, but as Rosenstiel School graduate student Derek Manzello and a team from the National Oceanic and Atmospheric Administration (NOAA) discovered, the intense cooling effect tropical cyclones and storm force winds have on the waters of the Atlantic are giving corals a much-needed boost to encourage repopulation.

Hurricanes development is dependent on warm sea surface temperatures and often closely linked with widespread coral bleaching events. Corals survive mainly in shallow water where photosynthetic algal reside symbiotically within the coral's transparent tissue. Even the slightest changes in water temperature can cause widespread bleaching, forcing the tiny food-producing algae to be expelled from the coral tissue. However, corals may seem unlikely candidates to benefit from cooling due to proximal hurricane passage. But until now, all evidence for this phenomenon has been anecdotal or qualitative, or researchers have chosen to focus solely on the damaging effects of hurricanes on coral reef habitats. As seemingly sensitive animals, corals may seem unlikely candidates to benefit from strong wind and wave conditions, but as Rosenstiel School graduate student Derek Manzello and a team from the National Oceanic and Atmospheric Administration (NOAA) discovered, the intense cooling effect tropical cyclones and storm force winds have on the waters of the Atlantic are giving corals a much-needed boost to encourage repopulation.

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Data analyzed from the 2005 Atlantic hurricane season – the busiest in recorded history – showed that the area affected by hurricane cooling is much larger than the narrow bands where damage actually occurs to reefs.

A special issue of Oceanography published in 2007 features articles and cover images by faculty, researchers and staff members from the Rosenstiel School. The edition covers marine population connectivity, a concept described in an article authored by Rosenstiel Marine Biology and Fisheries Division Chair and Myrta Professor of Ichthyology, Dr. Robert Conrow, and colleagues Drs. Gail Gaylord-Wick, Jesus Pineda and Simon Thorndyke. Researchers showed evidence suggesting that by circulating colder deep ocean waters toward the surface, high winds surrounding hurricanes and tropical storm events cooled surface waters enough to promote rapid recovery of bleached corals stressed by anomalously warm waters off the Florida Keys. The study focused on the magnitude and duration of sea temperature cooling after the passage of hurricanes and tropical storms near five reef sites on the Florida Reef Tract between 1998 and 2005.

Using two Caribbean coral species, Montastraea faveolata (mountainous star coral) and Porites furcata (finger coral), the team is studying how increasingly acidic oceans, caused by increasing atmospheric carbon dioxide, can affect corals when accompanied with increasing temperatures. Corals in the laboratory are being stressed with differing levels of carbon dioxide and temperatures, like those they might experience in the next 50 to 100 years, to see if skeletal development is affected.

Since the year 1800, nearly 30 percent of total global carbon dioxide emissions have been absorbed by the ocean. Despite the immensity of the world's oceans, this accumulation is gradually lowering the pH of ocean water, making it more acidic and in turn, making it difficult for corals and other important marine organisms to thrive.

The duo’s experimental studies are simulating scenarios already occurring in the Florida Keys. The Florida reef tract is the most extensive living coral reef system in the continental United States. Langdon’s research has shown that a coral’s ability to produce a limestone skeleton decreases substantially as oceans become more acidic, a conclusion which suggests that these organisms will grow at a slower rate, or their skeletons will become more fragile (less dense), a process that can be compared to osteoporosis in humans. As a result, reef structures will become increasingly brittle and unable to develop extensively as erosion and other factors will wear them away faster than they can grow.

The Coral Climate Change Lab was made possible through funding from the National Science Foundation, the Packard Foundation, Conservation International and the Wildlife Conservation Society.

In August 2007, Drs. Chris Langdon and Andrew Baker of the Marine Biology and Fisheries Division inaugurated a first-of-its-kind laboratory to tackle the global impacts that climate change is having on corals. The modest lab is the first to maintain corals under precisely controlled temperature and carbon dioxide conditions, while exposing them to natural light conditions.

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The year 2007 proved pivotal for advancements in aquaculture; a science dedicated to creating sustainable practices that will meet growing consumer demand for aquatic foods in a manner that is environmentally responsible. After two years of collecting data from scientists, fishermen, aquaculture practitioners, government regulations, and coastal citizens, the U.S. Marine Aquaculture Taskforce issued its report, *Sustainable Marine Aquaculture: Fulfilling the Promise; Managing the Risks*. The report makes recommendations to protect the health of marine ecosystems and to increase adherence by U.S.-based aquaculture practices.

**Fishing for Generations**

PESCA (Partnership for Ecologically Sustainable Coastal Areas), a collaborative project between the Rosenstiel School’s National Center for Coral Reef Research (NCORE) and the PUNTACANA Ecological Foundation, was established in 2007. Designed to provide a scientific basis for coastal management in greater Punta Cana, project leaders are working towards empowering local communities and businesses to actively support environmental awareness.

**Dr. Liana Talano-McManus, alongside Drs. Larry Brand, and John McManus from the Rosenstiel School, began conducting studies to assess the health of marine habitats in the greater Punta Cana watershed. Using a combination of satellite data analysis and underwater surveys, they gathered information to map the major habitat types in the Punta Cana Reef Ecosystem. The data collected also helped to establish a monitoring program to study nutrient patterns that might affect water quality and seek out their potential sources.**

**The team’s overall goal is to help educate and foster stewardship of natural resources in the region.** By analyzing policies and regulatory instruments, along with ecological and socioeconomic data, PESCA hopes to provide options to resource users that will help to conserve the reef system for the long term.

**SustainablePromise; Managing the Risks**

Marine Aquaculture: Fulfilling the

Sustainable

Marine Aquaculture Taskforce

issued its report,

Marine Aquaculture Taskforce,

In the Solomon Islands, destructive fishing practices have caused growing concerns for the country’s economy and marine ecosystems. A new partnership is bringing new hope.

**The蕾ponding the tsunami had on the geology of the Solomon Islands.**

Jackson, a student in the Rosenstiel School’s Division of Marine Geology and Geophysics, applied her knowledge of sedimentology and ancient geological records during her visit. The team travelled to severely damaged villages on the islands of Gizo, Ronagonga and Simbo, as well as several small, uninhabited reef-islands. The team witnessed homes made of thatched grasses and entire forests cut down for firewood and timber.

**Fishing for Generations**

The purpose of the survey was to document the changes to the coastal geology of the region, focusing on sediment transport on and off shore, to see how tsunamis are potentially recorded in the long-term geological record. The earthquake and resulting tsunami caused extensive damage to coral reefs, coastal erosion, and in some locations, three meters of uplift, subsidence, and landslides. In a community largely dependent on fishing and tourism, the extensive damage to the islands’ coral reefs, will leave a significant impact on both the geology and economy of the region.
Florida Red Tide and Asthma

A study published in the January 2007 issue of CHEST, the peer-reviewed journal of the American College of Chest Physicians (ACCP), suggests that Florida red tide toxins (known as brevetoxins) can impact respiratory function and increase respiratory distress in patients with asthma. The article notes that though Florida red tides may affect everyone adversely, inhaled aerosolized brevetoxins may have a greater and longer lasting impact on patients with asthma.

In the normal population, breathing in red tide toxins can lead to eye irritation, rhinitis, coughing, and wheezing. However, these symptoms usually subside after leaving beach areas.

Asthmatics and other patients with chronic respiratory illnesses, whether residents or tourists, need to be aware of the potential risks involved with Florida red tide and how they might react to exposure. It is important for patients to take steps to reduce exposure, especially during times when Florida red tide levels are highest.

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Hobie Beach, Florida

Hurricanes & Health

For most, the aftermath of a hurricane brings thoughts of flattened homes, uprooted trees, and water damage to property left standing once the wind and rain stop. But it is the dust and organic debris pumped into the air by the strong winds and storm surge that may pose the hardest punch—the potential for illness and even death—long after the storm has passed.

As part of a study assessing urban sediment after Hurricanes Katrina and Rita, scientists from the University of Miami published findings in an April 2007 issue of the Proceedings of the National Academy of Sciences, pointing to the need for rapid environmental assessments as part of preventative disaster relief policy. The study, entitled “Impacts of Hurricanes Katrina and Rita on the Microbial Landscape of the New Orleans Area,” provided new insights into the potential for human exposures to both inhaled and ingested pathogens from sewage-contaminated floodwaters generated by hurricane activity.

Dr. Helena Solo-Gabriele, professor of Civil and Environmental Engineering at the University of Miami and co-author of the paper, along with colleagues at the NSF/NIEHS Center for Oceans and Human Health (OH) based at the Rosenstiel School, researchers from five universities, and two other NSF/NIEHS Centers for OHH, analyzed water and sediment samples in New Orleans during the two months following the 2005 hurricane season. Samples were taken from the interior canal and shoreline of New Orleans, and the offshore waters of Lake Pontchartrain, showed higher than normal bacteria and pathogen levels. The microbial levels reduced to acceptable levels within a few weeks after the intense flooding completely subsided.

Public health impacts of hurricanes vary depending on a number of factors. Initial threats may include drowning due to storm surges or rainfall flooding, with additional risks from high winds and potential tornadoes spawned by the storm. Emergency response teams face serious public health risks when attempting rescues, both during and after natural disasters. Findings show the importance of a rapid assessment of conditions to protect emergency workers and residents from potential illnesses that could result from exposure.

The 2005 events were characterized by an unusually high volume and long duration of human exposure to potentially dangerous pathogens. The most contaminated area tested near the Superdome contained high levels of sewage pathogens. Researchers underscored the need for improved monitoring efforts that focus on evaluating the impacts of sediments in affected areas, since exposure to contaminated sediments through inhalation or ingestion, could result in potential health risks.

Scientists have long been aware that with hurricanes come the potential for disease, cholera contamination and even death. But concerted efforts are now being undertaken to study and understand the connections between them and how at-risk communities might add another level of preparedness to their hurricane preparation and response.

Where We Swim & Play

In fall 2007, the University of Miami’s NSF NIEHS Oceans and Human Health Center, the Centers for Disease Control and Prevention, the Florida Department of Health, the Miami-Dade County Health Department, Nova Southeastern University, NOAA, University of Florida and other collaborators kicked off an interdisciplinary epidemiological study on Hobie Beach, Florida. Investigators wanted to find out if regular beachgoers in marine recreational waters with known paint sources of pollution experience any adverse health effects from swimming in subtropical water often cited for contamination with infectious microorganisms. Similar studies have been done in Great Britain, Spain and Hungary—but this is the first time it is being done in a subtropical climate.

The research team is recruiting nearly 1,300 participants through June 2008. After completing baseline and pre-exposure questionnaires, adult residents of South Florida who regularly use recreational marine waters are asked to either: a) enter the water or b) remain on the beach for 15 minutes, with those sitting on the beach serving as the control group for the study. Individuals randomly selected to enter the water, submerge their entire body and collect a water sample in a five gallon receptacle for microbial analyses (e.g. bacteria, viruses, parasites). Researchers then schedule a telephone interview for a follow up questionnaire about the person’s health to assess their well being over the seven days after exposure. Ultimately, the researchers will evaluate if reported health effects are associated with exposure to non-point source subtropical marine waters, and if the currently recommended microbial assessment methods protect human health.

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Conversing Our Oceans

The Pew Institute for Ocean Science (PIOS) in 2007 conducted and sponsored pioneering research worldwide to conserve oceans and protect marine life, and reduce human impacts upon them. PIOS is headed by Executive Director Ellen Pikitch, Ph.D., who is also professor of Marine Biology and Fisheries at the Rosenstiel School. The Institute created important new knowledge this year about sharks, coral reefs, sturgeon and ocean ecosystems.

PIOS sponsored research that uncovered, through DNA testing, that endangered basking sharks are still being wastefully killed for their high-priced fins for use in soup in Japan, Hong Kong, and even the United States, despite an international trade ban.

PIOS sponsored pioneering research worldwide to conserve oceans and protect marine life. Studies have uncovered far-reaching implications of ocean food web disruptions. For example, found that a shellfish shortage along the U.S. Atlantic coast was caused by depletion of predatory sharks, whose favorite food (tays and skates) multiplied dramatically and gorged on bay scallops.

Additionally, sturgeon experts from the Pew Institute took steps to protect this ancient fish, which is on the brink of extinction due to the incessant pursuit of its caviar eggs. Scientists tagged and tracked threatened sturgeon species into Kazakhstan's Caspian Sea, and closer to home into New York's Hudson and Oregon's Rogue Rivers, to better understand migratory behavior and spawning habitats. PIOS also collaborated with American Museum of Natural History geneticists to detect, through DNA analysis of stored, bought caviar, whether beluga caviar continues to be sold in the United States despite an import ban.

The year also marked the beginning of an exciting partnership with Chantecaille cosmetics, which designed a collector’s edition compact with a beautiful faux coral cover (photo below) and donated five percent of proceeds to the “Reefs of Hope” project. The funds will help PIOS scientists to uncover whether certain coral species can adapt to survive climate change, and apply that knowledge to protecting other corals.

Throughout the year, more than 180 Fellows in Marine Conservation representing 27 countries continued to pursue conservation solutions through research, education, advocacy, and community-based projects. Five new Pew Fellows from Australia, Japan and the United States were selected to address critical challenges to healthy oceans, including climate change and ecosystem mismanagement. These scientists joined over 100 Fellows and guests at an annual gathering in Morro Bay, California to share ideas that can lead to increasingly effective conservation solutions.

The Pew Institute supported the work of external scientists who uncovered far-reaching implications of ocean food web disruptions. Their research published in Science, for example, found that a shellfish shortage along the U.S. Atlantic coast was caused by depletion of predatory sharks, whose favorite food (rays and skates) multiplied dramatically and gorged on bay scallops.

Conserving Our Oceans

Of Ice and Men

On the tropical island of Oahu, Hawaii, amidst active volcanoes and eerily trade winds, Dr. Axel Timmermann, an associate professor of Oceanography at the University of Hawaii, Manoa, cannot stop thinking about ice. Thousands of years ago during the last ice age, the global climate shifted suddenly from cold ice ages to warmer interglacials and then in only a century, swung back to a glacial state. For Timmermann, finding out why abrupt climate variations occurred in the past offers the chance to step back hundreds of thousands of years at a time, to uncover the answers to important questions surrounding modern climate dynamics.

For his dedication and substantial contributions to marine oceanographic research, Timmermann was selected by the Division of Meteorology and Physical Oceanography to receive the prestigious 2007 Rosenstiel Award for Outstanding Achievement and Distinction in Oceanographic Science. The Rosenstiel Award is designed to honor scientists who have made significant and growing impacts in their field in the last decade.

Timmermann is highly regarded for his seminal modeling study, which predicts increased El Niño Southern Oscillation frequency in response to future greenhouse warming. His work is widely cited and part of a large catalog of published works that seek to understand the fundamental mechanisms driving El Niño in the past, present and future. Timmermann’s more recent work has revealed mechanisms that link climate variability in the Pacific Ocean with the Atlantic Ocean, on decadal and longer timescales. His theories have contributed to a modern, integrated view of the global climate system.

Co-author of three chapters of the 2001 Intergovernmental Panel on Climate Change (IPCC) 3rd Assessment Report, Timmermann currently chairs the International Pacific CLIVAR (Climate Variability and Predictability) Panel.

In 2007, together with Dr. Lowell Stott from the University of Southern California, he published a groundbreaking paper in Science that proposes a new forcing mechanism for the southern hemisphere deglacial temperature rise: an increase in sub-Antarctic-driven spring insolation starting around 19,000 years ago. According to the team’s coupled climate model, this event led to a massive reduction in spring and summer sea-ice extent around Antarctica, which had repercussions for not only the southern hemisphere, but also potentially for the oceanic release of carbon dioxide. This explanation is at odds with previous ideas on deglacial temperature rise in the southern hemisphere that invoked northern hemispheric forcing.

Timmermann, who is currently the research team leader at the International Pacific Research Center of the School of Ocean and Earth Science and Technology at the University of Hawaii at Manoa, is studying the Paleocene Eocene Thermal Maximum, a period of global warming 5 million years ago that marks one of the most fascinating climate changes in the planet’s history. He is also working to obtain funding for fieldwork on Lake Kauhako, the 4th deepest lake in the United States. The ultimate goal of the project is to preserve a sediment core from this ancient lake in order to reconstruct the history of climate, vegetation, mega-tsunamis and volcanic eruptions for the Hawaiian Islands, which will help explain environmental changes the Hawaiian Islands may have experienced before the arrival of humans.

Little Salt Spring: Plunging into the Past

Listed in the National Register of Historic Places, Little Salt Spring is a unique underwater archaeological site, providing unparalleled evidence of human activity in the New World from at least 12,000 years ago, and an environment that has helped preserve to present day the most fragile traces of human activities, dating back to the end of the last Ice Age.

What makes the Little Salt Spring Archaeological and Ecological Preserve truly unique is the lack of dissolved oxygen in the water, which predicts increased El Niño Southern Oscillation frequency in response to future greenhouse warming. His work is widely cited and part of a large catalog of published works that seek to understand the fundamental mechanisms driving El Niño in the past, present and future. Timmermann’s more recent work has revealed mechanisms that link climate variability in the Pacific Ocean with the Atlantic Ocean, on decadal and longer timescales. His theories have contributed to a modern, integrated view of the global climate system.

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Little Salt Spring located in North Port, Florida. Photo credit: Barbara Gonzales

Little Salt Spring Plunging into the Past

In 1986, researchers recovered human tissue almost 7,000 years old from other parts of the spring, dating to the Middle Archaic period. In amplifying and sequencing fragments of mitochondrial DNA, they discovered a genetic lineage not previously recognized in New World populations.

Limited funding has kept infrastructure limited on the site rudimentary. With 95 percent of the spring yet to be explored, the potential this site offers for underwater archaeologists such as Dr. John Gifford, Little Salt Spring Principal Investigator and Associate Professor at the Rosenstiel School, is unparalleled. The University of Miami is now in a position to offer some of the most important research and educational opportunities to its students, faculty and guest researchers, who will have the potential to make a major impact on our understanding of the initial colonization of the New World.

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Promoting accurate, meaningful scientific information to local communities is an integral part of our mission. Throughout the year, the Rosenstiel School hosts lectures, and events designed to share new perspectives on contemporary scientific issues. In 2007, acclaimed author Dallas Murphy, Jr. visited our campus to discuss his book To Follow The Water, an in-depth re-counting of the roots of modern oceanography from Benjamin Franklin to the latest theories on climate change. Murphy made sure to recognize the School's talented faculty as well as NOAA researchers with whom he collabora-ted when writing the book.

The School also hosted a panel on a topic of international impor-tance: the trafficking of animals, animal parts and plants. Miami Hosted a panel on a topic of international importance. The trafficking of animals, animal parts and plants.

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Tomorrow's Science Scholars

Eighteen teams from high schools throughout eastern Florida converged on MAST Academy for the 10th anniversary of the National Ocean Sciences Bowl (NOSB®). Hosted in collaboration with the Rosenstiel School, the NOSB® is designed to generate interest and excitement about science and the oceans, giving teenagers a chance to gain in-depth information about potential careers in marine science. Students from Gallie High School emerged as the 2007 winners, moving on to compete at the national competition in Stony Brook, N.Y.

More than 60 sixth and seventh grade students from Miami-Dade County visited the Rosenstiel School to attend the annual "Exploring Marine Science Day." Held in collaboration with the American Association of University Women, the event featured female faculty members and graduate students, who gave hands-on presenta-tions, and provided inspiration to the budding scientists. A similar program with Fairchild Tropical Garden, called Environmental Immersion Day, awarded scholarships for local students to visit the Rosenstiel campus and other environmental sites for a day of comprehensive learning about careers in research.

Students were not the only ones learning about ocean sciences from Rosenstiel School faculty—the School also offered Atmospheric and Marine-Based Interdisciplinary Environmental Health Training (AMBENT) and Project INSTAR (Investigating Nature Through Science Teacher Active Research) for teachers. Funded through the National Institute of Environmental Health Sciences, AMBENT provided an interactive workshop for 37 Miami-Dade County teachers, which emphasized team teaching strategies for large classes (more than 35 students.) Research scientists from the University of Miami, Florida International University, and County Department of Health helped to facilitate the training.

Project INSTAR, funded through the National Science Foundation and Miami-Dade County Public Schools, aims to bridge the gap between scientific research and K-12 education by enhancing the knowledge, skills, and field study experience of teachers. Participants select one of four themes: earth systems science; marine animals; tropical meteorology; or coral reefs.

Ongoing IMPACT

The Integrated Marine Program and College Training (IMPACT) Project, established in 1999 by the Miami Science Museum, in cooperation with the Rosenstiel School was awarded a four-year continuation grant by the U.S. Department of Education. The program has mentored 252 students since its inception, and helps local students prepare for postsecondary study with an emphasis on math, science and technology.

The Museum, in partnership with the Rosenstiel School and Miami-Dade County Public Schools, hosts a six-week summer marine program. Classroom lectures and computer-based training are held at the Rosenstiel School. Each week, a marine science professor or graduate student shares their research with the group. To-date, 100 percent of the students remaining active throughout the 4-year program have graduated high school, with more than 95 percent of those students going on to enroll in postsecondary education. Two students have even gone on to win highly competitive Dell Scholarships.

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The 2007 graduating class of INSTAR teachers celebrates the program’s 10th anniversary. Photo credit: Oana Ionel.

IMPACT students sort samples collected during a cruise in Biscayne Bay with the South Florida Student Shark Program. Photo credit: Miami Science Museum.

The 2007 graduating class of INSTAR teachers celebrates the program’s 10th anniversary. Photo credit: Oana Ionel.

IMPACT students sort samples collected during a cruise in Biscayne Bay with the South Florida Student Shark Program. Photo credit: Miami Science Museum.
The Alumni Association is also involved in keeping alumni connected to the school. In October 2007, several alumni returned to RSMAS during Alumni Weekend. Waterfront, on The Commons patio, alumni from several decades traded stories and shared cocktails from the Wetlab.

Yurco holds a B. S. in Geology and dual minors in Spanish and Biology from Kent State University. While at Kent, she participated in a scientific research cruise to the Arctic aboard the U.S. Coast Guard Cutter HEALY, the country’s newest and most technologically advanced polarbreaker. This experience helped Yurco develop her senior honors thesis, studying grain size and spectral reflectance of a sediment core from the Northwind Ridge, Chukchi Sea, to better understand past climate change in the region. She is pursuing an M.S. in Marine Geology and Geophysics to further her research interests in paleoclimatology. Yurco hopes to contribute to the better understanding of past climate changes and their implications for the future of the planet.

Traditions Old & New

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The year 2007 marked the first Alumni Crawfish Boil – a new Rosenstiel tradition, not soon to be relinquished. Sponsored by the Alumni Association following May Commencement, the traditional Louisiana-style crawfish boil boasted a huge steaming pot of crawfish boiled with corn, artichokes and potatoes, prepared by our very own alumni. It was a great chance for alumni and their families to visit the campus, reconnect with old friends, and welcome our newest alumni just after their graduation.

Bowled Over!

The Alumni Association sponsored a social during the 60th Gulf and Caribbean Fisheries Institute (GCFI) Conference at the Ocean Blue Hotel in Punta Cana, Dominican Republic. After being treated to hors d’oeuvres and cocktails, alumni donned colorful bowling shoes and spent time bowling a few frames with fellow alumni, faculty, students and friends of the Rosenstiel School. Alumni Association Vice President, Jen Schull hosted the event in honor of the School’s founder Walton Smith, who was the first chairman of the GCFI.

2007 Alumni Lecturer: John E. Reynolds, MS ’77, PHD ’80 (MBF)

In the last 30 or so years, since the passage of the Marine Mammal Protection Act and the Endangered Species Act, certain marine mammal species and stocks have slowly and successfully been recovered. However, there remain issues in terms of the conservation and management of several species and their ecosystems – noise and chemical pollution, fishing, development, and climate change are among those issues. Reynolds is using his research and expertise to help improve management and conservation of these important marine species.

Reynolds served over 20 years as professor of Marine Science and Biology, and chairman of the Natural Sciences Collegium at Eckerd College in St. Petersburg, Florida. Chairman of the Marine Mammal Commission since 1991, he has been co-chair of the IUCN Sirenian Specialist Group since 2001. Reynolds was also President of the International Society for Marine Mammalogy from 2006 to 2008. At Mote Marine Laboratory in Sarasota, Florida, he currently serves as senior scientist and Manatee Research Program manager, helping to improve knowledge and enhance stewardship of marine mammals and their habitats.

Financial Information

The University of Miami’s Rosenstiel School of Marine and Atmospheric Science is one of the nation’s leading oceanographic research and education institutions. A leader in developing innovative collaborations with government, industry, foundations and other institutions of higher education, the School has had impressive success in obtaining funding for its proposals. Approximately on of every two proposals submitted by Rosenstiel School scientists is awarded the requested funding.

In 2007, the Rosenstiel School received total support of $56.5 million. External funding for the School reached $47.8 million, in an extremely competitive funding environment. Federal funds came predominantly from the following organizations:

- National Science Foundation (NSF)
- National Oceanic and Atmospheric Administration (NOAA)
- National Institutes of Health (NIH)
- National Aeronautics and Space Administration (NASA) and
- the U.S. Department of Defense (DoD).
In support of higher education in environmental and conservation-based sciences, the Louis Aaron Reitmeister endowed scholarship fund was established at the Rosenstiel School this year. Reitmeister was a 20th century American philosopher and writer for whom humanism and the environment were lifelong passions. The scholarship supports students working ‘to preserve and safeguard endangered species, and help rid pollution from rivers, streams and oceans’.

Dr. William W. Dolan Lectureship

Established in 2007, and hosted by Mrs. Jean Dolan, this series honors the memory and affinities of the sea of Dr. William W. Dolan. Lectures feature distinguished scientists and explorers, to help promote the Rosenstiel School’s mission to help communities better understand our planet, and aid in the improvement of society and quality of life.

Honorary committee members include: Kenneth A. Behrends, deborah Donovan, Dr. Richard Fury, Dr. Jeffery Leiser, Steve Leiser, and John Harris. Photo credit: Karen Wilkening.

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Louis Reitmeister
Credit: Reitmeister Foundation

RSMAS Archive

Rest, Relaxation, R.C.C.L & Rosenstien

In 2007, the Rosenstiel School hosted its first oceanographic voyage aboard Royal Caribbean Cruise Lines’ Explorer of the Seas. More than 38 passengers joined the successful 5-day cruise, traveling with oceanographer, author and Rosenstiel Marine Geology and Geophysics alumna Dr. Ellen Frager, who provided fascinating seminars about the marine environment and its future, and led a variety of interesting shore excursions. Guests also spent time in the state-of-the-art marine and atmospheric laboratories aboard the ship. Equipped with WeatherPort 2000 technology, acoustic Doppler current profilers, and other sophisticated scientific equipment, Explorer of the Seas has been collecting observational data for seven years. In 2007, a project to retrolley the laboratories for future observatory operation was initiated. If successful, this project would offer the instrumentation of additional R.C.C.L vessels enabling the program to reach even more passengers.

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Faculty, Staff and Students

2007 Student Award Winners

Rosenstiel School of Marine and Atmospheric Science Fellows
Jennifer Wylie, AMP
Robert Letscher, MAC
Constance Korres, MAF
Kristine Stump, MBF
Noelle Van Ee, MGG
Wei Wei Zhang, MPO

Dean’s Prize
Kathryn Sellwood, MPO

Kocz Fellowship
Illya Udoeyedichokwen, AMP

F.G. Walton Smith Prize
Dr. Jeremy Mathis, MAF

RSMAS Alumni Fellowship
Lynne Yurco, MGG

Don deSylva Memorial Award
Martha Houff, MFF

Frank J. Millero Prize
Irina Rymina, AMP

Honorable mention:
Dr. Jenny Litz, MFF

Iversen Student Award
Aaron Welsh, MAF
Bruno Sardenberg, MAF

Mary Roche Fellowship
Virendra Ghate, MPO

Robert Glanssmer
Arthur Gleason
Peter Gilman
Polina Glynn
Destiny Hazra
Genevieve Healy
James Hertman
Silvia Hernandez
Camila Herrera
Edward Hondrond
Gary Hitchcock
Robert Hoeng
Julie Hollenbeck
Daniel Holshtin
Alok Horvath
Christian Howard
Feng Huang
Jingfeng Huang
Xuanlan Huang
Alice Huddler
Klaus Huybert
Britany Huntington
Anthony Hynes
Demis Ilbas
Mehmet Ilkac
Katherine Isenberg
Gay Ingram
Mohamed Iskandarani
Nicole Jeycas
Miguel Iigaure
Kelly Jackson
Benjamin James
Karl James
Michael Jakulis
Da Hai Jieong
Ian Jiang
Jing Ju
Vijay John
William Johns
Darlene Johnson
Lindsey Johnson
Lyza Johnston
David Jones

RCC Fellowship
Dwight Ebanks, MFF
Jason Waters, MAC

University of Miami Fellowships
Rachel Silverstein, MFF
Brittany Huntington, MFF
Benjamin Shaw, MPO

Martha Hauff
Brian Hauss
Angelique Hazza
Destiny Hazra
Genevieve Healy
James Hertman
Silvia Hernandez
Camila Herrera
Edward Hondrond
Gary Hitchcock
Robert Hoeng
Julie Hollenbeck
Daniel Holshtin
Alok Horvath
Christian Howard
Feng Huang
Jingfeng Huang
Xuanlan Huang
Alice Huddler
Klaus Huybert
Britany Huntington
Anthony Hynes
Demis Ilbas
Mehmet Ilkac
Katherine Isenberg
Gay Ingram
Mohamed Iskandarani
Nicole Jeycas
Miguel Iigaure
Kelly Jackson
Benjamin James
Karl James
Michael Jakulis
Da Hai Jieong
Ian Jiang
Jing Ju
Vijay John
William Johns
Darlene Johnson
Lindsey Johnson
Lyza Johnston
David Jones
Paul Jones
Robert Jones
Sarah Jones
Terrell Jones
David Kudko
Atul Kapila
Hesewok Kang
Mandy Karnitskas
Christopher Kellbe
Patrick Kelly
David Kernetter
Melissa Kenen
Erika Key
Kristin Klister
Katherine Kilpatrick
Sang Won Kim
Benjamin Kirmse
Veronique Koch
Marina Konenko
Stephen Kozi
Johnathan Kool
Vasilli Koutalas
Katherine Krammer
Ajay Kumar
Erik Kumerz
Ivy Kuepe
Tammy Labeorge-McDonald
Michael LaGier
Mancelle Lagy
Shawn Lake
Allison Lamb
Peter Lane
Chris Langdon
Christopher Langdon
Monica Lato
Michael Larkin
Anne Le Guen
Chia-Ying Lee
Jas-Yin Lee
Sang-Ki Lee

Left: Rosenstiel School Fellow: Noelle Van Ee, Kristine Stump, Jennifer Wylie, Robert Letscher, Wei Wei Zhang. (not pictured Constance Korres). Above: F.G. Walton Smith Prize Winner Dr. Jeremy Mathis and Dr. Dennis Hanwell. Photo credit: Susan MacMahon
New Division Chairs

Two closely related academic divisions, Meteorology and Physical Oceanography (MPO) and Applied Marine Physics (AMP), elected new departmental chairs this year. Dr. Peter Minnett, professor and researcher studying the oceanic and atmospheric variables from satellite- and ship-borne sensors, was elected MPO chairman; a division engaged in interdisciplinary observational, diagnostic, modeling, and theoretical studies to improve our understanding of the oceans and atmosphere. The division works closely with other groups within the School, as well as with scientists at the NOAA Atlantic Oceanographic and Meteorological Laboratory and the National Hurricane Center.

Dr. Hans Graber, an expert on radar remote sensing of hurricanes, the understanding air-sea interactions and Meteorological Laboratory and the National Hurricane Center.

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Dr. Hans Graber, an expert on radar remote sensing of hurricanes, the understanding air-sea interactions and the generation of ocean waves and storm surge, was elected AMP chairman. In addition to operating a hurricane forecasting model using remotely sensed data that predicts winds, waves and storm surge, was elected AMP chairman. In addition to operating a hurricane forecasting model using remotely sensed data that predicts winds, waves and storm surge, was elected AMP chairman. In addition to operating a hurricane forecasting model using remotely sensed data that predicts winds, waves and storm surge, was elected AMP chairman. In addition to operating a hurricane forecasting model using remotely sensed data that predicts winds, waves and storm surge, was elected AMP chairman. In addition to operating a hurricane forecasting model using remotely sensed data that predicts winds, waves and storm surge, was elected AMP chairman. In addition to operating a hurricane forecasting model using remotely sensed data that predicts winds, waves and storm surge, was elected AMP chairman. In addition to operating a hurricane forecasting model using remotely sensed data that predicts winds, waves and storm surge.
Sunset view of an iceberg against the Greenland coastline, Baffin Bay. Photo credit: Sarah Woods.