

SOUNDINGS

Summer 2010

Transforming Campus

FUNDRAISING UNDERWAY FOR MARINE LIFE, STORM SURGE AND HURRICANE FACILITY

A shiny new 60,000 square-foot research building planned to open on the Rosenstiel School campus in 2012 will house the world's only wind-wave-storm surge simulator, capable of generating hurricane-force winds in a 3-D test environment.

Thanks to a \$15 million grant from the National Institute for Standards and Technology with funds from the American Recovery and Reinvestment Act, marine and atmospheric scientists and engineers will collaborate to understand the effects of hurricanes and how extreme weather events affect our natural and man-made environments.

"We are thrilled with the prospect of this new research building. It will completely transform our campus," said Roni Avisar, dean of the Rosenstiel School.

The building will house an 8,520 square-foot Surge-Structure-Atmosphere Interaction (SUSTAIN) research facility, which will allow scientists to observe critical storm

factors, such as sea spray and momentum transfers across the ocean surface in extreme wind conditions.

Understanding Hurricanes

"Developing a more complete understanding of our environment and its weather, as well as the weather's effects on structures, ecosystems, and human health is essential," said Brian Haus, associate professor at the Rosenstiel School and director of UM's Air-Sea Interaction Saltwater Facility and SUSTAIN principal investigator. "This building will provide an excellent resource to help us decipher what is taking place on the planet."

SUSTAIN will be used to develop and implement advanced sensor technology, including remote and optical imaging systems that can be deployed in hurricanes. Scientists there also will help develop the next generation, high-resolution fluid dynamic models, which help forecasters and emer-




Michael Schmale

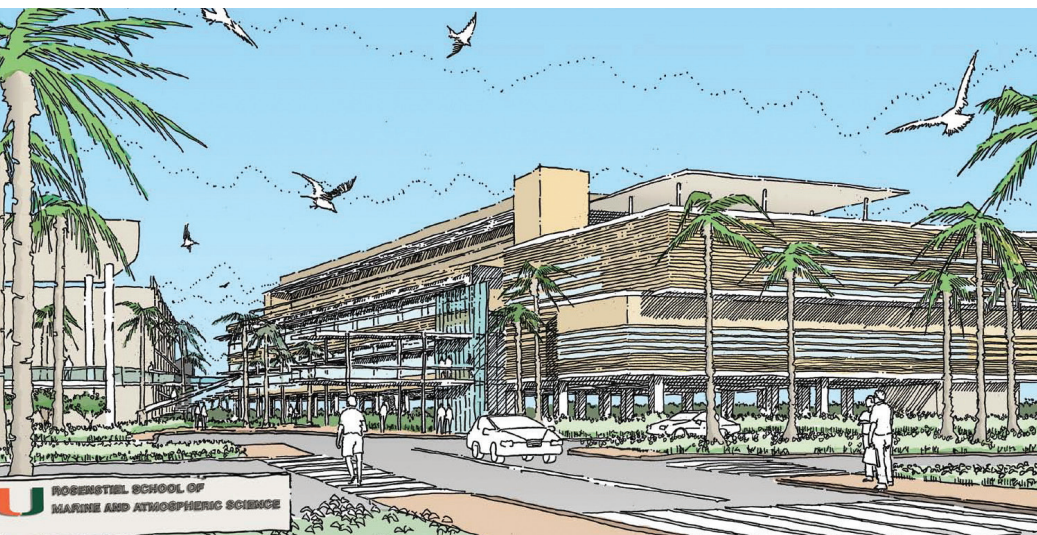
Tumored bicolor damselfish

gency response planners throughout the hurricane season. They will also work with engineers and architects to physically model coastal communities and develop new building and neighborhood designs that are more resistant to wind-driven rain, sea spray and moisture intrusion.

Co-located in the facility, the Marine Life Science Center will focus on coral reef, fisheries and biological oceanography research. It will also house UM's internationally recognized Center for Oceans and Human Health, which will focus on such issues as the effects of neurotoxins on the seafood that we eat, harmful bacteria on our beaches, and pathogens in drinking water.

Additional on-site biomedical research will include the NIH-funded National Resource for Aplysia, where the relatively simple neurological system of sea hares is used as a model for research on memory and learning, as well as laboratories to investigate marine genomics and toxicogenomics. Programs will also tackle studies on the effects of climate change on corals and the development of sustainable aquaculture and fisheries methodologies. 

The Marine Technology & Life Sciences Seawater Building will transform the Rosenstiel School's Virginia Key campus.



Cambridge Seven Associates, Inc.

Astronomer Edwin Hubble once said, "Equipped with his five senses man explores the universe around him and calls the adventure, 'science.'"

My first year at the Rosenstiel School has been a wonderful scientific adventure, and one of the most rewarding aspects of our work is the range of new possibilities that exist thanks to collaboration.

The work highlighted in many of the articles in this issue of *Soundings* is due to close work with our UM colleagues:

- the NIST grant for the new research building is thanks to our partners in the College of Engineering;
- our professional master's program would not be possible without critical input from the College of Arts & Sciences and schools of business and communication;
- our earthquake and climate research is enriched by collaborations with computer scientists.

As the Rosenstiel School is the only UM entity located on an island, we know how important community is—the University, City of Miami, South Florida, the Caribbean, and the world. And the oil spill in the Gulf of Mexico has reminded us all of how interdependent our world is.

You are invited to join our scientific community and collaborate with us in this great adventure.



Bob Soto Photography

Roni Avissar

New Conservation Program

DUNLAP FAMILY FUNDS OCEAN SCIENCE FOR FUTURE GENERATIONS

As a young boy, businessman and conservationist Richard James Dunlap spent family vacations in the Florida Keys, and vowed to return some day.

Today, his legacy will live on as his family has committed funding for the R.J. Dunlap Marine Conservation Program at the Rosenstiel School.

"Our goal in establishing this program is to honor the memory of my late husband," said Marian Dunlap. "We hope to create a legacy that will help us to understand these precious resources and to sustain them, so that future generations can enjoy them."

Intersection of Science and Policy

The joint program with UM's Leonard and Jayne Abess Center for Ecosystem Science

and Policy will enable UM to build upon its internationally recognized programs in marine and ecosystem science and to foster interdisciplinary approaches to emerging environmental issues.


The program also will focus on advancing ocean research through hands-on field and virtual learning experiences, such as the "Adopt-A-Shark" program where students will help attach satellite tags to hammerhead and bull sharks, which can then be tracked on-line.

"This will allow us to better understand their migratory routes and

Neil Hammerschlag



Lemon sharks are among the vital species being studied through the Dunlap Program.

habits to assist us in creating stronger policies to protect these magnificent, but critically threatened species," said Neil Hammerschlag, director of the R.J. Dunlap Marine Conservation Program. 

Masters of Professional Science

ROSENSTIEL OFFERS "21ST CENTURY EDUCATION"

A new degree program at the University of Miami has the Rosenstiel School partnering with other UM schools and colleges, helping to prepare students for the evolving job market of the 21st Century.

"There is a growing demand for students who have advanced training in the sciences but also have professional skills that are highly valued by employers," said Brian Soden, associate dean for the professional masters program. "Professional science programs are being developed nationwide, designed to meet the needs of 21st Century employers, much like the MBA did during the 20th Century."


The Bureau of Labor Statistics reports that the demand for environmental scientists and specialists will increase by 28 percent by 2018. Atmospheric scientists will increase by 15 percent, and the demand for conservation scientists will increase by 12 percent.

Trend-Setting

In anticipation of these trends, UM is offering advanced training in the marine and atmospheric sciences with a blend of team-building, communication skills, legal and regulatory knowledge, and business savvy in the following programs:

- Aquaculture
- Broadcast Meteorology
- Coastal Management
- Computational Meteorology and Oceanography
- Fisheries Management
- Marine Mammal Science
- Oceans and Human Health
- Tropical Marine Ecosystem
- Weather, Climate and Society
- Weather Forecasting

Our curriculum is structured to allow students to earn their degree in as little as 12 months. In addition to a foundation of scientific knowledge, students will receive applied training and internships to focus on acquiring marketable skills that will provide them with an efficient route into business and industry.

For more information, visit <http://mps.rsmas.miami.edu> or call 305-421-4202. 

Students in Broadcast Meteorology will learn skills they can immediately use on the job.



The University of Miami School of Communication


'OCEAN KIDS' WELCOMES BUDDING MARINE SCIENTISTS

More than 100 children from low-performing, high-needs elementary schools visited the University of Miami for a day of marine science adventures in order to learn about conservation and the ocean.



Elizabeth Martin

Organized by the Rosenstiel School, F.I.N.SEA Foundation, and the marine and atmospheric science honor society—Rho Rho Rho—the second annual event featured 15 stations where the children could participate in various conservation and ocean-related activities. At a microscope station (left), they observed plankton and larval fish, and they handled sea stars, sea urchins, sea cucumbers, and many other sea creatures in touch tanks.

Student volunteers and organizers hoped to educate and inspire children about the ocean, to generate environmental awareness and stewardship in the community, and to empower children to become leaders in their communities and effect positive change in the natural world. 

Climate and Cloud Cover

CLOUD COVER MAY AFFECT CLIMATE WARMING RATES

The relationship between clouds and climate change has been a major research issue for decades. Recently, a Rosenstiel School study published in the journal *Science* has made headway on this issue by revealing that subtle cloud changes can be detected by both satellites and the human eye.

“We were shocked to find such a high correlation between ship-based observations of cloud cover from beneath the clouds and remote sensing data from satellites,” said Amy Clement, lead author and associate professor of Meteorology and Physical Oceanography at the Rosenstiel School. “The ship-based data had been generally dismissed as too subjective, but the agreement with the satellites was extremely encouraging.”


This finding will give modelers a better target against which to compare their simula-

tion of the clouds in order to validate climate models.

Looking at an active area of the northeast Pacific Ocean, Clement and her team compared data from 1952 to 2006 with satellite data from 1984 to 2005. They then tested their data against the 18 current climate change models covered in the 2007 Intergovernmental Panel on Climate Change (IPCC) report.

“We found that one model—the Hadley Centre model from the UK—reproduced the cloud fluctuations from the past,” said co-author Robert Burgman, a research scientist at UM. “Because this model shows global temperature increases at the upper range of the IPCC models—approximately nine degrees Fahrenheit by the end of this century if

carbon dioxide levels double—we may need to accept that the top end is not a fluke.”


One of the factors that may drive temperatures higher is that as sea surface temperature increases, cloud cover decreases, which may create a vicious circle that would continue to increase sea surface temperatures and decrease cloud cover. 



GLOBAL DIALOGUE CONTINUES

Soon after the world climate change conference in Copenhagen, about 150 researchers from Australia, Japan, Europe, and across North America reconvened at the Rosenstiel School for a workshop called “Predicting the Climate of Coming Decades.” Dialogue focused on scientists developing climate prediction systems and potential users, such as resource managers and the insurance industry.

Several of the workshop attendees are developing experiments for the next assessment report by the Intergovernmental Panel Climate Change Assessment Review 5 (AR5), to be published in 2014.


“AR5 will have two big components: climate change for the next 50 to 100 years, and climate variability over the next 10 to 20, maybe 30 years. There is already a lot out there on the first component, and we now have gotten a good start with the natural variability and human factors in the near term,” said Ben Kirtman, workshop co-chair and professor of Meteorology and Physical Oceanography at the Rosenstiel School. 

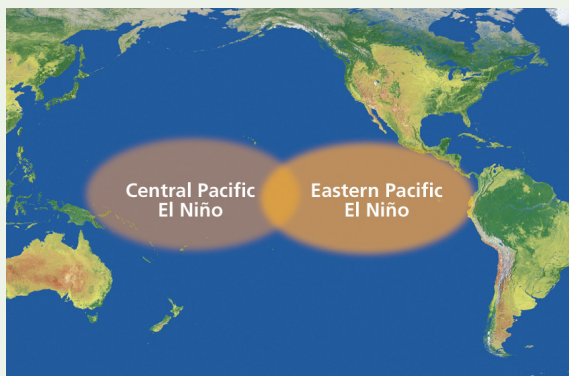
CLIMATE’S EFFECT ON EL NIÑO

El Niño, the eastern Pacific phenomenon credited with shielding the United States and Caribbean from severe hurricane seasons, may be overshadowed by its big brother in the central Pacific due to climate change, according to an article in *Nature* co-authored by Rosenstiel School investigator Ben Kirtman.

Kirtman was part of a team of scientists that applied Pacific sea surface temperature data from the past 150 years to 11 global warming models developed by the IPCC. Eight of the models showed that global warming

conditions will increase the incidence of the central Pacific El Niño, which has more than doubled over the past 20 years.

Though the centers of the central and eastern oscillations are roughly 4,100 miles apart, El Niños historically have not occurred simultaneously. 



A Cohesive Response

ROSENSTIEL SCIENTISTS AND STUDENTS ASSIST WITH GULF OIL SPILL

Since the earliest moments of the *Deepwater Horizon* explosion in the Gulf of Mexico, researchers from the Rosenstiel School have monitored and studied the resulting oil spill and are helping to prepare for the long-term consequences of the ecological disaster.

- Meteorology and Physical Oceanography Professor Nick Shay and his students were involved in NOAA P3 aircraft flights from MacDill AFB in Tampa, deploying dropsondes over the affected area to study the effects of the Loop Current on the spill.
- CSTARS, the Center for Southeastern Tropical Advanced Remote Sensing, has provided satellite images of the region to government decision makers who are leading national response efforts.
- At the request of federal government, the Rosenstiel School's *R/V F.G. Walton Smith* was reassigned to support NOAA and EPA efforts to study the oil plumes near the well-head. Work on board the *Walton Smith* has been pivotal and featured in many news reports.
- Rosenstiel School oceanographers and meteorologists are creating complex two- and three-dimensional models of the Gulf of



Howard Gilley



Howard Gilley


Mexico to project paths the oil might take and areas that might be adversely impacted.

- Coral biologists are studying the effects on both shallow- and deep-water corals in the Gulf and around the southern end of Florida, which comprise the only natural reefs in the continental United States.
- The University's Center for Oceans & Human Health established a resource page with spill reporting guidelines and volunteer opportunities.
- UM was among the first universities to sign on to become a part of the statewide Oil Spill Academic Taskforce.

Robert Cowen, Rosenstiel School associate dean of Research and Maytag Professor of Ichthyology, and Peter Ortner, UM professor and director of the Cooperative Institute for Marine and Atmospheric Studies, have spearheaded efforts to assemble resources from different disciplines to address oil spill-related issues.

"Our faculty and scientists have been trying to help provide the best possible information to the relevant state and federal decision makers," said Cowen.

The entire academic team has been active throughout South Florida, sharing its knowledge with the community at large.

The School also established an educational web site that lists experts at the University of Miami and offers information gathered by several research groups. The Oil Spill Response Site can be found at www.rsmas.miami.edu/oil-spill. 

Above: Washing oil off profilers before bringing them on the ship. Left: Photo taken from the deck of the *R/V Walton Smith*.

BIG FISH

Florida State University has tapped Rosenstiel alumnus Eric Barron to be its 14th president. Previously, he was director of the National Center for Atmospheric Research (NCAR) in Boulder, Colorado.

Barron earned his master's degree from the Rosenstiel School in oceanography in 1976 and his Ph.D., in 1980. His dissertation was titled "Paleogeography and Climate, 180 Million Years to the Present."

"Eric was a very good student," said Christopher Harrison, professor of Marine Geology and Geophysics and one of Barron's advisors.

Barron's first job after graduating from UM was as a staff scientist at NCAR, followed by a short stint on the Rosenstiel faculty. He was recruited to join the faculty at Penn State in 1986, eventually rising to the post of dean of the College of Earth and Mineral Sciences in 2002. He also served as dean of the Jackson School of Environmental Sciences at the University of Texas.

"Eric is an excellent scientist and was on the trajectory to lead a large institution," said Harrison.

Have Harrison and Barron spoken since his appointment in December?

"Yes, and I teased him about picking a new football coach and asked him to make sure to pick one to beat the University of Florida, but not Miami!"

Barron's colleague and fellow Rosenstiel School alumnus Lawrence Abele, provost and executive vice president of Academic Affairs for FSU was appointed to the Gulf of Mexico Fishery Management Council by the Department of Commerce, designed to protect marine fish stocks in the region. 



Earthquakes in the Hemisphere

ROSENSTIEL SCHOOL SCIENTISTS STUDYING HAITIAN AND SOUTH AMERICAN SEISMIC ACTIVITY

Following January's devastating earthquake in Haiti, a team of UM scientists is pouring over data to understand what the unpredictable Enriquillo Fault that runs south of Port au Prince is going to do next.

Tim Dixon and a team of marine geology and geophysics scientists from the Rosenstiel School are comparing satellite data from before and after the earthquake to find new stress points that may cause aftershocks or ruptures.

Dixon is worried that the January event may be the first of several in the area.

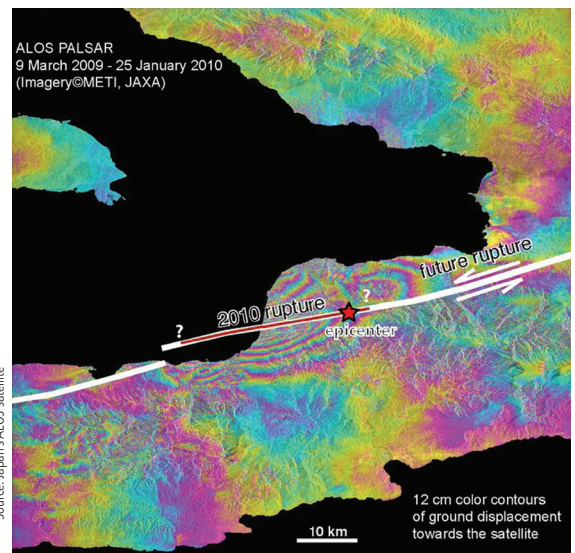
"The last time this happened was in the mid 1700s, when we had three major earthquakes in 20 years. That pattern could recur."

A similar pattern has been occurring in Turkey since the 1940s, where the fault is "unzipping" from east to west with a major earthquake every few years.

The good news is that government officials, donors, and planners probably have

time to fortify existing buildings and rebuild infrastructure to withstand future temblors.

"The bad news is that we've known for some time that Hispaniola was facing a major earthquake," said Dixon, who authored a paper in 1998 warning of a rupture on the Enriquillo Fault. But other papers both before and since had similar warnings. "As a profession, we need to do a better job of getting the word out."



Dixon and his colleagues met with US State Department officials and donors interested in rebuilding Haiti, and he is pleased to report that "they seem to be getting the message that things must be done differently."

Looking South

Prior to the March earthquake in Chile, the last major event in South America was a magnitude 8.0 earthquake that destroyed 90 percent of the city of Pisco, Peru, in 2007. Rosenstiel School scientists did a thorough review of data from that quake and its impact on regional topography.

Geophysical Journal International recently named the study one of eight "hot papers in 2009."

Top: Satellite image shows rupture in Enriquillo Fault.

Middle: Damage to Haiti's Presidential Palace and port.

CSTARS AIDS EARLY HAITI RESCUE EFFORT

Within hours after the earthquake struck Haiti, Professor Hans Graber received a call from the US Southern Command. The mission?

To visualize conditions on the ground in Haiti to determine the best strategies for bringing in massive aid.

"We provided satellite imagery to help them assess physical damage to buildings, the port and airport; the condition of the infrastructure; which roads were accessible to bring in supplies and other relief," said the chairman of the Rosenstiel School's Division of Applied Marine Physics and executive director of the CSTARS program. "It was a pretty exciting time for us, and we were happy to help."

CSTARS, or the Center for Southeastern Tropical Advanced Remote Sensing, normally provides satellite imagery to the US Government and for scientific applications as well as a communications link with the US South Pole station.

Rosemary Mann was named assistant dean of advancement for the Rosenstiel School. She previously served in fund and program development roles for the Herbert W. Hoover Foundation, the Guy Harvey Ocean Foundation, the Oceanographic Center for Nova Southeastern University, the Pew Institute for Ocean Science at the Rosenstiel School, and was assistant dean of development for the Rosenstiel School.

The **G. Unger Vetlesen Foundation** provided \$950,000 to support the School's climate science research and to purchase a highly sensitive Inductively Coupled Plasma Mass Spectrometer, capable of determining the elemental composition of rocks, marine sediments, and ocean water samples.

Jose Luis Jimenez, Ph.D., associate professor of Chemistry and Biochemistry and Fellow of Cooperative Institute for Research in the Environmental Sciences at the University of Colorado was awarded the 2010 Rosenstiel Award for his groundbreaking studies using the aerosol mass spectrometer. 🌍

San Jacinto Fault

DEEP CREEP SALVES EARTHQUAKES ALONG CALIFORNIA'S SAN JACINTO FAULT

Averaging four mini-earthquakes per day, fault constant adjustments to Southern California's San Jacinto fault may make it a less likely candidate for a major earthquake than its more famous neighbor to the east, the San Andreas fault, according to an article in *Nature Geoscience* by Rosenstiel School research associate professor Shimon Wdowinski.

"Those minor-to-moderate events along the San Jacinto fault relieve some of the stress built by the tectonic plates," said Wdowinski, who feels that "deep creep" along the San Jacinto fault releases elastic strain of the moving plates approximately six to ten miles beneath the surface.

The San Jacinto fault begins between Palm Springs and Los Angeles and runs 140 miles south toward the Salton Sea east of San Diego. Its frequent rumbling might be compared to a stick with a notch in it.

"When you bend it and it breaks, less energy is released," said Wdowinski. "Deep creep—

evidenced by those small, frequent earthquakes—in effect forms that small cut that reduces the release of energy when the rupture finally occurs. The big energy release of a major earthquake is less likely because pressure is not allowed to build up."

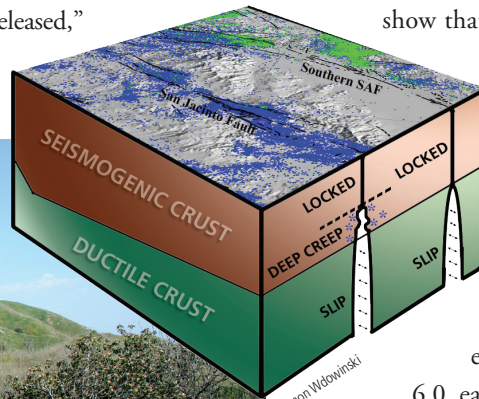
Overstated Estimates

The likelihood of a major event on the San Jacinto fault may have been previously overstated, which the US Geological Survey says has a 31 percent chance that an earthquake with a magnitude of 6.7 or higher on the Richter Scale may occur in the next 30 years. Only the San Andreas fault, with a 59 percent chance, is more likely to have a major event during the same period.

"Thirty-one percent is a high probability, when it comes to earthquake forecasting—the second highest in Southern California," said Wdowinski. "Our data show that the next significant event

for the San Jacinto fault would probably be between 6.0 and 6.7. It doesn't sound like much, but in earthquake terms it is the difference between a moderate event and a major earthquake." A magnitude

6.0 earthquake may be felt for dozens of miles from the epicenter, but building damage would be minimal. A 7.0 magnitude earthquake or higher results in much more serious property damage and possible loss of life, as was witnessed recently in both Haiti and Chile. 🌍



Fault trench along the San Jacinto Fault near Moreno Valley, California.



Nate Onderdonk



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UM RANKS GLOBALLY IN GEOSCIENCES

Disciplines within the Rosenstiel School helped UM rank among some of the world's most prestigious atmospheric research, oceanography and geology programs on the basis of citations per published paper, according to the *Essential Indicators* database of Thomson Reuters.

- 1 Met Office Hadley Centre for Climate Prediction and Research
- 2 Harvard University
- 3 Lawrence Livermore National Laboratory
- 4 Princeton University
- 5 University of East Anglia
- 6 National Center for Atmospheric Research
- 7 European Centre for Medium-Range Weather Forecasts
- 8 Max Planck Society
- 9 National Oceanography Centre, Southampton
- T10 University of Washington
- T10 University of California, Santa Barbara
- 12 CEA Saclay (Commission for Atomic Research)
- 13 University of Miami**
- 14 Columbia University
- 15 Woods Hole Oceanographic Institution
- 16 Carnegie Institution for Science
- 17 National Oceanic and Atmospheric Administration
- 18 University of California, Santa Cruz
- 19 California Institute of Technology
- 20 Massachusetts Institute of Technology



Seal lion with surgeon fish in the Galapagos.

DID YOU KNOW?
UM's Rosenstiel School launched its first exciting semester in the Galapagos this Spring, and is already accepting applications for Spring 2011.