



# AOML Keynotes

ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORY

*AOML is an environmental laboratory of NOAA's Office of Oceanic and Atmospheric Research located on Virginia Key in Miami, Florida*

## Second Underwater Glider Mission to Gather Observations in Caribbean Sea

AOML's second underwater glider mission began on February 5th with the deployment of two gliders in the Caribbean Sea south of Puerto Rico. Both gliders will spend the next few months gathering observations to aid researchers assess ocean dynamics and thermal conditions in this region of the Western Hemisphere Warm Pool. The ultimate goal is to better understand air-sea interaction processes that occur during the passage of tropical cyclones and the impact of the upper ocean on tropical cyclone intensity forecasts.

Deployment of the gliders was accomplished by two teams working in unison. The field operations team was led by Grant Rawson, a University of Miami Cooperative Institute research associate with AOML's Physical Oceanography Division (PhOD), working with Julio Morell and Luis Pomales from the University of Puerto Rico-Mayaguez aboard the RV *La Sultana*, a research vessel of the University of Puerto Rico. Francis Bringas of PhOD led the pilot team at AOML, which included Walter McCall of NOAA's National Data Buoy Center, Gustavo Goni of PhOD, and PhOD Cooperative Institute research associate Ricardo Domingues.

Following their successful launch from the RV *La Sultana*, the gliders immedi-



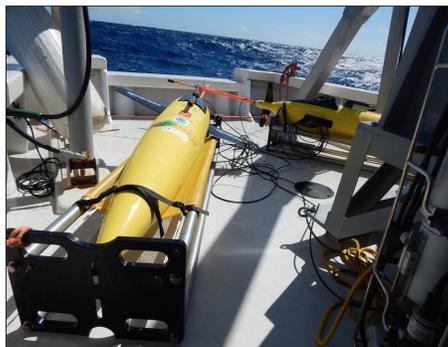
Dr. Julio Morell of the University of Puerto Rico-Mayaguez and Grant Rawson of AOML deploy underwater glider SG609 into the Caribbean Sea south of Puerto Rico from the R/V *La Sultana*.

ately began transmitting data to the AOML glider web page in real time. After the first few test dives, however, the pilot team noticed odd readings coming from the newly installed oxygen sensors. Upon further investigation, it was determined the gliders were in need of a firmware update from the manufacturer.

The field operations team returned to the deployment zone on February 6th, recovered the gliders, and installed the new firmware while at sea. The gliders were subsequently tested and redeployed to resume their mission with no further issues related to the oxygen sensors. In addition to the new oxygen sensors, the gliders are also equipped with Argo transmitters to aid in pinpointing their geographic location should an emergency recovery of them become necessary.

Gustavo Goni leads the glider project at AOML with financial support provided by NOAA's Hurricane Sandy Supplemental funds. This second mission is expected to last 4-5 months and collect more than 3000 temperature, salinity, and oxygen profiles from the Caribbean Sea to depths as great as 1000 m. During the first glider mission from July-November 2014, the two gliders successfully gathered more than 2800 temperature and salinity profiles in the North Atlantic Ocean and Caribbean Sea.

Data from the gliders are transmitted to the Global Telecommunications System and several data distribution centers. Additional information about AOML's glider operations can be found by visiting <http://www.aoml.noaa.gov/phod/goos/gliders/observations.php>.



Underwater gliders aboard the R/V *La Sultana* ready for deployment in the Caribbean Sea.

# The Galápagos Islands—A Glimpse into the Future of Our Oceans

*A study of coral reefs in the Galápagos Islands\* provides evidence that reefs exposed to lower pH and higher nutrient levels may be the most affected and least resilient to changes in climate and ocean chemistry.*

The Galápagos Islands are a unique habitat that allow scientists to study many ecological conditions, including exposure to naturally high levels of oceanic carbon dioxide. The coasts of the Galápagos are bathed in upwelled water from the deep ocean. This upwelled water has high carbon dioxide concentrations.

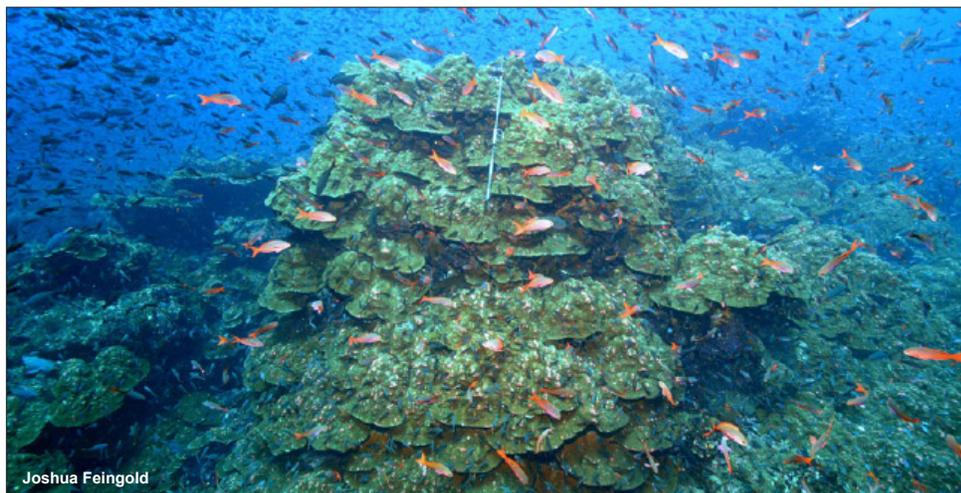
Greater levels of carbon dioxide result in lower pH levels in seawater, making it more acidic. Waters high in carbon dioxide can have a negative affect on some organisms, like corals, that build their skeletons under water. These naturally high levels of carbon dioxide surrounding the Galápagos are a present day example of the conditions expected throughout the rest of the tropics by the 2050s.

Warm water temperatures are another factor affecting the Galápagos. The 1982-1983 El Niño-Southern Oscillation warming event increased water temperatures in the Galápagos 3-4 degrees Celsius above the usual maximum sea temperatures. This warming physically stressed Galápagos corals, causing them to expel the algae living in their tissues and becoming completely white or bleached.

This and other similar coral bleaching events, coupled with the naturally occurring high levels of carbon dioxide, made it difficult for coral reefs to rebuild their calcium carbonate skeletons. None of the Galápagos' southern reefs show signs of revival, and only one reef is recovering off the far northern island of Darwin.

**Coral Reefs off the coast of Floreana Island in the southern Galápagos Islands. Left: In 1976, before the 1982-1983 El Niño-Southern Oscillation warming event. Right: In 2012, after stressful environmental conditions destroyed the reef.**

\*Manzello, D.P., I.C. Enochs, A. Bruckner, P.G. Renaud, G. Kolodziej, D.A. Budd, R. Carlton, and P.W. Glynn, 2014: Galápagos coral reef persistence after ENSO warming across an acidification gradient. *Geophysical Research Letters*, 41(24):9001-9008 (doi:10.1002/2014GL062501).



Joshua Feingold

Only one surviving reef remains off the coast of Darwin Island in the northern Galápagos Islands.

As a coral ecologist and lead researcher with NOAA's Coral Health and Monitoring Program, Derek Manzello of AOML gathered an abundance of data on the seawater surrounding the southern Galápagos Islands, but he had limited information on the seawater in the northern islands. Thanks to the Khaled bin Sultan Living Ocean's Foundation, Manzello and his team were able to venture to Darwin and conduct field studies comparing corals and seawater chemistry between the southern and northern islands. They discovered that at the present day acidification levels, corals can recover from severely stressful events, but their recovery is dependent on water quality conditions.

In the Galápagos study, waters have lower pH and higher nutrients in the southern islands. The team measured changes in coral density to compare growth rates of corals in the southern and northern waters. Corals, like trees, have an annual banding pattern, which is used to determine annual growth rates.

Manzello's team took core samples from corals and examined their density

bands with a micro-CT scanner, producing three-dimensional X-ray images. Using these images, they observed healthier annual growth rates and density patterns for corals in the northern waters. Corals in the southern waters, which were exposed to elevated nutrients and high carbon dioxide levels due to upwelling, showed less skeletal growth.

"The Galápagos reefs provide one piece of the science of predicting how coral reefs will fare with continued warming and ocean acidification," said Manzello. "There are other areas with high levels of carbon dioxide that do not experience as high a level of the nutrient values found in the Galápagos. This allows us to understand how acidification may impact the future of coral reefs throughout the world's oceans."

With support from NOAA's Coral Reef Conservation and Ocean Acidification programs, AOML scientists will continue their efforts to monitor, evaluate, and study the effects of ocean acidification and warming ocean temperatures at coral reefs in the Florida Keys, and at reef sites throughout the world.



Peter Glynn



Derek Manzello

# Coral Researcher Jim Hendee Selected to Lead Ocean Chemistry and Ecosystems Research at AOML

AOML is proud to announce the selection of Dr. James “Jim” Hendee as the director of its Ocean Chemistry and Ecosystems Division. Internationally recognized for his expertise in coral observing systems and data management, Jim’s almost 25-year tenure with AOML began in 1990 as a data manager for several ocean chemistry programs.

Jim is well known for his ability to leverage resources to develop and inspire productive research teams. He steps into the role of director after serving in an acting capacity since June 2013.

Jim’s early career at AOML blossomed as he oversaw data management of the newly established SEAKEYS program, a network of lighthouses and other platforms that collect hourly in situ sea temperature and meteorological data at coral reef sites in the Florida Keys. Jim initially gathered SEAKEYS data and distributed them daily via fax to environmental managers in the Florida Keys (Coral Fax), as well as to dive boat and fishing charters.

Realizing an opportunity to embrace emerging technology and the new, burgeoning Internet, Jim successfully launched the Coral Health and Monitoring Program (CHAMP) Web page, the very first coral reef related Web page in the world and the first Web site at AOML. The

server was also used to host a list-server called Coral-List with about 100 names taken from the attendee list for the 8th International Coral Reef Symposium held in Panama in 1996. That list still operates today with over 8,500 subscribers and has become the de facto means of broad communication among coral reef researchers the world over.

In 1998, Jim was chosen as a member of the newly established U.S. Coral Reef Task Force Monitoring Working Group. Jim and his growing team of CHAMP researchers eventually devised a new design for in situ coral reef monitoring stations and began installing the design at coral reef sites in the Caribbean, with funding help from NOAA’s newly formed Coral Reef Conservation Program.

Through the years the CHAMP program has received more than \$8M in funding for coral reef research and the development of an expert system that is the heart of the Coral Reef Early Warning System (CREWS) used for ecological forecasting. Additionally, Jim’s efforts have supported the acquisition of an appreciable amount of computing hardware and software, oceanographic and meteorological instrumentation, and five major international workshops. He has also leveraged the continuing CHAMP funds to establish and



support new research directions (e.g., ocean acidification, ecological forecasting, physical oceanography of coral reefs) and personnel support for University of Miami-Cooperative Institute research scientists and system administrators, five National Research Council post-docs, numerous NOAA Hollings Scholars, and student interns.

From 1993 to 2000, Jim worked nights to earn a Ph.D. in Information Systems from Nova Southeastern University. His previous degrees include a B.S. and M.S. in marine biology. In 2000, Jim received the NOAA Research Employee of the Year award, and in 2005 the NOAA Bronze medal for establishing the CREWS Network.

NOAA's Atlantic Oceanographic & Meteorological Laboratory and Southeast Fisheries Science Center are hosting a



# NOAA Open House

Saturday, May 16, 2015 | 10:00 am - 3:00 pm

75 Virginia Beach Drive, across from the Miami Seaquarium

Help NOAA celebrate SEFSC's 50th anniversary!  
Come meet NOAA scientists and learn about hurricanes, corals, fisheries, coasts, and much more!



For more information, please contact: Erica Rule at (305) 361-4541 (Email: [Erica.Rule@noaa.gov](mailto:Erica.Rule@noaa.gov)) or Essie Coleman-Duffie at (305) 361-4237 (Email: [Essie.C.Duffie@noaa.gov](mailto:Essie.C.Duffie@noaa.gov))

NOAA’s Southeast Fisheries Science Center and AOML are partnering with the University of Miami’s (UM) Rosenstiel School to host an open house in May 2015.

The open house will rotate through each NOAA facility and the Rosenstiel School’s new Marine Technology and Life Sciences Seawater Complex for a total visit time of about 4 hours. Students will also have the opportunity to visit the MAST Academy Land SHARC and Weather on Wheels mobile outreach stations.

This is a great event to enhance science-technology-engineering-mathematics (STEM) education. Participants will learn about hurricane research, climate science, oceanography, local fisheries, endangered species, and coral communities. NOAA and UM scientists will be on-hand to describe their research projects and to answer questions.



Researchers with AOML's Physical Oceanography Division (PhOD) participated in the PIRATA Northeast Extension (PNE) cruise aboard the UNOLS R/V *Endeavor* from December 29, 2014 to February 12, 2015. Rick Lumpkin of PhOD served as chief scientist, with scientific support provided by Zachary Barton, Shaun Dolk, Kyle Seaton, and Erik Valdes, all PhOD-University of Miami Cooperative Institute staff members. ATLAS moorings were recovered and redeployed and conductivity-temperature-depth (CTD) casts were conducted to a depth of 1500 m; surface drifting buoys were also deployed. The PNE project is a joint effort between AOML and NOAA's Pacific Marine Environmental Laboratory to expand the PIRATA array of ATLAS moorings into the northern and northeastern sections of the tropical Atlantic Ocean for improved understanding of climate variations in these regions.

Shaun Dolk, Rick Lumpkin, and Erik Valdes prepare to deploy a surface drifter.

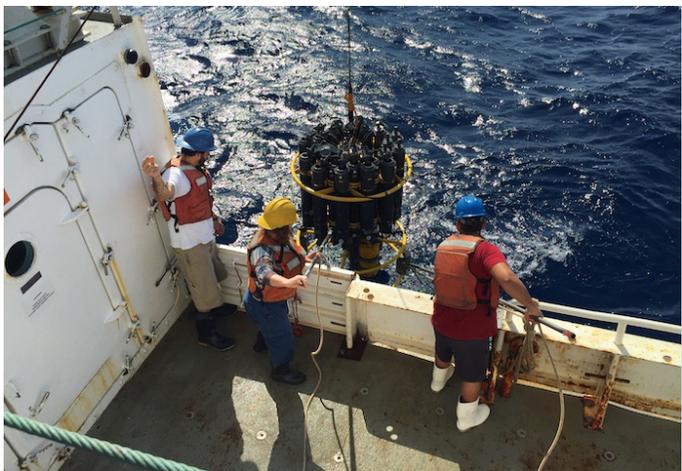
Ryan Smith, Grant Rawson, and Jay Hooper of AOML's Physical Oceanography Division (PhOD) conducted a hydrographic survey along 27°N in the Florida Straits on January 12-13 aboard the R/V *F.G. Walton Smith*. The cruise was undertaken in support of the Western Boundary Time Series program to quantify the volume transport and water mass variability of the Florida Current. This survey and others like it help to calibrate daily estimates of the Florida Current's volume transport derived from a submarine telephone cable deployed across the Straits. PhOD researchers have used the submarine cable, as well as regularly-scheduled hydrographic surveys, to gather daily estimates of Florida Current transport since 1982. During the survey, divers also exchanged a pressure gauge on the west side of the 27°N section.

A shallow-water pressure gauge mooring is loaded aboard the R/V *F.G. Walton Smith* prior to its departure.



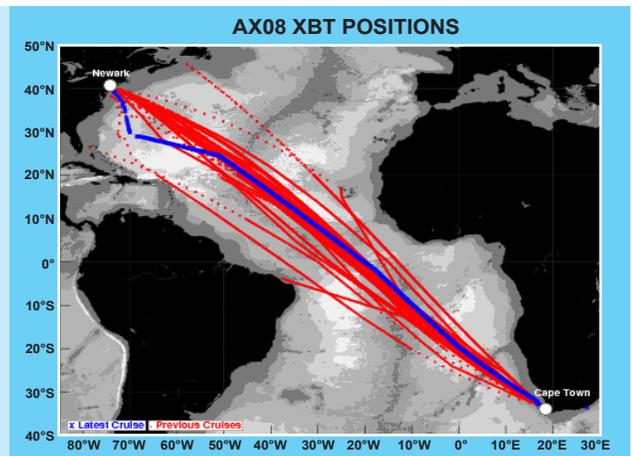
AOML physical oceanographers Molly Baringer, Ulises Rivero, Pedro Pena, Andrew Stefanick, Grant Rawson, Jay Hooper, and Francis Bringas left Puerto Rico on February 15th aboard the UNOLS R/V *Endeavor* for two weeks at sea in support of the Western Boundary Times Series Program. Molly Baringer, AOML's Acting Deputy Director, served as chief scientist with additional support provided by staff from the University of Puerto Rico. Full water column profiles of salinity, temperature, and oxygen were obtained along 26°N and data telemetered from the Rapid/MOC/MOCHA/WBTS moorings that monitor the meridional overturning circulation. A fall rate experiment was also conducted to assess biases in temperature profiles based on XBT (expendable bathythermographs) launch height.

A CTD (conductivity-temperature-depth) instrument is lowered to gather vertical profiles of salinity, temperature, and oxygen.



During the January-February 2015 cruise of the AX08 transect from Cape Town, South Africa to Newark, New Jersey, approximately 500 expendable temperature probes (known as XBTs) were deployed to gather profiles of the upper ocean's thermal structure. Real-time data transmission of these profiles into the Global Telecommunications System was performed with a new system developed at AOML during 2014. The system uses the Iridium satellite network, which will save thousands of dollars annually in operating costs. Data from this transect are used to monitor and investigate the variability of the zonal current system in the tropical Atlantic Ocean and the variability of the South Atlantic and North Atlantic subtropical gyres.

Cruise track of the January-February 2015 AX08 transect is denoted in blue; previous AX08 cruise tracks are shown in red.



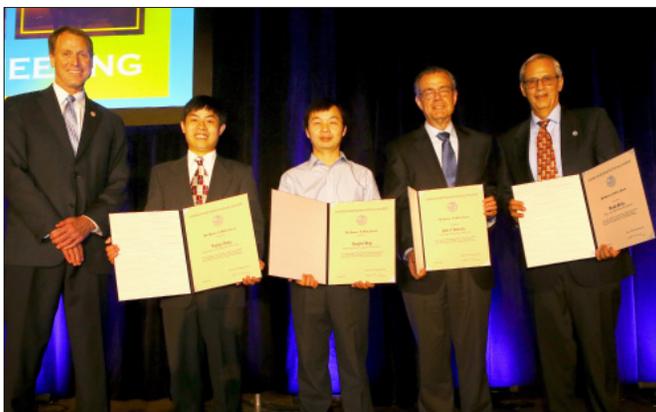
Jason Dunion, a Cooperative Institute scientist with AOML's Hurricane Research Division, received the American Meteorological Society's (AMS) Special Award on January 7th during the AMS' 95th Annual Meeting in Phoenix, Arizona. Jason is currently a member of the Tropical Cyclones Group at the University of Wisconsin's Cooperative Institute for Meteorological Satellite Studies which was recognized for "providing the weather community with valuable tropical cyclone-related satellite information and derived products for over two decades."

AMS president Bill Gail with Christopher Velden, Anthony Wimmers, Sarah Griffin, Derrick Herndon, David Stettner, Steven Wanzong, Jason Dunion (of AOML), John Sears, and Timothy Olander as they received the Special Award.



Drs. John Gamache and Frank Marks of AOML's Hurricane Research Division, along with colleagues Fuqing Zhang and Yonghui Weng of Pennsylvania State University, received the American Meteorological Society's (AMS) 2014 Banner I. Miller award on January 7th during the AMS' 95th Annual Meeting in Phoenix, Arizona. The team won the award for their 2011 *Geophysical Research Letters* paper (38:L15810, doi:10.1029/2011GL048469) of how assimilation of high resolution airborne Doppler radar data into a regional-scale hurricane prediction system led to improved tropical cyclone track and intensity forecasts.

AMS President Bill Gail with Drs. Fuqing Zhang, Yonghui Weng, John Gamache, and Frank Marks as they received the 2014 Banner I. Miller Award.



Drs. Frank Marks, Sundararaman Gopalakrishnan, and Thiago Quirino of AOML's Hurricane Research Division, along with several colleagues from the National Weather Service, were honored at an awards ceremony held in Washington, DC on January 26th. The team received the Department of Commerce Gold Medal, the highest distinction bestowed by the Secretary of Commerce, in recognition of their efforts to develop and implement a high-resolution version of the Hurricane Weather Research and Forecasting (HWRF) computer model. HWRF has dramatically improved tropical cyclone forecasts in recent years and is used operationally by NOAA's National Hurricane Center, as well as several international operational forecast agencies, to provide forecast guidance on the track and intensity of tropical cyclones.

Drs. Frank Marks, Sundararaman Gopalakrishnan, and Quirino Thiago in Washington, DC, after receiving their Department of Commerce Gold Medals.



### AOML Director Attends Swearing-In Ceremony of South Florida Congressional Representatives

AOML Director Dr. Bob Atlas was a guest at the swearing-in ceremony of South Florida Congressional representatives Lois Frankel (District 22), Debbie Wasserman Schultz (District 23), and Frederica Wilson (District 24). The event was held at the Broward County Courthouse in Fort Lauderdale on January 23rd with Dr. Fred Lippman of Nova Southeastern University's Health Professions Division serving as the Master of Ceremonies.



Above: South Florida Congressional representatives pose for a photo after their swearing-in ceremony (from left to right): Congresswoman Lois Frankel, U.S. District Judge Beth Bloom, Congresswoman Debbie Wasserman Schultz, Dr. Fred Lippman, and Congresswoman Frederica Wilson.

Right: AOML Director Dr. Bob Atlas with Congresswoman Debbie Wasserman Schultz.



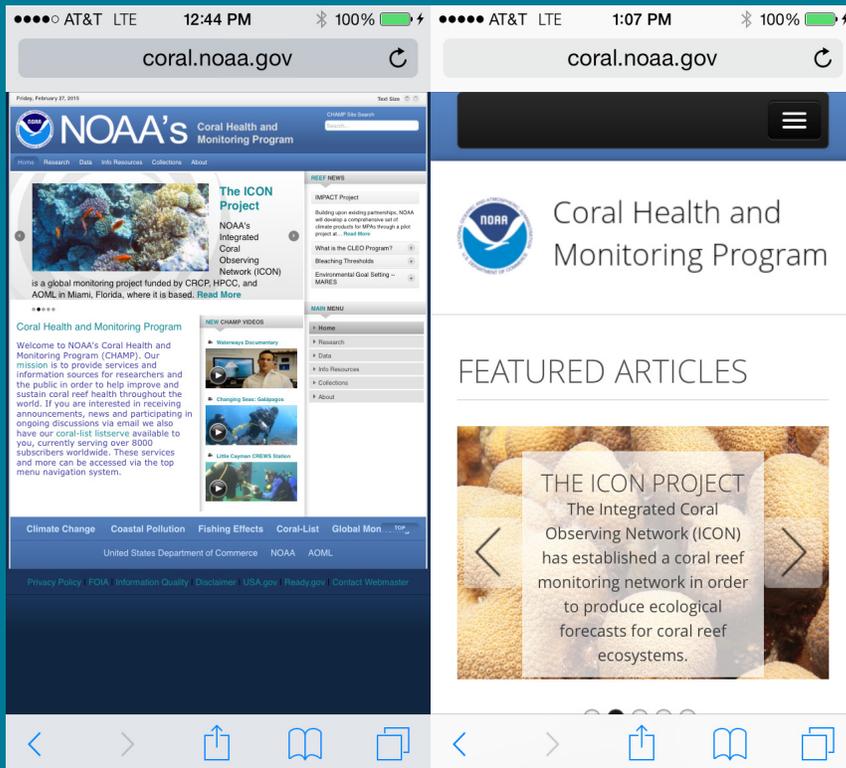
U.S. District Judge Beth Bloom administered the oath of office for the three delegates, swearing them in as members of the U.S. House of Representatives for the 114th Congress, which will be in place until January 2017. Lois Frankel returns to Congress for a second term, while Frederica Wilson returns for a third term; Debbie Wasserman Schultz returns for her sixth term in office.

## CHAMP Web Site Revamped

On February 27th, researchers with the Coral Health and Monitoring Program (CHAMP) at AOML released a redesigned web site to the public. With this release the site takes on a cleaner, more modern look and becomes smartphone- and tablet-friendly, adapting its menus, image sizes, and page organization seamlessly to accommodate the size of the visitor's browser window.

An informal survey of web sites across NOAA suggests that at present only CHAMP and PMEL have web sites that are smartphone-friendly to this degree. Unlike the previous site redesign in 2010 (left image), which was commissioned from an external web developer, the present overhaul (right image) was completed entirely in-house by CHAMP's Mike Jankulak, a University of Miami Cooperative Institute systems administrator.

Among other upgrades, the site features expanded personnel bios of CHAMP team members and highlights the activities of the newly-christened Acidification, Climate, and Coral Reef Ecosystems TEam (ACCRETE). The revamped CHAMP site can be viewed at <http://www.coral.noaa.gov>.

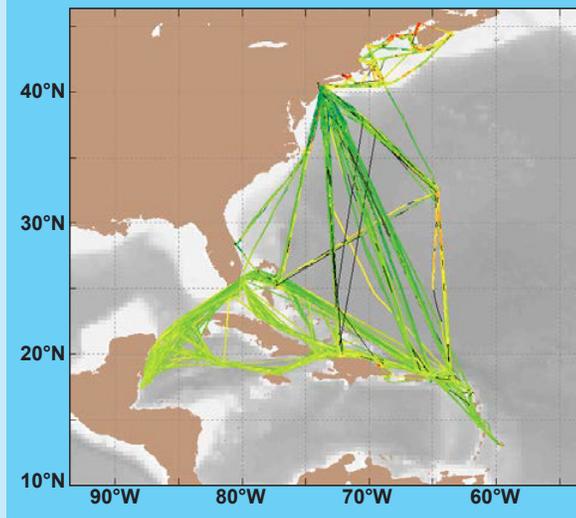


**Left:** The CHAMP web site before revision. **Right:** After revision, as loaded into the browser of an iPhone 5S. The old site simply shrank everything until small enough to load the entire width of the page as it would appear on a desktop browser, and this is common to most NOAA web sites. The new site automatically generates a smartphone-specific menu (at top) and rearranges its content to most prominently display its slideshow of featured articles, complete with large, readable captions.

The *Explorer of the Seas*, a passenger ship that has autonomously gathered surface carbon dioxide (CO<sub>2</sub>) data for 12 years in the Caribbean and along the U.S. eastern seaboard, completed its final research cruise on January 21st. The *Explorer's* 400+ voyages produced more than 600,000 data points through a collaborative effort between AOML, the University of Miami's Rosenstiel School, and Royal Caribbean Cruise Lines. These data have been critical for determining sea-air CO<sub>2</sub> fluxes and trends in ocean acidification in U.S. coastal waters and the Intra-Americas Seas; they have also been the basis of numerous publications (see below). In February, researchers with AOML's Ocean Carbon Cycle group installed an automated CO<sub>2</sub> system aboard the *Equinox*, a Celebrity Cruise Lines passenger ship, to continue gathering observations in the region. Funding for the project is from the Climate Observation Division of NOAA's Climate Program Office, NOAA's Ocean Acidification Program, and NOAA's Office of Oceanic and Atmospheric Research.

A few key publications resulting from the surface CO<sub>2</sub> measurements obtained from the *Explorer of the Seas* include:

- Olsen, A., J. Triñanes, and R. Wanninkhof, 2004: Sea-air flux of CO<sub>2</sub> in the Caribbean Sea estimated using in situ and remote sensing data. *Remote Sensing of Environment*, 89:309-325.
- Wanninkhof, R., A. Olsen, and J. Triñanes, 2007: Air-Sea CO<sub>2</sub> fluxes in the Caribbean Sea from 2002-2004. *Journal of Marine Systems*, 66:272-284.
- Gledhill, D.K., R. Wanninkhof, F.J. Millero, and M. Eakin, 2008: Ocean acidification of the greater Caribbean region, 1996-2006. *Journal of Geophysical Research-Oceans*, 113:C10031, doi:10.1029/2007JC004629.
- Park, G.-H., and R. Wanninkhof, 2012: A large increase of the CO<sub>2</sub> sink in the western tropical North Atlantic from 2002 to 2009. *Journal of Geophysical Research-Oceans*, 117:C08029, doi:0810.01029/2011JC007803.



*Explorer of the Seas* cruise tracks from data submitted to the Surface Ocean Carbon Atlas (SOCAT). All data are posted at [www.aoml.noaa.gov/ocd/ocdweb/explorer/explorer\\_introduction.html](http://www.aoml.noaa.gov/ocd/ocdweb/explorer/explorer_introduction.html).

# 40 Years of TC Anniversaries in 2015

*With the start of 2015 comes a bevy of tropical cyclone-related anniversaries.\* Below is a list of the more recent anniversaries to be noted this year that end in either 5 or 0.*

## 2010—5th Anniversary

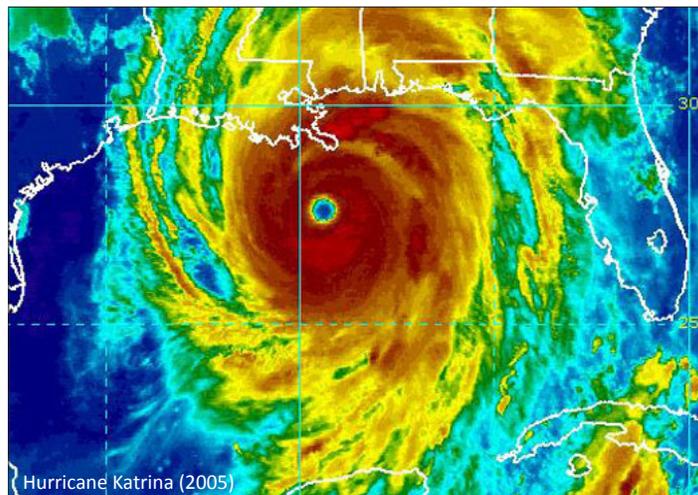
- NOAA adds 12 hours to its hurricane watch and warning lead times.
- References to storm surge heights are removed from the Saffir-Simpson scale.
- NASA runs its Genesis and Rapid Intensification Processes experiment in conjunction with NOAA's Intensity Forecasting EXperiment (IFEX) and with National Science Foundation-funded PRE-Depression Investigation of Cloud Systems in the Tropics experiment. Several tropical cyclones are documented from their inception to decay.
- Tropical Storm Matthew kills 126 in Central America and Mexico due to flooding.
- Typhoon Megi reaches 885 mb central pressure in the West Pacific.

## 2005—10th Anniversary

- Severe Tropical Cyclone Ingrid rampages across all three northern states in Australia, leaving five dead and over US \$14 million in damages.
- One of the most active Atlantic hurricane seasons on record sees 28 named storms with forecasters resorting to Greek letters when the storm name list runs out.
- Hurricane Dennis becomes one of the strongest June/July hurricanes ever recorded in the Atlantic.
- Hurricane Emily becomes the earliest category-5 hurricane ever recorded in the Atlantic.
- Hurricane Katrina makes landfall in the northern Gulf of Mexico, bringing a tremendous storm surge to Mississippi and Alabama and great loss of life to New Orleans when the levees fail. The storm causes over \$100 billion in damages and over 1800 deaths.
- Hurricane Rita makes landfall in Louisiana, causing over 100 deaths and \$12 billion in damage.
- Hurricane Wilma strikes the Yucatan peninsula and then Florida, causing \$29 billion in damage.
- Hurricane Stan makes landfall in Mexico, causing about \$4 billion in damage and killing more than 1500, making it one of the deadliest hurricanes in modern Mexican history.
- NASA runs its Tropical Cloud System and Processes experiment in conjunction with the NOAA IFEX program, but diverts resources from the eastern Pacific to the Atlantic when activity there becomes overwhelming.
- The IFEX experiment begins transmitting detailed Doppler wind field analyses from NOAA P-3 aircraft to NCEP.
- NCAR operates its RAINband and intensity EXperiment (based at the University of Miami Rosenstiel campus) in conjunction with NOAA's IFEX, exploring tropical cyclones in the Gulf of Mexico.
- An aerosonde is flown into Tropical Storm Ophelia, becoming the first unmanned vehicle to penetrate an Atlantic tropical cyclone.

## 2000—15th Anniversary

- Typhoon Bill brings heavy rainfall and flooding to Taiwan. Over US \$133 million in damages are caused.
- Very Intense Tropical Cyclone Hudah kills 114 in Madagascar and Mozambique with a maximum intensity of 905 mb.



## 1995—20th Anniversary

- The GFDL model becomes operational.
- Hurricane Luis strikes the eastern Caribbean as one of the strongest hurricanes ever recorded there, killing 19 and leaving about \$2.5 billion in damage.
- Hurricane Opal suddenly intensifies and threatens the Florida panhandle but rapidly weakens before landfall.
- The Rapid Scan ability on GOES satellites becomes available.
- Super Typhoon Rosing/Angela hits Visayas, Philippines, killing 936.

## 1990—25th Anniversary

- Mark DeMaria and John Kaplan develop the Statistical Hurricane Intensity Prediction Scheme (SHIPS).
- Roger Pielke Sr. writes the book, "The Hurricane."
- The Tropical Cyclone Motion-90 experiment is conducted in the western Pacific.
- Super Typhoon Ruping/Mike strikes Visayas, Philippines, killing 748.
- The Andra Pradesh Cyclone reaches 920 mb and kills 967 in India.

## 1985—30th Anniversary

- Hurricane Gloria roars up the eastern seaboard, brushing Cape Hatteras. It threatens New York City, but at landfall its strongest winds are east of the city over Long Island.
- Hurricane Elena prompts the evacuation of the Florida coast three times before making landfall in Louisiana.
- Hugh Willoughby, Robert Black, Stanley Rosenthal, and David Jorgensen write the definitive paper assessing Project STORMFURY.
- A cyclone hits Urir, Bangladesh, killing 15,000 people.

## 1980—35th Anniversary

- NHC begins issuing all Atlantic tropical cyclone advisories.
- Hurricane Allen careens across the Caribbean and Gulf of Mexico as a category-5 hurricane, leaving behind nearly a billion and a quarter dollars worth of damages.
- Hurricane Frances becomes the only major hurricane to form east of 30°W.

## 1975—40th Anniversary

- Vern Dvorak develops his technique for estimating tropical cyclone strength using satellite images.
- Hurricane Eloise hits the Florida panhandle.
- Typhoon Nina becomes the deadliest typhoon in China, killing about 100,000 when reservoirs fail.

\*A complete compilation of 2015 tropical cyclone-related anniversaries dating back 450 years can be found at <https://noaahrd.wordpress.com/2015/01/14/hurricane-related-anniversaries-expected-in-2015/>

## Happy Birthday AOML

February 9th marked AOML's 42nd year of operating out of its Virginia Key facility. Below is an abbreviated history of AOML's earliest roots.

**1965**—A new agency, the Environmental Science Services Administration (ESSA, predecessor of NOAA) is established within the Department of Commerce, consolidating the activities and functions of the Coast and Geodetic Survey and the Weather Bureau.

**1966**—An Institute for Oceanography is established as one of four environmental research institutes in ESSA with Dr. Harris Stewart as Director. A Dade County delegation meets with ESSA officials to propose Miami as the site for a new multi-million dollar research facility and ship base for the Institute for Oceanography.

**1967**—ESSA selects Virginia Key and Dodge Island over 115 other sites as the home for the new ESSA facilities. Institute of Oceanography staff transfer to Miami and secure temporary office space at 901 South Miami Avenue. The Dade County Commission passes a resolution authorizing the transfer of 12 acres of land on Virginia Key to the Federal government.

**1968**—The architectural firm of Pancoast, Ferendino, and Grafton is contracted to design the Virginia Key research facility.

**1969**—Funding is eliminated from the FY-1969 federal budget for all new government construction projects. Dr. Harris Stewart wages a successful public relations campaign to have the funds reinstated.

**1970**—ESSA is supplanted by the National Oceanic and Atmospheric Administration. Ground-breaking ceremonies for the new AOML facility are held on October 19th. Film footage by Dr. Harris Stewart that documents the construction of AOML can be viewed at [http://docs.lib.noaa.gov/noaa\\_documents/video/NOAA\\_16mm/GC58B91972.mov](http://docs.lib.noaa.gov/noaa_documents/video/NOAA_16mm/GC58B91972.mov).

**1973**—Dedication ceremonies for the newly completed AOML facility on Virginia Key are held February 9th. AOML officially opens its doors for business, the start of a new era.

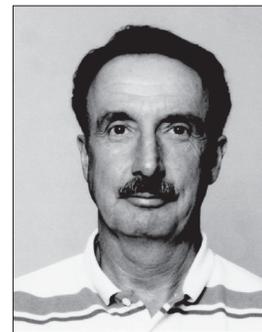
## In Memoriam

AOML lost two former staff members in January—Dr. Donald K. Atwood and Mr. John B. (“Jack”) Eglund—both of whom played leadership roles in the early days of the lab.

Donald Keith Atwood, the first director of AOML's Ocean Chemistry and Ecosystems Division, passed away on January 16th at his home in Kihei, Hawaii, at 81 years of age. Don, a research chemist and oceanographer, was selected to lead the newly-created Ocean Chemistry Laboratory at AOML in July 1976. Prior to his selection, he was an associate professor of chemical oceanography with the Marine Sciences Department at the University of Puerto Rico.

The Ocean Chemistry Laboratory was formed to study the origin, identity, movement, and ecological impact of various organic and inorganic pollutants. It was also tasked with pioneering new techniques to identify pollutants in samples taken from the marine environment and developing predictive ocean chemistry models of selected ecosystems. Don led the Division for 19 years, retiring from federal service in 1995 to pursue a second career in theater and dance.

He was an avid cyclist and sportsman who participated in the annual Key Biscayne Triathlon during the years he worked at AOML. A native of Burlington, Vermont, Don held a Ph.D. in inorganic chemistry from Purdue University. Don is survived by his four children, two daughters and two sons, and several grandchildren.



John Bernard (“Jack”) Eglund, one of AOML's earliest administrative officers, passed away on January 17th in Hanover, Kansas, at 88 years of age. Jack initially became acquainted with AOML as a result of his friendship with Bob Crowell, AOML's very first administrative officer. When Bob Crowell retired from federal service in 1969, Jack applied for his job and was selected to replace him. At the time, he had been working in the Comptroller's Office of the U.S. Army's Joint Munitions Command in New Jersey.

Jack moved his family to Miami and joined the group of more than 100 scientists, technicians, and support staff that had relocated from the Institute for Oceanography in Silver Spring, Maryland. Miami had been selected in 1967 by the Environmental Science Services Administration (ESSA, predecessor of NOAA) as the site for a new federal oceanographic research laboratory and ship base under the leadership of Dr. Harris Stewart, AOML's founder and first director.

A last minute cut from President Lyndon Johnson's FY-1969 federal budget, however, eliminated the funding that was to begin construction of the facility on Virginia Key. Jack was part of the management team that supported Dr. Stewart's efforts to have the funding reinstated and, in early FY-1971, construction finally began. Over the next three years, Jack meticulously handled a broad array of administrative and fiscal duties incumbent in the building a five-story, 74,000 square foot research facility equipped with both office and laboratory spaces.

Jack was a World War II Naval veteran. As AOML's administrative officer, he was known for his integrity and firm, but fair management style in arbitrating personnel conflicts and administrative issues. He retired from federal service in 1978, moved to Colorado, and spent many years traveling throughout the U.S. with his wife Delores. He is survived by Delores, two daughters and a son, as well as several grandchildren and great-grandchildren.



The December 2014 issue of *Oceanography* features a supplement entitled “Women in Oceanography: A Decade Later” that reviews the challenges encountered and career advances made over the past decade by women oceanographers. The compilation of more than 200 autobiographical sketches includes four researchers with AOML's Physical Oceanography Division—Drs. Silvia Garzoli, Libby (Elizabeth) Johns, Renellys Perez, and Claudia Schmid. Their stories can be viewed at [http://www.tos.org/oceanography/archive/27-4\\_supplement.html](http://www.tos.org/oceanography/archive/27-4_supplement.html).

## Farewell

Qi Yao, a University of Miami Cooperative Institute senior research associate, retired in December after 15 years of working with AOML's Physical Oceanography Division (PhOD). During Qi's time with PhOD, she supported various research efforts by helping to analyze expendable bathythermograph (XBT) data, maintaining research web pages, and by helping to create web-based heat transport products using data obtained from western boundary time series cruises and XBT transects.



Kelly Kearney, a University of Miami post-doctoral researcher with AOML's Ocean Chemistry and Ecosystems Division (OCED), resigned in February to accept an assistant scientist position at the University of Washington's Joint Institute for the Study of the Atmosphere and Ocean. Kelly joins a collaborative effort between the University of Washington, NOAA's Pacific Marine Environmental Laboratory, and NOAA's Alaskan Fisheries Science Center focused on ecosystem modeling. During her two years with OCED, she conducted research on the Florida Bay ecosystem.



Dr. Roslyn Clark Artis, president of Florida Memorial University, visited AOML on February 20th as the laboratory's honored guest and featured speaker for Black History Month. Dr. Artis spoke of the pivotal role education plays in creating opportunities for advancement in life and for furthering economic prosperity.

## Congratulations

Ricardo Domingues, a University of Miami-Cooperative Institute for Marine and Atmospheric Studies (CIMAS) research associate with AOML's Physical Oceanography Division, was named NOAA's Team Member for the month of February. Ricardo was recognized for his work with Paul Chinn, a CIMAS contractor, in developing the Mandatory Ship Reporting (MSR) system. This system is used to monitor and protect North Atlantic right whales along the U.S. eastern seaboard. North Atlantic right whales are a critically endangered species; the major source of their injury and death involves collision with ships. The MSR system, developed in collaboration with NOAA's National Marine Fisheries Service and the U.S. Coast Guard, collects information about ships entering designated areas along the eastern seaboard and provides them with reports containing instructions for how to avoid collisions with whales, as well as information about the latest right whale sightings.



Evan Forde, an oceanographer with AOML's Computer Networks and Services Division, was elected president of the Greater Miami Chapter of the American Meteorological Society on February 26th. During his tenure as president, Evan aspires to dramatically increase the local chapter membership, create a greater awareness of hurricane preparedness and safety, and form a speaker's bureau that will emphasize making presentations at K-12 schools. Evan believes that part of any scientist's career should be devoted to helping inspire the next generation of scientists.



Christopher Kelble, an oceanographer with AOML's Ocean Chemistry and Ecosystems Division, is the recipient of a 2015 Department of Commerce Bronze Medal as part of a group of researchers nominated for the award by the National Marine Fisheries Service. The Bronze Medal recognizes superior performance by federal employees. Chris and his colleagues were recognized for "advancing ecosystem-based management via the first comprehensive Gulf of Mexico Ecosystem Status Report that includes more than 140 ecological indicators."



## Welcome Aboard

Jayalekshmi (Jaya) Nair joined AOML's Physical Oceanography Division in January as a research associate with the University of Miami's Cooperative Institute for Marine and Atmospheric Studies. Jaya will work with Dr. Claudia Schmid on the Argo project, an international collaborative effort to observe the evolving state of the upper ocean through the deployment of profiling floats that measure temperature and salinity. She holds a Masters degree in computer science and is currently pursuing a second Masters degree in information technology from Nova Southeastern University.



Kelly Ryan joined AOML's Hurricane Research Division in January as a senior research associate II with the University of Miami's Cooperative Institute for Marine and Atmospheric Studies. Kelly will work with members of the Observing System Simulation Experiments (OSSE) team which seeks to determine the potential impact of proposed space-based, sub-orbital, and in situ observing systems on tropical cyclone analyses and forecasts. She holds a Master's degree in atmospheric science from the University of Arizona.



Thanks to everyone who contributed to AOML's 2014 Combined Federal Campaign program. Because of your generosity and commitment to helping others, AOML raised \$30,056 in support charitable groups and organizations. This amount represents 98% of AOML's projected goal for 2014.



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## Recent Publications (AOML authors are denoted by bolded capital letters)

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