



# 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*

## Hurricane Researchers Receive Commerce Department's Highest Honor

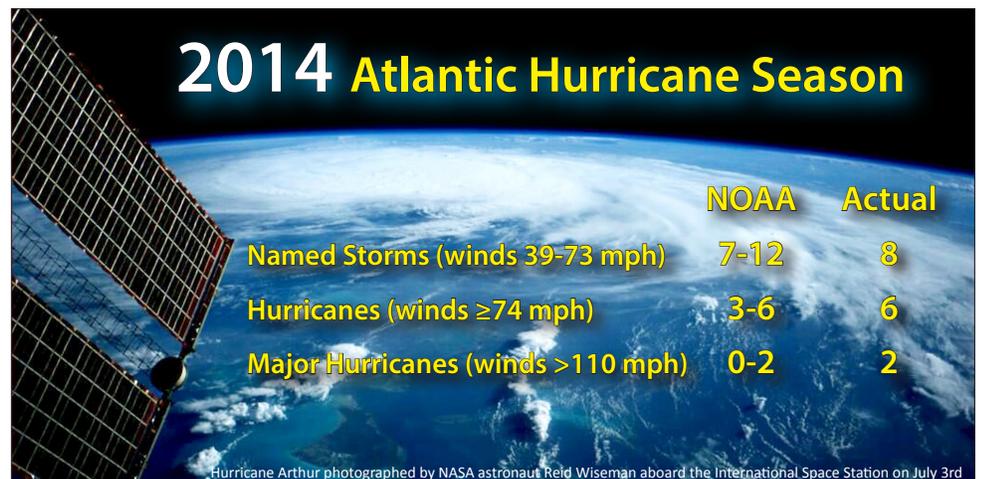
Three scientists with AOML's Hurricane Research Division (HRD) were part of a group recently recognized for their contributions in developing and implementing a high-resolution version of the Hurricane Weather Research and Forecasting (HWRF) model. HWRF is used operationally by NOAA's National Hurricane Center, as well as several international operational forecast agencies, to provide forecast guidance on the track and intensity of tropical cyclones.

Drs. Sundararaman Gopalakrishnan, Frank Marks, and Thiago Quirino of HRD, along with colleagues with the National Weather Service, were awarded a Department of Commerce Gold Medal in December, the highest honor bestowed by the Secretary of Commerce.

The Gold Medal recognizes distinguished performance characterized by extraordinary, notable, or prestigious contributions that favorably impact the Department's mission and benefit the U.S.

HWRF first became operational in 2007. Since then, the computer model has undergone several refinements, providing researchers with high-quality observations that have dramatically improved tropical cyclone forecasts in recent years.

2014 ATLANTIC STORMS			
Number	Type	Name	Dates
1	H	Arthur	Jul 1-5
2	H	Bertha	Aug 1-6
3	H	Cristobal	Aug 23-29
4	TS	Dolly	Sep 1-3
5	MH	Edouard	Sep 11-19
6	H	Fay	Oct 10-13
7	MH	Gonzalo	Oct 12-19
8	TS	Hanna	Oct 22-28



## Atlantic Hurricane Season Ends Quietly

November 30th marked the official end of the six-month long 2014 Atlantic hurricane season. As accurately predicted by NOAA's team of hurricane specialists, the season, which began June 1st, was marked by a below average level of storm activity.

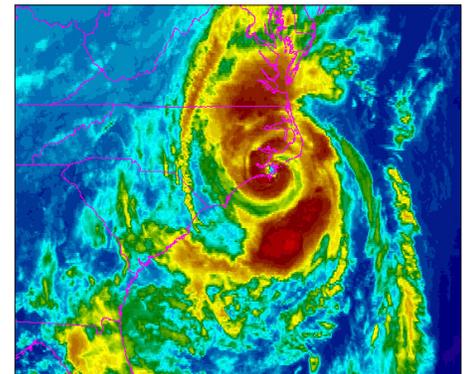
In total, eight named storms formed, the lowest number of tropical systems in the Atlantic since 1997. Six of these storms—Arthur, Bertha, Cristobal, Edouard, Fay, and Gonzalo—strengthened into hurricanes, while Edouard and Gonzalo further intensified into major hurricanes with winds above 110 miles per hour.

Edouard remained at sea for the duration of its life cycle with top winds reaching 115 mph, while Gonzalo's top winds of 145 mph made it the season's most powerful storm. Gonzalo weakened before landfall in Bermuda on October 18th as a category-2 hurricane; property damages are currently estimated between \$200-400 million.

Once again, the U.S. was spared from the devastating impacts of a landfalling major hurricane. A new record was thus set with the 2014 season: the time frame has now been extended to 9 years since the last major hurricane to strike the U.S.,

Wilma, made landfall along the southwest Florida coast in October 2005. Wilma was also the last hurricane to strike Florida.

While the U.S. evaded a major hurricane strike in 2014, the nation was nevertheless impacted by one tropical system. On July 3rd, Hurricane Arthur came ashore near Cape Lookout, North Carolina, with 100 mph winds. The system subsequently swept up the eastern seaboard, bringing blustery weather to coastal communities all the way to Maine before crossing over the Canadian Maritimes.



NOAA satellite image of Hurricane Arthur, the only tropical cyclone to impact the U.S. during 2014. Arthur came ashore on July 3rd near Cape Lookout, North Carolina, as a category-2 storm with 100 mph sustained winds.

## AOML Mourns the Loss of Dr. Robert Simpson, Hurricane Science Pioneer

Dr. Robert Simpson, a hurricane science pioneer who played an instrumental role in the formation of AOML and its Hurricane Research Division, died on December 19th after complications from having suffered a stroke; he was 102 years old.

Robert Homer Simpson was born in Corpus Christi, Texas, on November 19, 1912. At 6 years of age, he survived a hurricane that struck Corpus Christi, inundating the town with a 16-foot storm surge that swept away homes and drowned more than 250 individuals. The storm made a lasting impression, leading to a lifelong fascination of weather and a career spent studying hurricanes and their destructive potential.

Simpson joined the U.S. Weather Bureau in 1940, and by the late 1940s/early 1950s was carrying out research missions on Air Force reconnaissance flights to explore the upper reaches of tropical cyclones, as well as their structure. He wrote the plan that established the National Hurricane Research Project (NHRP, the forerunner of AOML's Hurricane Research Division) in 1955 and became its first director.

During NHRP's formation, Simpson also established an atmospheric observatory on the slope of Mauna Loa in Hawaii, which has since come to be recognized as the world's longest continuous monitoring site for carbon dioxide observations. Simpson also helped establish NOAA's National Severe Storms Laboratory in Norman, Oklahoma in 1961.

Simpson later became the Weather Bureau's Deputy Director of Research for Severe Storms and the inaugural director for Project STORMFURY, the U.S. Government's 20-year-long experiment testing the hypothesis that seeding tropical cyclones with silver iodide would reduce their maximum wind speeds.

In 1968, he was named director of the National Hurricane Center. Simpson reorganized the Center to separate it from the

Miami National Weather Service Office. He also established its small research section and expanded its satellite analysis branch. He ensured the Center remained current in computer and technological advances and was critical in raising the warnings about the severity of Hurricane Camille, which struck coastal Mississippi in 1969 with sustained wind speeds of at least 190 mph.

In the early 1970s, Simpson worked with his friend Herbert Saffir, a civil engineer, in developing a five-level scale for ranking hurricanes based on the intensity of their sustained winds that came to be known as the Saffir-Simpson Wind Scale.

Simpson retired from government service in 1974 and took a faculty position at the University of Virginia where he mentored numerous students and continued his research. Along with his wife, Dr. Joanne Simpson, a fellow atmospheric scientist, he established Simpson Weather Associates, a private consulting firm.

Among Simpson's many awards, he was an honorary member of the American Meteorological Society and the recipient of its Cleveland Abbe Award. He was also the recipient of a Department of Commerce Gold Medal.

For the last years of his life, Simpson worked on writing his autobiography with the aid of Neal Dorst of AOML's Hurricane Research Division. The book, *Hurricane Pioneer: Memoirs of Bob Simpson*, is set for public release in February 2015.

Bob Simpson will be remembered for a myriad of achievements and critical contributions that advanced the field of tropical meteorology; his illustrious career spanned more than 50 years.



### 2014 Hurricane Season Provides Opportunities to Gather Unique Data

The 2014 Atlantic hurricane season afforded NOAA scientists with opportunities to produce new forecast products, showcase successful modeling advancements, and conduct research to benefit future forecasts.

NOAA, and especially AOML's Hurricane Research Division (HRD), had an extremely productive research year. In collaboration with NOAA's Aircraft Operations Center, HRD scientists conducted 34 missions aboard the P3 aircraft and 15 missions aboard the G-IV jet in the Atlantic, eastern Pacific, and central Pacific oceans. The data they collected in Hurricanes Arthur, Bertha, and Cristobal will be used to better understand the problem of hurricane intensification in storms undergoing shear, something previously thought to be relatively uncommon. Additionally, extensive oceanographic data collected in Hurricanes Edouard and Ana will help researchers better understand how the ocean fuels hurricanes and how hurricanes, in turn, impact the ocean.

One of the season's highlights was the first-ever successful release of a Coyote unmanned aircraft system, deployed from NOAA's hurricane hunter manned aircraft, to collect wind, temperature, and other weather data in Edouard's hurricane-force winds. The Coyote flew into areas of the storm too dangerous for manned aircraft, sampling weather in and around the eyewall at very low altitudes.

NOAA researchers also participated in 11 missions of the SHOUT (Sensing Hazards with Operational Unmanned Technology) and NASA HS3 (Hurricane and Severe Storm Sentinel) projects using Global Hawk unmanned aircraft, and with the Office of Naval Research and NASA HS3 high-altitude manned WB-57 aircraft. These missions provided valuable real-time data used by forecasters at the National Hurricane Center and are being studied by NOAA, NASA, and university researchers to help advance the prediction and understanding of tropical cyclone track, intensity change, and storm structure. The data are also be used to assess their impact on forecast models and to design aircraft sampling strategies that optimize model forecasts of tropical cyclone track and intensity.

The WB-57 missions sampled Hurricane Gonzalo's upper-level outflow with a prototype dropsonde system, its three-dimensional wind field with a dual-frequency radar, and its surface winds with an advanced microwave radiometer. These observations will help advance the understanding and modeling of the rarely sampled hurricane upper-level outflow layer.



**NASA's Global Hawk unmanned aircraft gathered data during the 2014 hurricane season that will help researchers better predict and understand tropical cyclone tracks, intensity change, and storm structure.**

# NOAA Partners Join CalCOFI to Examine the Potential of 'Omics Research

*'Omics is the term for a set of genome-based technologies used for biological analysis at the molecular level (i.e., DNA, RNA, or proteins) to identify organisms and their function.*

AOML researcher Dr. Kelly Goodwin has teamed with colleagues at the J.C. Venter Institute and Scripps Institution of Oceanography to integrate modern, genome-based technologies ('omics) into the 65-year-old California Cooperative Oceanic Fisheries Investigations (CalCOFI) program.

Microbes underpin the function of the earth's biosphere by regulating marine food web dynamics and associated cycles of carbon, oxygen, metals, toxins, and nutrients. Despite the potential to indicate ocean change, microbial diversity and function represent one of the great data gaps in marine observations. While traditional measurements, such as chlorophyll or total biomass, have long been used by oceanographers to describe this essential component of the earth system, these measurements are unrefined, providing little detailed information.

'Omics, however, can quickly identify the multitude of organisms and enzymes present in a sample. Therefore, "environmental intelligence" (who is there, what they do, and how they are impacted by changing conditions) can be gathered at a scope and detail never before available.

The CalCOFI study area is a productive and economically important ocean region. Like many areas of the ocean, it is under pressure from multiple stressors, including hypoxia, acidification, and warming. Understanding and predicting the impacts of these combined stressors is critical to the long-term economic stability and resiliency of the region.

Incorporation of 'omics into CalCOFI will link the diversity and functional activity of microbes (viruses, prokaryotes, and eukaryotes) to other measurements of ecosystem productivity in the context of physical and chemical perturbations. The work aims to improve understanding of the factors that control ecosystem resiliency and tipping points. This project is a pilot for potential broader applications to other regions and across the NOAA fleet.

CalCOFI is one of the world's longest running ocean observing programs. It is a unique partnership between NOAA's National Marine Fisheries Service, the Scripps Institution of Oceanography,

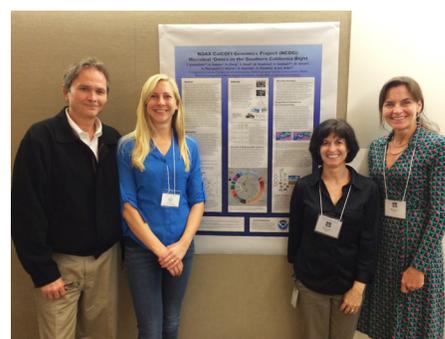
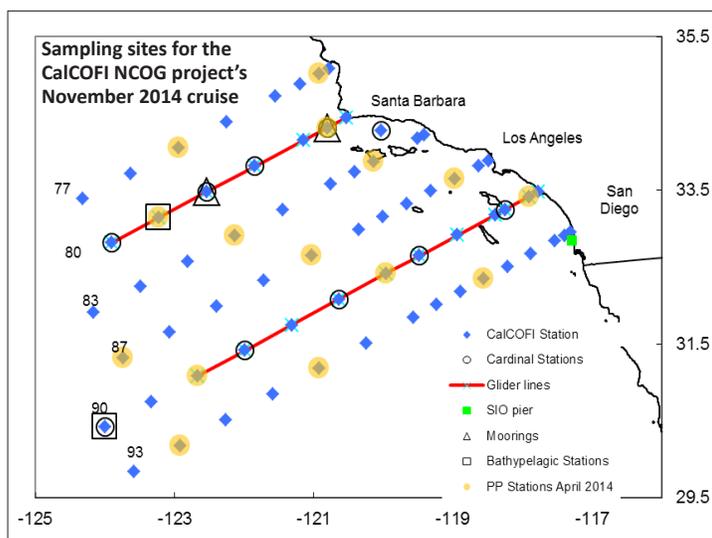


The November 2014 CalCOFI cruise aboard the RV *New Horizon* was the first to gather 'omics observations.

and the California Department of Fish and Game. Originally formed in 1949 to study the ecological aspects of the sardine population collapse off California, the current focus includes understanding this marine environment, managing its living resources, and monitoring the indicators of El Niño and climate change. Quarterly cruises are conducted off southern and central California to collect hydrographic and biological data on station and while underway between stations.

The NOAA-CalCOFI Ocean Genomics (NCOG) project represents a joint activity for NOAA's Office of Oceanic and Atmospheric Research (OAR) and the National Marine Fisheries Service (NMFS). Support was received from the NMFS Office of Science and Technology, OAR's Office of Ocean Exploration and Research (OER) and AOML, and the U.S. Integrated Ocean Observing System (IOOS).

The inaugural CalCOFI expedition for this new project was completed aboard the Scripps Institution of Oceanography RV *New Horizon* in November 2014, with samples presently undergoing metagenomic (DNA identity) and metatranscriptomic (RNA to identity function) processing.



Cisco Werner, Director of NOAA's Southwest Fisheries Science Center, Tilana Konotchic, Ph.D. student on the project, Kelly Goodwin of AOML, and Margot Bohan of NOAA's Office of Ocean Exploration and Research with their poster at the CalCOFI Conference in La Jolla, California.

AOML microbiologist Dr. Kelly Goodwin attended the California Cooperative Oceanic Fisheries Investigations (CalCOFI) conference in December. Kelly and her colleagues presented a poster highlighting a new project that introduces cutting-edge metagenomic and meta-transcriptomic analysis into the 65-year-old CalCOFI program.

# AOML Coral Researchers Document Impacts of Ocean Acidification



Coral colonies at Cheeca Rocks in the Florida Keys National Marine Sanctuary are increasingly challenged by ocean acidification, as well as warming ocean temperatures. Anomalously warm ocean temperatures in September 2014 resulted in widespread coral bleaching.

The ocean is becoming more acidic, but what does that really mean? On a pH scale of 1-14, 1.0 is strongly acidic and 14.0 is strongly alkaline or basic. Typically, ocean waters are slightly alkaline and fall around 8.0-8.1 on this scale. Over the past hundred years, the pH of seawater has decreased, dropping 0.1 pH units. This is due to ocean acidification, a process that occurs when seawater absorbs carbon dioxide (CO<sub>2</sub>) from the air. The amount of carbon dioxide in the atmosphere has steadily increased since the late 1800s. As more carbon dioxide is added to the air, the amount absorbed into the oceans increases, further decreasing pH. NOAA scientists monitor these changes and their possible effects.

Some of the organisms affected by ocean acidification are corals and shell-



A moored autonomous buoy continually gathers environmental data at Cheeca Rocks.

fish, animals that build their skeletons or exoskeletons underwater. Stony corals secrete skeletons made of calcium carbonate, or limestone, and build coral reefs. These reef ecosystems are valuable resources to many organisms, which rely on the corals for shelter and food. As corals build their skeletons, organisms such as fish and sponges simultaneously eat away at the calcium carbonate. This back and forth process of growth and erosion is a natural phenomenon in the coral reef ecosystem.

As the pH of seawater decreases, it becomes more difficult for corals to efficiently produce limestone. The trend of ocean acidification may result in coral reefs eroding faster than they are being built.

Scientists must measure the net growth, how fast a coral is growing, subtracted by how fast it is eroding, to determine the negative impacts of ocean acidification on corals. Using this formula, AOML scientists discovered coral reefs in the Florida Keys are in an erosive state, losing grams of calcium carbonate per year. One third of reefs in the wider Caribbean are eroding faster than they are growing, which could be detrimental to ocean and reef health. Twenty five percent of ocean animals rely

on coral reefs to survive, and many reef-associated organisms are important sources of protein for human populations along tropical coastlines.

With support from NOAA's Coral Reef Conservation and Ocean Acidification Programs, AOML coral researchers established a long-term monitoring site to learn more about the effects of ocean acidification. At Cheeca Rocks, in the Florida Keys National Marine Sanctuary, a Moored Autonomous pCO<sub>2</sub> (MAPCO2) buoy constantly collects data on carbon dioxide in the air and water, seawater pH, and temperature, providing NOAA scientists with the opportunity to observe changes in the environment. These data are reported in near-real-time on the internet via satellite relay.

Scientists can measure changes in a coral's growth and density to determine how it is affected by acidification. Corals, like trees, have an annual banding pattern, which is used to determine annual growth rates. Scientific divers obtain core samples from larger corals and examine their density bands with a micro-CT scanner. The scanner produces three-dimensional X-ray images that allow them to study how much skeletons grow each year. A different three-dimensional scanner accurately determines the surface area and volume of living corals, whose architecturally complex exterior is challenging to measure.

With these long-term monitoring sites and innovative technologies, scientists are able to provide information and analysis that helps resource managers and political leaders make laws and decisions for the future. This research may also help discover methods to reduce the impacts from ocean acidification and mitigate the current damage to coral reefs.

The latest episode of the educational television series *Waterways* features coral research conducted by NOAA scientists in the Florida Keys. The episode, entitled *Ocean Acidification and Tortugas Tide Gauge*, features AOML coral researchers discussing how they study this process and the high tech tools they use to monitor and describe changes in coral growth due to a more acidic ocean. The *Waterways* series airs on public and government channels throughout the state of Florida. The current episode can be viewed at <https://www.youtube.com/watch?v=rAvhOrp81dg>.



# Underwater Gliders Successfully Recovered after Four-Month Deployment

On November 18-19th, researchers with AOML's Physical Oceanography Division (PhOD) successfully recovered their two underwater gliders in the North Atlantic Ocean and Caribbean Sea from the RV *La Sultana* of the University of Puerto Rico Mayaguez (see map below for recovery locations). These recoveries marked the end of the first underwater glider mission for AOML, which started in mid July 2014.

The recovery involved a field team at sea retrieving the gliders and a pilot team at AOML controlling the gliders and steering them to an area where they could be safely recovered. PhOD-University of Miami Cooperative Institute personnel Grant Rawson and Kyle Seaton participated in their at-sea recovery, while PhOD personnel Francis Bringas and Gustavo Goni provided the piloting support from AOML.

After recovery, the gliders were brought to the University of Puerto Rico Mayaguez in La Parguera where they underwent a thorough refurbishment. Batteries were replaced and each glider was equipped with an oxygen sensor, expanding data collection capabilities for their second mission, which will start in January 2015. This next mission will be geared towards investigating the upper ocean dynamics and density structure in the Caribbean Sea south of Puerto Rico, and the gliders will be expected to carry out observations for four to five months.

During their first mission, the gliders collected more than 2800 temperature and salinity profiles in the region. These data were transmitted in real-time to the Global Telecommunication System, to data distributions centers, and also distributed through the AOML web page. Data included ocean temperature and salinity profiles collected during Tropical Storm Bertha and Hurricane Gonzalo, which were incorporated into ocean forecast models and used to initialize operational tropical cyclone intensification models. Temperature and salinity sections obtained during Bertha



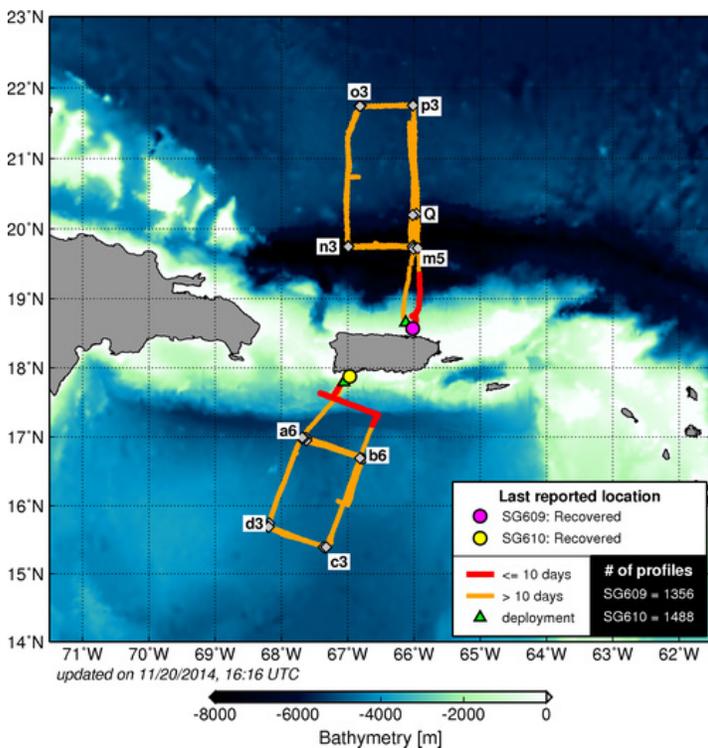
Grant Rawson of AOML and Carlos Ortiz of the University of Puerto Rico Mayaguez work to secure an underwater glider as it's brought aboard the RV *La Sultana* after retrieving it from the coastal waters of Puerto Rico.

and Gonzalo are currently being used to assess the impact of the wind field in surface mixing and upper ocean dynamics in the Caribbean Sea.

The two year-long project is supported by NOAA's Sandy Supplemental funds to collect and distribute ocean data for improved understanding of air-sea interaction during the passage of a tropical cyclone and to assess the impact of upper ocean environmental conditions in tropical cyclone intensity forecasts.

Research partners include the University of Miami's Cooperative Institute for Marine and Atmospheric Studies, NOAA's Environmental Modeling Center, National Data Buoy Center, and Integrated Ocean Observing System Office, the University of Puerto Rico Mayaguez, CariCOOS (Caribbean Coastal Ocean Observing System), and the Maritime Authority of the Dominican Republic.

Data collected by the underwater gliders are available on the PhOD glider home page at [www.aoml.noaa.gov/phod/gliders](http://www.aoml.noaa.gov/phod/gliders). There you can find their tracks, temperature and salinity plots of individual dives and sections, surface and depth-averaged currents, and plots encompassing their entire mission.



Trajectories and location of the observations obtained by AOML's two underwater gliders during their first mission, which ended in November 2014. Recovery sites are denoted by the yellow and magenta circles, respectively.



Underwater glider retrieved and safely aboard the RV *La Sultana*.

# NOAA Selects Biscayne Bay for Next Habitat Blueprint Focus Area

*Habitat Blueprint offers opportunities for NOAA to partner with organizations to address coastal and marine habitat loss and degradation issues. It provides a framework that builds upon existing programs, prioritizes activities, and helps users act strategically and preventively to sustain resilient and thriving coastal and marine ecosystems and resources.*

NOAA has selected South Florida's Biscayne Bay as one of the next Habitat Focus Areas under NOAA's Habitat Blueprint. AOML is located on Virginia Key in south Florida, surrounded by the clear waters of Biscayne Bay.

The bay provides a home for endangered species, seagrass nurseries, and feeding grounds for many valued fish. The bay's clear waters also support the regional economy, recreation, and tourism.



Biscayne Bay's mangroves provide shelter near seagrass nurseries for many valued species.

Over the past 20 years, scientists at AOML, Florida International University, the Miami-Dade County Department of Environmental Resources Management,



An aerial view of Boca Chita Key surrounded by Biscayne Bay.

and the South Florida Water Management District have observed a trend in increased concentrations of chlorophyll-a, an index of phytoplankton abundance. Phytoplankton, also known as microalgae, are microscopic plants in the water column that require sunlight and nutrients to live. With increasing levels of phytoplankton comes the potential for frequent algal blooms that damage seagrass beds by reducing the light available to seagrass.

The recorded increase in phytoplankton, coupled with the recent appearance of an expansive diatom bloom in the southern bay in 2013 and macroalgae overgrowing seagrass beds in the central bay, has caused scientists to worry about the future of Biscayne Bay's ecosystem. If phytoplankton continues to increase, the quality

of Biscayne Bay's clear, pristine water could degrade, and seagrass could be smothered, causing a widespread loss that would be difficult to halt or reverse.

AOML's Chris Kelble is co-leading the Habitat Blueprint implementation team with Joan Browder of NOAA's Southeast Fisheries Science Center to identify solutions for improving the health of Biscayne Bay before it declines. Through NOAA's Habitat Blueprint program, partnering organizations can aid in developing assessments, experiments, and analyses to ultimately protect, restore, and sustain Biscayne Bay's healthy ecosystem.

Additional information about NOAA's Habitat Blueprint efforts and opportunities can be found at [www.habitat.noaa.gov/habitatblueprint/southeast\\_caribbean.html](http://www.habitat.noaa.gov/habitatblueprint/southeast_caribbean.html).

Renee Carlton, a University of Miami Cooperative Institute coral researcher with AOML's Ocean Chemistry and Ecosystems Division (OCED), participated in the Global Reef Expedition of the Khaled bin Sultan Living Oceans Foundation from October 27th to November 25th. Renee collected seawater carbon dioxide data and coral cores in the Solomon Islands for calcification analysis. The research is part of an ongoing collaboration between the Living Oceans Foundation and OCED to gather baseline ocean acidification-relevant data from remote coral reef locations across the Pacific Ocean. The Solomon Islands lie in the Coral Triangle, which hosts the greatest amount of marine biodiversity on the planet and is, thus, a priority area for marine conservation. To date, there has been no ocean acidification research conducted in this vital region, making this a first-of-its-kind study. Since June 2012, OCED's coral researchers have participated in ten Global Reef Expedition cruises to gather data at reef sites in the Pacific.

**AOML coral researcher Renee Carlton diving in the Soloman Islands to gather coral cores and carbon dioxide data.**



Dr. Xaymara Serrano, a University of Miami Cooperative Institute coral researcher with AOML's Ocean Chemistry and Ecosystems Division, attended NOAA's 7th EPP (Educational Partnership Program) Biannual Education and Science Forum at the University of Maryland Eastern Shore (UMES) campus on October 26-29. The forum was held to showcase the results of collaborative research and education projects between NOAA researchers and scientists/students at NOAA-EPP funded academic institutions. The forum also promoted career opportunities for STEM graduates within the academic, government, and public/private sectors. Xaymara participated in the meeting by presenting the results of her doctoral research; she was part of a group of graduate students and alumni whose research was funded through NOAA's Living Marine Resources Cooperative Science Center (LMRCSC).

**LMRCSC graduate students, alumni, and faculty who attended NOAA's EPP Education and Science Forum included (left to right) Dr. Ayeisha Brinson, Dr. Xaymara Serrano, Austin Flynn, Dr. David Die, Dominique Lazarre, Karlisa Callwood, Dr. Kristy Wallmo, and Dr. Jose Reyes.**



Dr. Lew Gramer, a University of Miami Cooperative Institute coral researcher with AOML's Ocean Chemistry and Ecosystems Division, attended an international meeting in early November focused on the resilience of coral reefs. NOAA's Coral Reef Conservation Program sponsored the event; participants included resource managers from the Great Barrier Reef Marine Park Authority, representatives from U.S. federal, state, and territorial agencies in the Pacific and Caribbean, and researchers from various NOAA line offices and academic institutions. Information was shared on how to incorporate larval connectivity, stress disturbance exposure, and ecosystem diversity metrics into reef resilience assessments and how to apply these metrics for more effective resource management.

**A meeting in Honolulu, Hawaii, drew together an international group focused on improving the assessment of coral reef resilience.**

On November 13th, AOML hosted its first ever disability awareness event. Keeping in theme with the U.S. Labor Department's 2014 disability slogan, "Expect, Employ, Empower," a group of volunteers at AOML explained and demonstrated some of the work performed at the lab to the students and teachers of the Transition Academy Program, housed at Miami Central Senior High School. This program aids in transitioning disabled young adults into the work force to promote independent living. Thanks to everyone at AOML who participated in making this a successful event and for sharing your work in support of disability awareness.

**Cooperative Institute researcher Renellys Perez guided students from the Transition Academy Program in a demonstration to learn about the effects of temperature and salt content on the density of water. First, students tested whether warm or cold water was denser. Second, they tested whether salty room temperature water was lighter or denser than fresh cold water.**



Shirley Murillo and Alejandra Lorenzo of AOML participated the 2014 American Indian Science and Engineering Society's National Conference in Orlando, Florida, on November 12-15th. The event seeks to enhance representation of American Indians and Alaskan natives in engineering, science, and other related technology disciplines. Shirley and Alejandra gave a presentation on STEM careers in NOAA, told their individual stories, and shared career advice. A discussion on how to stand out in a sea of resumes and graduate school applications followed. Shirley and Alejandra also manned a NOAA exhibitor booth to answer questions and share information about careers within NOAA, as well as NOAA's educational and internship opportunities.

**AOML's Shirley Murillo and Alejandra Lorenzo at the 2014 National Conference of the American Indian Science and Engineering Society.**

## Farewell

Best wishes to NOAA Corps Officer LT Rachel Kotkowski, who departed AOML in December after four years with AOML's Office of the Director and the Ocean Chemistry and Ecosystems Division. During Rachel's tour of duty at AOML, she supported coastal ecosystem research, improved the safety and compliance of AOML's laboratory spaces and HAZMAT procedures, and managed AOML's small boat program. Rachel also trained small boat operators and served as AOML's Unit Diving Supervisor/Dive Officer, participating in numerous dives at sites throughout south Florida and the Caribbean. In addition to these activities, she also earned her master's degree from Florida International University's Department of Environmental Studies. Rachel's next duty station brings her to Pascagoula, Mississippi, to serve as the Operations Officer aboard the NOAA Ship *Pisces*.



## Congratulations

Jason Dunion, a Cooperative Institute scientist with AOML's Hurricane Research Division, is the recipient of an American Meteorological Society (AMS) Special Award as a member of the Tropical Cyclones Group at the University of Wisconsin-Madison Cooperative Institute for Meteorological Satellite Studies (CIMSS). The award recognizes individuals or groups that have made important contributions in the field of meteorology or toward meteorological aspects of oceanography or hydrography. The CIMSS Tropical Cyclones Group received the award for "providing the weather community with valuable tropical cyclone-related satellite information and derived products for over two decades," stating the award is "a reflection of [their] commitment to the society and to the field."



Gregory Foltz, an oceanographer with AOML's Physical Oceanography Division, is the recipient of an Early Career Scientist Award from the International Union of Geodesy and Geophysics (IUGG). The award is bestowed on as many as 10 scientists every four years in recognition of outstanding research in the earth and space sciences and for cooperative international research. Greg will make an invited presentation and receive the award at the 26th IUGG General Assembly to be held in Prague, Czech Republic, on June 22-July 2, 2015.



Maribeth Gidley, a Cooperative Institute scientist with AOML's Ocean Chemistry and Ecosystems Division, was inducted into the Leadership Circle of the CLEO (Climate Leadership Engagement Opportunities) Institute in November. The honor recognizes individuals for their significant leadership roles in assisting CLEO bridge the divide between science and society as related to the issue of climate change. Maribeth was honored for her numerous outreach efforts discussing the public health impacts of sea level rise.



## Welcome Aboard

Dr. Ghassan "Gus" Alaka joined AOML's Hurricane Research Division in November as a post-doctoral scientist with the University of Miami's Cooperative Institute for Marine and Atmospheric Studies. Gus will work with Drs. Sundararamen Gopalakrishnan and Xuejin Zhang of the Modeling Group on analyses of the basin-scale version of NOAA's Hurricane Weather Research and Forecast modeling system. He recently earned his Ph.D. from the Department of Atmospheric Science at Colorado State University.



Rick Lumpkin and Mayra Pazos of AOML's Physical Oceanography Division are the recipients of a NOAA Research 2014 Employee of the Year Award. Rick and Mayra received the award for their efforts to improve the quality of drifter data by developing a new evaluation methodology for when drifters have lost their drogues. Drifters gather sea surface temperature and ocean current data globally for use in climate monitoring and research. The year-long re-evaluation project involved the examination of a time series from more than 14,000 drifting buoys. The revised data set is significantly improved, with spurious, low-frequency current variations in places such as the Southern Ocean no longer present.



Erica Rule, director of communications and outreach at AOML, was selected to become a member of NOAA's Southeast and Caribbean Regional Team (SECART) in November. SECART members meet quarterly to review and coordinate the implementation of NOAA's regional products and services, as well as help fulfill NOAA's environmental stewardship mandates. The southeast and Caribbean region includes the land areas of North Carolina, South Carolina, Georgia, Florida, Puerto Rico, and the U.S. Virgin Islands, as well as the coastal waters adjacent to these lands. Erica replaces Alan Leonardi, AOML's former deputy director, as the SECART team member from AOML.



Dr. Sudip Majumder joined AOML's Physical Oceanography Division in December as a post-doctoral scientist with the University of Miami's Cooperative Institute for Marine and Atmospheric Studies. Using both in situ and satellite observations, as well as data from numerical models, Sudip will work with Drs. Claudia Schmid, George Halliwell, and others in studying the role of the South Atlantic in the Meridional Overturning Circulation. He recently earned his Ph.D. in physical oceanography from the University of Massachusetts Dartmouth.



The Environmental Microbiology team at AOML, led by Christopher Sinigalliano, has received a 2013 Scientific and Technological Achievement Award from the U.S. Environmental Protection Agency. AOML microbiologists were recognized, along with their collaborators from the other agencies and universities involved, for their contributions in supporting the implementation of the EPA's Method 1611 for rapid recreational water testing. AOML's Environmental Microbiology Laboratory was one of several research facilities that tested and validated the EPA's new molecular methodology for detecting and enumerating *Enterococcus* and *Bacteroidales* fecal indicator bacteria in marine and fresh water.





## U.S. Department of Commerce

Ms. Penny Pritzker  
Secretary of Commerce  
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## National Oceanic and Atmospheric Administration

Dr. Kathryn D. Sullivan  
Undersecretary of Commerce for  
Oceans and Atmosphere  
and NOAA Administrator  
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## Office of Oceanic and Atmospheric Research

Mr. Craig N. McLean  
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## Atlantic Oceanographic and Meteorological Laboratory

Dr. Robert M. Atlas  
Director

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

Amaya, D.J., and **G.R. FOLTZ**, 2014: Impacts of canonical and Modoki El Niño on tropical Atlantic SST. *Journal of Geophysical Research*, 119(C2):777-789.

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