



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

NOAA Outlook Calls for Quieter Atlantic Hurricane Season for 2014

El Niño conditions in the tropical Pacific are expected to continue developing, suppressing the number and intensity of tropical cyclones in the Atlantic basin

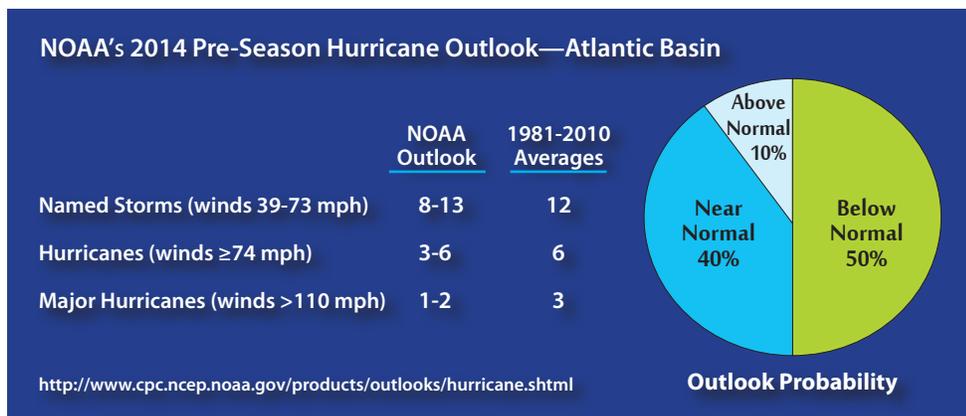
On May 22nd, NOAA's team of hurricane specialists released their 2014 pre-season outlook for the Atlantic basin, stating the six month long season from June 1st to November 30th would most likely be marked by a near-normal or below-normal level of storm activity.

The outlook calls for a 40 percent chance of a near-normal season, a 50 percent chance of a below-normal season, and only a 10 percent chance for an above-normal season. Overall, NOAA predicts a 70 percent likelihood that between eight to 13 named storms will develop (winds greater than 39 mph or higher), of which three to six could become hurricanes (winds of 74 mph and higher), including one or two major hurricanes (category 3, 4, or 5 on the Saffir-Simpson scale) with winds above 110 mph.

These numbers are near or below the seasonal average of 12 named storms, six hurricanes and three major hurricanes, based on the averages from 1981 to 2010. The Atlantic hurricane region includes the North Atlantic Ocean, Caribbean Sea, and Gulf of Mexico.

The main driver of this year's outlook is the anticipated development of El Niño

2014 Atlantic Storm Names		
Arthur	Hanna	Omar
Bertha	Isais	Paulette
Cristobal	Josephine	Rene
Dolly	Kyle	Sally
Edouard	Laura	Teddy
Fay	Marco	Vicky
Gonzalo	Nana	Wilfred



conditions during the summer months, characterized by warmer than average sea surface temperatures across the tropical Pacific Ocean that globally impact weather and climate. The El Niño phenomenon causes stronger wind shear in the Atlantic, which reduces the number and intensity of tropical storms and hurricanes. El Niño also strengthens the trade winds and increases atmospheric stability across the tropical Atlantic, making it more difficult for cloud systems coming off the west African coast to intensify into tropical storms.

NOAA's outlook provides the public with only a general guide to the expected overall activity for the upcoming hurricane season. It is not a seasonal hurricane land-fall forecast, and does not imply levels of activity for any particular region. NOAA will reassess climatic conditions later in the season and issue an updated forecast for the Atlantic basin in early August.

In spite of the forecast for a calmer hurricane season, coastal residents and communities in areas potentially impacted by landfalling storms are urged to remain vigilant in monitoring the tropics and to have preparedness measures and action plans in place. Below-average seasons can still produce hurricane disasters.

The 2014 Atlantic pre-season hurricane outlook is an official product of NOAA's Climate Prediction Center, produced in collaboration with the National Hurricane Center and AOML's Hurricane Research Division (HRD). Stanley Goldenberg, an HRD meteorologist, has been a member of the seasonal hurricane forecast team since its inception in 1998.

Atmospheric and oceanic conditions across the tropical Pacific are already taking on some El Niño characteristics. Also, we are currently seeing strong trade winds and wind shear over the tropical Atlantic, and NOAA's climate models predict these conditions will persist, in part because of El Niño. The expectation of near-average Atlantic Ocean temperatures this season, rather than the above-average temperatures seen since 1995, also suggests fewer Atlantic hurricanes.

Dr. Gerry Bell, lead forecaster
NOAA's Climate Prediction Center

AOML Hosts Hurricane Briefing for South Florida Leaders and Emergency Managers

AOML hosted a briefing for south Florida leaders and emergency managers on May 27th to discuss the 2014 Atlantic hurricane season. Congresswoman Debbie Wasserman Schultz attended, along with representatives from NOAA's National Hurricane Center and several South Florida disaster preparedness and response agencies. Wasserman Schultz represents Florida's 23rd congressional district. The 2014 meeting marked the first time this briefing has been hosted at AOML.

AOML Director Dr. Bob Atlas began the briefing by discussing NOAA's recently released outlook for the Atlantic basin, which calls for a below- or near-normal hurricane season based upon anticipated environmental conditions. Dr. Ed Rappaport of the National Hurricane Center explained research that has shown water from storm surge and heavy rainfall accounts for the greatest percentage of hurricane-related fatalities (90%), while strong winds account for only a small portion of hurricane-related deaths (8%).

Both Atlas and Rappaport discussed NOAA's continuing efforts to safeguard the public by working to improve the accuracy of hurricane forecasts, particularly the accuracy of intensity change forecasts. A few new technological advances that will be used during the 2014 hurricane season towards meeting these goals include:



Congresswoman Debbie Wasserman Schultz (center foreground) is shown one of the new unmanned aircraft systems that will be used during the 2014 hurricane season to gather data in the lowest reaches of the hurricane environment, an area too dangerous for manned aircraft to venture.

- Remotely-controlled unmanned aircraft systems that will gather data from the turbulent lowest reaches of the storm environment to better understand how air-sea interaction processes enable some storms to intensify;
- An experimental mapping tool that will show coastal communities the areas of greatest threat posed by storm surge and how high above ground the water could potentially rise in these areas;
- An updated version of NOAA's high resolution Hurricane Weather Research

and Forecasting computer model used by the National Hurricane Center that has demonstrated a 15-20% increase in accuracy every year since 2011.

Colonel William Beiswenger of the Florida Army National Guard, Robert Levine of the American Red Cross, Jonathan Lord of Miami-Dade's Emergency Operations Center (EOC), and Miguel Ascarrunz of Broward County's EOC all discussed preparedness measures.

Following the briefing, Congresswoman Wasserman Schultz, Bob Atlas, Ed Rappaport, and others spoke at a media event to share information with the public, highlight the contributions and support each office and/or emergency group provides to local communities during hurricane season, and answer questions posed by the media.

Wasserman Schultz expressed confidence in South Florida's emergency managers to capably handle any hurricane threat that might arise but emphasized preparedness was essential for everyone.



South Florida emergency managers, along with Drs. Bob Atlas of AOML and Ed Rappaport of NOAA's National Hurricane Center, listen as Florida Congresswoman Debbie Wasserman Schultz shares hurricane preparedness information with the public during a locally televised media event broadcast from AOML.



Learn about NOAA's Hurricane Hunters:
<http://oceantoday.noaa.gov/hurricanehunters/>

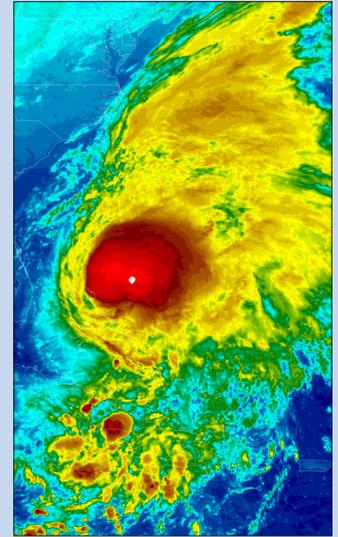
NOAA Collaborates with Indian Researchers to Improve Severe Weather Forecasts

In May, a Memorandum of Understanding between NOAA and the Ministry of Earth Sciences in India led to the establishment of a virtual joint center for advanced modeling of the tropical-land-atmosphere-ocean system for simulation of extreme weather events.

Under this project, NOAA's high-resolution Hurricane Weather Research and Forecasting (HWRF) computer model, used operationally in the U.S. by the National Hurricane Center, will also be used in India. HWRF will serve as the basis of joint research for numerical weather prediction and advanced data assimilation techniques to create the next generation of tropical prediction system for forecasting severe weather over India.

Principal investigators for the joint center include Dr. Frank Marks of AOML's Hurricane Research Division (HRD) and Professor U.C. Mohanty of the Indian Institute of Technology in Bhubaneswar, Odisha, India. Additionally, Drs. Sundararamen Gopalakrishnan of HRD and Vijay Tallapragada of NOAA's National Centers for Environmental Prediction will be the principal coordinators for NOAA's modeling activities with researchers in India.

Participating U.S. institutes supporting the joint center include AOML, Purdue University, and the National Centers for Environmental Protection, while partnering Indian institutes include the Indian Institute of Technology and the Indian National Centre for Ocean Information Services.



AOML Participates in Weather Day at Marlins Park

Eric Uhlhorn, Lisa Bucci, Erica Rule, and Shannon Jones represented AOML on May 22nd for Weather Day at Marlins Park in downtown Miami. The ninth annual event was hosted by the local CBS affiliate, WFOR-TV channel 4, to help south Florida kids learn about weather and climate.

More than 8,000 elementary and middle school students from Miami-Dade and Broward counties filled the stadium before the 12:40 start of the game between the Florida Marlins and Philadelphia Phillies to learn about thunderstorms, lightning, tornadoes, and hurricanes.

AOML staff spoke of how NOAA gathers data during hurricane season to improve forecasts, the use of GPS dropwindsondes to measure the winds, temperature, and humidity of tropical cyclones, and what it's like flying through the eye of a storm. They also brought along a Coyote unmanned aircraft system to explain how NOAA will use them during the 2014 Atlantic hurricane season to gather data near the turbulent ocean surface.

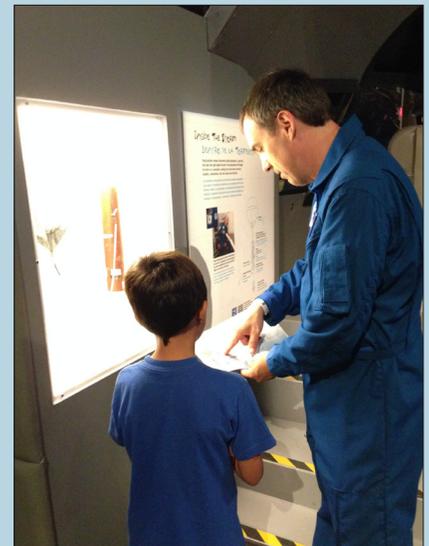
Craig Setzer, lead meteorologist at WFOR-TV in Miami, listens as AOML meteorologist Eric Uhlhorn discusses AOML's hurricane research efforts for 2014, including the use of the Coyote unmanned aircraft system.



"Feel the Force" Focuses on Hurricanes and Other Weather Hazards

On May 31st, AOML staff—Frank Marks, Neal Dorst, Rob Rogers, and Erica Rule—participated in the "Feel the Force: Hurricanes and Other Hazards" event at the Patricia and Phillip Frost Museum of Science in Miami. More than 1,000 guests visited the museum for a day of games, prizes, hands-on science activities, and information all geared towards learning about hurricanes and other weather hazards. Children of all ages had the chance to meet Owlie from NOAA's Young Meteorologist program and visit the Weather on Wheels mobile lab to learn the basics of weather forecasting. They also had a chance to try their luck at being a television meteorologist in the hurricane broadcast studio and meet/speak with NOAA's hurricane hunters. AOML staff answered questions, related what it's like flying through the eye of a hurricane, and explained how the data they gather are crucial to forecasts during hurricane season.

AOML meteorologist Rob Rogers shows a young visitor the flight path of a NOAA hurricane hunter plane through a storm and the locations where GPS dropwindsondes were deployed to gather atmospheric data.



Volcanic Island of Maug Provides Natural Lab to Study Ocean Acidification

Coral researcher Ian Enochs, a University of Miami Cooperative Institute scientist with AOML's Ocean Chemistry and Ecosystems Division, traveled in May to the island of Maug in the Pacific as part of a NOAA expedition aboard NOAA Ship *Hi'ialakai* to study coral reef ecosystems. The expedition was led by scientists with the Coral Reef Ecosystem Division of NOAA's Pacific Island Fisheries Science Center and the Earth-Ocean Interaction group of NOAA's Pacific Marine Environmental Laboratory. Ian participated in the expedition to study how coral reefs are impacted by underwater vents that seep carbon dioxide into the Pacific Ocean.

Why journey to the Island of Maug to study ocean acidification?

Maug is a unique natural laboratory that allows us to study how ocean acidification affects coral reef ecosystems. We know of no other area like this in U.S. waters. Increasing carbon dioxide in seawater is a global issue because it makes it harder for animals like corals to build skeletons.

What is the Island of Maug like?

Maug is an uninhabited volcanic island in the Commonwealth of the Northern Mariana Islands (CMNI) about 450 miles north of Guam. The volcano breaks through the ocean surface in three areas to form islands, and the relatively shallow water surrounding these islands is full of coral reefs. The underwater vents that seep carbon dioxide are found on the side of the caldera or crater formed by the volcano. Usually when I scuba dive, the moment I enter the water, air bubbles surround me and fade away quickly. At Maug, the bubbles never ceased; it felt like I was swimming in a glass of champagne.

What are your goals for studying the carbon dioxide vents?

We're mapping carbonate chemistry over time and space to examine the extent of carbon dioxide at the site. We're looking at how that chemistry changes over this area as you get farther from the vents and what corresponding changes there are in the coral community. We hope to learn more about which coral species are especially sensitive to elevated carbon dioxide and which may be resilient. Finally, we will look at how elevated carbon dioxide levels in seawater may influence the response of various organisms over time, including their growth rate.



Ian Enochs uses a drill to obtain a core sample of a coral to study changes in growth over time.



Vents that spew bubbles of carbon dioxide into the reef environment made coral researcher Ian Enochs feel as though he was diving in a glass of champagne.

What does your sampling show so far?

The carbon dioxide appears to be strongly influencing the growth of corals and algae in a small area around the vents. While there is weedy algae near the vent due to high levels of carbon dioxide, this gives way to healthier coral reefs as you get farther away from the site.

How do you measure these effects over time?

This first trip has allowed us to begin measuring the effects of carbon dioxide and to place instruments in the area that will continuously measure temperature, light, the partial pressure of carbon dioxide, seawater pH, and water currents. When we return in August, we'll have three months of data on how this special environment has been changing day to day. Additionally, we are able to measure coral growth over time by taking core samples and by using a special dye to measure new growth.

How can this research help our understanding of this and other areas of the ocean?

Research at the Maug site will help us determine the effects of elevated carbon dioxide on an entire natural ecosystem. Using this information, we'll have a better understanding of how the rest of the ocean's coral reefs may react to global increases in carbon dioxide and acidification. If the predictions of the Intergovernmental Panel on Climate Change remain the same, by the end of the 21st century the impact of ocean acidification on coral reefs around the world will be comparable to what we are already seeing on the reefs near Maug's carbon dioxide seeps today.

Note: Ian Enochs' research is part of a larger research mission that involves NOAA Fisheries, NOAA's Coral Program, NOAA Research's Pacific Marine Environmental Laboratory, the National Institute of Standards and Technology, and other partners, including Scripps Institution of Oceanography, the University of Guam, and Open Boat Films. NOAA is also working closely with coral managers and monitoring experts of the CNMI's Division of Coastal Resource Management and Department of Environmental Quality.

AOML and SEFSC Scientists Meet to Discuss Areas for Collaborative Research

Scientists from AOML and NOAA's Southeast Fisheries Science Center (SEFSC) got together for a one-day workshop on May 29th. The theme of the workshop was "AOML-SEFSC continued collaborative success: Now and in the future."

The workshop was organized by Libby Johns and Lew Gramer of AOML and Barbara Muhling and Mandy Karnauskas of SEFSC. Approximately 50 scientists attended, including several invited guests from the University of Miami's Rosenstiel School, Harbor Branch Oceanographic Institution, and Florida International University.

A total of 19 scientific presentations divided into three sessions—programmatic, observations, and modeling—were made that focused primarily on the Gulf of Mexico, South Florida, and Caribbean Sea regions. A lively group discussion focused on the possible research directions that could be pursued by AOML and SEFSC teams followed the presentations. The main ideas for new collaborative research included:

- Develop new technologies such as shallow water drifters, gliders, etc., to



AOML and SEFSC scientists gathered to discuss and explore areas for collaborative research during a one-day workshop on May 29th.

monitor the drift trajectories of key larval fish species.

- Add net tows for plankton and larval fish sampling to AOML's hydrographic monitoring activities (e.g., Florida Current, Western Boundary, tropical Atlantic cruises).

- Assess/fill gaps in existing physical observations of coastal ecosystems to generate baseline values of parameters associated with the spawning habitat and

recruitment success of critical fish, invertebrates, and benthic species.

- Increase efforts to develop successful, fully-coupled, high resolution biogeophysical models that include data assimilation and predictive capabilities (e.g., seasonal predictions of red tide).

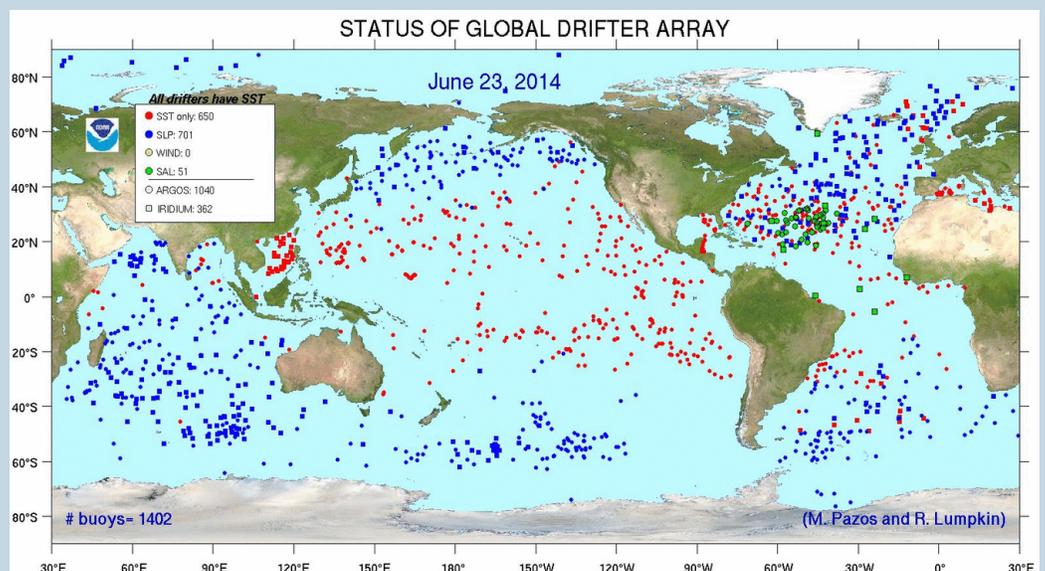
The workshop was considered a success by all who attended, and interest was shown in holding such joint workshops on a more regular basis.

Global Drifter Array Overcomes Challenges to Re-Reach Goal of 1250 Drifters

In April, the global drifter array re-reached its goal of over 1250 drifting buoys deployed worldwide that measure sea surface temperature, near-surface currents, barometric pressure, and surface salinity. The array is managed by AOML's Surface Drifter Program, a component of NOAA's Global Drifter Program, and the first part of the Global Ocean Observing System to reach "100% completed" status in September 2005 (1250 drifters).

Beginning in mid-2010, however, the array began suffering from premature failures caused by several factors and fell to a low of 875 drifters in early 2012. Since then, researchers have worked to re-reach the goal of 1250 drifters through weekly analysis of drifter deaths based on drifter age/manufacturer to identify problems and disseminate results as rapidly as possible, as well as greatly increasing drifter deployments coordinated by AOML.

Now that the global drifter array has returned to its goal of 1250 drifters, AOML's drifter group faces the challenge of decoding, processing, and quality controlling data from new types of drifters, including GPS and salinity, and decoding and processing Iridium drifter data from the ever-growing subset of the array using Iridium instead of Argos for satellite transmissions.



AOML Microbiologists Participate in International Ocean Sampling Day

Researchers with AOML's Environmental Microbiology program participated in Ocean Sampling Day (OSD) held on June 21st, the summer solstice. The international event, organized by the European Union's MicroB3 project, took a snapshot of the ocean state by documenting the diversity, distribution, number, and function of microbes in the ocean.

"Small organisms make up the majority of the ocean's biomass and drive the cycles that sustain life on earth, but not until recently have we had the tools to reveal their diversity and function," said Kelly Goodwin, a microbiologist at AOML. "Ocean Sampling Day and future efforts by genomic observatories will employ state-of-the-art omic technologies to uncover how the oceans are adapting to a multitude of stressors and how those changes translate up to ecosystem services, including seafood supply, healthy swimming waters, and coastal habitats."

NOAA's Marine Microbes Working Group established a dozen sampling locations within U.S. coastal waters for Ocean Sampling Day. The goal is to have these sites monitored over the long term as part of the global Genomic Observatories Network. The resulting database will serve as a baseline for the marine environment and will be accessible to the research community, industry, policy makers, and the public. As part of this U.S.-European Union collaboration, the Smithsonian's Global Genome Initiative will archive the samples collected from around the globe.



Summer interns Mishelle Rodriguez and Alejandro de la Cova fill a 10-liter container with water from the Florida Keys.

Marine scientists worldwide were tasked with gathering 10-liter samples of water at a depth of 1 meter, filtering and freezing the water, and then shipping it to a laboratory for next-generation sequencing and metagenomic analysis. With this cutting-edge technology, the entire microbial community of a water sample will be analyzed to study its structure, function, and biodiversity.

With the aid of several summer interns, AOML microbiologists Chris Sinigalliano and Maribeth Gidley gathered water samples from several of NOAA's sampling sites, including Port Everglades, Tennessee Reef offshore of Long Key in the Florida Keys National Marine Sanctuary, and near the mouth of Tampa Bay at Fort DeSoto in Saint Petersburg. Additionally, AOML microbiologist Kelly Goodwin coordinated efforts with a number of scientists to gather water samples from the sampling site located at the Scripps Institution of Oceanography pier in La Jolla, California.



Dr. Kelly Goodwin of AOML's Environmental Microbiology Lab uploads metadata gathered from the Scripps Institution of Oceanography pier in La Jolla, California using the OSD smart phone app.

As part of Ocean Sampling Day, AOML's microbiologists and outreach coordinator Erica Rule supported an international collaboration to promote ocean literacy. In Miami, they worked with a local Citizen Scientist group on Key Biscayne to gather metadata/environmental data such as salinity, water/air temperatures, oxygen, etc., to support the global metagenomic dataset. In La Jolla, a local Girl Scout troop learned about a variety of ocean topics while helping with OSD collection. The gathered metadata and photos were submitted via a smart phone app to the MyOSD Citizen Science website at <http://www.microb3.eu/myosd>, while complete information on OSD can be found at <http://www.microb3.eu/osd>.

More than 180 marine science teams participated in Ocean Sampling Day worldwide, generating the largest marine dataset ever obtained in a single day. The data gathered will enable a better understanding of the microbial composition and diversity of the ocean and coastal environment to emerge, as well as how microbes adapt to various stressors and changes in their environment.



Summer intern Alejandro de la Cova collects a water sample in the Florida Keys.



Dr. Chris Sinigalliano of AOML's Environmental Microbiology Lab measures environmental metadata such as temperature, salinity, pH, and dissolved oxygen in a water sample drawn from the Florida Keys.



A filtered and labeled sample from Port Everglades, ready for freezing and shipment to the Max Planck Institute for Marine Microbiology in Bremen, Germany, for genetic sequencing.

NOAA Volunteers Aid Restoration Efforts on Virginia Key

Staff from NOAA's Southeast Fisheries Science Center (SEFSC) and AOML joined forces on June 14th to plant sea oats (*Uniola paniculata*) along the dune of North Point Beach on Virginia Key. Sea oats are a salt and drought-tolerant form of grass with an extensive root system that holds sand and soil in place, protecting the shoreline from erosion and the passage of tropical cyclones.

The event was undertaken in support of a larger, ongoing effort sponsored by the City of Miami and Virginia Key Beach Park Trust to preserve and restore the island's native habitats and ecosystems.



Cooperative Institute scientist Bachir Annane of AOML's Hurricane Research Division and son Aden were part of the NOAA team that planted sea oats along the North Point Beach dune.



Volunteers from NOAA's Southeast Fisheries Science Center and AOML spent a busy Saturday morning planting more than 1000 sea oat plants along the dune area of Virginia Key's North Point Beach.

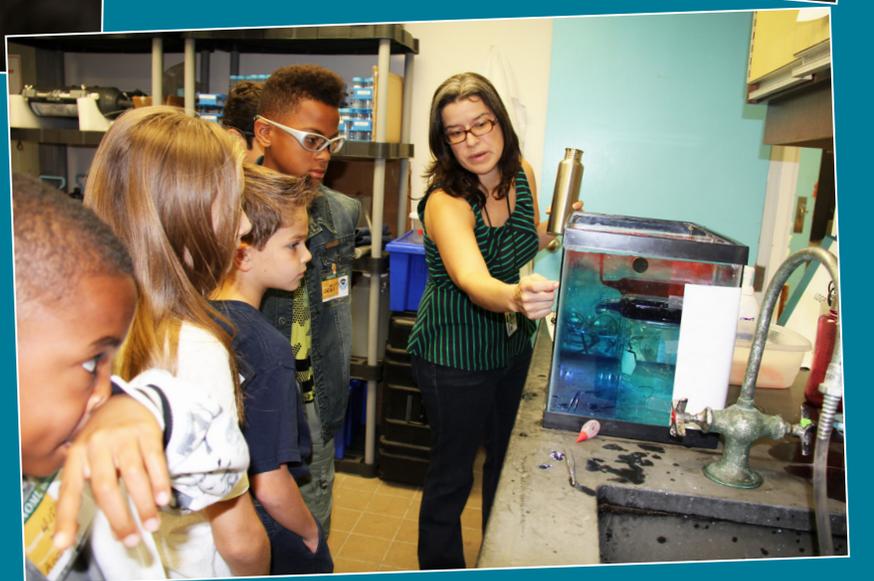
Hundreds of volunteers have participated in the Virginia Key restoration process to remove invasive/exotic plant species, propagate and plant native species, and clean coastal areas of trash and debris. NOAA's volunteers participated under the auspices of the Patricia and Phillip Frost Museum of Science's MUVE (museum volunteers for the environment) program.

Virginia Key, home to both SEFSC and AOML, is a barrier island situated about two miles offshore from mainland Miami. Its varied ecosystems include seagrass beds, coastal dunes, a coastal hammock, and mangrove forests. Besides playing host to a variety of wildlife and endangered/threatened plant species, the island also provides food and shelter for migrating birds and is a nesting ground for endangered Loggerhead sea turtles.



Staff from NOAA's National Hurricane Center, Tropical Prediction Center, Southeast Fisheries Science Center, and AOML formed Team NOAA-Miami to compete in the 2014 Mercedes-Benz 5K Corporate Run on April 24th. They were joined on a picture-perfect evening in downtown Miami's Bayfront Park by more than 25,000 competitors from an array of local companies, corporations, state and federal agencies, financial institutions, and non-profits. Dubbed "Florida's largest office party," a portion of the proceeds from the event were donated to the United Way charity. The co-ed team of Eric Blake, Lisa Bucci, Hua Chen, and Greg Foltz placed third in the government employees category out of a field of 15 co-ed teams. Overall, they placed 23rd out of a field 265 co-ed teams.

Bring Your Child To Work Day



AOML's Bring Your Child to Work Day event on May 15th was another great success, with a small but very enthusiastic group of children. This year the participants learned about how ocean circulation is driven by changes in water temperature and density (salinity) and also about acids and bases.

AOML Cooperative Institute scientist Renellys Perez gave a brief introduction on the topic and then used a 10-gallon fish tank to illustrate how cold and warm water interacts. The children placed cups of plain and salted water in a -80°C freezer to see which would freeze faster and how salt lowers the freezing point of water.

The children also learned about various types of acids and bases and learned how to measure their pH using test strips.

They learned about the global carbon cycle and that increasing amounts of carbon dioxide in ocean waters has changed the chemistry to make the water more acidic. Dry ice and bromothymol blue were used to illustrate how adding additional carbon dioxide changed the pH. It also made for an entertaining color show!

Welcome Aboard

Hosmay Lopez joined the staff of AOML's Physical Oceanography Division in May as a post-doctoral scientist with the University of Miami's Cooperative Institute for Marine and Atmospheric Studies. Hosmay will use his modeling expertise and ocean observations to work with Drs. Gustavo Goni and Shenfu Dong on research to better understand the role of the Southern Hemisphere, in particular the South Atlantic, in extreme weather and global climate. He received his Ph.D. in 2013 from the Department of Meteorology and Physical Oceanography of the University of Miami's Rosenstiel School.



Farewell

Tomislava (Tomi) Vukicevic, a meteorologist/senior research scientist with AOML's Hurricane Research Division, resigned in May after five years of federal service. Tomi has accepted a research position with the Euro-Mediterranean Center for Climate Change in Lecce, Italy, where she will lead data assimilation efforts for the TESSA (Technologies for the Situational Sea Awareness) project. TESSA will develop products and services to improve sea awareness by integrating oceanographic data into advanced technological platforms for use by the maritime sector, tourism industry, and for environmental protection.



Congratulations

Mark Powell, a senior atmospheric scientist with AOML's Hurricane Research Division (HRD), retired in April after 36 years of federal service. Mark began his career with NOAA in 1978 at the National Hurricane Research Laboratory, which was subsequently renamed the Hurricane Research Division and absorbed into AOML in 1982.

Over the years, Mark's research has helped advance the state of tropical cyclone knowledge through detailed analysis of landfalling hurricanes, improvements in real-time wind field monitoring and analysis, rainband structure and dynamics, and the hurricane boundary layer structure. He also had a chance to serve on NOAA's Marine Forecast Team at the 1996 Olympics sailing venue in Savannah, Georgia.

To his credit, Mark developed a hurricane wind analysis system that has led to substantial improvements in understanding the extent and strength of the hurricane wind field, while his subsequent research on the surface drag coefficient as deduced from hurricane wind profiles has led to major improvements in the numerical modeling of hurricanes for track and intensity forecasting, as well as for predicting storm surge and waves. Together with Tim Reinhold of the Institute for Business and Home Safety, Mark developed new storm destructive potential scales for hurricane winds, storm surge, and waves based on integrated kinetic energy. These scales have accurately depicted the threat of large impact-low intensity events such as recent Hurricanes Ike (2008) and Sandy (2012).

Among his many accolades, Mark was elected a Fellow of the American Meteorological Society in 2012 for his outstanding long-term contributions to the atmospheric sciences. Although retired from federal service, Mark is still affiliated with NOAA as a Cooperative Institute scientist at Florida State University's Center for Ocean-Atmospheric Prediction Studies in Tallahassee, Florida. There he will continue research on extreme wind design conditions for offshore wind turbines as part of the recent Interagency Agreement between AOML and the Department of Energy.

Mark has also started a hurricane consulting business, Hwind Scientific, which was recently assigned the rights to Hwind by NOAA's Tech Partnerships Office. Hwind Scientific is one of several startups operating in the new DomiStation business incubator facility in Tallahassee.



Renellys Perez, a Cooperative Institute scientist with AOML's Physical Oceanography Division, was selected to join the U.S. CLIVAR POS (Phenomena Observations and Synthesis) panel in May. Renellys will serve on the panel for a four-year term through December 2017. The POS Panel plays a critical role in the development of plans to improve understanding of climate variations in the past, present, and future, and to develop a syntheses of critical climate parameters, while also sustaining and improving the global climate observing system.



The Model Development Team of AOML's Hurricane Research Division was collectively named the Scientific Employee of the Year by the South Florida Federal Executive Board at its annual awards banquet on May 9th. The team was recognized for its outstanding contributions towards developing the advanced, high-resolution Hurricane Weather Research and Forecasting (HWRF) model used operationally by the National Hurricane Center. The state-of-the-art HWRF model assimilates data from satellite observations, reconnaissance aircraft, and buoys to generate hurricane track and intensity forecasts for both the Atlantic and East Pacific basins.



The Hurricane Research Division's Model Development Team (left to right): Thiago Quirino, Sundararamen Gopalakrishnan, Hua Chen, Lisa Bucci, Robert Black, and Stanley Goldenberg. Missing from the photo are Frank Marks and Xuejin Zhang.

Over the next few months, several projects are planned to improve the AOML facility:

July

- Wash windows (exterior and interior)

August

- Install NESDIS antenna on roof

September

- Install sidewalks at emergency exits
- Paint building exterior
- Repair roof, apply weatherproof coating, and install safety railings
- Renovate Inorganic Chemistry Lab



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

DONG, S., and K.A. Kelly, 2013: How well do climate models reproduce North Atlantic Subtropical Mode water? *Journal of Physical Oceanography*, 43(10):2230-2244.

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