September-October 2011
Vol. 15/No. 5

AOML Keynotes

ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORY

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

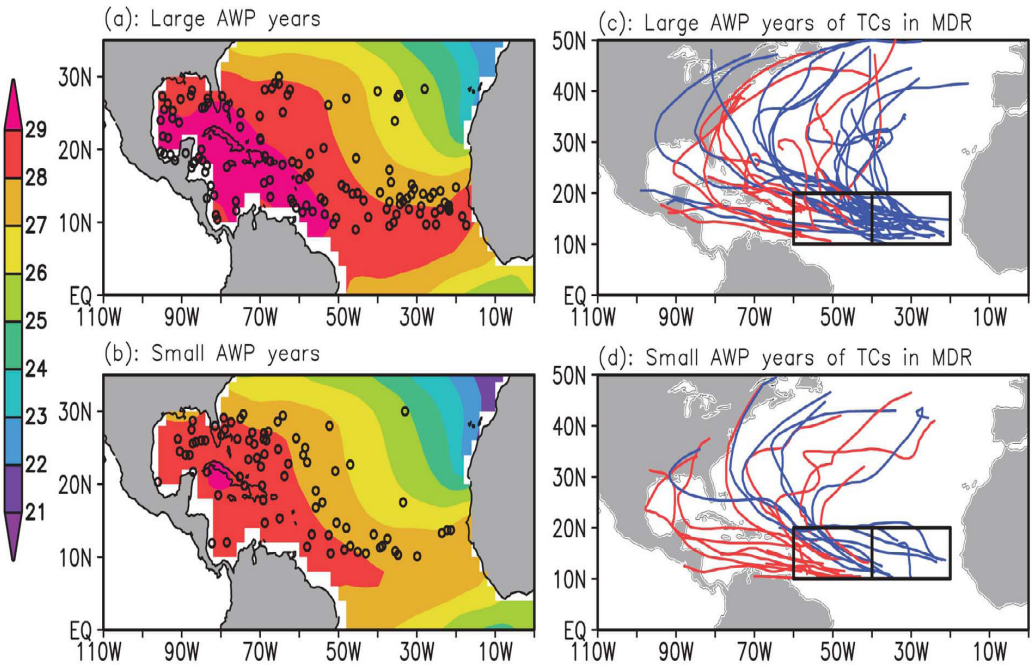
Relationship Identified Between Atlantic "Warm Pool" and U.S. Landfalling Hurricanes

The factors that control a hurricane's track are complicated, determined by a storm's internal dynamics, the large-scale climate, and weather patterns. In a study published in the journal *Geophysical Research Letters* on October 7th, AOML scientists identified a relationship between one of these large-scale climate factors, the Atlantic warm pool, and hurricanes making landfall in the United States. Specifically, the study indicates that a large warm pool is an unfavorable condition that decreases the likelihood of hurricanes coming ashore in the United States.

Researchers used more than 40 years of oceanographic, atmospheric, and hurricane data, as well as a computer model, to study the role that the Atlantic warm pool plays in keeping storms from landfall. The "warm pool" is a large body of warm water in the tropical North Atlantic that exceeds 83.3°F (28.5°C). The warm pool in 2010 was double its average size, likely contributing to the environmental conditions that steered storms away from the United States by influencing wind patterns and storm formation sites.

The 2010 Atlantic hurricane season was one of the most active on record, with 19 named storms. A dozen of these named storms strengthened into hurricanes, with five reaching category 3-5 intensity (winds above 110 mph). However, no hurricanes made landfall in the United States.

"The Atlantic warm pool of 2010 was much larger than its normal size and extended from the east coast of Mexico to the west coast of Africa. The large warm pool caused a change in atmospheric circulation, which steered hurricanes towards the northeast as they approached the United States," said Dr. Chunzai Wang, a climate researcher with AOML's Physical Oceanography Division and lead author on the study.



Tropical cyclone (TC) genesis location, track, and Atlantic warm pool variability based on data from 1970-2009. Shown in (a) and (b) are the TC genesis locations (circles) and sea surface temperatures (colored shading) for TCs that formed southward of 30°N during large (126 TCs) and small (79 TCs) Atlantic warm pool years. Shown in (c) and (d) are the tracks of TCs that formed in the main development region during large and small Atlantic warm pools.

Both a large warm pool in the tropical North Atlantic Ocean and a La Niña event in the tropical Pacific Ocean increase the number of storms in the Atlantic; however, their influence on the hurricane track is opposite. While a large Atlantic warm pool tends to influence storms to stay over the open ocean east of the United States, a La Niña event tends to enhance the possibility for storms to make landfall in Central America and the Caribbean, as well as the southeastern United States.

"Our study indicates that the effects of the 2010 La Niña event on hurricane tracks were offset by the influence of an extremely large Atlantic warm pool, which may partially explain why no hurricanes made landfall in the United States," Wang said. The study also found that when the Atlantic warm pool is large and expands eastward, the region where tropical storms typically form moves closer to the west coast of Africa.

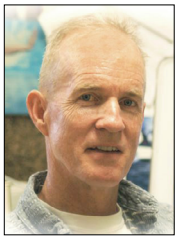
The eastward shift of this tropical storm genesis location decreases the possibility that a hurricane will make landfall in the U.S. because there is more time for a storm to turn north before it impacts the U.S. east coast. The combination of warm water-induced steering winds and genesis shift thus reduces the ability of storms to make landfall in the United States.

As part of their overall analysis, the team noted that in years when the Atlantic warm pool was small, the associated steering winds contributed to more favorable conditions for landfall in the United States. In years when the warm pool was at its normal size, the changes in steering winds were very small compared with the years when there was either a large or small warm pool.

(*continued on page 2*)

Wang, C., H. Liu, S.-K. Lee, and R. Atlas, 2011: Impact of the Atlantic warm pool on United States landfalling hurricanes. *Geophysical Research Letters,* 38:19702, doi:10.1029/2011GL049265, 7 pp.

AOML Meteorologist Elected Fellow of AMS



AOML meteorologist, Mark Powell, was elected to become a Fellow of the American Meteorological Society (AMS) in October 2011. AMS Fellows are chosen annually in acknowledgment of their outstanding long-term contributions to the atmospheric sciences.

A member of AOML's Hurricane Research Division since 1978, Mark was recognized for his more than 30 years of research that has advanced the state of tropical cyclone knowledge through fostering improvements in real-time wind field monitoring and analysis, rainband structure and dynamics, and hurricane boundary layer structure.

Mark is best known for his 2003 cover article in the journal *Nature,* in which hurricane wind profiles measured by global positioning system sondes launched from NOAA and Air Force aircraft were used to describe drag coefficient behavior in hurricanes (Powell, M.D., P.J. Vickery, and T.A. Reinhold, 2003: Reduced drag coefficient for high wind speeds in tropical cyclones, *Nature*, 422:279-283). This work contributed to major improvements in the numerical modeling of hurricanes for track and intensity forecasting, as well as for predicting storm surge and waves.

Additionally, Mark also pioneered the development of a unique hurricane wind analysis system, H*Wind, that synthesizes measurements from a variety of observing system platforms. H*Wind products are now widely used by emergency managers and have substantially improved understanding of the extent and strength of the hurricane wind field.

Mark has recently developed an Integrated Kinetic Energy scale for assessing tropical cyclone damage potential that expands upon the Saffir-Simpson scale currently used to evaluate tropical cyclones. In addition to his research, Mark is an AMS Certified Consulting Meteorologist and a member of the American Geophysical Union and American Association for Wind Engineering.

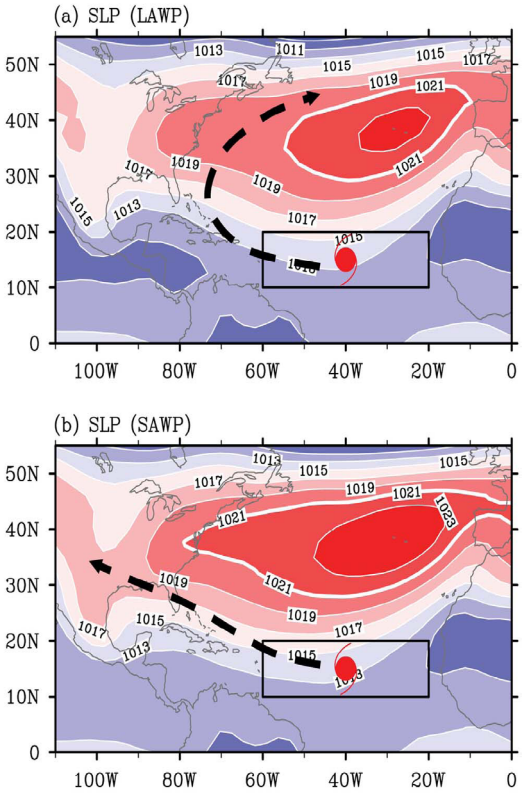
(*continued from page 1*)

"Most hurricane-related costs and damages occur when hurricanes make landfall," said Dr. Robert Atlas, AOML Director and a coauthor of the paper. "Our study suggests that a better prediction of climate variability in conjunction with further improvements in the numerical models might enable NOAA to make seasonal projections for landfalling hurricanes in the future."

AOML is also currently researching other large-scale climate phenomena, using observations and numerical modeling, to gain a better understanding of their influence on seasonal hurricane tracks.

In addition to Wang and Atlas, other authors of the study include Drs. Hailong Liu and Sang-Ki Lee, both researchers with AOML's Physical Oceanography Division and NOAA's Cooperative Institute for Marine and Atmospheric Studies at the University of Miami.

Besides its publication in the journal *Geophysical Research Letters*, a brief overview of the findings presented in Wang *et al.* recently appeared in the October 21st edition of *Science* magazine (Vol. 334, No. 6054). *What Keeps the Storms Away?* was included as part of the "Editors' Choice–Highlights of the Recent Literature" column as a noteworthy ocean sciences research article.



Hurricanes that form in the Main Development Region (shown as a black box) appear to be influenced by the Atlantic Warm Pool. The top image (a) depicts the influence of a large Atlantic Warm Pool, allowing storms to recurve into the Atlantic. The bottom image (b) depicts the influence of a small Atlantic Warm Pool, steering storms in a more westwardly direction towards the United States.

AOML welcomed Mishellee Taylor, a climate change specialist from Colombia, in September as part of an exchange program funded by the U.S. Department of State's Bureau of Educational and Cultural Affairs. Taylor was recently awarded a Climate Change Fellowship through Partners of the Americas, a non-profit organization based in Washington, DC. The Climate Change Fellows Program seeks to build bilateral relationships and capacities between climate change institutions in the U.S. and Colombia.

During Taylor's two months in south Florida, she worked closely with Pamela Fletcher, AOML's Florida Sea Grant liaison in the greater Miami area. Together, they participated in a series of technical workshops as part of the Marine and Estuarine Goal Setting for South Florida Project to assess south Florida's marine ecosystem, including climate change impacts to the environment. Taylor also worked with Fletcher to develop portions of the Integrated Climate Tools for Marine Protected Area Managers Project.

Climate change specialist Mishellee Taylor from Colombia besides a poster she developed in conjunction with Pamela Fletcher, Florida Sea Grant liaison at AOML, for the U.S. Department of State Fellows Congress.

In Colombia, Taylor has worked for the past 8 year for CORALINA—the Corporation for Sustainable Development of the Archipelago of San Andres, Providence, and Santa Catalina—to raise awareness of the flora and fauna in the Archipelago and to promote community participation in the preservation and conservation of natural resources. She also conducts research on the population of the black land crab (*Gecarcinus ruricola*), a protected species. CORALINA manages the Seaflower Biosphere Reserve and Marine Protected Area, the largest conservation region in the Caribbean.

Combined Federal Campaign

CFC Combined Federal Campaign

November 1-28, 2011

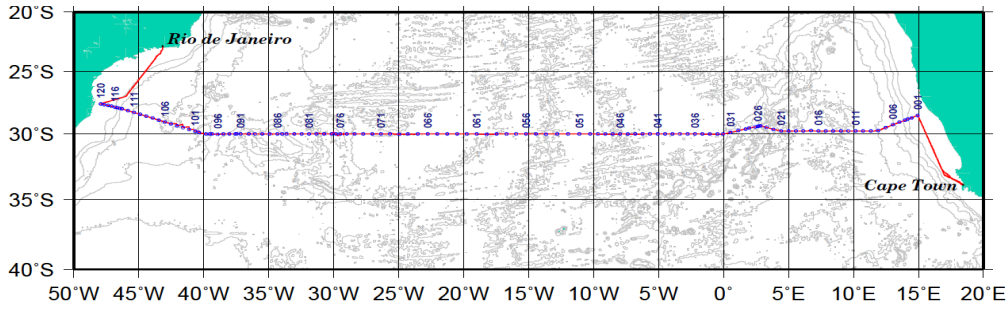
AOML Campaign Managers:
Erica Rule and Hector Casanova
(305-361-4541; 305-361-4544)

Trans-Atlantic Cruise Helps Map Climate Variability in the World's Oceans

AOML scientists returned to Miami in late October after completing a trans-Atlantic cruise aboard the NOAA Ship *Ronald H. Brown* from Cape Town, South Africa to Rio de Janeiro, Brazil. Dr. Molly Baringer of AOML's Physical Oceanography Division served as chief scientist for the research effort conducted in support of the U.S. Global Ocean Carbon and Repeat Hydrography Program.

Global changes in the ocean's transport of heat and freshwater, which can have a significant impact on climate and carbon sequestration capacity, can be tracked through long-term measurements. The A10 cruise was undertaken as part of a decadal series of repeat hydrography sections to monitor the changing inventories of carbon dioxide (CO_2) and related biogeochemical parameters, tracers, heat, and freshwater in the ocean and their transport. The Repeat Hydrography Program thus provides a robust observational framework to assess long-term trends for these parameters and is currently the only means to sample the deep ocean.

Staff from more than a dozen academic institutions and NOAA research laboratories departed Cape Town on September 26th, a month later than scheduled due to ship engine malfunctions. The voyage across the South Atlantic Ocean occurred along approximately 30°S. AOML's scientific component included George Berberian, Robert Castle, Charles Featherstone, Charles Fischer, James Hooper, Kyle Seaton, and Andrew Stefanick.



Cruise track of the A10 research cruise across the South Atlantic Ocean from Cape Town, South Africa to Rio de Janeiro, Brazil. Equipment failures on the *Ronald H. Brown* delayed the cruise by a month. The ship departed Cape Town on September 26th and arrived in Rio de Janeiro on October 31st.

During their month at sea, A10 researchers gathered atmospheric and hydrographic data at 120 stations from about 15°E-47°W along the cruise track (see map above). Several Argo profiling CTD (conductivity-temperature-depth) floats and drifting buoys were also deployed.

Observations obtained along the same transect during two previous oceanographic expeditions in 1992 and 2003 serve as the baseline measurements upon which data from the present campaign will be evaluated to assess changes in the ocean's biogeochemical cycles in response to natural and/or anthropogenic activity. The A10 reoccupation was conducted with the goal of discerning long-term changes in a variety of ocean properties and transport in the South Atlantic Ocean during this 19-year interval, including changes in ocean temperature and salinity, as well as changes in dissolved carbon dioxide, pH, chlorofluorocarbons, dissolved organic carbon, nutrients, oxygen, carbon isotopes, helium, and tritium.

Data gathered from monitoring the changing patterns of CO_2 help support the development of models for improved forecasting skill of the oceans and global climate system. The data also provide a means of tracking the decadal invasion of anthropogenic CO_2, chlorofluorocarbons, and other tracers into intermediate and deep water and assist in determining the variability of the inorganic carbon system and its relationship to biological and physical processes.

The A10 cruise was funded by the Climate Observation Division of NOAA's Climate Program Office and the National Science Foundation.

A drifting buoy is deployed in the South Atlantic Ocean from the deck of the NOAA Ship *Ronald H. Brown*.

Hurricane Researchers Win Outstanding Scientific Paper Award

Scientists with AOML's Hurricane Research Division (HRD) are among the winners of the NOAA-Office of Oceanic and Atmospheric Research's (OAR) 2010 Outstanding Scientific Paper Awards. HRD Director Frank Marks, along with affiliated scientist Michael Montgomery and former HRD researchers Peter Black and Robert Burpee received the award for their study of Hurricane Hugo (1989) that appeared in the American Meteorological Society journal *Monthly Weather Review.*

Marks, F.D., P.G. Black, M.T. Montgomery, and R.W. Burpee, 2008: Structure of the eye and eyewall of Hurricane Hugo (1989). *Monthly Weather Review,* 136(4):1237-1259.

The Outstanding Scientific Paper Awards recognize the most original, important, and best written peer-reviewed research papers authored by OAR's Federal and cooperative institute scientists.

AOML Contributes to Oil Spill Workshop

AOML employees Alan Leonardi and Ryan Smith participated in the 2011 Deepwater Horizon (DWH) Oil Spill Principal Investigator Workshop in St. Pete Beach, Florida, on October 25-26, 2011. The meeting was hosted by the National Science and Technology Council Subcommittee on Ocean Science and Technology (NSTC-SOST).

The two-day event provided a forum for investigators from all sectors currently working on DWH-related science to present findings and was designed to foster continued and future collaboration on spill-related issues, as well as Gulf of Mexico ecosystem science. The workshop served as a follow-up to the first NSTC-SOST workshop focused on the topic, held in 2010, and included six concurrent science sessions on issues such as the extent and fate of oil spilled from the Macondo wellhead and the dispersants utilized during the spill; the impacts and mitigation of these contaminants in coastal and offshore environments; the subsequent effects on human health and the regional economy; and the use and development of in situ and remote sensors to assess DWH spill-related contaminant extent, fate, impacts, and mitigation.

During the conference, Ryan Smith presented results from AOML in situ and remotely-sensed data gathering efforts, which took place over the summer of 2010 as part of the DWH response. Alan Leonardi worked closely with the NSTC-SOST, leading the organization and planning of the meeting.

AOML Tests New System for Underway Data

In an effort to collect upper ocean measurements with new technology, researchers with the Physical Oceanography Division at AOML have started testing an Underway CTD (UCTD, conductivity-temperature-depth, http://www.oceanscience.com/uctd.html) system. This system is capable of collecting temperature and salinity profiles of the upper ocean at underway speeds, to depths of up to 500 m.

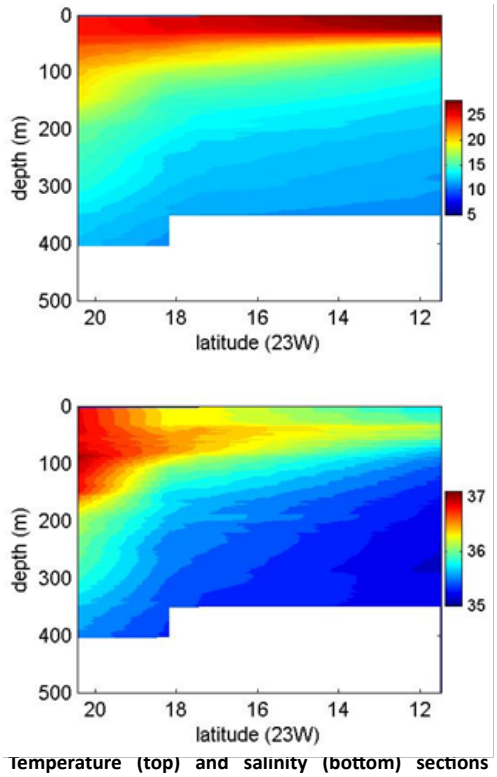
A group in the Physical Oceanography Division formed by Gustavo Goni, Rick Lumpkin, Marlos Goes, Verena Hormann, and Grant Rawson is leading the effort to assess the value of the UCTD for climate-related studies and its potential implementation at AOML as a source of sustained observations of the upper ocean.

During the July 21-August 21 PIRATA Northeast Extension (PNE) cruise aboard the NOAA Ship *Ronald H. Brown*, AOML teamed up with Oceanscience to evaluate the UCTD system. This operation was organized by Marlos Goes, and approximately 60 casts were conducted by Rick Lumpkin, Grant Rawson, Verena Hormann, and Shelby LaBuhn (Lake Superior State University).

Rick Lumpkin, Grant Rawson, and Verena Hormann of AOML's Physical Oceanography Division prepare the UCTD system for deployment off the stern of the NOAA Ship *Ronald H. Brown* during the 2011 PIRATA Northeast Extension cruise.

UCTD data from the PNE cruise revealed the subsurface salinity maximum associated with subsurface midlatitude surface water subducted beneath fresher water that had earlier in the year been exposed to rainfall associated with the Intertropical Convergence Zone (see figure at right).

AOML is now providing specific recommendations to Oceanscience based on the experiences collected during the PNE cruise in order to update the system before another AOML test is conducted. This type of system will ultimately be capable of robust, near-continuous measurements of the upper ocean while underway, saving ship time and funds, as it can replace a subset of the more time consuming standard CTD stations when the upper 500 m is of primary scientific interest.



Temperature (top) and salinity (bottom) sections collected by the UCTD while transiting southward in the Atlantic Ocean along 23°W from 20.5°N to 11.5°N.

Scientists with AOML's Hurricane Research Division discuss the latest developments in AOML's hurricane modeling efforts, including the incorporation of observations from the tail Doppler radar of NOAA's P-3 hurricane hunter aircraft. From left to right are Drs. Frank Marks, Jane Lubchenco, Bob Atlas, Tomislava Vukicevic, and Robert Rogers.

Dr. Christopher Kelble (center) of AOML's Ocean Chemistry Division discusses ecosystem-based modeling efforts in south Florida with Dr. Jane Lubchenco (left) during her visit to AOML's Nutrient Analysis Laboratory, operated by Lindsey Visser (right).

NOAA Administrator, Dr. Jane Lubchenco, visited AOML on Thursday, October 20th while in the south Florida area to attend the 21st annual conference of the Society of Environmental Journalists, the 26th meeting of the U.S. Coral Reef Task Force, and the 2011 annual meeting of the Pew Fellows Program in Marine Conservation. Dr. Lubchenco met with AOML director Dr. Bob Atlas, as well as a handful of researchers from across the Laboratory, to learn about some of AOML's recent science activities.

Christopher Kelble, Rick Lumpkin, Ryan Smith, and Jane Lubchenco discuss the use of the *Virginia K*, one of AOML's small boats (pictured), as a sampling platform for the shallow south Florida coastal environment, as well as AOML's ability to monitor regional phenomena such as the recent spread of flood waters from the Mississippi River through the Gulf of Mexico into the Florida Straits.

From Gulf of Mexico Oil Spill to the Florida Keys and Beyond

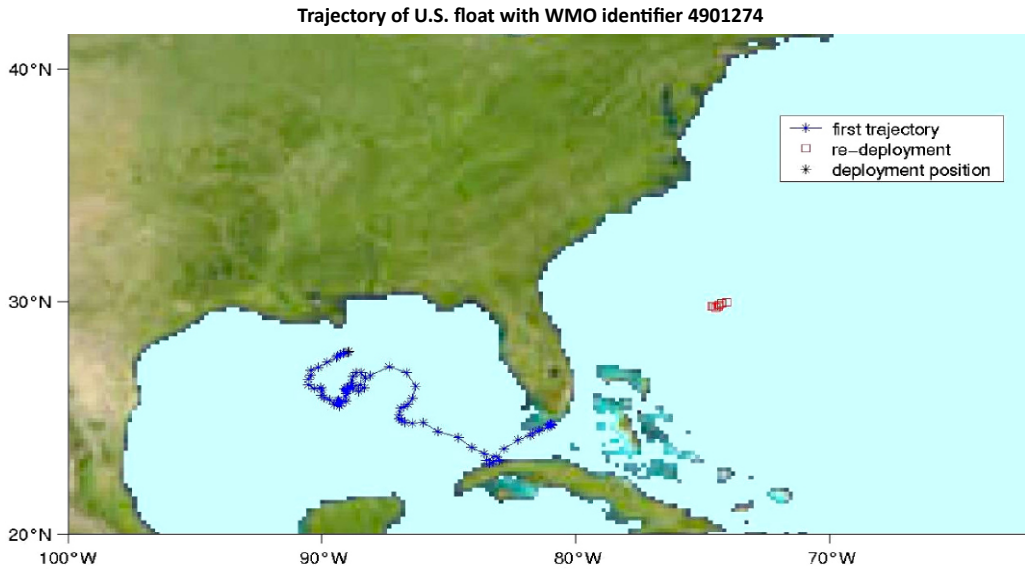
In the months following the April 2010 Deepwater Horizon oil spill, drifting buoys and Argo profiling floats were deployed in the Gulf of Mexico as part of the effort to monitor oceanographic conditions in the region. Once such ocean-observing instrument was Argo profiling float 4901274, deployed by the Naval Oceanographic Office on August 16, 2010.

Argo floats spend the majority of their time drifting beneath the ocean's surface, sinking to depths as great as 2000 meters to gather temperature and salinity measurements. At regular intervals, typically every 10 days, they rise to the surface, transmit their data, and descend once again to drift with the currents.

More than 3,000 Argo floats presently circulate throughout the global ocean and measure an estimated 100,000 temperature and salinity profiles annually. These profiles provide researchers with the needed data to document and analyze seasonal to decadal shifts in climate. They also provide information on the changing patterns of heat and freshwater storage in the global ocean, as well as their transport.

AOML researchers manage the U.S. Argo Data Assembly Center, which processes and quality controls data from all the floats deployed by principal investigators and partners of the U.S. Argo Consortium. After processing, these data are transmitted to the Global Telecommunications System and Argo's Global Data Assembly Centers for public use.

Floats deployed in the Gulf of Mexico are typically at risk of either running aground, due to shallow water conditions and extensive regional coastline, or of being transported into Atlantic waters by powerful currents. As tracked by AOML researchers, the trajectory of float 4901274 documented both scenarios: first the float drifted in the Loop Current, then transitioned into the Florida Current, and finally entered the Florida Straits. Instead of being shuttled into Atlantic waters by the Gulf Stream, however, it ran aground in the town of Marathon, a small community in the Florida Keys. Before its grounding in June 2011, float 4901274 transmitted 72 temperature and salinity profiles.



Trajectory of Argo profiling float 4901274 in the Gulf of Mexico (blue) and North Atlantic Ocean (red).

Marathon residents Ed Watson and James Moncrief subsequently found float 4901274 and called the telephone number on the float's tag. After contacting NOAA and the Naval Oceanographic Office, they brought the float to AOML. In honor of their visit, the two met with staff from the U.S. Argo Data Assembly Center, learned about AOML's ocean and climate research, and the role AOML plays in maintaining the Argo array of floats in the Atlantic Ocean.

Thanks to their help, Argo float 4901274 was successfully recovered and has since been redeployed. On September 21st, AOML staff placed float 4901274 in the North Atlantic Ocean where it continues to drift and transmit data in support of climate research.

Marathon residents Ed Watson and James Moncrief at AOML with Argo float 4901274. They met with Dr. Silvia Garzoli, AOML's Chief Scientist and one of the founders of the international Argo Project.

AOML oceanographer Claudia Schmid (second row, center) participated in the 7th Annual Indonesia-U.S. Ocean and Climate Observations, Analysis, and Applications Partnership meeting in Yogyakarta, Indonesia on September 19-20, 2011. Claudia made presentations on Argo float and drifter technology, as well as on data management practices at the Argo and Global Drifter Data Assembly Centers at AOML. She also presented information on how to access these data and products.

In addition to the two days of formal presentations, U.S. representatives visited the Universitas Gadja Mada in Yogyakarta on September 21st and the Badan Pengkajian dan Penerapan Teknologi in Jakarta on September 22nd to participate in logistical, technical, and scientific discussions with Indonesian researchers.

The meeting was convened to increase collaboration between NOAA and its Indonesian partners. This collaboration initially began with an expansion of the RAMA (Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction) mooring array in the Indian Ocean; float and drifter deployments are currently being added to this array.

Congratulations

Shailer Cummings, an oceanographer with AOML's Ocean Chemistry Division, retired in August after 38 years of Federal service. He began his career in Chile, working on a Peace Corps sponsored fishery-oceanography project in 1968. In 1976, Shailer joined AOML's Physical Oceanography Laboratory; a year later he moved to AOML's newly formed Ocean Chemistry Laboratory and was asked to hire a principal investigator for the Biological Oceanography Group.

Shailer chose Peter Ortner, and they worked closely together for the next 35 years. Asked about Shailer, Peter said "along with Drs. Harold Edgerton, Van Holliday, and Tom Rossby, I treasure most my collaboration (and friendship) with Shailer as the highlight of my career. He is truly a remarkable human being."

Over the years, they designed, constructed, and deployed a variety of plankton samplers to characterize zooplankton, fish egg, and larval fish distributions. The technologies they employed and integrated included mechanical nets, optics, video, and acoustics, all of which relied upon Shailer's self-taught electronics and computing expertise. These innovations enabled them to illuminate the role of currents, internal waves, and eddies upon the concentration of zooplankton (larval fish food), fish larvae, and recently-hatched fish eggs and, as a result, to better understand what regulates secondary productivity.

In 2000, Shailer's electronic and engineering expertise were relied upon to design and install NOAA's oceanographic sampling equipment aboard the *Explorer of the Seas,* at that time the largest cruise ship afloat. The data from the *Explorer's* voyages in the Caribbean have been freely distributed to the research community, resulting to date in more than 200 papers and presentations.

After the passage of Hurricane Katrina in 2005, Shailer served as the chief scientist for NOAA's emergency response cruises that tested Gulf water, marine species, and sediments for the presence of toxins and bacteria. He and his team members were awarded a Department of Commerce Silver Medal in recognition of their diligent efforts to ensure seafood from the region was safe for public consumption.

Ocean Chemistry Division Director Dr. Michelle Wood, Shailer Cummings, and AOML Director Dr. Bob Atlas.

When the Deepwater Horizon oil spill occurred in April 2010, Shailer was among the first at AOML to propose fieldwork in the Loop Current, and he participated in two cruises that collected data near the well-head. He subsequently became one of the first AOML scientists to publish research about the oil spill.

Shailer continues to work with the OCD Director on the analysis of methods for detecting oil in seawater by fluorescence. "Shailer and I had worked together before I came to AOML," said OCD Director Michelle Wood, "but during the Deepwater Horizon experience I really got to know him and appreciate the incredible generosity of spirit that others have enjoyed for so many years."

"We've had some great times together in the field, and are very lucky that Shailer will continue to work with the Ocean Chemistry Division as a researcher with the University of Miami's Cooperative Institute for Marine and Atmospheric Studies."

A number of scientists with AOML's Hurricane Research Division (HRD) are members of a team that have received NASA's Group Achievement Award for 2011. HRD researchers participated in NASA's Genesis and Rapid Intensification Processes (GRIP) science missions during the summer of 2010. The GRIP campaign was a collaborative effort of NOAA, NASA, and academic partners to better understand how tropical storms form and intensify. During GRIP, several systems, including hurricanes Earl and Karl, were sampled from as many as seven aircraft, including NASA's Global Hawk unmanned drone. The GRIP missions documented both the rapid intensification and decay of Hurricane Earl, making its lifecycle the most intensively sampled to date. Congratulations to Sim Aberson, Altug Aksoy, Michael Black, Neal Dorst, Jason Dunion, John Kaplan, Frank Marks, Shirley Murillo, Robert Rogers, Kathryn Sellwood, Eric Uhlhorn, and Paul Willis, all of HRD and members of the GRIP team honored by NASA. AOML Director Bob Atlas also received the award from NASA for his participation in the GRIP science missions.

Farewell

Judith Gray, AOML's former Deputy Director, retired in September after 33 years of Federal service. Judy joined AOML in January 1998 as the Laboratory's first deputy director, a position she held for 12 years. In April 2010, Judy departed AOML to serve as the Acting Deputy Assistant Administrator for Programs and Administration with NOAA's Office of Oceanic and Atmospheric Research (OAR) in Silver Spring, Maryland.

Judy began her Federal career in 1978 as a NOAA Corps officer, resigning a year later to become a research meteorologist with NOAA's Pacific Marine Environmental Laboratory in Seattle, Washington. In 1990, she made the move to Washington, DC to become a program specialist with NOAA's Environmental Research Laboratories (ERL). She subsequently held a number of leadership positions within NOAA including OAR's first representative in the Deputy Under Secretary's Program Coordination Office, program manager for the Global Ocean Ecosystem Dynamics (GLOBEC) and Coastal Forecasting project, and the Acting Deputy Director of ERL.

In 2010, Judy was the recipient of a Distinguished Career Award from the Department of Commerce in recognition of her exceptional management, leadership, and service to NOAA employees. During her Federal career, she also earned a Department of Commerce Bronze Medal, a Department of Energy Federal Energy and Water Management Award, and a NOAA Special Act Award.

Throughout her career, Judy lived her core value of being a leader in service to NOAA—the people, the science, and the organization—a value she learned from her father. She encouraged colleagues and employees to examine their leadership styles and to pursue leadership training.

At her retirement party in Miami, Judy emphasized her gratitude for the opportunities, support, and challenges NOAA afforded her, in particular, the opportunity to work with so many amazing and dedicated people.

All NOAA employees are required to complete the web-based NOAA Employee Safety, Environmental and Sustainability Awareness Course by December 30, 2011. The course can be accessed on the Internet at:

http://ns.learnsecuritywith.us/access.login.asp

Welcome Aboard

Zachary Barton, a recent graduate of the Florida Institute of Technology with a B.S. degree in Ocean Engineering, joined the staff of AOML's Physical Oceanography Division (PhOD) in September as a Fall Intern. Zachary is working with the exependable bathythermograph (XBT), Argo float, and engineering groups in PhOD to help with ship recruitment for the deployment of XBTs and profiling floats, XBT autolauncher upgrades, and an oceanographic equipment database.

Dr. Xin Wang joined the staff of AOML's Physical Oceanography Division in October as a CIMAS post-doctoral scientist. Xin obtained his Ph.D. degree from the Institute of Atmospheric Physics at the Chinese Academy of Sciences, Beijing, China in 2007. His doctoral thesis and past research have focused on ocean-atmosphere interaction, climate variability, and typhoon activity in the western North Pacific Ocean. During his time at AOML, he will work with Dr. Chunzai Wang and scientists with the Climate and Hurricane Group to improve under- standing of climate variability in the Indian Ocean associated with the new national program called DYNAMO (Dynamics of the Madden-Julian Oscillation).

Liping Zhang joined the staff of AOML's Physical Oceanography Division in October as a CIMAS Research Associate. Liping is a Ph.D. student at the Ocean University of China in Qingdao, China and will defend her Ph.D. degree in the spring of 2012. Her research over the past few years has focused on climate, climate change, and oceanic-atmospheric circulation in the Atlantic and Pacific oceans. During her time at AOML, she will work with Dr. Chunzai Wang and scientists with the Climate and Hurricane Group to examine the relationship of the Atlantic warm pool with the Atlantic meridional overturning circulation.

Please Recycle!

Travel

Robert Kohler attended a Department of Commerce Information Technology Security Conference and the NOAA-Office of Oceanic and Atmospheric Research's Senior Information Technology Meeting in Washington, DC on September 6-9, 2011.

Leticia Barbero, Denis Pierrot, and Rik Wanninkhof attended the Surface Ocean CO_2 Data-to-Flux Workshop in Paris, France on September 12-13, 2011.

Claudia Schmid participated in the 7th Annual Indonesia-U.S. Ocean and Climate Observations, Analysis, and Applications Partnership meeting in Yogyakarta, Indonesia on September 19-21, 2011.

Bob Atlas attended NOAA's Senior Executive Service Summit in Annapolis, Maryland on September 26-28, 2011.

Shaun Dolk, Rick Lumpkin, and Mayra Pazos attended the 27th Data Buoy Cooperation Panel Conference in Geneva, Switzerland on September 26-30, 2011.

Dwight Gledhill attended the 2011 NASA Carbon Cycle and Ecosystems Joint Science Workshop in Alexandria, Virginia on October 3-7, 2011.

Alan Leonardi attended an Ocean Discovery Institute meeting in San Diego, California on September 19-21st. He also attended and served as the co-chairmen of the NOAA Statoil meeting in Silver Spring, Maryland on September 26-30, 2011.

Robert Rogers participated in the World Weather Research Program's Annual Meeting of the Working Group on Tropical Meteorology Research on October 10-11, 2011 and the Monsoon Heavy Rainfall Workshop on October 12-14, 2011 in Beijing, China.

Silvia Garzoli, Christopher Meinen, and Renellys Perez attended the South Atlantic Meridional Overturning Circulation Workshop in Simons Town, South Africa on September 27-29th; Silvia Garzoli and Christopher Meinen also attended the Climate Research in Service to Society Conference in Denver, Colorado on October 24-28, 2011.

Alan Leonardi and Ryan Smith attended the Deepwater Horizon Oil Spill Principal Investigator One Year Update Workshop in St. Petersburg, Florida on October 25-26, 2011.

Alejandra Lorenzo attended the annual Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) National Conference in San Jose, California on October 27-30, 2011.

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

AMORNTHAMMARONG, N., J.-Z. ZHANG, and P.B. Ortner, 2011: An autonomous batch analyzer for the determination of trace ammonium in natural waters using fluorometric detection. *Analytical Methods,* 3(7):1501-1506 (doi:10.1039/C1AY05095H).

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