

AOML Keynotes

May-June 2009

Atlantic Oceanographic and Meteorological Laboratory

Volume 13, Number 3

"More than 35 million Americans live in regions most threatened by Atlantic hurricanes. Timely and accurate warnings of severe weather help save lives and property. While we cannot prevent hurricanes, we can prepare and we must. Public awareness and public preparedness are the best defenses against a hurricane."

Mr. Gary Locke
Commerce Secretary

"NOAA strives to produce the best possible forecasts to help emergency officials and residents better prepare for an approaching storm. I'm pleased to have the Administration's support for an additional \$13 million in next year's budget request to continue the trend of improving hurricane track and intensity forecasts."

Dr. Jane Lubchenco
NOAA Administrator and
Undersecretary of Commerce for
Oceans and Atmosphere

"The outlook is a guide to the overall expected seasonal activity. However, it's not just about the numbers, it's also about taking action. Prepare for each and every season regardless of the seasonal outlook. Even a near- or below-normal season can produce landfalling hurricanes, and it only takes one landfalling storm to make it a bad season."

Dr. Gerry Bell
Climate Prediction Center
NOAA Hurricane Forecast Team

NOAA Predicts Near-Normal Hurricane Season for 2009

The 2009 Atlantic hurricane season should be marked by near-normal levels of storm activity according to NOAA's team of hurricane forecasters, who released their annual hurricane seasonal outlook on May 21st. The outlook indicates that a 50% probability exists for a near-normal season, with only a 25% probability for either above- or below-normal conditions. Coastal communities in areas potentially impacted by landfalling storms are urged to prepare and to make plans in advance for protecting both life and property.

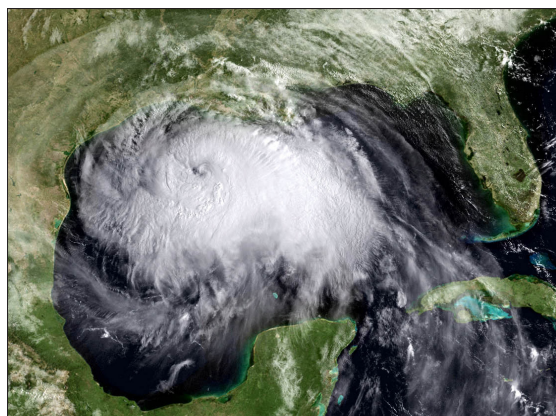
The outlook predicts a 70% probability for the following ranges of activity during the six-month long Atlantic hurricane season, which runs from June 1st to November 30th.

Between nine and 14 named storms could potentially form, with four to seven named storms developing into hurricanes. One to three hurricanes are expected to strengthen into major hurricanes with winds above 110 mph (categories 3, 4, and 5 on the Saffir-Simpson Hurricane Scale). In an average hurricane season, 11 named storms form with six becoming hurricanes and two becoming major hurricanes.

The accumulated cycle energy (ACE), a measure of the total overall activity of the season that takes into account the strength and duration of

storms and hurricanes, is expected to be between 65-130% of the median value. A value above 117% of the median is indicative of an above-normal season, while a value below 75% is indicative of a below-normal season (see graphic on page 2).

The impact of three environmental parameters—the tropical multi-decadal signal, the El Niño/La Niña cycle, and sea surface temperatures in the tropical Atlantic Ocean—are all critical to this season's hurricane outlook. Climatic conditions continue to support the ongoing active phase of the tropical multi-decadal signal, which is believed to have contributed to increased levels of hurricane activity since 1995. *(continued on page 2)*



GOES satellite image of massive Hurricane Ike, the most destructive and powerful storm of the 2008 hurricane season, as it approached the coast of Galveston, Texas on September 12, 2008.

2009 Atlantic Storm Names

Ana	Danny	Grace	Joaquin	Mindy	Peter	Teresa
Bill	Erika	Henri	Kate	Nicholas	Rose	Victor
Claudette	Fred	Ida	Larry	Odette	Sam	Wanda



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



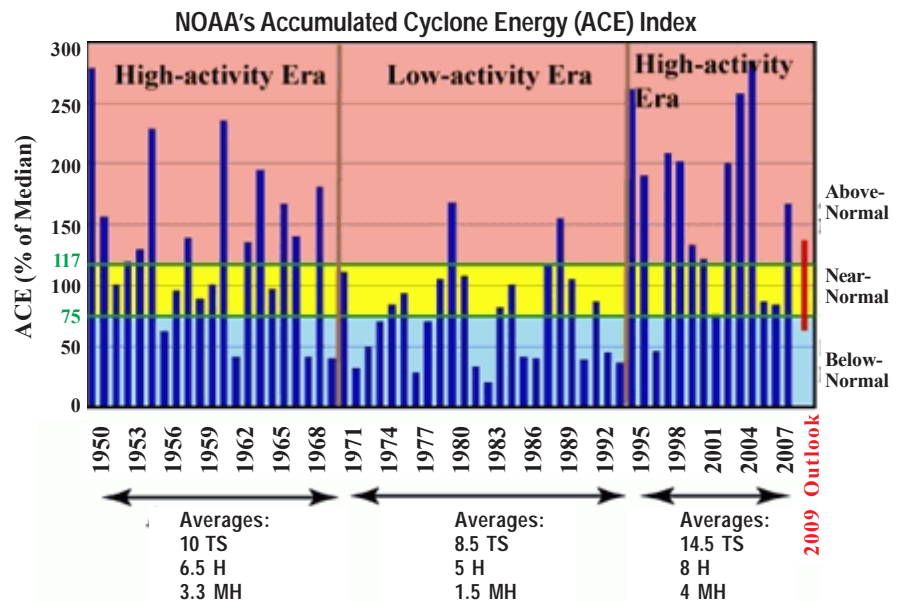
AOML researchers participated in several hurricane preparedness forums in May to discuss the upcoming 2009 Atlantic hurricane season. Among them were:

3rd Annual Hurricane Preparedness Summit hosted by Florida Congresswoman Ileana Ros-Lehtinen in Marathon, Florida. The Summit brought together hurricane experts, emergency management personnel, Federal, state, and local officials, and the public on May 9th to participate in discussions about hurricane preparedness efforts for the Florida Keys. AOML Director Bob Atlas was an invited member of Ros-Lehtinen's Hurricane Summit panel, where he fielded questions from the audience and spoke of how AOML's hurricane research supports operations at the National Hurricane Center.

23rd Annual Governor's Hurricane Conference hosted by Florida Governor Charlie Christ in Ft. Lauderdale, Florida. The Conference brought together emergency managers, response personnel, hurricane experts, and elected officials from across Florida on May 10-15th to participate in workshops and training sessions geared towards improving Florida's ability to respond to and recover from tropical cyclones. Dr. Frank Marks, Director of AOML's Hurricane Research Division (HRD), taught a training session on the basic principles of tropical meteorology, and Shirley Murillo, a meteorologist with HRD, taught a training session on tropical cyclone hazards and impacts.

4th Annual Hurricane Preparedness Expo and Open House hosted by Florida Congressional representatives Ron Klein and Debbie Wasserman Schultz in Plantation, Florida. The Expo provided a forum on May 29th to prepare Broward County residents for hurricane season. AOML Director Bob Atlas was an invited expert on a panel discussion where he spoke of NOAA's efforts to improve the accuracy, reliability, and lead time of hurricane track, intensity, and storm surge forecasts. He also answered questions posed by the public on a number of topics including hurricane modification (see adjacent photo and caption at right).

(continued from page 1)



NOAA's 2009 Atlantic hurricane season outlook indicates a 70% chance that the ACE range will be 65-130% of the median. The outlook mainly reflects the ongoing active Atlantic hurricane era that began in 1995, with possible competing influences if an El Niño develops and/or eastern Atlantic sea surface temperatures remain below average.

However, there is a possibility of El Niño conditions developing in the eastern equatorial Pacific Ocean during the summer months and early fall, and this could potentially decrease hurricane activity in the Atlantic basin. Tropical Atlantic sea surface temperatures are currently cooler than average and, if they remain below average, this factor could also exert a dampening effect on hurricane activity.

NOAA cautions that the 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 landfall forecast, and it does not imply levels of activity for any particular

region. The majority of storm activity typically occurs from August through October, the peak months of the Atlantic hurricane season. NOAA will reassess climatic conditions in early August and issue an updated forecast for the Atlantic basin at that time.

The 2009 hurricane forecast team consists of scientists with NOAA's Climate Prediction Center, National Hurricane Center, and Hurricane Research Division (HRD) of AOML. Stanley Goldenberg, a meteorologist with HRD, has been a member of NOAA's seasonal hurricane forecast team since its inception in 1998.

Type of Activity	NOAA 2009 Outlook	Average Season
Tropical Storms	9-14	11
Hurricanes	4-7	6
Major Hurricanes	1-3	2
ACE (% Median)	65-130%	100%

AOML Director Bob Atlas appeared on the evening broadcast of Miami's WSVN Channel 7 news program as part of its coverage of the 4th Annual Hurricane Preparedness Expo and Open House held at the Broward County Emergency Operations Center on May 29th. Atlas was part of a panel of experts that answered questions about hurricanes and addressed concerns posed by the general public. He was shown responding to a question about hurricane modification.



New Findings on Carbon Footprint of Landfalling Tropical Cyclones

The May 12th issue of the *Proceedings of the National Academy of Sciences** presents the findings of a study that examines the annual destruction of trees in the U.S. due to landfalling tropical cyclones. Widespread damage to forests can decrease their ability to remove carbon dioxide from the atmosphere, a greenhouse gas that contributes to global warming.

Researchers with Tulane University, the University of New Hampshire, and AOML evaluated U.S. tropical cyclones from 1851-2000 for their long-term impact on forests and the carbon cycle. Using field measurements, satellite image analyses, and computer models, the authors were able to estimate that about 97 million trees have been destroyed annually in the last 150 years, predominantly in Louisiana, Texas, and south Florida. Forests along the east coast of North Carolina have also been significantly impacted by tree mortality from damaging winds associated with tropical cyclones.

Plants absorb carbon dioxide through the process of photosynthesis, storing carbon and releasing oxygen as a by-product. When millions of trees perish simultaneously, fewer are available for the uptake of carbon dioxide. Additionally, as trees and other types of vegetation decompose, they release carbon dioxide. Destruction to forests from tropical cyclones results in an average annual loss of 53 million tons of biomass and pumps an estimated 25 million tons of carbon dioxide into the atmosphere.

Over the period of 1980-1990, released carbon dioxide potentially offset the carbon sink in forest trees by 9-18% across the entire United States. The study also found that U.S. forests experienced twice the impact from landfalling tropical cyclones before 1900 than after 1900.

*Zeng, H., J.Q. Chambers, R.I. Negrón-Juarez, G.C. Hurtt, D.B. Baker, and M.D. Powell, 2009: Impacts of tropical cyclones on U.S. forest tree mortality and carbon flux from 1851 to 2000. *Proceedings of the National Academy of Sciences*, 106(19):7888-7892.

Surface Drifter Data Used to Locate Plane Wreckage

Mayra Pazos and Rick Lumpkin, Global Drifter Program/Drifter Data Assembly Center

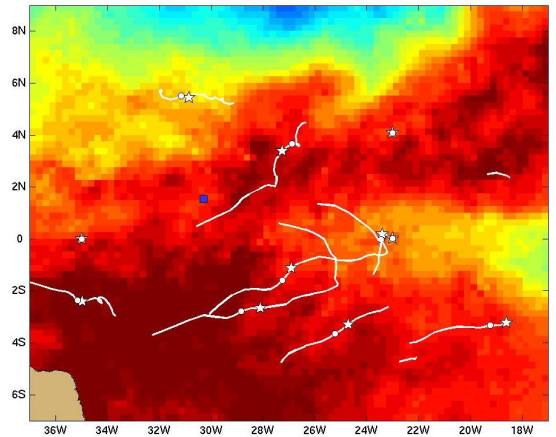
Shortly after the disappearance of Air France flight 447 on May 31, 2009 and the discovery of debris on June 2nd, researchers with the Drifter Data Assembly Center at AOML were contacted by staff from the French Research Institute for Exploitation of the Sea (IFREMER) and the Hydrographic Center of the Brazilian Navy (Centro de Hidrografia da Marinha). AOML staff were asked for help in obtaining in-situ and near real-time data from surface drifting buoys in the area where the plane disappeared while crossing the Atlantic Ocean en route from Rio de Janeiro, Brazil to Paris, France. Flight 447 plummeted into the ocean off the northeast coast of Brazil with 216 passengers and 12 crew members aboard.

Several drifters were identified in the general area of flight 447 (see graphic at right). AOML researchers assisted IFREMER and Brazilian Navy colleagues by providing the drifters' trajectories so that they could estimate how far the currents had carried floating debris from the crash site where heavier equipment such as the "black box" recorders sank.

Satellite-tracked surface drifting buoys are transported by ocean currents as they gather sea surface temperature, atmospheric pressure, wind, salinity, and current data. AOML's Drifter Operations Center manages the global deployment of surface drifting buoys, and data from the buoys are transmitted to AOML's Drifter Data Assembly Center for processing once the buoys are deployed and become operational.

To further populate the region and obtain higher resolution current measurements, as well as help the search teams locate additional debris, the Hydrographic Center of the Brazilian Navy deployed five more surface drifting buoys near the crash site area on June 14th. This active collaboration with IFREMER and the Brazilian Navy continues the long history of cooperation between AOML and its international partners.

The drifter data are available in real time, along with currents derived from altimetry sea height anomaly fields, at www.aoml.noaa.gov/phod/trinanes/xbt.html and www.aoml.noaa.gov/phod/dataphod/work/trinanes/INTERFACE/index.html.



Trajectories of surface drifters from May 11-June 11, 2009, with their locations at the time of the disappearance of Air France flight 447 on May 31st denoted by stars and at the time of the first discovery of debris on June 2nd by circles. The approximate location of the debris on June 2nd is indicated by a blue square. Shading indicates microwave sea surface temperatures on May 31, 2009.

AOML's Buoys and Gulls Club celebrated National Bike-to-Work Day by offering breakfast to all AOML and NOAA/Southeast Fisheries Science Center (SEFSC) employees who biked to work the morning of May 15th. Among those who reduced their carbon footprint and enjoyed a free breakfast were (from left to right) Robert Roddy (AOML), Michael Judge (SEFSC), Tsung-Hung Peng (AOML), Pedro Peña (AOML), Eric Buck (SEFSC), Paul Willis (AOML), Jack Javech (SEFSC), Carlisle Thacker (AOML), and Dave McClellan (SEFSC).



Common Access Cards

New identification badges known as Common Access Cards have become a requirement for all employees working onsite at Federal facilities, as specified by Homeland Security Presidential Directive 12 (HSPD-12) signed into law by former President George W. Bush in August 2004. Current NOAA identification badges do not satisfy HSPD-12 requirements and will become obsolete on December 31, 2009.

All AOML employees—Federal, CIMAS, and contractors—must obtain Common Access Cards at their earliest convenience. These new cards must be worn alongside existing NOAA identification badges until the NOAA badges are phased out.

Common Access Cards can be obtained at the following locations:

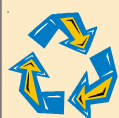
U.S. Coast Guard
Integrated Support Command
100 MacArthur Causeway
Miami, FL 33139
305-535-4598 (call for appointment)

U.S. Army Garrison
8300 N.W. 33rd Street
Miami, FL 33122
(No appointments, walk-ins only)

Two forms of personal identification must be presented:

- Florida state-issued document, e.g., Florida driver's license.
- Social security card, passport, birth certificate, or voter registration card.

For purposes of time and attendance, travel involved in obtaining a Common Access Card is considered work time. Please inform Ruth Almonte of AOML's Administrative Group (305-361-4367) when you have obtained a Common Access Card so your name can be added to AOML's weekly compliance reports.



Recycling aluminum saves up to 95% of the energy needed to make new aluminum from raw materials.

High-Resolution SST Imaging Improves Reef Monitoring

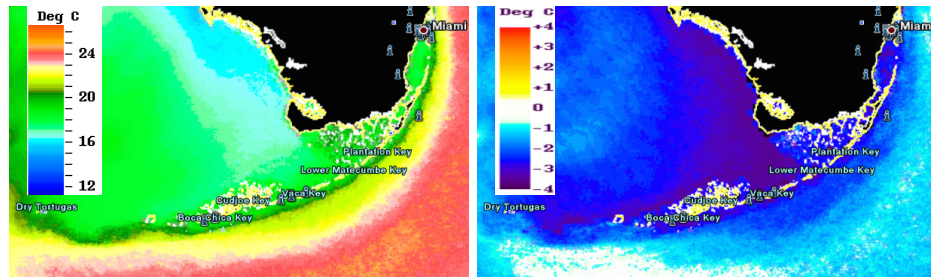
Researchers with NOAA's Coral Health and Monitoring Program (CHAMP) at AOML, along with colleagues at the University of South Florida and Dartmouth School for Marine Science and Technology, have developed several new, high-resolution imaging products that are now being used to monitor coral reefs in the Florida Keys National Marine Sanctuary. A description of these products, as well as a detailed methodology for how they're generated, appears in the June 2009 issue of the *Transactions on Geoscience and Remote Sensing*. The journal is published monthly by the Institute of Electrical and Electronics Engineers (IEEE).

The article discusses how highly-accurate 1-km data obtained from satellite sensors are being used to produce sea surface temperature (SST) means, anomalies, and climatologies (see figures below). These data are transmitted in near real-time to the CHAMP web site; high-resolution images can be viewed at http://imars.usf.edu/merged_sst.

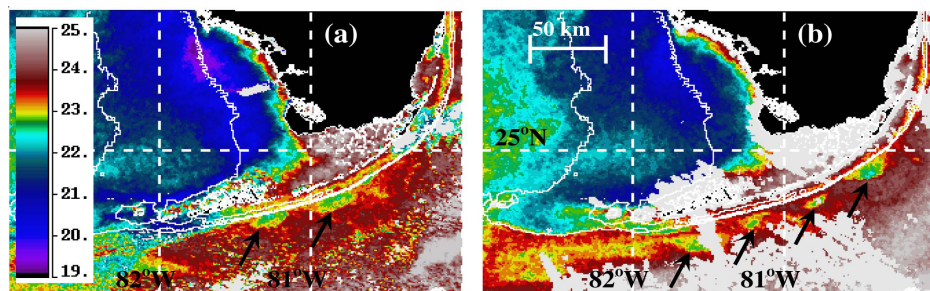
Additionally, a newly-developed experimental product, DHW—degree-heating-weeks, provides researchers with an overall measure of the cumulative thermal stress at reef sites during three-month intervals. Data from the DHW experimental product, updated periodically, have been integrated with other CHAMP in-situ data to generate ecological forecasts, “ecoforecasts,” within the Sanctuary and at more remote reef locations. These integrated data and ecoforecast models can be viewed at <http://ecoforecast.coral.noaa.gov>.

Comparison with ground truth data from monitoring stations within the Sanctuary indicates that the new SST products have a near-zero bias ($<0.05^{\circ}\text{C}$) with root-mean-square errors below 0.5°C and, therefore, produce more accurate SST anomaly estimates. Through the use of these improved data products, researchers and marine managers are better able to gauge the environmental factors that affect reefs and better determine the likelihood of events related to thermal stress such as coral bleaching episodes that negatively impact reef ecosystems.

Hu, C., F. Muller-Karger, B. Murch, D. Myhre, J. Taylor, R. Luerksen, C. Moses, C. Zhang, L. Gramer, and J. Hendee, 2009: Building an automated integrated observing system to detect sea surface temperature anomaly events in the Florida Keys. *IEEE Transactions on Geoscience and Remote Sensing*, 47(6):1607-1620.



High-resolution 1-km satellite composite images show the mean sea surface temperatures (SST) and SST anomalies (SSTA) in degrees Celsius for February 5-11, 2009, as displayed by Google Earth. Large gradients around the Florida Keys National Marine Sanctuary are clearly visible, where the water is 2-4°C colder than normal. These Google Earth compatible images are updated weekly and are available at http://imars.usf.edu/merged_sst.



High-resolution 1-km SST images obtained from the Advanced Very High Resolution Radiometer (AVHRR) sensor on the NOAA-16 satellite show small-scale (<10 km) areas where cool, presumably nutrient-rich water is upwelling (black arrows) along the shallow isobaths of the Florida Reef Tract on (a) January 22, 2002 at 7:36 GMT and (b) January 23, 2002 at 18:45 GMT. These upwelling events may be the result of interaction between the reef topography and eddies or other dynamic features of the Florida Current front, together with wind forcing, that cannot be detected by coarser-resolution data (4 km or greater). Color scales above are stretched to show the upwelling features more clearly.

Recent AOML Publications*

DI NEZIO, P.N., L.J. GRAMER, W.E. Johns, **C.S. MEINEN,** and **M.O. BARINGER,** 2009: Observed international variability of the Florida Current: Wind forcing and the North Atlantic oscillation. *Journal of Physical Oceanography*, 39(3):721-736.

ELIPOT, S., and S.T. Gille, 2009: Ekman layers in the Southern Ocean: Spectral models and observations, vertical viscosity, and boundary layer depth. *Ocean Science*, 5(2):115-139.

ELIPOT, S., and S.T. Gille, 2009: Estimates of wind energy input to the Ekman layer in the Southern Ocean from surface drifter data. *Journal of Geophysical Research*, 114(C6):C06003, doi:10.1029/2008JC005170.

Gentemann, C.L., P.J. Minnett, J. Sienkiewicz, M. DeMaria, J. Cummings, Y. Jin, J.D. Doyle, **L. GRAMER,** C.N. Barron, K.S. Casey, and C.J. Donlon, 2009: MISST: The Multi-sensor Improved Sea Surface Temperature Project. *Oceanography*, 22(2):76-87.

HALLIWELL, G.R., A. Barth, R.H. Weisberg, P. Hogan, O.M. Smedstad, and J. Cummings, 2009: Impact of GODAE products on nested HYCOM simulations of the West Florida Shelf. *Ocean Dynamics*, 59(1):139-155.

Hu, C., F. Muller-Karger, B. Murch, D. Myhre, J. Taylor, R. Luerssen, C. Moses, C. Zhang, **L. GRAMER,** and **J. HENDEE,** 2009: Building an automated integrated observing system to detect sea surface temperature anomaly events in the Florida Keys. *IEEE Transactions on Geoscience and Remote Sensing*, 47(6):1607-1620.

Tao, W.-K., J.-D. Chern, **R. ATLAS,** D. Randall, M. Khairoutdinov, J.-L. Li, D.E. Waliser, A. Hou, X. Lin, C. Peters-Lidard, W. Lau, J. Jiang, and J. Simpson, 2009: A multi-scale modeling system: Developments, applications, and critical issues. *Bulletin of the American Meteorological Society*, 90(4):515-534.

Zeng, H., J.Q. Chambers, R.I. Negrón-Juarez, G.C. Hurtt, D.B. Baker, and **M.D. POWELL,** 2009: Impacts of tropical cyclones on U.S. forest tree mortality and carbon flux from 1851 to 2000. *Proceedings of the National Academy of Sciences*, 106(19):7888-7892.

*AOML authors are denoted in blue capital letters.

Western Boundary Time Series Data Collection Continues

Christopher Meinen, Physical Oceanography Division

Variability in the Atlantic Meridional Overturning Circulation (MOC) has been shown in climate models to be highly correlated with important quantities such as surface air temperatures and precipitation rates throughout much of the northern hemisphere. Recognition of the criticality of MOC measurements resulted in its designation as a key short-term research priority in the U.S. interagency Ocean Research Priorities Plan in 2007.

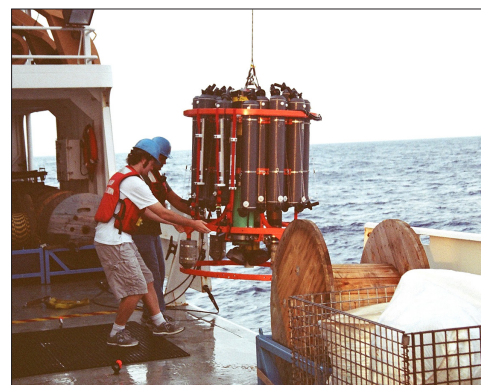
AOML has been at the forefront of research on the MOC since 1982 when scientists from the Physical Oceanography Division (PhOD) joined with colleagues from NOAA's Pacific Marine Environmental Laboratory and the University of Miami's Rosenstiel School of Marine and Atmospheric Science (RSMAS) to start a program to monitor key components of the MOC at 27°N east of Florida. This program, presently called the Western Boundary Time Series (WBTS) project and directed solely by AOML, has formed the cornerstone of a major international initiative between the U.S. and the United Kingdom to measure the complete MOC at 26.5°N from Florida to Africa.

The international program, denoted as MOCHA (Meridional Overturning Circulation and Heatflux Array) by the U.S. contributors and RAPID-MOC by the U.K. contributors, has been in place since early 2004 and has the goal of providing daily estimates of the basin-wide MOC for at least ten years. In the latest expedition of these collaborative projects, five AOML/PhOD scientists—Dr. Christopher Meinen, Mr. Carlos Fonseca, Mr. Pedro Peña, Mr. Andrew Stefanick, and Mr. Kyle Seaton—joined with colleagues from RSMAS and the National Oceanography Centre, Southampton, U.K., on a very successful research cruise from April 15-May 5th on the NOAA Ship *Ronald H. Brown*. This cruise extended the long time-series of hydrographic and moored observations of the western boundary currents in the subtropical Atlantic while maintaining NOAA's key role in the joint international program.

The scientific team completed 61 conductivity-temperature-depth profiles, acoustically collected data from four pressure-inverted echo sounder moorings, recovered five tall and three short moorings, and deployed six tall and three short moorings. The success of this cruise continues the impressively long time-series of observations collected as part of the WBTS program, a program that is unique in its ability to aid in the study of climate time-scale ocean processes, and that has also provided a critical service to the newer, larger, trans-basin program that is ongoing through the cooperation of NOAA, the U.S. National Science Foundation, and the U.K. National Environmental Research Council.



The science team for the 2009 April-May WBTS cruise on the bow of the NOAA Ship *Ronald H. Brown*.



A conductivity-temperature-depth (CTD) instrument is deployed to gather data about the physical properties of the water column.



LTJG Lecia Salerno of AOML's Ocean Chemistry Division has been selected to serve as AOML's new Unit Diving Supervisor (UDS), effective June 15, 2009. As the UDS, Salerno will provide diving support for AOML operations and is responsible for the administrative functions of the unit. Salerno replaces Jules Craynock, who served as AOML's UDS from 1988 until the present.

Researchers with the Physical Oceanography Division's Ship of Opportunity Program (SOOP) held their annual Operations Meeting at AOML on May 12-13th. More than 30 scientists, technical specialists, and project managers attended. Participants included representatives from AOML, the National Weather Service, Northeast Fisheries Science Center, National Oceanographic Data Center, the SeaKeepers Society, the Southern California Marine Institute, and Olympia Computer Services.

Discussions focused on technical and logistical issues related to high density and frequently-repeated expendable bathythermograph (XBT) transects, thermosalinograph (TSG) observations, data transmission, and data management. Participants also discussed the installation and testing of new systems that use Iridium satellite transmission technology and the Devil XBT system.

SOOP is a worldwide network of commercial vessels that aid NOAA in obtaining surface and subsurface oceanographic measurements through the deployment of XBTs, TSGs, surface drifters, and Argo floats. Data obtained from these instruments are quality-controlled and disseminated through the Global Telecommunications System (GTS). Additional information about SOOP can be found at www.aoml.noaa.gov/phod/goos/.



Photo courtesy of Ivan Castro

SOOP participants at the annual Operations Meeting gather on the front steps of AOML.

Recent Meetings and Workshop Summaries

The 14th Annual Meeting of the North American Trilateral Committee for Wildlife and Ecosystem Conservation and Management was held in Miami on May 11-14th. Elizabeth Johns and Lewis Gramer of AOML attended and presented posters on coral reef monitoring activities and research at AOML. Johns highlighted coral reef ecosystem research in the Intra-Americas Sea, while Gramer presented research on efforts to quantify the relationship between elevated sea temperatures and incident visible and ultraviolet light and decreased photosynthetic efficiency for the *zooxanthellae* (symbiotic microalgae) within coral tissue.

The fifth meeting of the Joint WMO–IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) Ship Observations Team (SOT) was convened in Geneva, Switzerland on May 18-22nd. Participants included scientists and leaders of meteorological and oceanographic institutions from around the world. The biannual meeting, supported by the World Meteorological Organization (WMO) and Intergovernmental Oceanographic Commission (IOC), provided the international community with a forum for discussing SOT-related logistical, implementation, and data management issues. The SOT consists of three components: the Voluntary Observing Ship (VOS) program, the Automated Shipboard Aerological Program (ASAP), and the Ship of Opportunity Program Implementation Panel (SOOPIP), of which Gustavo Goni of AOML is the chairman. Francis Bringas and Joaquin Trinanes, also of AOML, joined Goni in representing AOML at the meeting. SOOPIP manages a global network of cruise, merchant, and research vessels equipped with expendable bathythermograph (XBT) and thermosalinograph (TSG) instruments that gather oceanographic data for use in research and weather/climate forecasting models.

A workshop at NOAA's Southeast Fisheries Science Center (SEFSC) on June 1st enabled AOML and SEFSC researchers to discuss areas for joint collaboration, with an emphasis on ocean data analysis and data products. Thirteen oral presentations were followed by discussions in which participants identified several potential projects that could enhance the current level of collaboration between the two laboratories. Possible new projects include the participation of SEFSC scientists in AOML's repeat hydrography cruises to collect neuston samples, increased interaction between Virginia Key researchers to investigate frontal regions and how they're associated with harmful algae blooms, the use of drifter observations and satellite-derived methods to monitor passive larvae trajectories, and an AOML-SEFSC authored paper on the use of satellite altimetry observations in



Photo courtesy of Molly Baringer

AOML and SEFSC researchers met on June 1st to discuss future collaborative research efforts.

the Gulf of Mexico for stock assessment of bluefin tuna. The workshop was organized by Gustavo Goni of AOML and John Lamkin of SEFSC. Researchers with the University of Miami's Rosenstiel School and from private industry also attended.

The 12th Annual Meeting of the CLIVAR-VAMOS (Variability of the American Monsoons System) Science Panel was convened in San Juan, Puerto Rico on June 3-4th with a healthy participation of scientists from AOML including David Enfield, Sang-Ki Lee, Ernesto Muñoz, and Jason Dunion. Of interest to AOML and a broad spectrum of research institutions is the emerging multi-year Intra-American Studies of Climate Processes (IASCLIP) program. IASCLIP is expected to advance the capability for predicting summer climate in and around the Intra-Americas Sea. Prior to the VAMOS Panel meeting, about 35 scientists from the U.S. and Central/South American and Caribbean countries met on June 1-2nd to discuss the rationale and plans for IASCLIP implementation. Seven new projects have been funded by NOAA's Climate Program Office (CPO) to perform IASCLIP research. A local radio station interviewed both David Enfield and Ernesto Muñoz for the "A Ciencia Cierta" radio program, which promotes environmental science.

Congratulations

Evan B. Forde, who had April 21st named in his honor by the Mayor and Commissioners of Miami-Dade County, is also the recipient of a 2009 Federal Employee of the Year award presented by the South Florida Federal Executive Board (FEB). Forde, an AOML oceanographer, received the award in the "Service to Community" category on May 8th and was recognized for his leadership, dedication, and long-term assistance and support of youth and the needy. In addition to Forde, three AOML staff members were also finalists for 2009 FEB Employee of the Year awards in the following categories: Sim Aberson—management; Joseph Cione—professional/scientific; and Joseph Griffin—technical.



Ron Demes, Chairman of the South Florida Federal Executive Board, presents Evan Forde of AOML with the 2009 Service to Community Federal Employee of the Year Award.

Dr. Silvia Garzoli, the director of AOML's Physical Oceanography Division (PhOD) for the past 12 years, became AOML's new chief scientist in May. Garzoli is now a member of AOML's Office of the Director and will work closely with AOML director Bob Atlas on climate-related issues. She will, however, continue to conduct research as a principal investigator for PhOD. Dr. Gustavo Goni, an oceanographer with the Division for the past 11 years, has assumed leadership of PhOD as its new director.



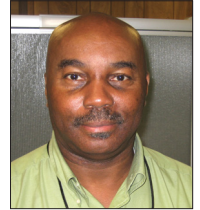
Drs. Bob Atlas, Silvia Garzoli, and Gustavo Goni.

Welcome Aboard

Ruth Almonte joined the staff of AOML's Administrative Group in April as a budget analyst. Almonte will provide assistance and oversight on financial and budget activities, personnel and procurement issues, and other assorted administrative functions. Prior to her arrival at AOML, Almonte worked as a budget analyst with the Department of Treasury's Office of the Assistant Commissioner in Washington, D.C.



Rickey Little joined the staff of AOML's Administrative Group in April as a management support specialist to assist with duties associated with procurement, blanket purchase agreements, grants, analysis of financial reports, and to serve as the administrator for AOML's bankcard purchasing system. Little previously worked as a procurement specialist at the Department of Housing and Urban Development in Washington, D.C.



Farewell

Carmen Alex, a CIMAS research associate with AOML's Physical Oceanography Division, departed AOML in March after being accepted into the Basic Officer Training program of the NOAA Corps. During her 2½ years at AOML, Alex analyzed various climatological data sets, created web pages for the PIRATA (Prediction and Research Moored Array in the Atlantic) program, and quality controlled expendable bathythermograph and thermosalinograph data.



NOAA Corps officer LCDR Nancy Ash of AOML's Office of the Director departed in May after having served for more than three years as the Laboratory's Associate Director. Ash has been reassigned to NOAA's Aircraft Operations Center at MacDill Air Force Base in Tampa, Florida where she will serve as the Executive Director for operations, overseeing research flights of the WP-3D, GulfStream-IV, and other aircraft.



It's a Boy!

Angie Arias, an administrative assistant with AOML's Administrative Group, gave birth to her first child, a son, during the evening of June 3, 2009 at South Miami Hospital. Matthew Andrew Henry arrived at 7:54 p.m. and weighed in at 8 lbs. Matthew and his parents are all healthy, happy, and doing well.



Staff from the U.S. Coast Guard's Miami Beach Marine Safety Office participated in an Earth Day event at the Miami Seaquarium on April 22nd where they showcased the types of materials used by the Coast Guard in cleaning up local oil spills. Cheryl Brown, a CIMAS research associate with AOML's Ocean Chemistry Division and a Coast Guard Auxiliary member representing Flotilla 6-7, also participated. Brown answered questions on environmental issues and the Coast Guard's mission to protect the environment, as well as discussed and promoted AOML's environmental research. The group played the Officer Snook recycling game with children and handed out prizes of coloring books and T-shirts. Educational materials were also given to students and their teachers. Pictured from left to right are Cheryl Brown, AOML/Coast Guard Auxiliary, PS3 Dave Wilson, MST1 Dana McCutcheon, and MST1 Daniel Lanno.



Photo courtesy of Isabel Sanchez

Travel

Molly Baringer, Shenfu Dong, Silvia Garzoli, George Halliwell, Ernesto Muñoz, and Chunzai Wang attended the First U.S. Atlantic Meridional Overturning Circulation Annual Meeting in Annapolis, Maryland on May 4-6, 2009.

Sim Abernson attended the Third THORPEX (The Observing System Research and Predictability Experiment) International Science Symposium in Monterey, California on May 4-8, 2009.

James Hendee and Derek Manzello attended NOAA's Atlantic Coral Reef Ecosystem Integrated Observing System Workshop in San Juan, Puerto Rico on May 13-15, 2009.

Diana Aranda, Jakub Bartkowiak, Maribeth Gidley, and Christopher Sinigalliano attended the General Meeting of the American Society for Microbiology in Philadelphia, Pennsylvania on May 17-21, 2009.

Francis Bringas, Gustavo Goni, and Joaquin Triñanes attended the Fifth Meeting of the JCOMM (Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology) Ship Observations Team in Geneva, Switzerland on May 18-22, 2009.

Rik Wanninkhof attended the 2009 Joint Assembly, Meeting of the Americas, of the American Geophysical Union in Toronto, Canada on May 24-27, 2009.

Lewis Gramer attended the International GHRSSST (Group for High-Resolution Sea Surface Temperature) Data Users Symposium in Santa Rosa, California on May 28-29, 2009.

Chunzai Wang attended the Second International Summit on Hurricanes and Climate Change in Corfu, Greece on May 31-June 5, 2009.

Jason Dunion, David Enfield, Sang-Ki Lee, and Ernesto Muñoz attended the 12th Annual Meeting of the CLIVAR-VAMOS (Variability of the American Monsoons System) Science Panel in San Juan, Puerto Rico on June 1-4, 2009.

Robert Atlas attended an OAR Senior Research Council meeting on June 17-19th; visited Capitol Hill on June 17th and June 22-23rd; and made an invited presentation at the National Academy of Sciences on June 23, 2009, all in Washington, D.C.

Remote River Plume Observed in Virgin Island Waters

Elizabeth Johns, Physical Oceanography Division

AOML and Southeast Fisheries Science Center (SEFSC) researchers participated in a collaborative cruise aboard the NOAA Ship *Nancy Foster* on April 7-20, 2009. The cruise mapped the oceanographic conditions of the northeastern Caribbean (temperature, salinity, chlorophyll, currents, etc.) from shipboard observations and satellite-tracked surface drifter deployments, while simultaneously collecting larval reef fish samples using net tows.

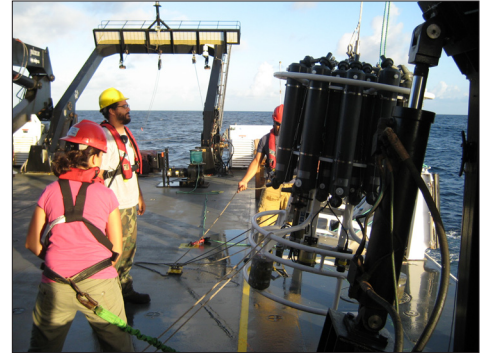
The objective of this ongoing research is to gain an understanding of the role of oceanographic conditions and circulation patterns in relation to the abundance, distribution, and diversity of larval reef fish. This knowledge will ultimately lead to better resource management, such as in determining the optimum location and size of Marine Protected Areas.

During the cruise, an unusual oceanographic event was noticed in the shipboard data collection and in real-time satellite ocean color imagery. It became obvious that a large area of "green water," which could be traced back to its South American source, the Orinoco and Amazon Rivers, was present in the region. The shipboard observations showed that this green water was approximately 20-25 meters thick, and was relatively high in surface temperature, low in surface salinity, and rich in plankton and other biological content, as evidenced by the samples from the net tows.

What made this set of observations unique was not that the river plume was present in the northeastern Caribbean, as it has been observed in the general area to some extent during most years, but that it extended farther to the northeast, surrounding the U.S. Virgin Islands and the British Virgin Islands. Eye witness reports from fishermen and charter dive boats, as well as long-time Virgin Islands residents, described this green water event as something they had never seen in the area before.

AOML and SEFSC researchers were able to capture this unusual, transient event using a full suite of in-situ oceanographic and biological sampling techniques. In the past, river plumes have been predominantly studied using satellite imagery.

These direct observations from the cruise, which include data from the shipboard flow-through seawater system, discrete stations, net tow samples, filtered chlorophyll samples, dissolved oxygen and nutrients, and shipboard acoustic Doppler current profiler data, as well as trajectories from 10 satellite-tracked surface drifters, will all be processed and analyzed over the coming months, and the results published in the peer-reviewed literature.



Science team members deploy the conductivity-temperature-depth (CTD) package in Anegada Passage.



Conservation and Fisheries officers from the British Virgin Islands examine the contents of a bongo catch obtained south of Beef Island.

Keynotes is published bi-monthly by the Atlantic Oceanographic and Meteorological Laboratory to promote the research activities and accomplishments of staff members. Contributions are welcome and may be submitted via email (Gail.Derr@noaa.gov), fax (305-361-4449), or mailing address (NOAA/AOML, *Keynotes*, 4301 Rickenbacker Causeway, Miami, FL 33149).

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