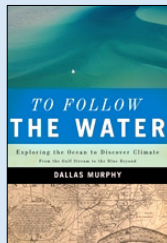


The Western Boundary Time Series (WBTS) program of AOML's Physical Oceanography Division and the scientists associated with it are featured in a recent book by author Dallas Murphy. *To Follow the Water: Exploring the Ocean to Discover Climate*, published in July 2007 by Basic Books, focuses on the critical role of the ocean in the global climate system.



The author participated in two WBTS research cruises aboard the NOAA Ship *Ronald H. Brown* and used his experience on these cruises, along with interviews with scientists from AOML and many other institutions, to explain in lay-person terms the role of the Gulf Stream and meridional overturning circulation in the climate system.



AOML scientists and others during a March 2006 research cruise of the NOAA Ship *Ronald H. Brown* to gather data for monitoring the western boundary currents of the Atlantic meridional overturning circulation. Pictured from left to right: Vincent Rosato (volunteer-Teacher at Sea Program), Dallas Murphy (volunteer-author), Michael Beal (volunteer), Carlos Fonseca (AOML), Jonathan Shannahoff (*Ron Brown* survey technician), and Rigoberto Garcia (AOML).

## Monitoring Array Shows Significant Variability in North Atlantic Climate Signal

Christopher Meinen, Physical Oceanography Division/ Erica Rule, Office of the Director

British scientists partnering with AOML and the University of Miami to monitor the Atlantic meridional overturning circulation (MOC) at 26°N have discovered there is much more variability in the MOC than had previously been believed and that, contrary to earlier analyses, the MOC cannot be conclusively shown to be slowing down based upon the available data. The MOC's broad circulation is the primary mechanism by which heat energy is transferred from the equator to the poles and is closely linked with the regional climate around the Atlantic basin and the globe. Scientists with the National Oceanography Centre of Southampton, United Kingdom, the University of Miami, and AOML have been collaborating to monitor the MOC since 2004 and recently published the findings from their first year of observations in the August 17, 2007 issue of *Science*.\*

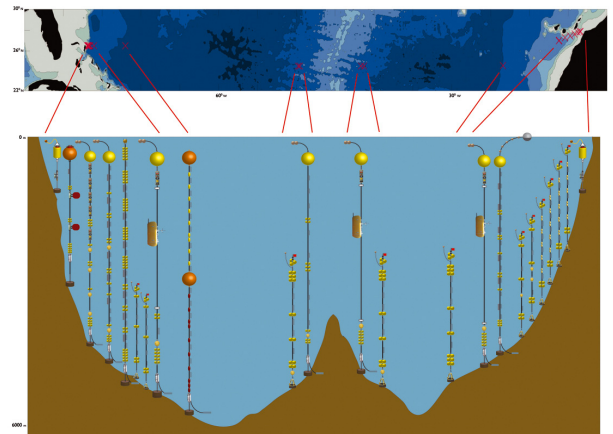


Diagram of the RAPID/MOCHA monitoring array along 26°N latitude stretching from the Bahamas to the northwest coast of Africa. The instrument array provides measurements of water flow, salinity, temperature, and water pressure (graphic courtesy of Darren Rayner, National Oceanography Centre, Southampton, UK).

A consortium of U.S. government research agencies recently designated improving understanding of the MOC and its variability as a key short-term priority for the oceanographic and climate research community. A previous analysis of the MOC that appeared in a 2005 issue of the journal *Nature* indicated a 30% decrease in the MOC. Such a significant change in the MOC would likely result in significant changes in air temperatures and precipitation throughout the Northern Hemisphere. However, this 2005 analysis was based on only five snapshot data points over a 50-year period. (continued on page 2)

\*Cunningham, S.A., T. Kanzow, D. Rayner, M.O. Baringer, W.E. Johns, J. Marotzke, H.R. Longworth, E.M. Grant, J.J.-M. Hirschi, L.M. Beal, C.S. Meinen, and L.H. Bryden, 2007: Temporal variability of the Atlantic meridional overturning circulation at 26.5°N. *Science*, 317(5840):935-938.

Kanzow, T., S.A. Cunningham, D. Rayner, J.J.-M. Hirschi, W.E. Johns, M.O. Baringer, H.L. Bryden, L.M. Beal, C.S. Meinen, and J. Marotzke, 2007: Observed flow compensation associated with the MOC at 26.5°N in the Atlantic. *Science*, 317(5840):938-941.

Scientists with AOML's Hurricane Research Division (HRD) served as members of a group that helped develop the new State of Florida Public Hurricane Loss Model (FPHLM), an open, transparent computer model that will be used by the State Office of Insurance Regulation to provide a baseline for evaluating rate change requests for windstorm insurance.

Dr. Mark Powell of HRD led the meteorology component for the project, assisted by Bachir Annane of HRD and the University of Miami's Cooperative Institute for Marine and Atmospheric Studies (CIMAS) and Steve Cocke of Florida State University. The effort also included scientists from a number of other academic institutions including Florida International University, the University of Florida, and the Florida Institute of Technology.

The FPHLM is the first model that enables all of the results and details from the modeling approach to be open to scrutiny. To date, all other models used for ratemaking in Florida have been proprietary.

The model simulates thousands of years of hurricane activity based on the historical record. A hurricane track is predicted and the maximum wind at every zip code is recorded for each hurricane event. This information is then passed to an engineering model that estimates the damage to residential structures within the zip code, followed by an actuarial model that estimates the insured loss. The average annual loss is then estimated state-wide for every zip code in Florida.

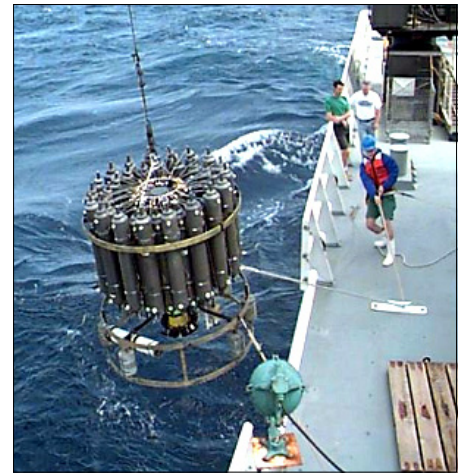
The Florida Commission on Hurricane Loss Projection Methodology employs a professional team of experts to review hurricane loss models according to a book of standards. The FPHLM passed the "pro team" review in June, and received a unanimous acceptance vote from the Commission on Friday, August 17th. The model is now available for insurance ratemaking purposes in Florida.

(continued from page 1)

In 2004, AOML and its University of Miami and UK partners built upon a long-term AOML project, the Western Boundary Time Series program, to monitor components of the MOC near its western boundary. Since then, data have been collected from a monitoring array spanning the complete width of the North Atlantic Ocean at 26°N (see graphic on previous page). The Rapid Climate Change/Meridional Overturning Circulation and Heat Flux Array (RAPID/MOCHA) was designed specifically to observe and document fluctuations of the Atlantic MOC on a daily basis.

During the first year of monitoring the array, significant variability in the MOC was discovered at time scales ranging from a few days to months, and all five points discussed in the *Nature* study were observed. These results indicate that more regular observations, such as those being made by the RAPID/MOCHA array, will be required to accurately determine any possible trend or shift in the Atlantic MOC.

AOML's contributions to the program include leading several research cruises each year on the NOAA Ship *Ronald H. Brown* to sample and analyze the MOC flows near the western boundary. AOML also assists with recovery and redeployment of the British western boundary moorings and provides transport monitoring of the Florida Current using a submarine cable as part of the ongoing Western Boundary Time Series program.



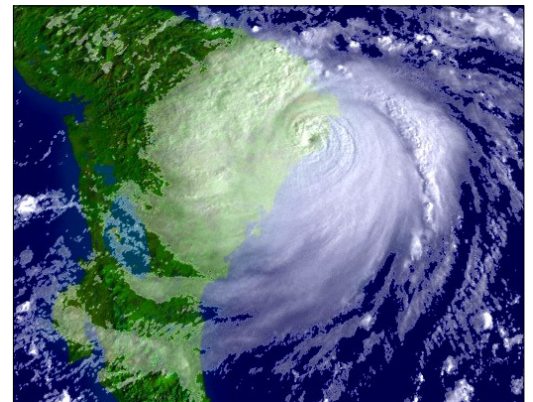
A CTD (conductivity-temperature-depth) instrument is used to sample the water column to depths of up to 5400 meters.

## Airborne Doppler Radar Documents Rapid Intensification of Hurricane Felix

Airborne Doppler radar onboard NOAA's WP-3D hurricane hunter aircraft documented the rapid intensification of Hurricane Felix as it trekked westward across the central Caribbean in early September. The data were collected on four research missions to assist in developing the new Hurricane Weather Research and Forecasting (HWRF) model now used operationally for track and intensity forecasts by meteorologists with the NOAA's National Hurricane Center (NHC) and the National Centers for Environmental Prediction. Researchers from four NOAA offices—the Aircraft Operations Center, Environmental Modeling Center, National Hurricane Center, and Hurricane Research Division of AOML—collaborated in the effort to gather the data.

The missions began just as Felix was transitioning from a tropical storm into a hurricane on September 1st. Three subsequent missions were conducted as Felix rapidly intensified into a powerful category 5 hurricane (winds of 155 mph and greater) during the late evening hours of September 2nd.

These flights documented the changing structure of Felix's circulation, including the very deep, vertically-coherent structure of the wind. The three-dimensional analyses of the wind speed in portions of Felix's circulation were sent to NHC in real-time, as well as vertical cross-sections of wind components along the inbound and outbound flight tracks.



GOES-12 satellite image of Hurricane Felix making landfall in Nicaragua on September 4th with maximum sustained winds of 160 mph (category 5 on the Saffir-Simpson scale).



Dr. John Proni (left), Director of AOML's Ocean Chemistry Division (OCD), poses with Florida Congressman Ron Klein and Drs. Tsung-Hung Peng, Christopher Sinigalliano, and Rik Wanninkhof of OCD.

Florida Congressman Ron Klein (22nd District of Florida) visited AOML during the morning hours of August 31st for a tour of the facility and selected research areas. AOML Director Bob Atlas welcomed Klein to the Laboratory and accompanied him on the tour as they made several stops to meet with scientists.

Frank Marks, Joseph Cione, Peter Black, Mark Powell, and Jason Dunion of the Hurricane Research Division provided Congressman Klein with an overview of the Division's latest findings and its efforts to transition hurricane research to operational use for improved forecasts and warnings.

Elizabeth Johns and Molly Baringer of the Physical Oceanography Division presented information about AOML's ongoing efforts to monitor Florida's coastal waters and their critical relationship to climate and marine ecosystems.

John Proni, Tsung-Hung Peng, Christopher Sinigalliano, and Rik Wanninkhof of the Ocean Chemistry Division presented an overview of AOML's monitoring and prediction efforts to describe the impacts of anthropogenic activities upon the oceans.

The presentations enabled Congressman Klein to learn how AOML's research programs serve the American public. They also highlighted the role of both AOML and NOAA in advancing knowledge and understanding of the Earth system.

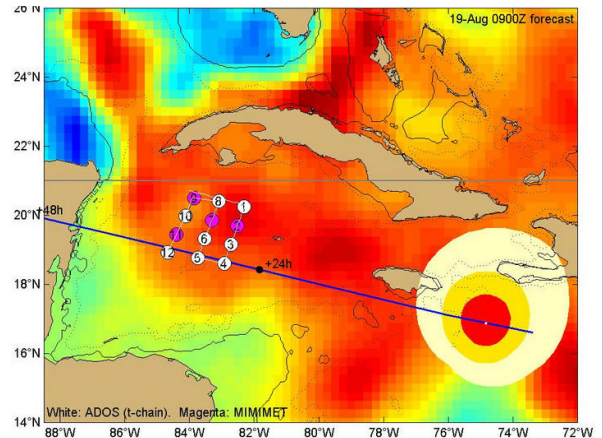
## Hurricane Dean Monitored by Air-Deployed Ocean Buoys

Hurricane researchers and oceanographers at AOML orchestrated the deployment of 12 ocean drifters into the projected path of Hurricane Dean on August 19th to obtain data about the upper ocean's heat structure. Scientists with the Scripps Institution of Oceanography, along with hurricane hunters with the U.S. Air Force, also participated in the collaborative effort to deploy the drifters ahead of Hurricane Dean as the powerful storm trekked westward across the Caribbean. On August 20th, Dean passed over the array with all drifters fully functioning and reporting data.

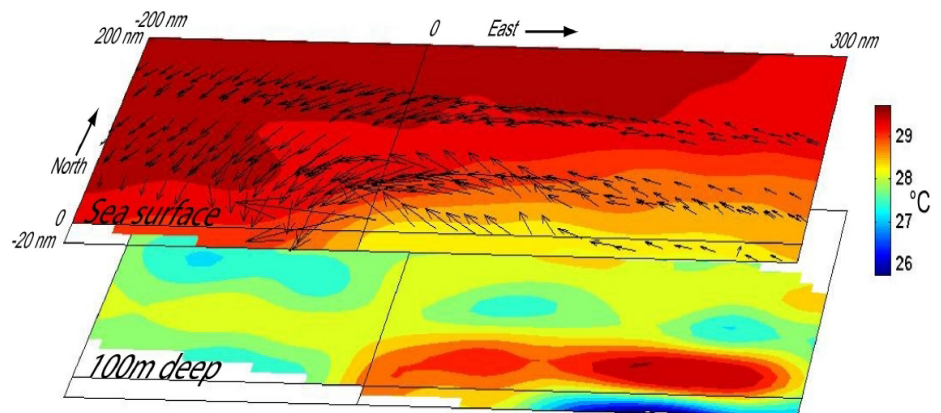
Warm ocean water is the main energy source that fuels hurricanes and provides the potential for their intensification. Eight of the 12 drifters were equipped with thermistor chains that gathered subsurface ocean thermal data to a depth of 150 m. These temperature data gave researchers a glimpse of how Dean mixed and cooled the upper layers of the ocean during its passage (see graphic below). The other four drifters (magenta colored in graphic at right) reported wind data estimated from sub-surface hydrophones. By coordinating data obtained from the drifters with data obtained from airborne-observing instruments that measure surface and higher level inner core winds, AOML researchers were able to capture a complete vertical profile of Dean's complex dynamics.

Ocean surface and subsurface data gathered by the drifters were transmitted in real-time via the Global Telecommunications System to forecasters at the National Hurricane Center, as well as to NOAA's Environmental Monitoring Center (EMC) for input into the Hurricane Weather Research Forecast (HWRF) model. EMC will use the data for model simulations that test their impact upon the HWRF model. Improved ocean observations added to the HWRF model should enhance its ability to forecast intensity changes.

The project served as a test for ocean-surface data acquisition and real-time transmittal of data to forecasters and for model ingest. This effort supported NOAA's strategic goals of serving society's need for weather and water information and for enhancing society's ability to plan and respond to changing climate conditions.

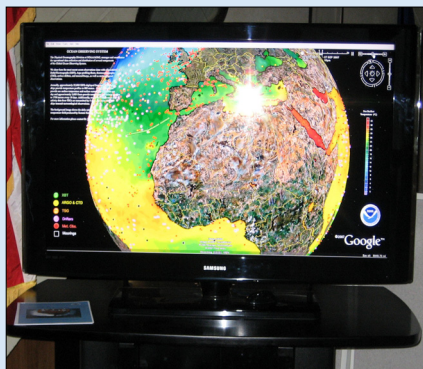


An array of 12 data-gathering ocean drifters deployed on August 19th in advance of Hurricane Dean's westward passage through the Caribbean provided researchers with data about the upper ocean's thermal structure.



Hurricane drifter data in storm-centered coordinates. In this coordinate system, Hurricane Dean is always centered at 0.0, and the array of 12 drifters rapidly transits from left to right. Arrows denote wind direction; shading is temperature (°C) at the sea surface (top image) and at 100 meters depth (bottom image). Temperature changes are dominated by wind-forced mixing, Ekman divergence, and near-inertial waves in the wake of the storm.

The AOML lobby now features a computer-generated display that uses Google Earth to depict a global map of the Earth. Appearing on the rotating map are the locations of ocean observations from expendable bathy-thermographs (XBTs), Argo floats, drifters, moorings, CTD stations, and thermosalinographs. The location of meteorological observations from more than 2,000 ships and platforms are also displayed.



The map depicts the variety of parameters currently being measured in real-time, which are transmitted to databases to initialize climate and weather forecast models. It also highlights the large, concerted effort to collect oceanographic data. Annually, about 25,000 XBTs are deployed from more than 50 ships participating in the Ship-of-Opportunity-Program (SOOP), providing temperature profiles to depths of 800 m. Over 1,200 drifters provide sea surface temperature and surface current data four times per day, and approximately 2,700 Argo floats provide temperature and salinity profiles to 1,700 m every 10 days. Sea surface temperature and salinity data from thermosalinographs are also transmitted by five ships, and more than 400 ships transmit meteorological observations.

This project is being carried out by Drs. Gustavo Goni and Joaquin Trinanes of AOML's Physical Oceanography Division, which manages and coordinates the operational data collection and distribution of several components of the Global Ocean Observing System. Thanks to Derrick Snowden and Michael Sam for configuring and installing the computer and video display.

## Collaborative Research on New "Historic" Vessel Planned

In August, Dr. Silvia Garzoli, Director of AOML's Physical Oceanography Division, met with Argentine Coast Guard officials (the Prefectura Naval Argentina) to discuss the possibilities for collaborative research, as well as the feasibility of conducting oceanographic studies from aboard a new research vessel currently under construction. Garzoli visited the shipyard where the vessel is being built, currently due for completion in mid-2009.

The new ship, named the *Dr. Bernardo Hussay* after the late Argentine Nobel Prize winner, is a replica of the former research vessel *Atlantis*. The R/V *Atlantis* was built specifically for the Woods Hole Oceanographic Institution in 1930 and sailed the seas for more than 30 years as a platform for marine and oceanographic studies. With more than 300 cruises to its credit, the 142-foot, two-masted ketch served the Institution admirably. The *Atlantis* helped make innumerable contributions to the ocean sciences. The many discoveries made during its voyages were acknowledged by NASA in 1985 when the fourth space shuttle orbiter *Atlantis* was named in honor of the R/V *Atlantis*.

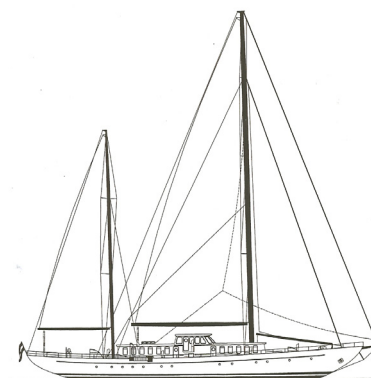


Dr. Silvia Garzoli (second from left) at a shipyard in Argentina where the new R/V *Dr. Bernardo Hussay* is being built.

The *Atlantis* was retired from Woods Hole in 1964 and later sold to the Argentine National Research Council in 1967. After refurbishment, it was rechristened as the *El Austral*. Ownership of *El Austral* transferred to the Argentine Coast Guard in 2001, who made the decision to completely renovate the vessel and make it available to the international science community for interdisciplinary oceanographic studies.

The *Hussay* will use as many original parts from the *El Austral* as possible in keeping with the spirit of the old ship. It will feature modern technology, berths for 20 scientists, and both wet and dry laboratories.

As a first step, Garzoli invited two technicians from the Argentine Coast Guard to participate in AOML's upcoming April 2008 research cruise aboard the NOAA R/V *Ronald H. Brown*. The *Brown* cruise will service Pirata moorings in the tropical Atlantic and collect hydrographic and meteorological data for air-sea interaction studies. Participation by the Argentine technicians will enable them to become familiar with shipboard operations, data collection, and post-cruise data processing, paving the way for future collaborations.



Schematic drawing of the *Dr. Bernardo Hussay*, a replica of the historic R/V *Atlantis*, which served as the Woods Hole Oceanographic Institution's primary research vessel from 1931-1964.

# OKTOBERWE'EN

October 31st—12 Noon

Booey Staging Area

\$5.00+Dessert

Contact Neal Dorst for more info (305-361-4311-Neal.Dorst@noaa.gov)

COSTUME CONTEST

## Welcome Aboard

Lin Lin joined the staff of AOML's Physical Oceanography Division in August as a team member of the U.S. Argo Data Assembly Center under the guidance of the U.S. Argo Data Manager, Dr. Claudia Schmid. Lin is currently a Ph.D. candidate with the University of Miami's Electrical and Computer Engineering Department.

Victoria Halliwell joined the staff of AOML's Physical Oceanography Division in September as a CIMAS Senior Research Associate. Halliwell will work as a team member of the South Atlantic Argo Regional Center under the guidance of Dr. Claudia Schmid.

Kathryn Sellwood joined the staff of AOML's Hurricane Research Division in October as a CIMAS Research Associate to perform modeling studies and work with the dropwindsonde archive. Sellwood is a recent graduate of the University of Miami's Rosenstiel School with a M.S. degree in meteorology.

## It's a Boy!



Jason Dunion, a meteorologist with AOML's Hurricane Research Division, and his wife Paige are the proud parents of a new baby boy. Corey James Dunion was born in Miami on September 4, 2007 at 3:09 p.m. and weighed in at 8 lbs. 7 oz. Corey, his big sister, Mom, and Dad are all doing well.

## Combined Federal Campaign

*The annual CFC program enables federal employees to support thousands of non-profit charitable organizations and agencies through payroll deductions*

**CFC 2007:  
October 15–November 16**

For more info contact Erica Rule  
2007 CFC Coordinator  
305-361-4541 – [Erica.Rule@noaa.gov](mailto:Erica.Rule@noaa.gov)

## Farewell

Dr. Peter Black, a senior research meteorologist with AOML's Hurricane Research Division, retired from federal service in September after a distinguished 40-year career devoted to studying tropical cyclones.

Black began his federal career in 1966 as a student meteorologist with the Miami-based National Hurricane Research Laboratory (forerunner of AOML's Hurricane Research Division). In 1969, he became a full-fledged meteorologist after obtaining a M.S. degree in meteorology from the University of Chicago. Black completed his formal education in 1983 when he was awarded a doctorate in meteorology from Pennsylvania State University.

During his years with the Division, Black's research focused on the hurricane boundary layer structure, microwave remote sensing of surface winds, hurricane convective clusters, and hurricane air-sea interaction processes. These observational studies were all based upon data obtained from the hurricane environment by research aircraft and remotely-sensed platforms. Black frequently served as the lead project scientist on airborne missions, flying into more than 200 hurricanes and tropical storms since the 1960s and racking up over 400 eyewall penetrations.

In addition to these studies, Black helped pioneer the field of airborne oceanography in the early 1980s by designing and executing experiments that placed air-deployed buoys and expendables in the path of approaching storms. A mission that deployed drifting buoys in advance of Hurricane Josephine in 1984 provided the first glimpse of a tropical cyclone's atmospheric and oceanic boundary layer structure.

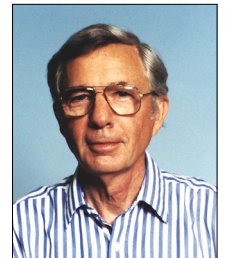
Black's long-term efforts to test and refine the capabilities of the stepped-frequency microwave radiometer (SFMR), an instrument aboard NOAA's WP-3D aircraft that measures surface winds, recently led to its transition from a research tool to that of an operational tool. The National Hurricane Center now routinely uses SFMR technology to estimate the radius of tropical storm and hurricane-force winds, as well as the maximum sustained surface winds in tropical cyclones. The Air Force Reserve's hurricane hunter aircraft are currently being equipped with SFMR instruments. More recently, Black served as the Chief Scientist for the Coupled Boundary Layer Air-Sea Transport (CBLAST) program, a research effort to improve hurricane intensity forecast skill.

After retirement, Black will work with colleagues at the U.S. Naval Research Laboratory in Monterey, California as a contractor with Science Applications International Corporation. "It's hard to believe that this is really going to happen after 40 years at the only job I have ever known," said Black. "I'm only changing horses though, not getting off altogether." Although gone from Miami, Black will continue interacting with AOML as a distinguished visiting scientist. Congratulations to Pete for his many years of dedicated service and for research that has helped advance the understanding of tropical cyclones.

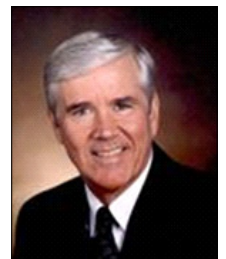


## In Memoriam

Dr. Robert Long, a former oceanographer with AOML's Sea-Air Interaction Laboratory and the Physical Oceanography Division, passed away on August 20th after a long battle with Parkinson's disease. He was 76 years old. During his years with AOML in the 1970s and 1980s, Long conducted research on surface waves in the ocean and later focused his efforts on assimilating data into ocean models. He is survived by his wife Barbara and two daughters.



Friends and colleagues at AOML were saddened by the recent death of Dr. Steven Clifford, former Director of NOAA's Environmental Technology Laboratory in Boulder, Colorado. Clifford passed away at his home in Boulder on September 18. He was 64 years old. Over the years, Clifford collaborated with several scientists at AOML and was held in high regard. He will be remembered for his professional contributions, as well as his humor and wit.



# *AOML Bids Farewell to Peter Black*



Photos by Erica Rule

AOML hosted a retirement party for Peter Black during the evening hours of October 3rd. A cordial crowd turned out at the Rosenstiel School's "Commons" to roast and toast Pete and to wish him much success in his future endeavors.

## Travel

Frank Marks attended a NOAA Research Council meeting in Washington, D.C. on September 9-10, 2007.

Mark Powell was an invited participant at the Workshop on Storm Surge Risk Assessment in College Station, Texas on September 19-21, 2007.

Joseph Cione was an invited participant at the Civil Applications of Unmanned Aircraft Systems Symposium in Boulder, Colorado on October 1-3, 2007. He also attended NOAA's Unmanned Aircraft Systems Arctic Testbed Stakeholders meeting in Anchorage, Alaska on October 15-17, 2007.

Judith Gray attended a meeting of the Southeast Regional Partnership for Planning and Sustainability (SERPPAS) and the Southeast and Caribbean Regional Team (SECART) in Charleston, South Carolina on October 1-3, 2007. She was also an invited speaker at the graduation ceremonies for NOAA's Leadership Competencies and Development Program in Silver Spring, Maryland on October 19, 2007.

Shaun Dolk and Mayra Pazos attended the 23rd session of the Data Buoy Cooperation Panel in Jeju, the Republic of Korea on October 15-19, 2007.

Kevin Sullivan visited Shanghai, China to install an automated CO<sub>2</sub> system aboard the Chinese icebreaker *Xue Long* (*Snow Dragon*) as part of a collaborative effort with the Chinese Polar Institute on October 17-30, 2007.

Elizabeth Johns and Judith Gray attended the Fall 2007 Workshop of the Southeast Atlantic Coastal Ocean Observing System (SEACOOS) in St. Pete Beach, Florida on October 22-23, 2007.

Rik Wanninkhof attended the China-U.S. Panel on Polar Sciences meeting in Washington, D.C. on October 22-23, 2007.

Chunzai Wang attended NOAA's 32nd Climate Diagnostics and Prediction Workshop in Tallahassee, Florida on October 22-26, 2007.

Bob Atlas attended a meeting of the National Academy of Science's Ocean Studies Board in Irvine, California on October 25-26, 2007.

## Recent Publications

Cunningham, S.A., T. Kanzow, D. Rayner, **M.O. BARINGER**, W.E. Johns, J. Marotzke, H.R. Longworth, E.M. Grant, J.J.-M. Hirschi, L.M. Beal, **C.S. MEINEN**, and L.H. Bryden, 2007: Temporal variability of the Atlantic meridional overturning circulation at 26.5°N. *Science*, 317(5840):935-938.

**DONG, S.**, S.T. Gille, and J. Sprintall, 2007: An assessment of the Southern Ocean mixed layer heat budget. *Journal of Climate*, 20(17):4425-4442.

Jones, T.A., D.J. Cecil, and **J.P. DUNION**, 2007: The environmental and inner-core conditions governing the intensity of Hurricane Erin (2001). *Weather and Forecasting*, 22(4):708-725.

Kanzow, T., S.A. Cunningham, D. Rayner, J.J.-M. Hirschi, W.E. Johns, **M.O. BARINGER**, H.L. Bryden, L.M. Beal, **C.S. MEINEN**, and J. Marotzke, 2007: Observed flow compensation associated with the MOC at 26.5°N in the Atlantic. *Science*, 317(5840):938-941.

Lonfat, M., **R.F. ROGERS**, T. Marchok, and **F.D. MARKS**, 2007: A parametric model for predicting hurricane landfall. *Monthly Weather Review*, 135(9):3086-3097.

Marchok, T.P., **R.F. ROGERS**, and R.E. Tuleya, 2007: Validation schemes for tropical cyclone quantitative precipitation forecasts: Evaluation of operational models for U.S. landfalling cases. *Weather and Forecasting*, 22(4):726-746.

McGillis, W.R., J.H. Dacey, J.D. Ware, D.T. Ho, J.T. Bent, W.E. Asher, C.J. Zappa, P.A. Raymond, **R. WANNINKHOF**, and S. Komori, 2007: Air-water flux reconciliation between the atmospheric CO<sub>2</sub> profile and mass balance techniques. In *Transport at the Air-Sea Interface: Measurements, Models, and Parameterizations*, C.S. Garbe, R.A. Handler, and B. Jahne (eds.). Springer-Verlag, Berlin, 181-192.

Moyer, A.C., J.L. Evans, and **M.D. POWELL**, 2007: Comparison of observed gale radius statistics. *Meteorology and Atmospheric Physics*, 97(1-4):41-55.

**SCHMID, C.**, **R.L. MOLINARI**, **R. SABINA**, **Y.-H. DANESHZADEH**, **X. XIA**, **E. FORTEZA**, and **H. YANG**, 2007: The real-time data management system for Argo profiling float observations. *Journal of Atmospheric and Oceanic Technology*, 24(9):1608-1628.

Tory, K.J., N.E. Davidson, and **M.T. MONTGOMERY**, 2007: Prediction and diagnosis of tropical cyclone formation in a NWP system, Part III: Diagnosis of developing and nondeveloping storms. *Journal of the Atmospheric Sciences*, 64(9):3195-3213.

**UHLHORN, E.W.**, **P.G. BLACK**, J.L. Franklin, M. Goodberlet, J. Carswell, and A.S. Goldstein, 2007: Hurricane surface wind measurements from an operational Stepped Frequency Microwave Radiometer. *Monthly Weather Review*, 135(9):3070-3085.

**WANG, C.**, **S.-K. LEE**, and **D.B. ENFIELD**, 2007: Impact of the Atlantic warm pool on the summer climate of the western hemisphere. *Journal of Climate*, 20(20):5021-5040.

**WANNINKHOF, R.**, 2007: The impact of different gas exchange formulations and wind speed products on global air-sea CO<sub>2</sub> fluxes. In *Transport at the Air-Sea Interface: Measurements, Models, and Parameterizations*, C.S. Garbe, R.A. Handler, and B. Jahne (eds.). Springer-Verlag, Berlin, 1-23.

\*Names of AOML authors are in blue capital letters.

*Keynotes* is published bi-monthly by the Atlantic Oceanographic and Meteorological Laboratory. Contributions and/or comments 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.

Editor – Robert Atlas  
Publishing Editor/Writer – Gail Derr

View *Keynotes* online: <http://www.aoml.noaa.gov/keynotes>