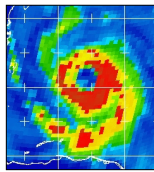


NOAA Reaffirms Active Season Forecast for 2007

NOAA reaffirmed its pre-season forecast for the Atlantic hurricane season on August 9th, stating with 85% confidence that 2007 would be an above-normal year for hurricane activity. Hurricane specialists predict that 13 to 16 named storms will develop before the season ends on November 30th, with seven to nine storms strengthening into hurricanes. Three to five hurricanes are forecast to become major hurricanes with winds above 110 mph (category 3 on the Saffir-Simpson scale).



Environmental conditions driving the forecast include the ongoing active phase of the Atlantic multi-decadal signal, which is believed to have contributed to a greater number of storms since it began in 1995, the growing likelihood that a La Niña episode will develop in the tropical Pacific during the August-October peak of the hurricane season, and above average sea surface temperatures throughout the western Atlantic Ocean and Caribbean Sea. These climatic factors are all known to favor increased levels of Atlantic storm activity. Coastal communities along the Gulf and eastern seaboard, as well as throughout the Caribbean, are urged to remain vigilant and prepare.

NOAA's hurricane outlooks are a collaborative effort of scientists with the Climate Prediction Center, National Hurricane Center, AOML's Hurricane Research Division, and the Hydro-meteorological Prediction Center.

Hurricane Field Program Gets Underway

John Gamache, Hurricane Research Division/Hurricane Field Program Director

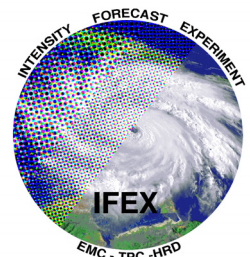
This summer, the Hurricane Research Division's (HRD) hurricane field program will concentrate on collecting data that document the life cycle of tropical cyclones, their structure, and intensity changes that occur at landfall. HRD is once again partnering with NOAA's Aircraft Operations Center (AOC), Environmental Modeling Center (EMC), National Hurricane Center (NHC), and the National Environmental Satellite, Data, and Information Service (NESDIS) to collect these data.



NOAA's P-3 Orion aircraft are a key component of HRD's hurricane field program. The specially-instrumented aircraft serve as airborne observing platforms, enabling researchers to gather data from the inner core and surrounding environment of tropical cyclones.

We hope to obtain observations in a single storm from its genesis to either its landfall, conversion to an extra-tropical cyclone, or its dissipation. The tropical cyclone life cycle will be studied through an overall experiment entitled "Three Dimensional Doppler Winds," which is a component of NOAA's Intensity Forecast EXperiment (IFEX). As the title implies, the focus will be on collecting observations with the airborne Doppler radar mounted aboard the two NOAA P-3 aircraft.

IFEX is a multi-year, cooperative effort between operational and research organizations to gather high-quality observations from the atmosphere and ocean in and around tropical cyclones during all stages of their life cycle. By observing tropical cyclones from their formation and early organization to landfall and/or decay over the open ocean, we hope to develop a better grasp of their internal processes and how they interact with the environment, ultimately leading to improved intensity forecasts.



Beginning as soon as possible after genesis, preferably when a tropical disturbance has been classified as a tropical depression, NOAA aircraft will begin collecting data on flights arranged to probe the center of the cyclone at 12-hour intervals. Normally, this would require one flight per day by each NOAA P-3 but, if needed, the same aircraft will be flown by different crews every 12 hours. The storm will then be followed as closely as possible for several days to document its intensification and either its landfall or weakening.

Several other experiments to be conducted during the hurricane field program include:

- *Tropical Cyclogenesis Experiment*: An experiment designed to study and document how a tropical disturbance develops into a tropical cyclone (a weather system that has a closed circulation at the surface).

(continued on page 2)

Scientists at AOML are preparing for a string of new advances and exciting collaborations during this year's hurricane field program:

Oceanographers and Hurricane Experts Partner to Study Waves in Hurricanes. AOML's oceanographers and hurricane scientists have teamed up to study the changing dynamics of ocean waves in relation to hurricanes to improve the understanding and prediction of hurricane-induced storm surge. In August, three acoustic Doppler current profilers (ADCPs) were deployed offshore of coastal Alabama in 20-30 m of water in preparation of hurricanes tracking through the Gulf of Mexico. The ADCPs will enable background wave climate to be observed before, during, and after tropical cyclone events. This project is a joint study between AOML's hurricane and ocean chemistry researchers, the University of South Alabama, and NOAA's Environmental Modeling Center.

USAF Hurricane Planes Outfitted with Latest Observing Technology. The first operationally tasked U.S. Air Force WC-130J stepped-frequency microwave radiometer (SFMR) flight was flown into Hurricane Flossie in early August. The SFMR uses passive microwave radiation to continuously measure surface wind speeds during missions, a key data component for accurately describing a storm's strength. NOAA's P-3 aircraft are already outfitted with SFMR technology with plans to add a SFMR unit to NOAA's Gulfstream-IV jet. As of this hurricane season, three of the USAF's ten hurricane hunter planes are equipped with SFMRs, with the goal of one additional plane outfitted every month.

Impact of New Observations on the Next Generation of Hurricane Models. AOML recently welcomed a hurricane modeler into its cadre of hurricane researchers, with the eventual goal of improving track, intensity, and structure forecasting by combining high resolution modeling techniques with in-house observations. This new area of modeling expertise will enable researchers to test how well hurricane models incorporate various kinds of atmospheric/oceanographic data previously excluded from traditional models. Researchers will then adapt the models to use these new types of information.

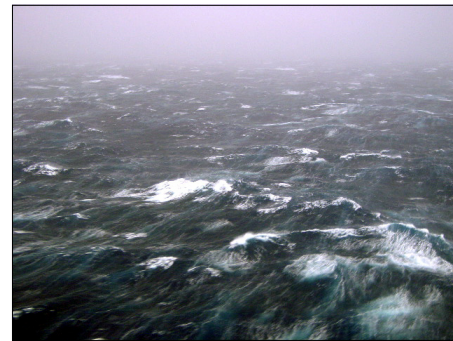
(continued from page 1)

• *Aerosonde Unmanned Aircraft System Experiment:* HRD researchers will test an Unmanned Aircraft System (UAS) in tropical cyclones that come within range of the launching site at the Key West Naval Air Station. If proven successful in hurricane-strength winds, the Aerosonde UAS will become an important operational and research tool for obtaining near surface observations in tropical cyclones at altitudes lower than traditional manned aircraft can safely fly. These critical data will be obtained in near-real time and used by NHC hurricane specialists for immediate use in public forecasts. HRD's partners in this experiment include NHC, the Office of Marine and Aviation Operations, the National Aeronautics and Space Administration, and AAI Corporation.

• *Saharan Air Layer Experiment:* An experiment that will use both P-3 and Gulfstream-IV aircraft to document the thermodynamic and kinematic structure of the Saharan Air Layer and its potential impact on tropical cyclone genesis and intensity change.

• *Tropical Cyclone Landfall and Intensity Decay Experiment:* An experiment designed to study structural and intensity changes that occur as a tropical cyclone makes landfall and to better document changes in the storm as it decays over land.

Airborne Doppler and stepped-frequency microwave radiometer (SFMR) data gathered during the hurricane field program will be used by EMC to refine the procedures that assimilate airborne Doppler data into the Hurricane Weather Research and Forecasting model (HWRF). Assimilation is the process by which evolution of the simulated storm structure is adjusted to account for observations in a way that maintains the delicate balance between the dynamics and thermodynamics required in the model. Such a process will be refined by looking at more than one life cycle and adjusting the procedures to reconcile the Doppler data with the continuously evolving model structure of the tropical cyclone, as well as with other data. HRD will consider a variety of flight patterns and data collection strategies to gather data that most benefits the assimilation. This will be an ongoing process for several years to produce fully operational versions of HWRF and HWRF-support flight patterns that derive maximum positive benefit from the flights.

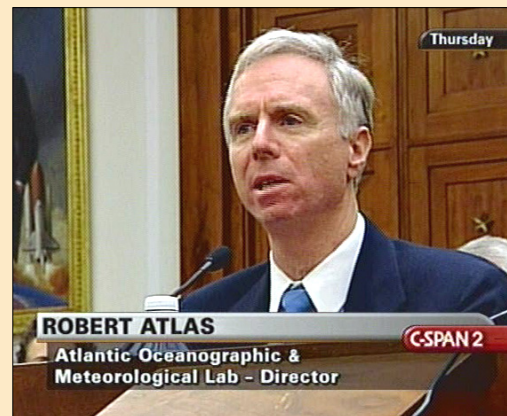


Observations obtained by unmanned aircraft flying at low altitudes hold the potential to improve understanding of the interface between the atmosphere and sea surface, depicted here as in Hurricane Isabel (2004).



NOAA's Gulfstream-IV jet is used for high-altitude synoptic surveillance missions during HRD's hurricane field program. Data collected by the Gulfstream-IV provides researchers with information about the steering currents that influence a storm's movements.

AOML Director Bob Atlas testified before the U.S. House of Representatives' joint hearing of the Subcommittee on Energy and Environment and the Subcommittee on Investigations and Oversight on July 19th in Washington, D.C. Atlas was called upon as an expert witness to address the use and impact of QuikSCAT satellite data in the forecasting process. The hearing was held to evaluate recent events at NOAA's National Hurricane Center.



**July-August 2007
Informal Research Reports***

July 16

**Connectivity of the South
Florida Coral Reef
Ecosystem to
Upstream Waters of the
Western Caribbean and
Gulf of Mexico**

**Dr. Elizabeth Johns
Physical Oceanography Division**

July 20

**Eddy Stirring Across the
Gulf Stream Front -or-
Surviving the North
Atlantic in February**

**Dr. Rick Lumpkin
Physical Oceanography Division**

July 25

**Recent Trends in the
Brazil-Malvinas Frontal
Variability**

**Dr. Gustavo Goni
Physical Oceanography Division**

August 2

**The Florida Current:
Spatial Variability from
STACS Revisited**

**Dr. Molly Baringer
Physical Oceanography Division**

August 7

**Spreading of the Antarctic
Intermediate Water in the
Atlantic Derived from Argo
and Other Observations**

**Dr. Claudia Schmid
Physical Oceanography Division**

*Presentations are held in the first-floor conference room.

Hurricanes Aid Recovery of Coral Reefs

Coral reefs stressed by warming sea surface temperatures may have an unlikely ally. A paper published in the July 17th issue of the *Proceedings of the National Academy of Sciences* suggests hurricanes may aid coral reefs in surviving and rebounding from bleaching events. The study by researchers with AOML's Ocean Chemistry Division is the first to document how large portions of the ocean cooled by the passage of hurricanes can benefit coral reef ecosystems.

Derek Manzello of AOML, along with co-authors from AOML, the University of Miami, and University of the Virgin Islands, assessed sea surface temperatures at coral reef sites scattered throughout the Florida Reef Tract and U.S. Virgin Islands during a Caribbean-wide bleaching event in 2005. Bleaching occurs when *zooxanthellae*, the algae that lives in coral limestone and provides its bright color, is ejected due to stress factors such as warm water temperatures. With the algae expelled, corals appear colorless or "bleached."

The bleaching that took place throughout 2005 was attributed to unusually warm sea surface temperatures. All reefs in the study area were found to be equally impacted and challenged.

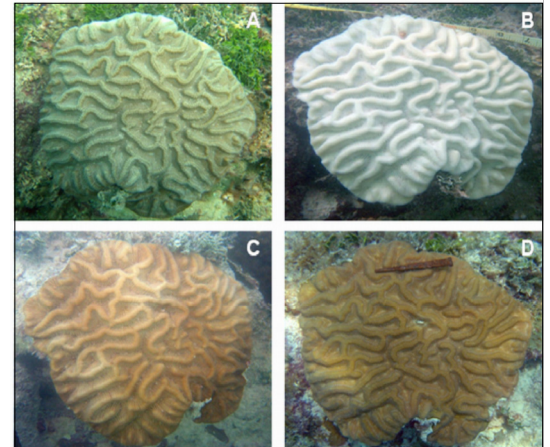
This warm water also fueled the formation of a record number of tropical systems during the 2005 Atlantic hurricane season. While tropical storms and hurricanes damage reefs when they pass overhead and as far away as 90 kilometers, storms passing only peripherally to reefs (at a distance of 275-375 km) can provide respite from the harmful effects of climate change.

The authors observed how the passage of four hurricanes in 2005—Dennis, Katrina, Rita, and Wilma—each cooled sea surface temperatures across wide swaths of the ocean by an average of 1.5°C (2.7°F) for up to 40 days. The cooling resulted from powerful winds whipping across the ocean surface and from deeper, colder water churning upwards from the ocean floor and mixing with warmer surface waters.

Even small changes in ocean temperature can make a critical difference in the life cycle of heat-stressed corals. The study found that coral reefs in the Florida Reef Tract recovered rapidly from the bleaching event due to their proximity to the cooled water. Just weeks after the passage of Hurricane Wilma in October 2005, the reefs were returning to a healthy equilibrium with flourishing populations of *zooxanthellae*. Reefs in the Virgin Islands, however, suffered a different fate. Out of range of the cooled water, they experienced prolonged and intense bleaching. Their recovery was slower and not as extensive.

While tropical systems damage reefs across localized regions, their capacity to alleviate ecological stress across larger areas of the ocean by reducing sea surface temperatures is a newly recognized benefit.

Manzello, D.P., M. Brandt, T.B. Smith, D. Lirman, J.C. Hendee, and R.S. Nemeth, 2007: Hurricanes benefit bleached corals. *Proceedings of the National Academy of Sciences*, 104(29):12,035-12,039.



Time-series of bleached coral (*Colpophyllia natans*) at Coral Gardens, Florida Reef Tract. (A) Prebleaching (August 11, 2005); (B) Bleached (September 6, 2005); (C) Nearly recovered (November 9, 2005); and (D) Recovered with normal pigmentation (March 2, 2006). (Photo courtesy of the Proceedings of the National Academy of Sciences)



The street crossing signal in front of the University of Miami's Rosenstiel School has been adjusted to allow pedestrians a greater amount of time to walk across the Rickenbacker Causeway. Please continue to use caution, however, when crossing the intersection. Also exercise extreme caution when merging onto the Rickenbacker Causeway from Virginia Beach Drive. Look carefully for cyclists as new road markings route the bike lane directly across the merge lane.



Dr. Silvia Garzoli (left) discusses AOML's climate and ocean observing research with AOML Director Bob Atlas, Chuck Atkins, and Representative Brian Baird.

Representative Brian Baird (D-WA), Chairman of the House Science Subcommittee on Research and Education, and Chuck Atkins, Staff Director of the House Science Committee, visited NOAA facilities in southern Florida on July 27-30 as part of a Committee-sponsored trip.

The visit included a SCUBA diving trip around the exterior of Aquarius, NOAA's undersea research center, and the surrounding coral reefs. The visit also included a tour of AOML on Saturday, July 28th. AOML Director Bob Atlas, along with senior scientists Silvia Garzoli, John Gamache, and Rik Wanninkhof briefed Rep. Baird and Atkins on AOML's climate, weather, and coastal ecosystems research.

Rep. Baird was interested in the possible role of AOML in rapidly identifying coastal pathogens under the Community Beaches Protection Act (HR 1505). He was also interested in hearing about NOAA's international research collaborations for an upcoming trip to the mid-East to learn more about scientific partnerships that transcend the political and religious boundaries amongst warring nations.

Rep. Baird stated that he is continually impressed with how energetic and dedicated NOAA scientists are to their research.



Dr. John Gamache (left) provides an overview of hurricane research activities and accomplishments during the visit of Congressman Brian Baird to AOML on July 28th.

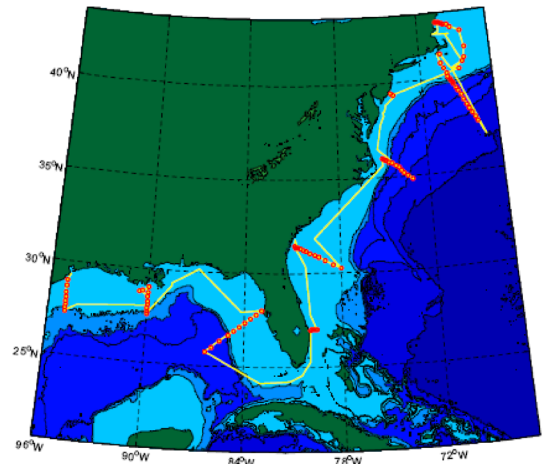
Carbon Data Gathered Along U.S. Coastal Zone

Researchers with AOML's Ocean Chemistry and Physical Oceanography Divisions participated in the Gulf of Mexico and East Coast Carbon (GOMECC) cruise aboard the NOAA Ship *Ronald H. Brown* on July 10-August 4th. They were joined aboard the *Brown* by a large complement of scientists from universities and another NOAA laboratory to study carbon cycle processes in the coastal zone over a wide range of oceanographic, atmospheric, and biogeochemical conditions. Drs. Tsung-Hung Peng of AOML and Christopher Langdon of the University of Miami's Rosenstiel School served as co-chief scientists.

The coastal ocean plays a critical role in the North American carbon cycle and in global carbon dynamics by serving as a conduit for transport of terrestrial material from the land to the open ocean. Its specific biological productivity is, on average, about three times larger than the average open-ocean values. Coastal regions have large carbon dioxide (CO₂) air-sea fluxes both into and out of the ocean but, to date, the net magnitude and direction of the fluxes still have large uncertainties. The GOMECC cruise was undertaken in support of the North American Carbon Program, which seeks to constrain fluxes of carbon over North America and adjacent seas.

During the 26-day cruise from Galveston, Texas to Boston, Massachusetts, underway measurements were gathered along nine transects and full water column conductivity-temperature-depth (CTD)/rosette stations were completed at 90 sites. The data obtained on this and subsequent cruises will provide a robust observational framework to monitor long-term trends of carbon on interannual time-scales. It will also aid in determining the temporal variability of the inorganic carbon system and its relationship to biological and physical processes in the coastal ocean and the capacity of coastal organisms to withstand the onset of ocean acidification.

The GOMECC cruise was the first in a biennial series of planned observational cruises and studies of carbon in the dynamic coastal ocean region above and adjacent to the continental shelf along the Gulf of Mexico and eastern seaboard of North America.



Schematic diagram of the GOMECC cruise track from Galveston, Texas to Boston, Massachusetts. Sampling was completed at nine transects (depicted in red), as well as at 90 CTD/rosette stations.

Representatives from AOML joined Congressman Mario Diaz-Balart (pictured in photo on the left) and his wife, Tia, in a visit to NOAA's undersea research center, Aquarius, offshore of Key Largo, Florida on August 13th. Mr. Otto Rutten, Aquarius Associate Director, and Dr. Ellen Prager, Aquarius Chief Scientist, presented details regarding the Aquarius underwater habitat, the programs they run, and the shore and boat-based operations required to support the activities conducted at and around the habitat. AOML's Dr. Libby Johns, Mr. Nelson Melo (pictured in photo on the right), and Ms. Judy Gray presented details regarding the ocean observing station deployed adjacent to the habitat and the relationship between AOML and the Aquarius Reef Base. Rutten and Melo accompanied Congressman Diaz-Balart on a dive to the habitat (47-ft. depth). Congressman and Mrs. Diaz-Balart both expressed deep appreciation for the trip and for helping to expand their awareness of the important scientific work ongoing in Florida's coastal waters.



Know the Plan!

AOML's Hurricane Preparedness and Recovery Plan provides a course of action to secure the grounds and facility for severe weather. The Plan requires the cooperation and support of all staff and can be viewed at <http://nuwave/intrapdf/hurrprep2007.pdf>. Should a tropical storm or hurricane threaten south Florida, the Plan is implemented.

The following Coordination Team members are tasked with leading the effort to carry out the Plan during both preparatory and recovery phases for their respective Division or group. Staff are tasked with assisting team members in fulfilling their duties, as well as preparing and securing their individual offices and work areas.

Computer Networks and Services

- Robert Kohler
- Thomas Heeb

Hurricane Research Division

- Neal Dorst
- Shirley Murillo
- Joseph Griffin (alternate)

Ocean Chemistry Division

- Thomas Carsey
- Jules Craynock
- Michael Shoemaker
- Joseph Bishop (alternate)

Office of the Director

- Nancy Ash
- Gregory Banes
- Judith Gray
- Manuel Fraga (alternate)

Physical Oceanography Division

- Robert Roddy
- Pedro Pena
- Ulises Rivero (alternate)

Biological and Oceanic Processes Studied in Virgin Islands

NOAA scientists with AOML's Physical Oceanography Division and the Southeast Fisheries Science Center (SEFSC) partnered in a joint research cruise aboard the NOAA Ship *Nancy Foster* this past March-April 2007 to gather biological and physical oceanographic data from the coastal waters of the Virgin Islands and surrounding region. Students and faculty from the University of the Virgin Islands also participated on the cruise. The collaborative research was part of a new three-year interdisciplinary project aimed at examining how recruitment of larval reef fish in the Virgin Islands and the surrounding area is affected by local oceanographic processes, and how the different shallow banks found in the northeastern Caribbean are ecologically linked via dispersal of these larvae.

Several sites throughout the Virgin Islands, including the Grammanik Bank south of St. Thomas, serve as spawning habitats for economically important fish such as yellowfin grouper, Nassau grouper, tiger grouper, and dog snapper. However, the biological and physical processes occurring at these bank ecosystems, including the circulation connecting the banks and the flows across the banks, are not yet fully understood. Long-term sustainability of fisheries in the Virgin Islands and surrounding areas is dependent upon a comprehensive understanding of regional spawning aggregations, larval transport, and overall larval recruitment.

Presently, the Caribbean Fisheries Council management decisions concerning the Virgin Islands bank ecosystems and surrounding regions are based on professional judgment rather than quantifiable scientific data. This is due to a lack of data for the region and is the primary motivator for the joint collaboration between AOML and SEFSC on this three-year project.

During the two-week cruise, biological sampling techniques such as MOCNESS (Multiple Opening/Closing Net and Environmental Sampling System) and bongo trawl tows were employed simultaneously with standard physical sampling methods such as CTD/LADCP (Conductivity-Temperature-Depth/Lowered Acoustic Doppler Current Profiler) casts and hull-mounted water velocity measurements. This interdisciplinary sampling strategy will help AOML and SEFSC scientists develop a better understanding of regional spatial variation in the supply of settlement-stage fishes, as well as more insight into the relative importance of Grammanik Bank and its marine protected areas as a source of juvenile fishes recruiting to the waters of the Virgin Islands.

Synthesis of the data collected over the three-year project will aid researchers in determining the location and relative importance of spawning sites, and incorporation of this information into fisheries oceanographic models will help local resource managers make more informed decisions about marine protected areas and optimal seasonal closures with respect to time and place.

The project's second research cruise is currently scheduled for early 2008 aboard the NOAA Ship *Nancy Foster*. For additional information, contact Ryan Smith or Libby Johns.



Grant Rawson of AOML (center) signals to a winch operator to "boom out" as a CTD/LADCP instrument package is deployed to gather data that will be used to improve understanding of the region's physical oceanographic processes.



Natasha Davis and Estrella Malca of NOAA's Southeast Fisheries Science Center gather samples from MOCNESS trawl tows. The island of St. Eustatius appears in the background.

**DAILY
TROPICAL
WEATHER
DISCUSSIONS**

**4TH FLOOR
WEATHER ROOM**

WEEKDAYS - 12:30 P.M.



Bob Atlas with Shailer Cummings and Chris Kelble, acknowledged for their contributions to field operations in the Gulf of Mexico following the landfall of Hurricane Katrina.

Department of Commerce service awards were presented to the following individuals in honor of their years of full-time federal employment:

- 10 years *Craig Engler*
Gustavo Goni
Shirley Murillo
Michael Sam
- 15 years *Christian Labbe*
Emy Rodriguez
Jack Stamates
- 20 years *Elizabeth Johns*
John Kaplan
Nina Liebig
Lloyd Moore
- 25 years *Yeun-Ho Daneshzadeh*
- 30 years *Paul Dammann*
Peter Ortner
Catherine Steward
Anne-Marie Wilburn
- 35 years *John Festa*
Gladys Medina
John Proni
Gary Soneira
- 40 years *Robert Kohler*



Bob Atlas with Robert Kohler, recipient of a service award celebrating 40 years of federal employment.

Staff Achievements Highlighted at Awards Ceremony

AOML celebrated the achievements of its staff members at an awards ceremony hosted on July 13th by the Office of the Director. AOML Director Bob Atlas proudly acknowledged the following individuals, as well as two individuals external to AOML—Bill Proenza and Jill Wright—for their recent accomplishments.

Robert Castle, Betty Huss, Esa Peltola, Tsung-Hung Peng, and Rik Wanninkhof (Kevin Sullivan of CIMAS also provided research support for this award)—U.S. Department of Commerce 2006 Gold Medal for 15 years of research and observations that have shown the oceans are becoming more acidic as a result of the uptake and storage of anthropogenic carbon dioxide.

Shailer Cummings (Christopher Kelble of CIMAS also provided research support for this award)—U.S. Department of Commerce 2006 Silver Medal for conducting field operations immediately following Hurricane Katrina's Gulf of Mexico passage that were vital to ensuring seafood was safe for public consumption, saving millions in potential fishery losses.

Derrick Snowden—U.S. Department of Commerce 2006 Bronze Medal for voluntary service during FEMA post-disaster relief operations after multiple hurricane strikes in 2005.

Hurricane Research Division—U.S. Department of Commerce 2006 Bronze Medal for innovation and commitment to the NOAA Hurricane Mission during Hurricane Katrina's Louisiana landfall while still recovering from the south Florida landfall.

Howard Friedman—American Meteorological Society's 2007 Charles E. Anderson Award for sustained commitment to fostering inclusiveness and diversity in all its forms within the atmospheric sciences.

Howard Friedman—NOAA 2006 Distinguished Career Award for providing guidance and career mentoring to NOAA scientists, from the youngest interns to seasoned researchers, and for contributions to NOAA's work environment through dedication to equal employment opportunity and mediation programs.

Peter Dodge, John Gamache, Joseph Griffin, Nancy Griffin, and Paul Leighton—NOAA 2006 Administrator's Award for developing the algorithms and related software to enable real-time analysis and transmission of wind fields and airborne Doppler radar data collected in hurricanes to improve the initialization of a new generation of hurricane forecast models.

Shirley Murillo—March 2007 NOAA Employee of the Month Award for research on the boundary layer wind structure of landfalling tropical cyclones which includes real-time surface wind analyses.

Bill Proenza (National Hurricane Center)—Certificate of Appreciation for dedication to maintaining and improving ocean surface wind observations and for recognizing the value of hurricane research in support of operations by strengthening interactions between AOML scientists and NHC forecasters.

Jill Wright (Institute for Shipboard Education)—NOAA 2007 Environmental Hero Award following her nomination by AOML's Physical Oceanography Division for dedication, enthusiasm, and collaboration in support of NOAA's global ocean observing system for climate and weather forecasts.



Bob Atlas with Derrick Snowden, recipient of a U.S. Department of Commerce Bronze Medal for his service to FEMA disaster relief efforts along the Gulf coast in 2005.



Bob Atlas with Bill Proenza of the National Hurricane Center, acknowledged for his efforts to strengthen hurricane research collaborative efforts.

Remembering Bob

The passing of Bob Burpee has caused many to reflect upon a friend and colleague who will be missed:

It is ironic that, in the span of about three hours, I would lose both my real and my professional fathers. Bob and my father were alike in a lot of ways: honorable, thoughtful, with great attention to detail, a tremendous desire to get things exactly right, and the wisdom and perseverance to get there. Bob knew the difference between good science and bad science. One of his expressions will likely live on forever at NHC, used whenever someone crosses that line: Bob once said to an NHC forecaster, "How can you speak so confidently on something we know so little about?" Forecasting being what it is, Bob's expression continues to get a lot of use.

Mr. James Franklin
National Hurricane Center

Bob was my very good friend and mentor. I would likely not be the person and scientist I am today without his influence.

Dr. Frank Marks
AOML Hurricane Research Division

Bob will surely be missed. He was a kind, thoughtful, and caring scientist.

Dr. Nick Shay
University of Miami/Rosenstiel School

I had the privilege of knowing Bob personally as a broadly caring man and an accomplished scientist who clearly, though quietly, earned the respect of all who knew him well. He was my valued friend and I, like many others, feel a knowing sense of loss at his passing.

Dr. Robert H. Simpson
Former Director, National Hurricane Center

Bob's great organizational and people skills, first manifest to his future colleagues when he was a graduate student at MIT, served him well throughout his life, both professionally and personally.

Dr. Lance Bosart
State University of New York

The synoptic flow experiment, which Bob developed and led for many years, led to the purchase of the Gulfstream-IV jet, one of the largest investments NOAA has made specifically for hurricane forecasting.

Dr. Sim Aberson
AOML Hurricane Research Division

Bob was a great boss. He will be missed by folks on both the research and operations side of the aisle.

Mr. Howie Friedman
AOML Hurricane Research Division

AOML Mourns the Loss of Dr. Robert Burpee

AOML was recently saddened by the death of Dr. Robert Burpee, a former senior meteorologist and director of the Hurricane Research Division. Burpee died on July 31st after a prolonged, debilitating illness. He was 65 years old.

Burpee developed an interest in weather by observing storms in his hometown of Reading, Massachusetts. After his 1963 graduation from Harvard University with an A.B. degree in applied physics, he enrolled in the meteorology program at Massachusetts Institute of Technology (MIT). As a young graduate student, Burpee's computer skills were put to excellent use. Working with Professor Fred Sanders, Burpee developed software that paved the way for the creation of SANBAR, the first dynamic (barotropic) computer model that was used operationally by the National Hurricane Center for tropical cyclone track forecasting.

In 1967, Burpee and Sanders traveled to Miami to work with staff at the National Hurricane Research Laboratory, the forerunner of AOML's Hurricane Research Division. While in Miami, he became interested in the weather systems associated with tropical waves that formed over the hot, arid deserts of western Africa and are often precursors to Atlantic tropical cyclones. His groundbreaking research into their origin and structure earned him a doctorate in meteorology from MIT in 1971.

After a brief tenure at the University of Illinois-Urbana, he returned to Miami in 1971 to join the staff of the National Hurricane Research Laboratory (Hurricane Research Division) as a research meteorologist. For the next 24 years, he was at the forefront of most of the advances made by the Division that not only contributed to greater understanding of tropical cyclone dynamics but also to forecast improvements. In 1976, he took part in the first research flight (into Hurricane Bonny) aboard NOAA's new WP-3D hurricane hunter aircraft. He subsequently flew on more than 250 research missions on the WP-3D aircraft that carried him through the turbulent eyewall of countless storms.

Burpee was the first to suggest and lead the effort to deploy Omega dropwindsondes (ODWs) from research aircraft flying through the core and surrounding environment of tropical cyclones as a means of obtaining atmospheric data over the open ocean where observations were sparse. Under his leadership, HRD conducted 20 synoptic flow experiments from 1982 to 1996 to gather wind, temperature, and humidity profiles from ODWs dropped along the aircraft's flight track. These data, when incorporated into forecast models, produced significant improvements (16-30%) in the accuracy of the National Hurricane Center's official track forecasts.

The success of the synoptic flow experiments led to NOAA's acquisition of the Gulfstream-IV jet, suggested by Burpee to be used as a high-altitude surveillance platform for deployment of satellite tracked Global Positioning System (GPS) dropsondes. Data obtained from the upper atmospheric profiles by the Gulfstream-IV GPS sondes have additionally improved tropical cyclone track forecasts by 10-15%.

In 1993, Burpee assumed directorship of the Hurricane Research Division. He departed AOML in 1995, however, to become the director of the National Hurricane Center in Miami. Unfortunately, Burpee's tenure at the National Hurricane Center was shortlived. He resigned as director and retired from federal service in 1997 due to failing health. In spite of the incapacitating nature of the ailments he suffered, Burpee continued interacting with the tropical meteorology science community and served as a co-author on a few recent publications.

During Burpee's distinguished career, he was the recipient of many awards including the American Meteorological Society's Charles L. Mitchell Award for the advancement of hurricane track forecasting through both research and administrative leadership. He was also recognized by NOAA with Meritorious Service and Outstanding Scientific Paper Awards.

From his involvement in developing the first operational computer model to his innovative ideas for improving forecast accuracy, Bob Burpee's research was always cutting edge. He is survived by his brother Richard Burpee and sister Nancy Cutter.



Dr. Robert Burpee

Farewell

Nicholas Carrasco, a CIMAS research associate with AOML's Hurricane Research Division, relocated to Arlington, Virginia in July. Although gone from Miami, Carrasco will continue to work with the Division and provide technical support for the Hurricane Surface Wind Analysis (H*WIND) Project.

NOAA Corps Officer LTJG Hector Casanova departed AOML's Ocean Chemistry Division in June to become the Operations Officer aboard the NOAA R/V *Gordon Gunter* in Pascagoula, Mississippi. During Casanova's three years with the Division, he assisted with the planning, coordination, and data management of the Florida Area Coastal Environment (FACE) program. As a member of the Division's Integrated Coral Observing Network (ICON) dive team, he contributed significantly to the successful pylon deployments in La Parguera, Puerto Rico and Lee Stocking Island, Bahamas.

Dr. Kelly Goodwin, a microbiologist with AOML's Ocean Chemistry Division, relocated to La Jolla, California in July. Goodwin will work from an office at NOAA's Southwest Fisheries Science Center but will continue her affiliation with AOML and research support of its Environmental Microbiology Laboratory.

Gary Soneira, a physical scientist with AOML's Physical Oceanography Division, retired in August after 35 years of federal service. Soneira was affiliated with the Division's Global Ocean Observing System (GOOS) Center for more than 10 years where he played a vital role in tracking and quality controlling data gathered from a variety of instrument arrays. Soneira also monitored expendable bathythermograph (XBT) and surface drifter contracts, major components of AOML's global observing system networks, ensuring sensors performed satisfactorily, schedules were met, and problems solved quickly. He will be missed.

It's a Girl

Erik Valdes, a CIMAS research associate with AOML's Physical Oceanography Division, and his wife Jossette are the proud parents of their first child, a daughter. Madison Marie Valdes was born in Miami on July 17, 2007 and weighed in at 6 lbs. 7 oz. Mom, Dad, and baby Madison are all doing well.



Welcome Aboard

NOAA Corps Officer LTJG Madeleine Adler joined the staff of AOML's Ocean Chemistry Division in June to assist with operational planning and data management for the Florida Area Coastal Environment (FACE) program. As a fully certified NOAA diver, Adler will also participate in field activities for the FACE and ICON (Integrated Coral Observing Network) programs. She holds a B.S. degree in environmental science from Bucknell University and a M.S. degree in atmospheric science from the University of Wyoming.

Dr. Sundararaman Gopalakrishnan (Gopal for short) joined the staff of AOML's Hurricane Research Division (HRD) in August to conduct research aimed at improving and evaluating numerical models of tropical cyclones. Gopal comes to HRD from NOAA's Air Resources Laboratory (ARL) where he worked on improving air dispersion models. Prior to his brief tenure at ARL, Gopal worked at the National Centers for Environmental Prediction's Environmental Modeling Center as a member of the team that developed the new Hurricane Weather Research and Forecasting (H-WRF) model (which became operational this year). Together with Dr. Robert Rogers, Gopal will form the core of HRD's expanded effort in tropical cyclone modeling research.

Thiago Quirino joined the staff of AOML's Hurricane Research Division in August to work with and assist Dr. Robert Rogers. Quirino is a doctoral student with the Meteorology and Physical Oceanography Division at the University of Miami's Rosenstiel School.

Guy Ravitz joined the staff of AOML's Hurricane Research Division in August to work with Dr. Mark Powell's Hurricane Surface Wind Analysis (H*WIND) group. Ravitz is a doctoral student with the Meteorology and Physical Oceanography Division of the University of Miami's Rosenstiel School.

In June, three Hollings Scholars joined the staff at AOML, as well as an exemplary group of high school, undergraduate, and graduate students. The Laboratory's 2007 summer interns performed an array of technical tasks, assisted with research, presented seminars, analyzed data, and gained valuable working experience immersed in a science environment. Their efforts were guided by volunteer mentors with the Computer Networks and Services (CNSD), Hurricane Research (HRD), Ocean Chemistry (OCD), and Physical Oceanography (PhOD) Divisions. Congratulations to AOML's summer interns for their valuable contributions and successful collaboration with AOML mentors.

NOAA Hollings Scholars:

Stephanie Mullins, University of Louisiana Peter Black (HRD)
Hannah Spencer, University of Virginia Christopher Sinigalliano (OCD)
Nancy Williams, University of Miami Rik Wanninkhof (OCD)

Student Interns:

Roque Cespedes, University of Miami Paul Dammann (OCD)
Noraica Davilla-Melendez, Univ. of Puerto Rico J. Dunion/D. Enfield (HRD/PhOD)
Jonathan Davis, St. Thomas Aquinas High School Thomas Carsey (OCD)
Sandy Delgado, Florida International University Gustavo Goni (PhOD)
Cristimer Gonzales-Jorge, University of Puerto Rico Jason Dunion (HRD)
Ashley Greene, University of Maryland Mark Powell (HRD)
Maclean Grindell, University of Miami-Rosenstiel School Jason Dunion (HRD)
Zachary Gruskin, Cyprus Bay High School Michael Black (HRD)
Andrew Hagen, Pennsylvania State University Robert Rogers (HRD)
Thomas Philip, University of Sheffield-UK Sim Aberson (HRD)
Nelsie Ramos, Howard University Sim Aberson (HRD)
Isha Renta, Howard University Mark Powell (HRD)
Latricia White, Florida State University Sim Aberson (HRD)
Spencer Winepol, University High School John Proni (OCD)

Student Volunteers:

Marcos Mirabent, Monsignor Edward Pace High School Alejandra Lorenzo (CNSD)

Travel

Shane Elipot, Silvia Garzoli, and Claudia Schmid attended the 24th General Assembly of the International Union of Geodesy and Geophysics (IUGG) in Perugia, Italy on July 2-13, 2007.

Nathanon Armonthammarong, George Berberian, Robert Castle, Charles Featherstone, Charles Fischer, Carlos Fonseca, Esa Peltola, Tsung-Hung Peng, Kyle Seaton, and Kevin Sullivan participated in the Gulf of Mexico and East Coast Carbon Cruise (GOMECC) aboard the NOAA Ship *Ronald H. Brown* from Galveston, Texas to Boston, Massachusetts on July 10-August 4, 2007.

Bob Atlas attended a meeting of the Space-Based Lidar Winds Working Group in Snowmass, Colorado, testified before Congress in Washington, D.C., and visited the National Center for Atmospheric Research in Boulder, Colorado on July 15-25, 2007.

Erica Rule attended the Federally-Employed Women's 38th National Training Program in Washington, D.C. on July 16-20, 2007.

Joseph Cione, Christopher Kelble, and Frank Marks attended the Unmanned Aerial Systems Hurricane Impacts Stakeholder Workshop in Starksville, Mississippi on July 17-18, 2007.

Lloyd Moore and Nancy Ash attended a Hazardous Waste Management Training Program in Orlando, Florida on July 18-20, 2007.

Judith Gray, Robert Kohler, and Catherine Steward attended the Office of Oceanic and Atmospheric Research's Management Conference in Norman, Oklahoma on July 19-21, 2007.

Shailer Cummings and Jack Stamates deployed acoustic Doppler current profilers off the coast of Mobile, Alabama aboard the R/V *A.E. Verrill* on July 30-August 10, 2007.

Mark Powell attended a meeting of the Florida Commission on Hurricane Loss Projection in Tallahassee, Florida on August 14-17, 2007.

Frank Marks attended the 29th meeting of the NOAA Science Advisory Board in Mystic, Connecticut on August 22-23, 2007.

Recent Publications*

- BARINGER, M.O.**, and **S.L. GARZOLI**, 2007: Meridional heat transport determined with expendable bathythermographs, Part I: Error estimates from model and hydrographic data. *Deep-Sea Research, Part I*, 54(8):1390-1401.
- BARINGER, M.O.**, and **C.S. MEINEN**, 2007: Global oceans: The meridional overturning circulation and oceanic heat transport. In *State of the Climate in 2006*, A. Arguez, A.M. Waple, and A.M. Sanchez-Jugo (eds.). *Bulletin of the American Meteorological Society*, 88(6):S38-S39.
- Bell, G.D., E. Blake, C.W. Landsea[†], M. Chelliah, R. Pasch, K.C. Mo, and **S.B. GOLDENBERG**, 2007: The tropics: Tropical cyclones—Atlantic basin. In *State of the Climate in 2006*, A. Arguez, A.M. Waple, and A.M. Sanchez-Jugo (eds.). *Bulletin of the American Meteorological Society*, 88(6):S48-S51.
- Cervený, R.S., J. Lawrimore, R. Edwards, and **C.W. LANDSEA[†]**, 2007: Extreme weather records: Compilation, adjudication, and publication. *Bulletin of the American Meteorological Society*, 88(6):853-860.
- Cram, T.A., J. Persing, **M.T. MONTGOMERY**, and S.A. Braun, 2007: A Lagrangian trajectory view on transport and mixing processes between the eye, eyewall, and environment using a high-resolution simulation of Hurricane Bonnie (1998). *Journal of the Atmospheric Sciences*, 64(6):1835-1856.
- Dye, J.E., M.G. Bateman, H.J. Christian, E. Defer, C.A. Grainger, W.D. Hall, E.P. Krider, S.A. Lewis, D.M. Mach, F.J. Merceret, J.C. Willett, and **P.T. WILLIS**, 2007: Electric fields, cloud microphysics, and reflectivity in anvils of Florida thunderstorms. *Journal of Geophysical Research*, 112(D11):D11215, doi:10.1029/2006JD007550.
- GARZOLI, S.L.**, and **M.O. BARINGER**, 2007: Meridional heat transport determined with expendable bathythermographs, Part II: South Atlantic transport. *Deep-Sea Research, Part I*, 54(8):1402-1420.
- Halverson, J., **M.L. BLACK**, S. Braun, D. Cecil, M. Goodman, G. Heymsfield, R. Hood, J. Molinari, **R.F. ROGERS**, C. Velden, E. Zipser, and R. Kakar, 2007: NASA's Tropical Cloud Systems and Processes (TCSP) Experiment: Investigating the genesis and intensification of hurricanes. *Bulletin of the American Meteorological Society*, 88(6):867-882.
- LUMPKIN, R.**, and **G.J. GONI**, 2007: Global oceans: Surface current observations. In *State of the Climate in 2006*, A. Arguez, A.M. Waple, and A.M. Sanchez-Jugo (eds.). *Bulletin of the American Meteorological Society*, 88(6):S36-S37.
- MANZELLO, D.P.**, M. Brandt, T.B. Smith, D. Lirman, **J.C. HENDEE**, and R.S. Nemeth, 2007: Hurricanes benefit bleached corals. *Proceedings of the National Academy of Sciences*, 104(29):12,035-12,039.
- ROGERS, R.F.**, **M.L. BLACK**, S.S. Chen, and **R.A. BLACK**, 2007: An evaluation of microphysics fields from mesoscale model simulations of tropical cyclones, Part I: Comparisons with observations. *Journal of the Atmospheric Sciences*, 64(6):1811-1834.
- Sabine, C.L., R.A. Feely, and **R. WANNINKHOF**, 2007: Global oceans: Global ocean carbon cycle. In *State of the Climate in 2006*, A. Arguez, A.M. Waple, and A.M. Sanchez-Jugo (eds.). *Bulletin of the American Meteorological Society*, 88(6):S40-S43.
- WANG, C.**, 2007: Variability of the Caribbean low-level jet and its relations to climate. *Climate Dynamics*, 29(4):411-422.
- Wang, Z.A., X. Liu, R.H. Byrne, **R. WANNINKHOF**, R.E. Bernstein, E.A. Kaltenbacher, and M. Patten, 2007: Simultaneous spectrophotometric flow-through measurements of pH, carbon dioxide fugacity, and total inorganic carbon in seawater. *Analytica Chimica Acta*, 596(1):23-36.
- Willoughby, H.E., E.N. Rappaport, and **F.D. MARKS**, 2007: Hurricane forecasting: The state of the art. *Natural Hazards Review*, 8(3):45-49.

*Names of AOML authors appear in blue capital letters.

[†]Landsea shown as both AOML and non-AOML author to reflect his departure from AOML.

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