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NOAA Forecasts Active Atlantic Hurricane Season

NOAA's team of hurricane specialists released their outlook for the 2007 Atlantic hurricane season on May 22nd, calling for another above normal year. Forecasters predicted with 75% certainty that 13 to 17 named storms would form during the June 1st-November 30th season, with seven to 10 storms becoming hurricanes. Three to five hurricanes were predicted to develop into major hurricanes of at least Category 3 strength with winds above 110 mph. An average Atlantic hurricane season produces 11 named storms, with six hurricanes and two major hurricanes.

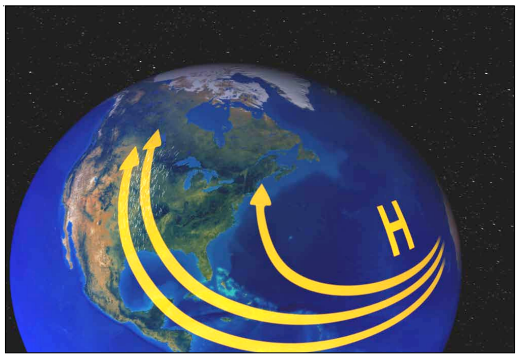
Environmental patterns contributing to the above normal forecast include warmer than average sea surface temperatures in the Atlantic and the ongoing active phase of the Atlantic multi-decadal signal, which is believed to have contributed to increased levels of storm activity since it began in 1995. The possibility that La Niña conditions could develop in the next few months is also being closely monitored as a factor which could enhance the likelihood for greater levels of storm activity.

The annual Atlantic pre-season hurricane outlook is a collaborative effort by scientists with NOAA's Climate Prediction Center, National Hurricane Center, AOML's Hurricane Research Division (Stanley Goldenberg), and the Hydrometeorological Prediction Center. Coastal communities are urged to prepare for another active hurricane year.

Impact of the Atlantic Warm Pool on Climate and Hurricanes

Chunzai Wang, Physical Oceanography Division

Climate fluctuations in the Western Hemisphere and Atlantic hurricane activity have been largely attributed to the El Niño-Southern Oscillation, whose teleconnections to global climate and weather are limited mainly to the winter season. Hence, these have been the overriding basis and emphasis for climate and hurricane outlooks. Recently, scientists with AOML's Physical Oceanography Division have pointed out the added predictive value of the Atlantic warm pool (AWP)—a large body of warm water comprised of the Gulf of Mexico, the Caribbean Sea, and the western tropical North Atlantic—for the summer climate and hurricanes.



Schematic diagram of the North Atlantic subtropical high and its associated low tropospheric flows. The atmospheric flows carry moisture from the Atlantic warm pool to North America, which helps bring summer rainfall to the central United states.

The AWP has a large seasonal cycle, and the fluctuations of its area show a large anomalous variation, with large warm pools being almost three times larger than small warm pools. Located on the AWP's northeastern side is the North Atlantic subtropical high that produces the tropical easterly trade winds. The easterly trade winds carry moisture from the tropical North Atlantic into the Caribbean Sea where the flow intensifies, forming the Caribbean low-level jet. As the Caribbean low-level jet transits the Caribbean Sea, it turns northward via the Gulf of Mexico to merge with the southerly Great Plains low-level jet (see schematic diagram above), bringing copious summer moisture to the central and eastern United States.

Both observational and numerical modeling studies are being performed by AOML's scientists. The numerical modeling study includes a series of atmospheric general circulation model experiments designed to assess and understand the influence of AWP variability on the summer climate and Atlantic hurricane activity. It is found that an anomalously large AWP weakens the summertime North Atlantic subtropical high and strengthens the summertime continental low over the North (*continued on page 2*)

2007 Atlantic Storm Names

Andrea	Dean	Gabrielle	Jerry	Melissa	Pablo	Tanya
Barry	Erin	Humberto	Karen	Noel	Rebekah	Van
Chantal	Felix	Ingrid	Lorenzo	Olga	Sebastien	Wendy

China Visit Promotes Recent Tropical Cyclone Research

Dr. Peter Black, a meteorologist with AOML's Hurricane Research Division, visited China on March 26-April 12 to meet with colleagues at various institutions and present seminars about tropical cyclone research, particularly the Coupled Boundary Layer Air-Sea Transfer (CBLAST) program. Black was invited to China as a guest lecturer by the World Meteorological Organization to participate in the International Training Workshop on Tropical Cyclone Disaster Reduction.

The workshop was conducted at the Guangdong Meteorological Bureau Training Center in Quangzhou (Canton) from March 26-April 1st. Approximately 45 tropical cyclone forecasters and researchers attended, half of whom were from coastal and inland provinces in China affected by tropical cyclones. A summary of workshop presentations can be found at www.wmo.ch/pages/prog/arep/tmrp/tropicalmeteorologyresearch.html.

Black was an invited guest at the Chinese Academy of Meteorological Sciences in Beijing on April 2nd to present a seminar on CBLAST results. On April 4th, he visited the Shanghai Typhoon Institute to present seminars on CBLAST results and landfall surface wind measurement and analysis.

Additional discussions were held with Dr. Tang Xu, Director of the East China Meteorological Region and Director of the Shanghai Meteorological Bureau, which oversees the Shanghai Typhoon Institute. A visit to the Hang Zhou Meteorological Bureau was arranged on April 6th where Black presented an informal seminar on the wind field of Hurricane Katrina and damage along the Gulf coast.

Black traveled to Taipei on April 9th to meet with Professor Chun-Chieh Wu of the National Taiwan University, as well as other faculty members in the Atmospheric Sciences Department. A seminar on CBLAST results was presented to the Department, as well as an informal seminar presented to Chun-Chieh's group of faculty advisors and students on stepped frequency microwave radiometer results and surface wind field determinations.

(continued from page 1)

American monsoon region. In response to these pressure changes, the easterly Caribbean low-level jet is weakened, as are its westward and northward moisture transports. The model runs also show that an anomalously large AWP weakens the southerly Great Plains low-level jet, which results in reduced northward moisture transport from the Gulf of Mexico to the United States east of the Rocky Mountains and thus decreases the moisture available for summer rainfall over the central United States, in agreement with observations.

The model experiments show that the AWP variability changes the tropospheric vertical wind shear and the moist static instability of the troposphere, both of which affect Atlantic hurricane activity. Dynamically, the AWP-induced anomalous atmospheric circulation pattern is baroclinic, with a cyclone in the lower troposphere and an anticyclone in the upper troposphere. This circulation structure reduces the lower tropospheric easterly flow and the upper tropospheric westerly flow, resulting in a reduction of the vertical wind shear that favors atmospheric convection. Thermodynamically, an anomalously large AWP tends to increase convective available potential energy due to the increased near-surface air temperature and water vapor content. This means that more latent heat energy is available for release as air parcels rise to their condensation level, thus favoring a more vigorous evolution of tropical waves into tropical cyclones.

The AOML studies also show that warm phases of the Atlantic multidecadal oscillation are populated by more frequent large AWPs. Since the climate response to the North Atlantic sea surface temperature anomalies is primarily forced at low latitudes, this implies that the observed reduction of rainfall over North America due to warm phases of the Atlantic multidecadal oscillation may be partly due to a decrease in AWP-induced northward moisture transport associated with more frequent large summer warm pools. The relationship between the Atlantic multidecadal oscillation and hurricanes may also operate through the AWP variability, i.e., the mechanism of the AWP-induced changes of the vertical wind shear and convective available potential energy. In other words, the AWP acts as a link between the Atlantic multidecadal oscillation and hurricane activity and rainfall in the United States.

These findings are detailed in three recent publications:

Wang, C., and S.-K. Lee, 2007: Atlantic warm pool, Caribbean low-level jet, and their potential impact on Atlantic hurricanes. *Geophys. Res. Lett.*, 34, L02703, doi:10.1029/2006GL0028579.

Wang, C., S.-K. Lee, and D.B. Enfield, 2007: Impact of the Atlantic warm pool on the summer climate of the Western Hemisphere. *J. Climate*, in press.

Wang, C., S.-K. Lee, and D.B. Enfield, 2007: Climate response to anomalously large and small Atlantic warm pools during the summer. *J. Climate*, submitted.

Congresswoman Debbie Wasserman Schultz (20th Congressional District of Florida), AOML Director Bob Atlas, and Congressman Ron Klein (22nd Congressional District of Florida) participated in a press conference at the Broward County Emergency Management Office on June 1st to raise public awareness about the need for hurricane preparedness. Atlas conveyed information about NOAA's forecasting capabilities and research to advance the understanding of hurricane cyclogenesis and intensity change. Congressman Klein is currently co-sponsoring a bill in the House of Representatives (Improved Hurricane Tracking and Forecasting Act of 2007) aimed at replacing the aging QuikSCAT satellite used by NOAA to track and forecast tropical storms and cyclones.

New Coral Reef Monitoring Station Goes Live

Members of AOML's Coral Health and Monitoring Program completed the installation of a new Integrated Coral Observing Network (ICON) station in Discovery Bay, Jamaica in early June. The new station is located on the northern coast of Jamaica in 20 feet of water offshore of the Discovery Bay Marine Laboratory in the West Fore Reef. Support for the station was obtained through the Mainstreaming Adaptation to Climate Change program funded by the World Bank and Global Environmental Facility, with personnel support from NOAA, the University of Miami, and the National Undersea Research Program/University of North Carolina at Wilmington.

Peter Gayle, Principal Scientific Officer at the Discovery Bay Marine Laboratory, shakes hands with AOML's Jim Hendee, ICON Program Manager, following completion of the Discovery Bay ICON station.

ICON stations are part of a network of environmental monitoring platforms that provide researchers with near real-time data and information about coral health and climate conditions at coral reefs. The Discovery Bay ICON station has been equipped to measure the following parameters:

- Wind speed and direction
- Precipitation
- Barometric pressure
- Air temperature
- Photosynthetically available radiation above and below the water surface
- Ultraviolet light above and below the water surface
- Sea temperature
- Salinity
- Partial pressure of carbon dioxide

Data gathered from the instruments at the Discovery Bay site can be viewed on NOAA's Coral Health and Monitoring Program web page at www.coral.noaa.gov/crw/crw_data_dbjm1_Web_12.html.

Storm Size, Intensity, Key to Evaluating Potential Damage

Hurricane Katrina's Gulf coast landfall in August 2005 left many to ponder how a less intense storm than Hurricane Camille, which devastated coastal Mississippi in 1969, could cause so much more damage. A study published in the April *Bulletin of the American Meteorological Society* by AOML research meteorologist Mark Powell and co-author Timothy Reinhold explores how the overall size of a storm's wind field, along with the strength of the winds, must be considered when gauging a storm's potential for destruction.

Aerial view of a neighborhood in Bay St. Louis, Mississippi following the passage of Hurricane Katrina in August 2005.

Powell, M.D., and T.A. Reinhold, 2007: Tropical cyclone destructive potential by integrated kinetic energy. *Bulletin of the American Meteorolo-gical Society*, 88(4): 513-526.

Powell and Reinhold describe a new Wind and Surge Destructive Potential classification. This metric associates a numerical value to each storm similar to the Saffir-Simpson scale and reflects potential damage due to wind, storm surge, and waves. The goal is to provide a better measure of the threat posed by landfalling storms. The authors suggest revising the classification of hurricanes to include physical characteristics such as the overall size of the storm and the area affected by winds exceeding certain threshold values.

"By incorporating both size and intensity, I see this system as a better way to allow people to assess the true potential impact of an approaching storm," Powell said. "If people knew that Katrina had a much higher damage potential than Camille, the Mississippi residents who chose to stay might have evacuated." Powell and Reinhold, a scientist and engineer with the Institute for Business and Home Safety, acknowledge that people who decide to leave or stay in response to a hurricane warning make decisions based on perceived vulnerability. Past hurricane experience is one of several influences on this perception.

The authors propose that many coastal Mississippi residents may have decided to stay during Hurricane Katrina, a Category 5 hurricane 24 hours before landfall, because their location had not flooded during a previous Category 5 storm (Hurricane Camille). This decision was made despite skillful forecasts by NOAA's National Weather Service. While Hurricane Camille's winds were stronger at landfall, Hurricane Katrina's wind field was much larger, resulting in significantly greater coastal flooding and damage.

"The Saffir-Simpson scale has been a very valuable tool in warning people about hurricanes, but we have known for some time that the level of surge and surge-related damage is not well correlated with the maximum wind speeds at landfall," said Reinhold. "The proposed methods may well lead to more consistent warnings of damage potential both for wind and surge. It could follow in the footsteps of NOAA's recent adoption of the Enhanced Fujita Scale for classifying tornadoes and provide the foundation for an enhanced Saffir-Simpson Scale."

To develop a scale that incorporates destructive potential due to storm surge and wind, Powell and Reinhold used kinetic energy calculations to classify small and large storms, ranging from Tropical Storm strength to Category 5 using data from NOAA's H*Wind experimental product that effectively describes the variations in the size and shape of the wind field of a given storm. H*Wind is currently the best tool available to evaluate the extent of damaging winds based on all available observations.

Powell will test-run the Hurricane Destructive Potential classification during the 2007 hurricane season as part of NOAA's H*Wind experimental products.

Article reprinted from NOAA Magazine.

New Orleans Post-Katrina Microbial Effects Examined

The passage of Hurricanes Katrina and Rita through the New Orleans region in the summer of 2005 raised public health concerns about the long-term effects of floodwaters laden with microbial pathogens and fecal indicator bacteria. A paper published in the May 22nd issue of the *Proceedings of the National Academy of Sciences* by Sinigalliano *et al.* employed a wide array of microbial methods to determine that Lake Pontchartrain had returned to its prestorm condition approximately two months after the storms struck the area.

Sinigalliano, C.D., M.L. Gidley, T. Shibata, D. Whitman, T.H. Dixon, E. Laws, A. Hou, D. Bachoon, L. Brand, L. Amaral-Zettler, R.J. Gast, G.F. Steward, O.D. Nigro, R. Fujioka, W.Q. Betancourt, G. Vithanage, J. Mathews, L.E. Fleming, and H.M. Solo-Gabriele, 2007: Impacts of Hurricanes Katrina and Rita on the microbial landscape of the New Orleans area. *Proceedings of the National Academy of Sciences*, 104(21):9029-9034.

Dr. Christopher Sinigalliano of the University of Miami's Cooperative Institute for Marine and Atmospheric Studies and AOML's Environmental Microbiology Laboratory oversaw the field investigation of the New Orleans region for the NSF/NIEHS Oceans and Human Health Centers and co-led a multi-institutional team of researchers. Extensive sampling of Lake Pontchartrain and the canals that drained into the lake began in October 2005 and continued through December 2006. A key finding of the effort is that the municipal sewage system in New Orleans caused the ensuing fecal and microbial pollution that impacted much of the area rather than Lake Pontchartrain.

The dried floodwater sediments that remain throughout the formerly inundated areas of the historic city are now considered the main concern for public health, e.g., airborne particles of dried sediment can be inhaled and/or ingested. Sinigalliano *et al.* recommend additional studies of the soils and sediments be conducted in the region to better assess potential ongoing risks to public health.

The National Academy of Sciences acknowledged the authors for their quick response and efficient sampling of the post-Katrina New Orleans environment in support of public health safety, as well as for their use of multiple methods of pathogen identification.

Workshop Builds Support for South Atlantic Monitoring System

Silvia Garzoli, Physical Oceanography Division

Researchers with AOML's Physical Oceanography Division helped organize and participated in an international workshop aimed at establishing a system for monitoring the meridional heat and mass transports in the South Atlantic and inter-ocean exchanges that contribute to the Meridional Overturning Circulation (MOC). The South Atlantic Workshop was held on May 8-10th in Buenos Aires, Argentina through the financial support of NOAA's Climate Program Office and the U.S. CLIVAR program; participants from Argentina, Brazil, France, Germany, Italy, Russia, Uruguay, the United Kingdom, and the United States attended.

The workshop began with a review of the current knowledge of the region. Observations, as well as results from theoretical and numerical models, suggest the South Atlantic is not a passive conduit for remotely-formed water masses, but that it actively creates them through dynamic and thermodynamic processes occurring within the basin. Furthermore, MOC variability can be linked to the equatorward heat transport at mid-latitudes within the basin that operates over longer time scales than surface fluxes and, hence, could potentially provide some predictability for climate.

Participants of the South Atlantic Workshop met in Buenos Aires, Argentina to discuss plans for an observing system that monitors heat and mass transports in the South Atlantic as components of the Meridional Overturning Circulation.

The Drake Passage and the region south of South Africa are key choke points for the world's largest current, the Antarctic Circumpolar Current (ACC). Heat, salt, mass, freshwater, nutrients, and other oceanic properties are transported from the ACC between the Atlantic, Pacific, and Indian Oceans, with consequences for global climate. The Agulhas leakage region is also of critical influence, not only as the gateway for the upper limb of the MOC return flow, but also through the shedding of Agulhas rings, which is one of the major sources of salinity increase in the South Atlantic. A better understanding and quantification of the circumpolar variability and the Agulhas leakage on a range of timescales is needed to design a monitoring system capable of measuring heat and salt fluxes.

Plans were established to coordinate existing and future observations in the Drake Passage in the region between South Africa and Antarctica and on a zonal line nominally at 35°S. The need for new developments in the present data collection system was discussed, as well as the need to collect data at climate time scales (e.g., a sustained commitment for a decade or more of observations in near real-time).

Strong endorsement was made in support of sustaining the Argo program, currently the only global source of subsurface data in the open ocean away from the tropics. Most monitoring projects already underway or in the planning stages place instruments along altimetry ground-tracks to supplement the observations. Therefore, the group strongly endorsed the continuation of the satellite altimetric missions with spatial resolution sufficient to resolve mesoscale features.

The main workshop recommendations included the following: (1) sustain existing observations in the three key regions mentioned above and further enhance the observing system; (2) develop new cost-effective technology to allow near real-time full water column observations; (3) collaborate on instrument deployments to reduce operational costs, as well as analysis of data sets and model products presently available and soon to be obtained; and (4) conduct process modeling studies to determine the most cost effective monitoring system for the MOC in the South Atlantic for climate time scales.

The group proposed to reconvene in 2008. Additional information about the workshop can be found at www.aoml.noaa.gov/phod/SAW/.

AOML jointly hosted an open house with the Southeast Fisheries Science Center on May 11-12th in celebration of NOAA's 200th anniversary. More than 800 middle and high school students visited AOML on May 11th and toured exhibits that showcased the Laboratory's hurricane, ocean carbon dioxide, and environmental microbiology research. A large array of oceanographic sampling and monitoring equipment, plus two small research vessels, helped to highlight AOML's climate and coastal ecosystem research. Special displays included a hurricane simulator where students experienced 78 mph winds and a special interactive tour of NOAA's Virtual Island presented by Eric Hackathorn of the Earth System Research Laboratory. More than 250 guests from the local community attended on May 12th. The event was organized by Erica Rule, AOML's outreach coordinator, and Essie Duffie from the Southeast Fisheries Science Center.

Welcome Aboard

Dr. Sylvie Lorsolo, a CIMAS post-doctoral scientist, joined the staff of AOML's Hurricane Research Division in March to work on the Northern Gulf of Mexico Hurricane Landfall project with Dr. Peter Black. Lorsolo will analyze airborne Doppler radar data from the Integrated Wind and Rain Atmospheric Profiler (IWRAP), as well as tail Doppler radar, both mounted on the NOAA WP-3D aircraft. Initial analysis of these data sets will focus on the small-scale features in hurricane boundary layers over the ocean in Hurricane Rita (2005) and continue on for any northern Gulf hurricane landfalls in 2007 and 2008. Lorsolo recently received her Ph.D. from Texas Tech University in Lubbock, Texas.

Angelica Arias joined the staff of the Office of the Director's Administrative Group in June to assist with data entry of travel into the admin and fdms systems, ordering supplies, and receptionist coverage in the lobby. She will also assist the Group's members with an assortment of clerical and administrative tasks.

AOML welcomed a special guest to its Open House on Saturday, May 12th. Congressman Mario Diaz-Balart of the 25th Congressional District of Florida was one of more than 250 visitors that attended the event conducted in honor of NOAA's 200th anniversary. AOML Director Bob Atlas and Deputy Director Judith Gray accompanied Diaz-Balart as he toured the facility. In addition to learning about AOML's environmental microbiology, carbon dioxide, and hurricane research, Nelson Melo of AOML's Physical Oceanography Division presented Diaz-Balart with an overview of AOML's coastal ecosystem research. Pictured above from left to right: Judith Gray, Congressman Mario Diaz-Balart, Bob Atlas, and Nelson Melo.

AOML Loses a Valued Colleague

Barbara Poppe, a former colleague and master of communications and outreach for NOAA's Space Environment Center (SEC), passed away on June 12th after a 10-year battle with cancer. Poppe was a role model for many in the NOAA community and will be remembered for her tireless efforts to educate the public about space weather and its impacts upon society.

As the outreach coordinator for SEC, Poppe worked with educators from schools and museums in the Boulder-Denver, Colorado area. She created and produced a variety of educational materials for children including the *Space Weather* comic books and the *Solar Fun Book*. Additionally, her efforts to raise public awareness for space weather resulted in U-Haul placing a space weather graphic on the side of rental vans and trucks across the country.

Poppe is also credited with leading the development activities that established NOAA's Space Weather Scales, now used worldwide, that communicate the possible impacts posed by space weather conditions. After retiring from federal service in 2005, she coauthored *Sentinels of the Sun: Forecasting Space Weather* with her daughter.

Described by colleagues as a "one-woman force of nature," Poppe will be missed.

Congratulations

Neal Dorst, a meteorologist with AOML's Hurricane Research Division, has been elected President of the Greater Miami Chapter of the American Meteorological Society.

Gustavo Goni, an oceanographer with AOML's Physical Oceanography Division, was named the new chairperson of the Joint WMO-IOC (World Meteorological Organization-Intergovernmental Oceanographic Commission) Technical Commission for Oceanography and Marine Meteorology's SOOP (Ship of Opportunity Program) Implementation Panel at a meeting conducted at WMO offices in Geneva, Switzerland this past April.

Alejandra Lorenzo, a computer specialist with AOML's Computer Networks and Services Division, was honored by Hialeah High School in March by becoming the first inductee into its new Science and Technology Hall of Fame. Lorenzo also received a Plaque of Recognition from Hialeah High School for her nine years of service on its Educational Excellence School Advisory Committee, as well as a plaque from Hialeah Elementary School for serving as a speaker at their annual Career Day for the past 15 years.

Frank Marks, Director of AOML's Hurricane Research Division, has been selected to lead NOAA's new Hurricane Forecast Improvement Project, a ten-year effort designed to accelerate improvements to hurricane intensity forecasting in the one to five-day time range. This project should result in a substantial increase in resources for hurricane research, involving both the oceanic and atmospheric research groups of AOML.

Nelson Melo, a CIMAS research associate with AOML's Physical Oceanography Division, proudly became a United States citizen on June 14, 2007. According to Melo, "when people ask me what citizenship means to me, I say just one word: freedom. America is now more than my home; America is now my country." Melo arrived in the U.S. from Cuba in October 1999.

Mark Powell, a meteorologist with AOML's Hurricane Research Division, has been named a member of the 2007 U.S. Sailing Team. The U.S. Sailing Team consists of the top three-ranked sailors for each of nine divisions. Powell was ranked the number three sailor for the Neil Pryde RS:X (men's windsurfer) division. He will compete in the U.S. Olympic Trials in October 2007 to determine the U.S. Olympic Team that will represent the United States at the August 2008 Olympic Games in Qingdao, China.

Travel

Judith Gray attended an Office of Oceanic and Atmospheric Research (OAR) Senior Research Council meeting in Seattle, Washington on May 7-10, 2007.

Molly Baringer, Silvia Garzoli, Gustavo Goni, and Christopher Meinen attended the South Atlantic Workshop in Buenos Aires, Argentina on May 8-10, 2007.

Michael Black, Jason Dunion, and Robert Rogers attended a Science Team meeting for NASA's Tropical Cloud Systems and Processes and the African Monsoon Multi-Disciplinary Analyses Missions in Baltimore, Maryland on May 15-17, 2007.

Joseph Cione attended the 8th GODAE (Global Ocean Data Assimilation Experiment) High-Resolution Sea Surface Temperature Science Team meeting in Melbourne, Australia on May 14-18, 2007.

Silvia Garzoli and Chunzai Wang, an invited speaker, attended the American Geophysical Union's Joint Assembly meeting in Acapulco, Mexico on May 22-25, 2007.

Bob Atlas briefed Florida Congressional representatives about hurricane research and forecasting at the Florida Congressional Delegation meeting in Washington, D.C., on May 24, 2007.

Nancy Ash, James Hendee, Michael Jankulak, and Christopher Langdon completed the installation of a new Integrated Coral Observing Network (ICON) station in Discovery Bay, Jamaica on June 4-8, 2007.

Molly Baringer, Silvia Garzoli, Gustavo Goni, Rick Lumpkin, Christopher Meinen, Claudia Schmid, and Rik Wanninkhof participated in the 5th Annual System Review of NOAA's Climate Observation Program in Silver Spring, Maryland on June 5-7, 2007.

Mayra Pazos was an invited lecturer of the Data Buoy Cooperation Panel at a training session for buoy program implementation and data management in Ostend, Belgium on June 11-15, 2007.

Rik Wanninkhof was an invited participant at the CoastWatch Review and Advisory Panel meeting in Annapolis, Maryland on June 12-14, 2007.

Recent Publications*

Baums, I.B., K.D. GOODWIN, T.L. Kiesling, D. WANLESS, M.R. Diaz, and J.W. Fell, 2007: Luminex detection of fecal indicators in river samples, marine recreational water, and beach sand. *Marine Pollution Bulletin,* 54(5):521-536.

Borges, A.V., and R. WANNINKHOF, 2007: Preface: 37th International Liege Colloquium on Ocean Dynamics, Liege, Belgium, May 2-6, 2005, 5th International Symposium on Gas Transfer at Water Surfaces. *Journal of Marine Systems,* 66(1-4):1-3.

Conzemius, R.J., R.W. Moore, M.T. MONTGOMERY, and C.A. Davis, 2007: Mesoscale convective vortex formation in a weakly sheared moist neutral environment. *Journal of the Atmospheric Sciences,* 64(5):1443-1466.

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LUMPKIN, R., and M.C. PAZOS, 2007: Measuring surface currents with Surface Velocity Program drifters: The instrument, its data, and some recent results. In *Lagrangian Analysis and Prediction of Coastal and Ocean Dynamics,* A. Griffa, A.D. Kirwan, A.J. Mariano, T. Ozgokmen, and H.T. Rossby (eds.). Cambridge University Press, 39-67.

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WANNINKHOF, R., A. Olsen, and J.A. Trinanes, 2007: Air-sea CO_2 fluxes in the Caribbean Sea from 2002-2004. *Journal of Marine Systems,* 66(1-4):272-284.

Walsh, K.J.E., M. Fiorino, C.W. LANDSEA, and K.L. McInnes, 2007: Objectively determined resolution-dependent threshold criteria for the detection of tropical cyclones in climate models and reanalyses. *Journal of Climate,* 20(10):2307-2314.

*Names of AOML authors appear in capital letters.

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