

Noteworthy Statistics

2007 Atlantic Hurricane Season

- Eight storms formed in the Atlantic Basin during September, tying September 2002 for having the most storm formations during any given month.
- For the first time in recorded history, two Category 5 hurricanes (winds above 155 mph) made landfall in the Atlantic Basin during the same season. Hurricane Dean struck the Yucatan Peninsula near Costa Maya on August 21st with 165 mph winds, followed by Hurricane Felix on September 2nd, near Punta Gorda, Nicaragua, with 160 mph winds.
- With a central pressure of 906 millibars, Hurricane Dean had the third lowest pressure at landfall, just behind the Labor Day 1935 Hurricane in the Florida Keys and Hurricane Gilbert of 1988 in Cancun, Mexico. Dean is also the first Category 5 hurricane to make landfall in the Atlantic Basin since Hurricane Andrew struck South Florida in 1992.
- Hurricane Humberto grew from a tropical depression with top winds of 35 mph into a hurricane with winds of 85 mph within 24 hours. Only three others storms (Celia—1970, Arlene and Flora—1963) intensified faster during a 24-hour period from below tropical storm strength.

Happy Holidays!

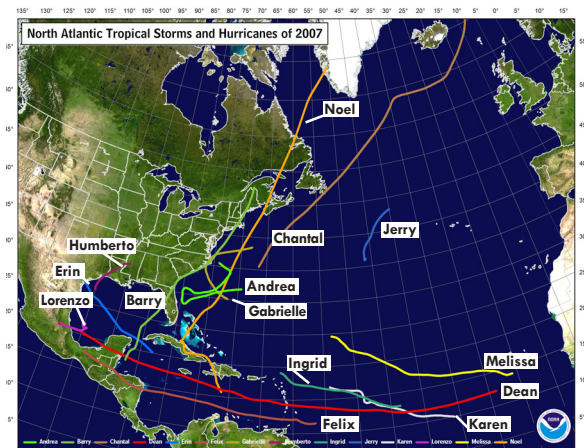
2007 Atlantic Hurricane Season Ends But Questions Remain

As the 2007 Atlantic hurricane season officially came to a close on November 30th, NOAA scientists carefully reviewed a set of dynamic weather patterns that yielded lower-than-expected hurricane activity across the Atlantic Basin. As a result, the United States was largely spared from significant landfalling storms. However, several noteworthy events took place, including two back-to-back Category 5 hurricanes striking Central America and the rapid near-shore intensification of the single U.S. landfalling hurricane.

As a whole, the 2007 Atlantic hurricane season produced a total of 14 named storms, including six hurricanes, two of which became major hurricanes. NOAA's August update to the seasonal forecast predicted 13 to 16 named storms, of which seven to nine would be hurricanes, including three to five major hurricanes of Category 3 strength (winds stronger than 110 mph) or higher. An average season has 11 named storms, with six becoming hurricanes, including two major hurricanes.

"The 2007 Atlantic hurricane season produced the predicted number of named storms, but the combined number, duration, and intensity of the hurricanes did not meet expectations," said Dr. Gerry Bell, lead seasonal hurricane forecaster at NOAA's Climate Prediction Center. "The United States was fortunate this year to have fewer strong hurricanes develop than predicted. Normally, the climate patterns that were in place produce an active, volatile hurricane season."

The climate patterns predicted for the 2007 hurricane season—an ongoing multi-decadal signal (the set of oceanic and atmospheric conditions that have spawned increased Atlantic hurricane activity since 1995) and La Niña—produced the expected below-normal hurricane activity over the eastern and central Pacific regions. However, La Niña's impact over the Atlantic was weaker than expected, which resulted in stronger upper-level winds and increased wind shear over the Caribbean Sea during the peak months of the season (August-October). This limited Atlantic hurricane formation during that period. NOAA's scientists are investigating possible climate factors that may have led to this lower-than-expected activity.



Tracks of all named storms of the 2007 Atlantic hurricane season; stronger-than-predicted winds over the Caribbean and western tropical Atlantic led to stronger wind shear, limiting storm formation, duration, and intensity.

(continued on page 2)

Recent AOML Publications

Chavez, F.P., T. Takahashi, W.-J. Cai, G. Friederich, B. Hales, **R. WANNINKHOF**, and R.A. Feely, 2007: Coastal oceans. In *The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research, A.W. King, L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T. J. Wilbanks (eds.). National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, USA, 157-166.

DORST, N.M., 2007: The National Hurricane Research Project: 50 years of research, rough rides, and name changes. *Bulletin of the American Meteorological Society*, 88(10):1566-1588.

LUMPKIN, R., and K. Speer, 2007: Global ocean meridional overturning. *Journal of Physical Oceanography*, 37(10):2550-2562.

POWELL, M.D., and T.A. Reinhold, 2007: Reply to comments on "Tropical cyclone destructive potential by integrated kinetic energy." *Bulletin of the American Meteorological Society*, 88(11):1800-1801.

Reynolds, C.A., M.S. Peng, S.J. Majumdar, **S.D. ABERSON**, C.H. Bishop, and R. Buizza, 2007: Interpretation of adaptive observing guidance for Atlantic tropical cyclones. *Monthly Weather Review*, 135(12):4006-4029.

Wu, C.-C., K.-H. Chou, P.-H. Lin, **S.D. ABERSON**, M.S. Peng, and T. Nakazawa, 2007: The impact of dropsonde data on typhoon track forecasts in DOTSTAR. *Weather and Forecasting*, 22(6):1157-1176.

*Names of AOML authors are in blue capital letters.

An AOML-authored paper appeared on the American Meteorological Society's "AMS Top 20" list for the most-viewed articles online during the month of October:

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.

Wang *et al.* discusses the role of the Atlantic warm pool in creating a favorable environment in the Caribbean for tropical cyclone development, as well as its impact on U.S. rainfall east of the Rocky Mountains.

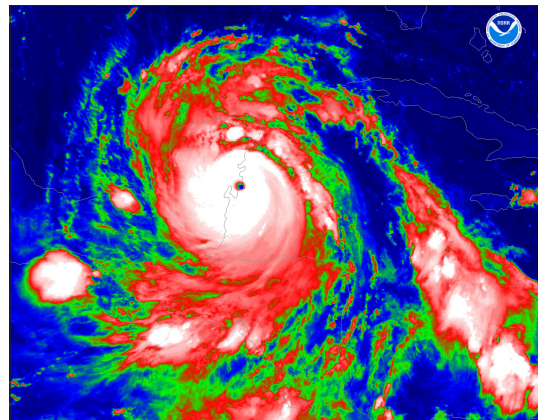
(continued from page 1)

All in all, three tropical depressions, one tropical storm, and one hurricane struck the United States. Tropical Depression Barry came ashore near Tampa Bay, Florida, on June 2nd; Tropical Depression Erin struck southeast Texas on August 16th; and Tropical Depression Ten came ashore along the western Florida panhandle on September 21st. Tropical Storm Gabrielle struck east-central North Carolina on September 9th, and Hurricane Humberto pummeled the upper Texas coast on September 13th.

NOAA's Climate Prediction Center will release an official summary of the 2007 Atlantic hurricane season in January 2008. NOAA will announce its 2008 hurricane outlooks for the Atlantic, East Pacific, and Central Pacific in May.

NOAA's Atlantic hurricane outlook is an official product of its Climate Prediction Center in collaboration with scientists at the National Hurricane Center, Hurricane Research Division (of AOML) and the Hydrometeorological Prediction Center.

Adapted from a November 29th online article appearing on the NOAA web site.



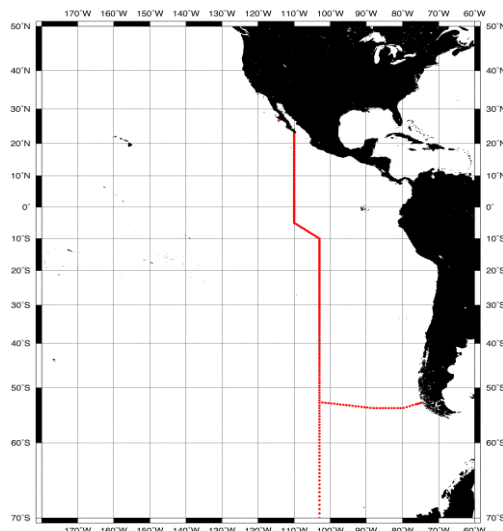
GOES-12 satellite image of Hurricane Dean making landfall along the Yucatan Peninsula near Costa Maya, Mexico on August 21st as a Category 5 storm with winds of 165 mph. Dean became the first hurricane, as well as first major hurricane (winds above 110 mph), of the 2007 Atlantic hurricane season.

Repeat Hydrography Cruise is Pacific Ocean Bound

Researchers with AOML's Physical Oceanography and Ocean Chemistry Divisions will be spending the holiday season aboard the NOAA Ship *Ronald H. Brown* studying chemical and physical changes in the Pacific Ocean as part of the Climate Variability and Prediction (CLIVAR)/CO₂ Repeat Hydrography Program. The CLIVAR/CO₂ effort is a systematic observational campaign of all major ocean basins focused on determining decadal changes in the ocean in response to climate change and input of anthropogenic carbon dioxide.

The program is a unique partnership of academic institutions and NOAA research laboratories with funding from the National Science Foundation and the NOAA Climate Observation Division. Robert Castle, Charles Fischer, Charles Featherstone, George Berberian, Carlos Fonseca, and Pedro Pena will be performing hydrographic, carbon, oxygen, and nutrient measurements in around-the-clock operations on a cruise that departed San Diego, California on December 12th and will arrive at Easter Island in mid-January.

They will be relieved for the second leg of the cruise by a team comprised of Natchanon Amornthammarong, George Berberian, Andrew Stefanik, and Kyle Seaton. The *Brown* will proceed from Easter Island to the ice edge of the Antarctic ice-shelf and finish in Punta Arenas, Chile on February 21, 2008. About 15 tons of scientific gear were trucked to San Diego after Thanksgiving in preparation for the cruise.



Track of the 2007-2008 CO₂ Repeat Hydrography Cruise from San Diego, California to the ice edge of Antarctica.

AOML Under Construction

AOML will undergo three major construction projects beginning in December, each expected to last several months and cause disruptions to both work spaces and work schedules.



- **Window replacement:** Plate-glass windows throughout the facility will be replaced with hurricane-resistant windows. Staff members are responsible for preparing their offices by moving furniture, books, papers, computer equipment, and personal effects at least three feet away from their windows. Visqueen plastic sheeting is available for use to cover and protect office areas from dust and debris.

- **Plumbing refit:** Galvanized piping throughout the facility will be replaced with copper pipe. This project is expected to generate loud drilling and hammering noise as contractors remove tile from floors and walls to access the piping. Staff members will need to use alternate bathrooms.

- **Asbestos abatement:** Asbestos-containing popcorn ceilings will be removed from the atrium areas on all floors. Drop ceiling tiles in offices, labs, and other areas will also be removed. Staff members will be required to vacate their offices for several days once abatement proceedings begin in their area; therefore, plans for alternative work sites must be determined in advance and essential items removed from offices.

Deputy Director, Judith Gray, will hold informal meetings at 12 noon in the first-floor conference room on most Fridays to provide progress updates. Additional information, including a tentative schedule of activities, can be found on the AOML intranet site at <http://nuwave/construction/construction.html>.

Global Ocean Observing Array Reaches Milestone

The Argo ocean observing network has reached its initial target of 3,000 robotic floats worldwide after eight years of deployments. By systematically measuring ocean temperature and salinity, Argo has already improved estimates and forecasts of sea level rise and is playing a key role in improving seasonal climate forecasts and giving new insight into hurricane activity.

“This is a major milestone as we expand our global earth observing systems,” said Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.) Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator. “NOAA is proud to be a partner in this international effort that will answer many of our planet’s climate and ocean questions and enrich our life through science.”

The free-drifting profiling floats measure the temperature and salinity of the upper 2,000 meters (about 6,000 feet) of the ocean. This allows, for the first time, continuous monitoring of the temperature, salinity, and velocity of the upper ocean, with all data being relayed and made publicly available within hours after collection.

NOAA is committed to maintaining one-half of the worldwide Argo network and supports the U.S. component of the international program. AOML serves as the Argo data center for the United States. NOAA’s Pacific Marine Environmental Laboratory in Seattle, Washington calibrates Argo floats before deployment and monitors quality control.

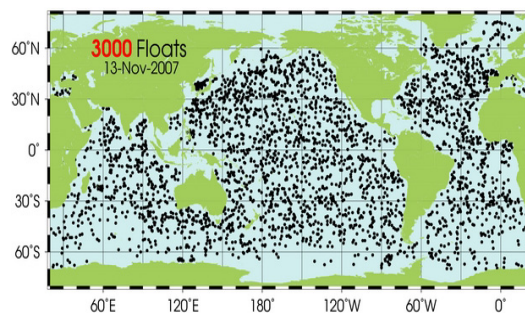
“Completion of the full implementation of the Argo float program is the first step in a truly global ocean observing system that will help warn society of threatening climate change,” said Dr. James Baker, former NOAA administrator. The Argo program began in 1998 during Baker’s tenure at NOAA. The Argo array has been deployed by collaboration of more than 30 countries and the European Union.

One benefit from Argo has been a reduction in the uncertainty of ocean heat storage calculations. These are a key factor in determining the rate of global climate warming and sea level rise, and in projecting their future progression. The steady stream of Argo data, coupled with global scale satellite measurements, has also made possible advances in the representation of the oceans in coupled ocean-atmosphere models, leading to seasonal climate forecasts and the routine analysis and forecasting of the state of the ocean below the surface.

Argo data are also being used in an ever-widening range of research applications that have led to new insights into how the ocean and atmosphere interact in extreme as well as normal conditions. Two examples are the processes in polar winters when the deep waters that fill most of the ocean basins are formed and, at the other temperature extreme, the transfer of heat and water to the atmosphere beneath tropical cyclones. Both conditions are crucial to global weather and climate and could not be observed by ships.

The Argo array is the centerpiece of the in-place ocean observing system promoted by the Joint Commission for Oceanography and Marine Meteorology, co-sponsored by the Intergovernmental Oceanographic Commission of UNESCO and the World Meteorological Organization. Argo is a pilot project of the Global Ocean and Climate Observing Systems.

Adapted from a November 2nd online article appearing on the NOAA web site.



Global distribution of Argo’s 3000 profiling floats

AOML, which serves as the U.S. Data Assembly Center for the international Argo program, conducts real-time quality control of raw float data obtained by satellite transmissions. The data are then distributed worldwide via the Global Telecommunications System and sent to the Global Argo Data Assembly Centers in Monterey, California and Brest, France.

Reef Fest Supports Conservation of South Florida Coral Reefs



Reef Fest is a non-profit venture to raise awareness and funds to help support coral reef conservation. Donations gathered at concert venues, nightclubs, and music festivals in south Florida and throughout the Caribbean on behalf of Reef Fest are directly deposited into a Reef Fest Fund administered by the National Fish and Wildlife Foundation.

The first Reef Fest event took place at the Hard Rock Cafe in Hollywood, Florida this past September. Reef Fest concerts will continue through 2008 in support of the International Year of the Reef.

At the end of 2008, funds gathered from locales that have supported Reef Fest will be distributed through peer-reviewed project awards to help the reefs in those areas.

Nova Southeastern University will host a Reef Fest "Summer Bash" at its University Center on July 5-6, 2008 as a kickoff event for the 11th International Coral Reef Symposium in Ft. Lauderdale, Florida on July 7-11.

Dr. Jim Hendee of AOML's Ocean Chemistry Division and NOAA's Coral Health and Monitoring Program originated the concept of Reef Fest in October 2006 and has led the effort to organize and promote concert events. Visit www.reeffest.org or www.myspace.com/reeffest for more information.

Collaborative CO₂ Study of Polar Oceans Begins

Scientists with the Ocean Carbon Group at AOML have established a collaboration with researchers at the Third Institute of Oceanography in Xiamen, China to study the carbon cycle in the Arctic and Antarctic oceans. The "Institutes" are Chinese federal environmental science agencies similar to NOAA.

A highlight of this endeavor has been the recent installation of an underway CO₂ system to measure surface water carbon dioxide levels, salinity, temperature, oxygen, and chlorophyll from aboard the Chinese icebreaker *Xue Long* (Snow Dragon). The effort was sponsored by NOAA's Polar Programs and the Office of Oceanic and Atmospheric Research. Dr. Wei-Jun Cai of the University of Georgia is also a partner in the collaboration that includes outreach, training, and scientific exchanges.

Installation of the complex system was performed by Kevin Sullivan, a CIMAS senior research associate, who visited Shanghai on October 17-31. Unfortunately, the *Xue Long* was undergoing major renovations during much of his visit. Sullivan and Yongchen Wang from the University of Georgia made the best of the delay by meeting with collaborating scientists at Xiamen University and the Third Institute of Oceanography.

The automated instrument was finally installed on Sullivan's last day in China. Data from the *Xue Long* are being transmitted to AOML daily via satellite and indicate that the system is working well. The Polar Research Institute of China (PRIC) operates the *Xue Long*, and administrators such as Liu Kefeng (pictured above at right) were helpful in assisting the scientific effort.



Kevin Sullivan of AOML with liaison officer Liu Kefeng of the Polar Research Institute of China in the science laboratory onboard the *Xue Long*. The newly installed CO₂ system appears in the background.

Happy Oktober'ween



AOML's annual Oktoberfest-Halloween party, delayed a few days due to the proximity of Tropical Storm Noel, featured a delectable assortment of goodies and traditional Oktoberfest cuisine.

Photos by Erica Rule

Congratulations

Sim Aberson, a meteorologist with AOML's Hurricane Research Division, was recently named by the National Academy of Sciences as a Kavli Frontier Fellow. He was one of approximately 100 invited participants that attended the 19th Kavli Frontiers of Science Symposium at the Academy's Beckman Center in Irvine, California. The event, held annually in November, brings together a broad range of leading young scientists under 45 years of age from industry, academia, and the federal sector to present and discuss their research. Aberson made a presentation about data obtained during a P-3 flight into Hurricane Felix in early September that was aborted due to extreme vertical motion, ice, and lightning in the eyewall.

Kathryn Sellwood, a CIMAS research associate with AOML's Hurricane Research Division, is the recipient of the 2007 Dean's Award from the University of Miami's Rosenstiel School for the best master's thesis of the year. *Can we predict the effect of observations for 3-6 day winter weather forecasts* explored how supplementary data obtained from strategic locations and added to forecast models can potentially improve the accuracy of 3-6 day winter weather forecasts.

Welcome Aboard

Cheryl Brown joined the staff of AOML's Ocean Chemistry Division (OCD) in October as a CIMAS research associate. Brown will provide support for the Florida Area Coastal Environment program, which seeks to improve understanding of the nearshore environment of Florida's southeastern coastal waters. She was previously an OCD staff member from 1988-1990. Brown recently returned from two years of service as a Peace Corps volunteer on Paama Island in the South Pacific archipelago of Vanuatu where she worked to promote environmental education and projects that protected both natural and cultural resources.

Thank You!

Thanks to the generosity of 34 donors, \$17,103.00 was raised in support of non-profit charitable groups and organizations during AOML's 2007 Combined Federal Campaign program.

Farewell

Dr. Peter Ortner, a supervisory oceanographer with AOML's Ocean Chemistry Division, retired in November after 30 years of federal service, all spent at AOML. Ortner joined the recently formed Ocean Chemistry Division in 1977 while still a doctoral student with the Woods Hole Oceanographic Institution. He subsequently earned a Ph.D. in biological oceanography from Woods Hole in 1978.

As a research oceanographer at AOML, Ortner's studies focused primarily on developing new optical and acoustic sampling techniques for larval fish and zooplankton. His studies also examined the chemical composition of seawater and its current structure as related to the movement and migration of these larval and zooplankton species. In pursuit of this research, Ortner participated in more than 80 investigative cruises, many as the chief scientist, in the Atlantic, Pacific, and Indian Oceans, Arabian and Caribbean Seas, Gulf of Mexico, and other areas. More recently, Ortner's studies have focused on the coastal ecosystems of south Florida, their restoration and management, and the potential anthropogenic impacts upon them as a result of burgeoning population growth and water management practices.

In 1992, Ortner obtained a J.D. degree in environmental law from the University of Miami's School of Law. He became the Director of the Ocean Chemistry Division in 1995. Following the retirement of former AOML Director Dr. Kristina Katsaros in 2003, Ortner's leadership skills were once again tapped as he assumed acting directorship of the Laboratory. In 2004, he was named AOML's Chief Scientist.

Although retired from federal service, Ortner will continue conducting research as a professor with the Department of Marine Biology and Fisheries at the University of Miami's Rosenstiel School. He will also serve as the new Associate Director of the University of Miami's Cooperative Institute for Marine and Atmospheric Studies.

Congratulations to Peter on his retirement from federal service and best wishes for his continued success.

Derrick Snowden, a physical scientist with the Physical Oceanography Division, departed AOML in November after nine years of service to the Laboratory. Snowden has accepted a position at NOAA Research headquarters in Silver Spring, Maryland as the Operations Officer for the Climate Program Office. His new duties include developing and maintaining tools to evaluate the effectiveness of the global ocean observing system, of which NOAA is one of the largest contributors.

While at AOML, Snowden was involved with all aspects of the data collection efforts for the Ship of Opportunity program, from planning and carrying out equipment installations to analyzing data and developing quality control procedures. Additionally, Snowden performed analysis on data related to subtropical cells and tropical Atlantic variability. He also participated in numerous field cruises, supporting the North Brazil Current Rings Experiment, the Subtropical Cells, and, more recently, the PIRATA (Pilot Research Moored Array in the Atlantic) Northeast Extension projects.

Although departed from Miami, Snowden will continue to work part-time for AOML until October 2008 to facilitate the transition process. His new responsibilities will be closely related to the various oceanographic observation projects he performed at AOML, and he will continue to collaborate with many AOML scientists.

It's a Girl!

Christopher Kelble, a CIMAS research associate with AOML's Ocean Chemistry Division, and his wife Amy are the proud parents of their first child, a daughter. Calla Naomi Kelble was born in Miami on November 30th at 9:20 in the morning. Mom, Dad, and baby Calla are all fine and doing well.



AOML Director Bob Atlas congratulates Peter Ortner during a retirement party held in his honor on November 30th.



Travel

Howard Friedman participated in the South Florida Federal Executive Board Strategic Planning Session in Key West, Florida on October 18-19, 2007.

Sim Aberson was an invited participant at the 19th annual Kavli Frontiers of Science Symposium hosted by the National Academy of Sciences in Irvine, California on November 8-10, 2007.

Reyna Sabina and Claudia Schmid attended the 8th Argo Data Management Team meeting in Hobart, Australia on November 14-16, 2007.

Chunzai Wang attended the Workshop on Western Tropical Pacific: Hatchery for ENSO and Global Teleconnections in Guangzhou, China on November 26-28, 2007.

Rick Lumpkin attended the Second International AMMA Conference on the West African Monsoon in Karlsruhe, Germany on November 26-30, 2007. He also served as a co-convenor at the Workshop on Ocean Velocity Measurements and their Applications in La Jolla, California on December 5-7, 2007.

Silvia Garzoli attended a Science Advisory Committee meeting of the Inter-American Institute for Global Change Research in Arlington, Virginia on November 28-29, 2007.

Rik Wanninkhof attended the 50th Anniversary of the Global Carbon Dioxide Record Symposium and Celebration in Kona, Hawaii on November 28-30, 2007.

Lewis Gramer, James Hendee, and Derek Manzello attended Think Tank #5: A Strategic Planning Session for Ocean Acidification Research in Little Cayman, Cayman Islands on December 3-7, 2007.

Denis Pierrot and Rik Wanninkhof attended the Third CarboOcean Annual Meeting in Bremen, Germany on December 4-7, 2007.

Robert Atlas, David Enfield, Sundararaman Gopalakrishnan, and Robert Rogers attended the 2007 Fall Meeting of the American Geophysical Union in San Francisco, California on December 10-14, 2007.

AOML
Holiday Party
December 18, 2007
Lobby—12:00 Noon
Bring a covered dish or dessert
to share with others
\$10.00 per person
(includes turkey, ham, chicken,
mashed potatoes, side dishes, and more...)
Featuring:
*Special visit by Santa
*Raffle drawing & prizes
*Music by Holiday Ensemble
To register contact:
Iran Castro—305-361-4420

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