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Keynotes

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The National Oceanic and Atmospheric Administration (NOAA) celebrates its 200th anniversary during 2007. To commemorate the milestone, NOAA will host a series of events and activities throughout the year to highlight its history of science, dedicated service, and stewardship to the nation.

NOAA's roots can be traced to the founding of the U.S. Coast and Geodetic Survey in 1807 by Thomas Jefferson (known then as the Survey of the Coast). The Weather Bureau was subsequently founded in 1870, and the U.S. Commission of Fish and Fisheries was founded a year later in 1871. The excellence of these three federal agencies for scientific accuracy and precision, service to protect life and property, and stewardship of resources were brought together in 1970 with the establishment of NOAA.

To learn more about NOAA's history and upcoming planned events, visit:

<http://celebrating200years.noaa.gov/>

CO₂ Sampling in Indian Ocean to Draw Decadal Picture

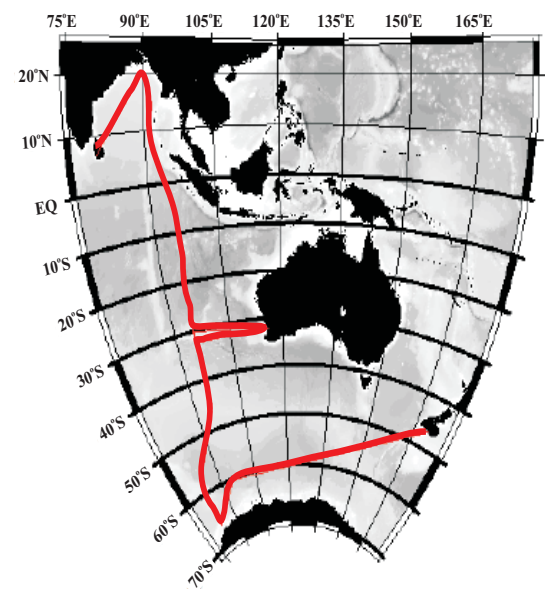
Members of AOML's CO₂ group and NOAA's Pacific Marine Environmental Laboratory joined investigators aboard the U.S. Navy research vessel *Roger Revelle* in February to participate in an Indian Ocean research cruise. The four-month long sampling effort will assess decadal changes that have occurred in the biogeochemical and physical characteristics of the ocean with a focus on quantifying the uptake of anthropogenic CO₂.

The *Revelle* departed New Zealand on February 3rd and cruised southwest to Antarctica where sampling began near the ice edge of the Southern Ocean. From this location, the *Revelle* will head north between 90-95°E longitude, stopping every 50 kilometers to gather a suite of carbon and hydrographic measurements. One port stop is planned for Perth, Australia. Sampling operations will conclude after the *Revelle* reaches the Bay of Bengal in early May.

The Indian Ocean cruise is part of the international, interdisciplinary program on Climate Variability and Predictability (CLIVAR), whose principal objective is improved climate predictive capability. Data from this cruise will be compared with results of sampling from a research cruise conducted from aboard the NOAA ship *Malcolm Baldrige* in 1995 that occurred in the same region.

Repeat occupations in the Atlantic and Pacific Oceans in the last four years have shown significant changes in carbon levels over the past decade due to the uptake of anthropogenic CO₂. The ocean acts as a large buffer for climate change effects, such as atmospheric temperature and CO₂ rise. It is, therefore, imperative to quantify this buffering effect through direct measurement of changing temperature and CO₂ levels in the ocean.

Anthropogenic changes in the ocean are often masked by large seasonal to interannual variability; thus, measurements spanning longer timescales are necessary. This investigation also includes actively studying the response of the ocean to increasing heat and carbon content such as ecosystem changes due to warming and ocean acidification. CLIVAR CO₂ cruises are the only way researchers are currently able to probe the deep ocean for changes in heat content and capture chemical changes in the entire water column.



Cruise track of the R/V *Roger Revelle* during its four-month sampling effort in the Indian Ocean.



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



Ocean Chemistry Division Welcomes New Director

A change of leadership has taken place within AOML's Ocean Chemistry Division. Dr. Tsung-Hung Peng, who had served as the Director of the Division for the past three years, stepped down from the position in December 2006 to return to his duties as a senior scientist with the Division. Dr. John Proni, leader of the Division's Coastal Environmental Group, has assumed the role of Director.



Tsung-Hung Peng



John Proni

Proni is a supervisory oceanographer with 35 years of research experience and expertise in ocean acoustics. He is currently overseeing field sampling studies designed to measure the impacts of treated wastewater effluent from subsurface plumes and dredged material discharges on the coastal ocean environment. Proni will serve as the Director for the Division until a more permanent director can be found; a recruitment process is expected to begin in the near future.

AOML commends Dr. Peng for his capable leadership and successful tenure as Director of the Ocean Chemistry Division.

2007 Federal Holidays

New Year's Day	January 1
Martin Luther King's BirthDay	January 15
Washington's BirthDay ...	February 19
Memorial Day	May 28
Independence Day	July 4
Labor Day	September 3
Columbus Day	October 8
Veterans Day	November 12
Thanksgiving Day	November 22
Christmas Day	December 25

FACE Cruise to Explore Effects of Wastewater Plumes

Investigators with AOML's Florida Area Coastal Environment (FACE) program will conduct the Florida Outfalls and Coastal Inlets Tracer Experiment cruise in late February. Two tracers, sulfur hexafluoride and rhodamine dye, will be used to examine the underwater plume generated by the South Central Wastewater Treatment Plant outfall pipe near Delray Beach, Florida. The pipe pumps millions of gallons of treated wastewater daily into the coastal ocean. The Boynton Inlet plume, located about 9 km north of the South Central outfall pipe, will also be studied.

Blooms of algae (e.g., *Lyngbya*, *Caulerpa*), as well as seasonal bleaching, have been observed on Gulf Stream Reef, located a mile offshore between the cities of Delray Beach and Lake Worth, Florida. These phenomena have been attributed by some observers to excess nutrients (nitrate, nitrite, ammonia) entering the coastal ocean through treated wastewater. In general, however, nutrients in the coastal ocean may be derived from many sources, including lagoon inlets, ground water seepage (i.e., septic tanks, fertilizers), oceanic upwelling, and atmospheric deposition. None of these possible nutrient sources have been adequately investigated in this area.

The FACE cruise will obtain a large number of chemical and physical measurements (including acoustic backscatter data) that will help define the two plumes both vertically and horizontally. The data will also help define the extent of the plumes in terms of concentration dilution due to mixing with ambient seawater. The impact of the plumes on the reef environment can then be estimated.

The sampling will take place from aboard the *Coral Reef II* and the *Cable*, a new NOAA small boat renovated by Joseph Bishop and LT Hector Casanova of AOML's Ocean Chemistry Division. The *Cable* is a 21-foot long vessel (6-foot width) that can accommodate a crew of four.



Photo by Jack Stamatias

Boynton Inlet in southern Palm Beach County will be used to access two nearby wastewater outfall pipes for sampling during the FACE cruise.



Photo by Tom Carsey

The R/V *Cable*, AOML's newest research vessel.

Coral Team Services La Parguera ICON Station

Members of AOML's Coral Health and Monitoring Program (CHAMP), along with Dr. Chris Langdon of the University of Miami's Rosenstiel School, serviced the Integrated Coral Observing Network (ICON) station in La Parguera, Puerto Rico this past December. While on site, the team retrieved and redeployed the station's electronics and satellite transmission assembly, as well as added a new pCO₂ sensor. The Submersible Autonomous Moored Instrument (SAMI) pCO₂ sensor provides hourly values of carbon dioxide concentrations measured in microAtmospheres. Data from the sensor are available on the CHAMP website at www.coral.noaa.gov.

The work was supported by collaborators at the University of Puerto Rico's Department of Marine Sciences, most notably Idelfonso Ruiz Valentin, who served as the boat operator for the team. 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 climatic conditions at coral reefs.



Mike Jankulak of AOML sits perched almost 20 feet above the ocean as he services the electronics at the La Parguera, Puerto Rico icon station.

Recent Publications*

ATLAS, R., S.-J. Lin, B.-W. Shen, O. Reale, and K.-S. Yeh, 2007: Improving hurricane prediction through innovative global modeling. In *Extending the Horizons: Advances in Computing, Optimization, and Decision Technologies*, E.K. Baker, A. Joseph, A. Mehrotra, and M.A. Trick (eds.). Springer, 1-14.

Ayina, L.-H., A. Bentamy, A.M. MESTAS-NUNEZ, and G. Madec, 2006: The impact of satellite winds and latent heat fluxes in a numerical simulation of the tropical Pacific Ocean. *Journal of Climate*, 19(22):5889-5902.

Chen, S.S., J.A. Knaff, and F.D. MARKS, 2006: Effects of vertical wind shear and storm motion on tropical cyclone rainfall asymmetries deduced from TRMM. *Monthly Weather Review*, 134(11):3190-3208.

Huang, X.-L., and J.-Z. ZHANG, 2006: Surfactant-sensitized malachite green method for trace determination of orthophosphate in aqueous solution. *Analytica Chimica Acta*, 580(1):55-67.

KELBLE, C.R., E.M. JOHNS, W.K. Nuttle, T.N. Lee, R.H. SMITH, and P.B. ORTNER, 2007: Salinity patterns of Florida Bay. *Estuarine, Coastal, and Shelf Science*, 71(1-2):318-324.

McArthur, J., S.J. STAMATES, and J.R. PRONI, 2006: Review of the real-time current monitoring requirement for the Miami Ocean Dredged Material Disposal Site. NOAA Technical Memorandum, OAR AOML-95, 17 pp.

Serafy, J.E., T.R. Caprio, and C.R. KELBLE, 2006: Live capture of larval billfishes: Design and field testing of the continuous access Neuston observation net (CANON). *Bulletin of Marine Science*, 79(3):853-857.

THACKER, W.C., 2007: Data assimilation with inequality constraints. *Ocean Modelling*, 16(3-4):264-276.

WANG, C., and S.-K. LEE, 2007: Atlantic warm pool, Caribbean low-level jet, and their impact on Atlantic hurricanes. *Geophysical Research Letters*, 34(2):L02703, doi:10.1029/2006GL028579.

*Names of AOML authors appear in capital letters.

Recent Meetings and Workshop Summaries

Chunzai Wang of AOML's Physical Oceanography Division co-convoked a special session entitled "Climate Variability over the Americas: Links with Oceans and Lands" at the American Geophysical Union's 2006 Fall Meeting in San Francisco, California this past December. Variability in the ocean and on land surfaces greatly influences (and is influenced by) climate variability over the Americas. The session provided a forum for discussion about recent progress in the knowledge and understanding of climate variability over the Americas including observational, numerical modeling, and theoretical studies. The main session focused on intraseasonal-to-decadal climate variations associated with ocean-atmosphere-land interactions, particularly on the climate impacts of the Pacific El Niño-Southern Oscillation, tropical Atlantic variability, Atlantic warm pool, and North Atlantic Oscillation.

Christopher Meinen and Silvia Garzoli of AOML's Physical Oceanography Division hosted a workshop at AOML devoted to decadal variability in the Atlantic on January 10-12, 2007. Participants included the Head of the NOAA Climate Office, Dr. Chet Koblinsky, and program managers from NOAA's Climate Program Office, NASA, and the U.S. CLIVAR Office (Drs. Jim Todd, Eric Lindstrom, and David Legler, respectively), as well as participants from numerous universities, AOML's Physical Oceanography and Ocean Chemistry Divisions, and other NOAA research laboratories. Plans were discussed for advancing the understanding of decadal variability in the Atlantic Ocean and for better physical attribution of signals that are being observed by the components of the Global Ocean Observing System in the Atlantic sector. This interagency group will be working together to produce a "road-map" for moving the U.S. research community forward towards the long-term goal of decadal prediction.

Robert Atlas, AOML Director, along with Peter Black, Howard Friedman, and Shirley Murillo of AOML's Hurricane Research Division, attended the 87th annual meeting of the American Meteorological Society in San Antonio, Texas on January 14-18, 2007. Atlas served as the program chairman for the 11th Symposium on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surfaces (IOAS-AOLS). The symposium was convened to explore the elements that integrate weather and science, and to strengthen the links between studies of weather and climate. Atlas also presented a paper on the relative impact of QuikScat and Windsat data on ocean surface analysis and forecasting. Black presented a paper at the 11th Symposium session on results from recent field experiments and their potential relevance to operational prediction. Friedman chaired the Atmospheric Observation session at the 11th Symposium. Friedman also received the Charles E. Anderson award during the Seventh Presidential Forum celebrating the observance of Martin Luther King, Jr., Day. Murillo, Chairperson of the AMS' Board of Women and Minorities, presented the award to Friedman. Murillo and Friedman attended the annual meeting of the AMS Education and Human Resources Commission and several meetings of the Commission's constituent boards. Murillo also chaired the K-12 and Popular Initiatives session of the 16th Education Symposium.

U.S. Department of Commerce Secretary Carlos Gutierrez participated in a NOAA Cooperative Conservation Listening session held at the University of Miami's Rosenstiel School on September 2006. Afterwards, he met with members of NOAA's Virginia Key science community. Pictured (from left to right) are: Dr. Eric Prince and Jennifer Schull of the Southeast Fisheries Science Center, AOML Director Dr. Robert Atlas, Secretary Carlos Gutierrez, and AOML Deputy Director Judith Gray.



February is National African-American History Month

Remembering "Vic"

The death of Vic Ooyama has been felt throughout the tropical meteorology science community. Several individuals have expressed their sense of loss, as well as their fond memories, for a friend and colleague who will be missed:

"He was one of our field's toughest and deepest thinkers about hurricanes and hurricane modeling. Vic made a huge impact on many of us in the hurricane research business and his papers will continue to inspire both young and old."

Dr. Michael Montgomery
Naval Postgraduate School

"The clarity of his thinking, speaking, and writing were unmatched. Having him in our group [at NCAR] elevated all who had the privilege of talking with him and absorbing his wisdom. He had more than unmatched scientific integrity, he had a way of exporting it to others, sometimes in memorable, even amusing ways."

Dr. Edward Zipser
Dept. of Meteorology, University of Utah

"Vic was on my thesis committee while I was a student at NYU. He was a world-class scientist whose research will live on in his papers and in the work of his students and colleagues."

Mr. Howard Friedman
AOML Hurricane Research Division

"He was a great meteorologist and a great man. He will be sadly missed."

Dr. John McBride
Bureau of Meteorology, Australia

"His brilliance and the science I learned from him, both from reading his seminal papers and from stimulating conversations, will always be remembered with gratitude and appreciation."

Mr. Michael Black
AOML Hurricane Research Division

"Dr. Ooyama is highly appreciated in Japan too. Although he left the Japan Meteorological Agency (JMA) about 50 years ago, I believe that he greatly contributed to the numerical weather prediction at the JMA, as well as the meteorological research in Japan."

Dr. Nobutaka Mannoji
Japan Meteorological Agency

"Dr. Ooyama's research will continue to inspire new research at AOML for many years to come."

Dr. Robert Atlas
AOML Director

AOML Mourns Loss of Former Hurricane Research Division Scientist

AOML was recently saddened by the death of Dr. Katsuyuki Ooyama, also known as "Vic" Ooyama, a former long-time senior scientist with the Hurricane Research Division. Ooyama died unexpectedly of an aortic aneurism at his home in Penfield, New York, on December 19, 2006. He was 77 years old.

Ooyama began his career as a meteorologist in the early 1950s at the Japan Meteorological Agency. He immigrated to the United States in 1955 to attend New York University. By 1958, he had obtained both a master's degree and doctorate in meteorology and began employment with the University as a research scientist in the Department of Meteorology and Oceanography. He was subsequently made an assistant, associate, and full-fledged professor of meteorology, specializing in the study of tropical cyclones and cumulus parameterization.

In 1973, he departed New York University to work at the National Center for Atmospheric Research in Boulder, Colorado. Ooyama became part of a research team focused on the field program planning, execution, data quality control, and data analysis of the Global Atmospheric Research Program's Atlantic Tropical Experiment (GATE). GATE, conducted in 1974, was a massive, complex international experiment aimed at advancing the understanding of the tropical atmosphere and its role in global circulation. Ooyama worked tirelessly for several years to develop a new statistical interpolation technique to synthesize upper air sounding data collected during GATE from a wide array of observing systems. The dataset he helped create became the definitive dataset used almost universally.

Ooyama joined AOML's Hurricane Research Division in 1980 as a senior research scientist. During his 23 years with the Division, he tackled a variety of challenges related to improving the understanding of tropical cyclones, particularly the application of advanced numerical methods to three-dimensional modeling. Ooyama published three landmark papers on numerical modeling that earned him three NOAA distinguished authorship awards.† These publications, regarded as major contributions to the science of tropical meteorology, influenced and inspired a new generation of tropical cyclone modelers.

His development of scale-controlled objective analysis methods based on b-splines became the foundation for many of the numerical applications developed at HRD, e.g., the barotropic tropical cyclone track model (VICBAR and LBAR), the hurricane spline analysis used in the hurricane wind analysis system (H*WIND), and a non-hydrostatic model used by many colleagues. Ooyama retired from federal service in 2003 but continued collaborating with colleagues and conducting research. His last published paper appeared in the January 2006 issue of the *Journal of Atmospheric Sciences* (Hausman *et al.*, 63(1):87-108).

During a distinguished science career that spanned more than five decades, Ooyama was the recipient of many awards including the American Meteorological Society's Meisinger Award and the Meteorological Society of Japan's Fujiwara Award. He was also an honorary member of the Meteorological Society of Japan and a Fellow of the American Meteorological Society.

Ooyama will long be remembered by friends, colleagues, and former students not only for the depth of his knowledge and wisdom, but also for the generosity and skill he possessed in sharing it with them. His family has established the Dr. K. Vic Ooyama Scholarship Fund with the American Meteorological Society. The annual scholarship will be awarded to undergraduate seniors studying tropical meteorology. Ooyama is survived by Yoko, his wife of 53 years, son Robert, daughter Clara, and five grandchildren.

†Ooyama, K.V., 1982: Conceptual evolution of the theory and modeling of the tropical cyclones. *Journal of the Meteorological Society of Japan*, 60:369-380.

Ooyama, K.V., 1987: Scale-controlled objective analysis. *Monthly Weather Review*, 115(10):2479-2506.

Ooyama, K.V., 1990: A thermodynamic foundation for modeling the moist atmosphere. *Journal of the Atmospheric Sciences*, 47(21):2580-2593.



Dr. Katsuyuki Ooyama
1929-2006

Welcome Aboard

Dr. Shane Elipot joined the staff of AOML's Physical Oceanography Division in January as a National Research Council post-doctoral fellow. He will work with Dr. Rick Lumpkin in studying the global distribution of rotary motion in the upper ocean as a function of frequency using position data from satellite-tracked surface drifters, and with an emphasis on identifying the wind-driven component of this motion. Elipot obtained a doctoral degree in physical oceanography from the Scripps Institution of Oceanography in October 2006.

Shaun Dolk joined the staff of AOML's Physical Oceanography Division in January as a CIMAS research associate. Dolk will work in the Division's Drifter Operations Center where he will be involved with Argo float deployments in the Atlantic Ocean. He received a B.S. degree in biology with a minor in chemistry from the University of New Mexico in 2003.

It's a Girl!

Eric Uhlhorn, a meteorologist with AOML's Hurricane Research Division, and his wife Susan are the proud parents of their first child, a daughter. Elizabeth Martha Uhlhorn was born on December 17, 2006 in Miami and weighed in at 6 lbs. 3 oz. Mom, Dad, and baby Lizzie are all doing well.



CPR/First Aid Training*



February 27, 2007

Cardiopulmonary Resuscitation
9:00 a.m. – 12:30 p.m.

First Aid
1:30 p.m. – 4:00 p.m.

First-Floor Conference Room

Contact Nancy Ash to register
or for more information

305-361-4544

Nancy.Ash@noaa.gov

*Sponsored by the American Red Cross

Congratulations

Howard Friedman, Deputy Director of AOML's Hurricane Research Division, is the 2007 recipient of the American Meteorological Society's (AMS) Charles E. Anderson Award. Friedman received the award at the 87th Annual Meeting of the American Meteorological Society in San Antonio, Texas in January.

The Charles E. Anderson Award is given to individuals in recognition of their outstanding contributions to the promotion of diversity in the atmospheric and related sciences and broader communities through education and community service. The citation for Friedman's award, presented as an inscribed wooden book, reads: "For his sustained commitment to fostering inclusiveness and diversity in all its forms within the atmospheric sciences."

Gloria Lockett, a mathematician with AOML's Hurricane Research Division assigned to the Storm Surge Group at the National Hurricane Center/Tropical Prediction Center in Miami, retired in December 2006 after 32 years of federal service. During Lockett's years with the Division, she worked extensively with the SLOSH (Sea Lake Overland Storm Surge from Hurricanes) computer model, performing calculations and analyses to obtain estimated values of storm surge heights associated with tropical cyclones.

SLOSH data are used in forecasts and warnings during hurricane season, as well as by Federal Emergency Management Agency (FEMA) officials in their post-hurricane assessment reports. For her efforts in providing real-time potential storm surge height values during the recordbreaking 2005 hurricane season, Lockett was named NOAA's January 2006 employee of the month. Best wishes to Gloria for a well deserved retirement.



Photo courtesy of AMS

Howard Friedman was presented the Charles E. Anderson Award in January at the 87th Annual Meeting of the American Meteorological Society (AMS). Shirley Murillo, a meteorologist with AOML's Hurricane Research Division and the current chairperson of the AMS Board on Women and Minorities, presented the award to Friedman, along with AMS President Dr. Franco Einaudi.



AOML staff members, their families, and friends were given a close-up, behind-the-scenes tour of Miami International Airport's air traffic control tower operations on January 6th. Thanks to Ramon Hurlockdick (pictured far left) for organizing this event.

Travel

Bob Atlas, Peter Black, Howard Friedman, and Shirley Murillo attended the American Meteorological Society's 87th Annual Meeting in San Antonio, Texas on January 14-18, 2007.

John Proni attended the Gulf of Mexico Alliance Nutrients Criteria Conference in Gulf Breeze, Florida on January 16-18, 2007.

Rik Wanninkhof attended the Joint Canada-Mexico-USA Carbon Program Planning Meeting in Colorado Springs, Colorado on January 21-24, 2007.

David Enfield attended a meeting of the Editorial Committee for the journal *Aqua-LAC* of the International Hydrological Programme of UNESCO in Montevideo, Uruguay on January 22-23, 2007.

Silvia Garzoli was an invited guest aboard the *Semester At Sea's* 2007 All-Voyage Reunion cruise from Fort Lauderdale, Florida to Freeport and Nassau, Bahamas on January 25-29, 2007.

Bob Atlas attended the Office of Oceanic and Atmospheric Research's (OAR) Senior Research Council meeting, the OAR/National Marine Fisheries Service Summit, and the NOAA Senior Executive Service Summit in Chantilly, Virginia on January 22-26, 2007.

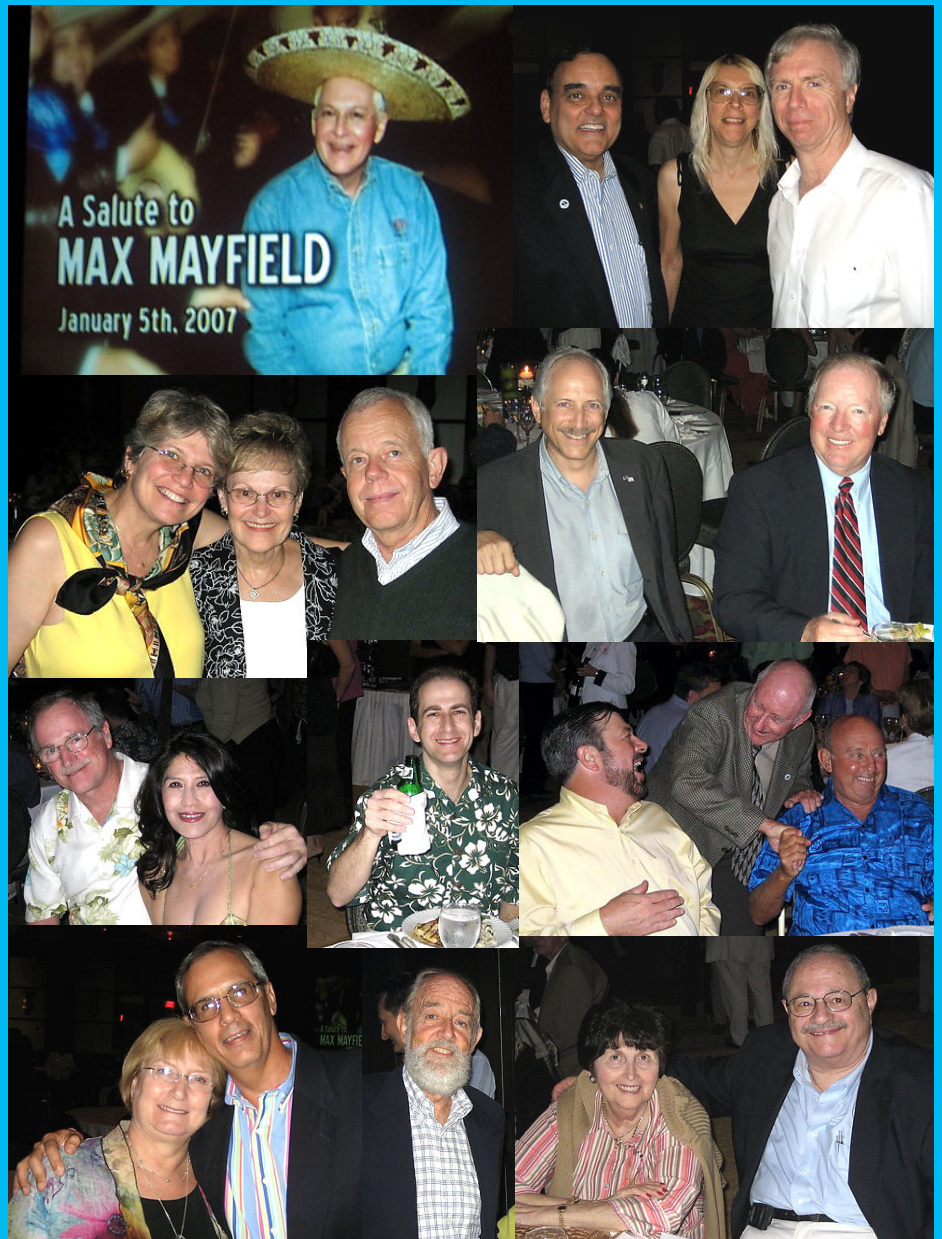
Jules Craynock attended a NOAA Diving Safety Board meeting in Key West, Florida on January 29-February 2, 2007.

Judith Gray attended a SECOORA (Southeast Coastal Ocean Observing Regional Association) business planning meeting in Savannah, Georgia on January 31, 2007.

Kelly Goodwin attended and made a presentation at the American Society of Limnology and Oceanography's Aquatic Sciences meeting in Santa Fe, New Mexico on February 4-9, 2007.

Natchanon Amornthammarong, Joseph Bishop, Thomas Carsey, Jules Craynock, Shailer Cummings, Paul Dammann, Charles Featherstone, Esa Peltola, Denis Pierrot, Christopher Sinigalliano, Jack Stamates, and Kevin Sullivan participated in a research cruise of the Florida Area Coastal Environment (FACE) Program offshore of Delray Beach and Boynton Beach, Florida on February 21-March 2, 2007.

FAREWELL TO MAX MAYFIELD



National Hurricane Center Director Max Mayfield retired from federal service in early January 2007. A farewell party at Miami's Intercontinental Hotel was held in his honor on January 5th. Several AOML staff members attended to wish Max well in his retirement.



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

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