AOML Keynotes

July-August 2009 | Atlantic Oceanographic and Meteorological Laboratory | Volume 13, Number 4

Ocean Surface Wind Product Derived from Satellite Data

A new ocean surface wind product developed by a team of researchers led by AOML Director Dr. Bob Atlas can be accessed from the Physical Oceanography Distributed Active Archive Center (PO.DACC). The cross-calibrated, multi-platform (CCMP) data set is available at three levels of processing—3.0, 3.5, and 2.5—that can be downloaded from the PO.DACC web site for a broad array of meteorological and oceanographic applications (http://podaac.jpl.nasa.gov/DATA_CATALOG/ccmpinfo.html).

The main data set, level 3.0, provides a long-term, uniform record of global ocean surface winds every 6 hours at 25-km resolution that extends from 1987 to 2008. It was created through the use of an enhanced variational analysis method (VAM). The VAM quality controls and combines satellite-derived wind speed radiometer (SSM/I, AMSR-E, TMI) and wind vector scatterometer (QuickSCAT, ADEOS-2) observations with wind data from ships and buoys, along with analyses provided by the European Centre for Medium-Range Weather Forecasts.

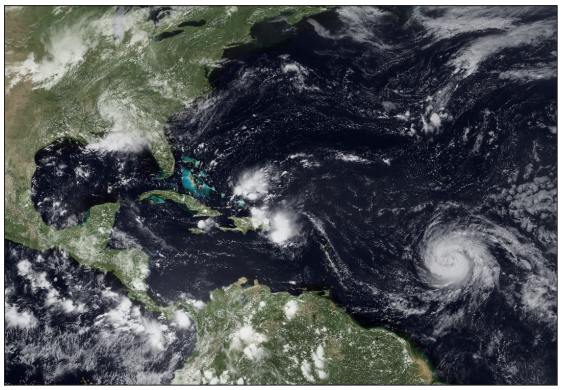
The level 3.5 data set is derived by averaging the level 3.0 data over five-day and monthly intervals, while the level 2.5 data set provides wind directions to the level 3.0 input radiometer wind speed observations.

Wind data from future satellite missions will be added to the CCMP data set as they become available to extend the data record and keep it current. The project was supported by NASA's MEaSUREs (Making Earth System data records for Use in Research Environments) program.

NOAA Predicts Fewer Storms for 2009 Hurricane Season

An El Niño developing in the equatorial Pacific Ocean has prompted NOAA to lower the number of named storms it predicts will form during the 2009 Atlantic hurricane season. NOAA's updated seasonal hurricane outlook, released in early August, predicts seven to 11 named storms will develop before the season ends on November 30th. Three to six named storms will become hurricanes, with one to two hurricanes becoming major hurricanes with winds above 110 mph (categories 3, 4, and 5 on the Saffir-Simpon hurricane scale).

In May, NOAA predicted nine to 14 named storms would develop, with four to seven storms strengthening into hurricanes and one to three storms becoming major hurricanes. An average hurricane season produces 11 named storms with six hurricanes and two major hurricanes (see table below).



GOES satellite image of the 2009 Atlantic hurricane season's first three named storms—Ana, Bill, and Claudette—as they appeared on August 17th. Remnants of Tropical Storm Claudette can be seen over the Florida panhandle and Alabama; Ana, downgraded to a tropical depression, is near Puerto Rico; and Hurricane Bill, the season's first hurricane, is west of the Lesser Antilles.

El Niño events, marked by warmer than average sea surface temperatures in the Pacific Ocean, impact weather on a global scale. They have been shown to curb hurricane activity in the Atlantic basin by increasing vertical wind shear, which can hinder the ability of storms to develop and/or intensify. The current El Niño is expected to last into the winter months of 2009-2010.

Coastal communities are nevertheless urged to remain vigilant and to have hurricane plans in place to protect both life and property. The majority of the season's storms are forecast to develop during August-October, the peak period for hurricane activity.

NOAA's seasonal hurricane forecasts, issued annually since 1998, are a collaborative effort of a team of specialists with the Climate Prediction Center, National Hurricane Center, and Hurricane Research Division of AOML.

NOAA's 2009 Atlantic Hurricane Season Outlooks

Type of Activity	August Update	May Outlook	Average Season
Named Storms	7-11	9-14	11
Hurricanes	3-6	4-7	6
Major Hurricanes	1-2	1-3	2

Miami experienced hazy conditions for several days in early July as a large cloud of Saharan dust moved through the area and blanketed the city. The dust was transported from the west coast of Africa across the Atlantic Ocean over a seven- to ten-day period courtesy of a hot, dry layer of air known as the the Saharan Air Layer (SAL). The Saharan dust is visible in the above photograph as the hazy white fog surrounding the cloud. Thomas Hinson, one of AOML's 2009 summer interns working with the Hurricane Research Division (HRD), snapped the above photograph while at AOML. Miami experienced record-breaking high temperatures, and afternoon thunderstorms were few and far between. Recent research by HRD scientists suggests that the SAL's dry air, strong winds, and suspended dust may have a suppressing influence upon the development and intensity of tropical cyclones.

TROPICAL WEATHER DISCUSSIONS

FIRST FLOOR CONFERENCE ROOM

WEEKDAYS - 12:30 P.M.

Florida Coastal Waters Assessed for Microbial Contaminants

Chris Sinigalliano, Environmental Microbiology Program, Ocean Chemistry Division

Staff with the Environmental Microbiology Program at AOML participated in a research cruise along the Florida Gulf coast on July 17-28th hosted by the University of Miami's Center for Excellence in Oceans and Human Health. AOML's microbiologists joined with researchers from the University of Miami's Rosenstiel School (RSMAS) aboard the R/V *F.G. Walton-Smith*. The cruise was conducted to investigate the environmental factors that contribute to the incidence of harmful algal blooms (HABs) in the Gulf of Mexico along Florida's coastal shelf. Land-based sources of microbial contaminants to the coastal environment were also examined.

HABs develop when algae, phytoplankton, or cyanobacteria multiply rapidly. The dense aggregations they form can have detrimental effects upon fish, marine mammals, and humans. HABs have been implicated in incidences of marine mass mortality events and shellfish poisoning.

During the 12-day cruise, ocean sediment was collected and examined for the presence of toxic dinoflagellate cysts that potentially contribute to HABs. Tissue from a wide variety of fish and marine invertebrates was examined for cyanobacterial toxins. Ground-based investigations of suspected algal blooms were conducted, as indicated by satellite remote sensing, to serve as "ground-truthing" for satellite-based algal bloom detection.

Water samples were collected from Port Charlotte to Florida Bay to test for harmful algal blooms, nutrient loads, and microbial contaminants including fecal indicators and pathogens. Samples were also collected on several small-boat missions along the Caloosahatchee, Shark, and Peace Rivers. Seaweed and seagrass samples were genetically analyzed, and a large portion were found to contain fecal indicators, suggesting that contaminated macrophyton might play a role as non-point sources of indicators for recreational coastal waters and beaches.

Dr. Larry Brand of RSMAS served as the chief scientist. AOML researchers included Drs. Chris Sinigalliano and Maribeth Gidley, graduate student Diana Aranda, and undergraduate student Jakub Bartkowiak. AOML technician David Wanless provided laboratory support during the cruise, as well as field transportation of personnel and equipment between AOML and Fort Myers, Florida, where the *Walton-Smith* docked for sample exchange.

Funding for the effort was provided by the National Science Foundation.

AOML student researcher Jakub Bartkowiak collects surface water samples and floating macrophyton (seaweed) samples to test for harmful algae and land-based sources of fecal indicators and pathogens.

Chief Scientist Dr. Larry Brand (RSMAS) and AOML Microbiology Lab technician Diana Aranda prepare to deploy a MOCNESS (Multiple Opening and Closing Net, with an Environmental Sensing System) plankton tow device to investigate and ground-truth potential toxic algal blooms, as indicated by satellite remote sensing.

A small boat crew departs the R/V *F.G. Walton-Smith* for water quality assessment of the Shark River discharging to the southwest Florida Gulf coast and to collect samples for harmful algae, indicator, and pathogen analysis. Shown from left to right are RSMAS researchers, Drs. Mariana Framinan and Maria Josefina Olascoaga, and AOML environmental public health physician Dr. Maribeth Gidley.

Common Access Cards

New identification badges known as Common Access Cards have become a requirement for all employees working onsite at Federal facilities, as specified by Homeland Security Presidential Directive 12 (HSPD-12) signed into law by former President George W. Bush in August 2004. Current NOAA identification badges do not satisfy HSPD-12 requirements and will become obsolete on December 31, 2009.

All AOML employees—Federal, CIMAS, and contractors—must obtain Common Access Cards at their earliest convenience. These new cards must be worn alongside existing NOAA identification badges until the NOAA badges are phased out.

Common Access Cards can be obtained at the following locations:

U.S. Coast Guard
Integrated Support Command
100 MacArthur Causeway
Miami, FL 33139
305-535-4598 (call for appointment)

U.S. Army Garrison
8300 N.W. 33rd Street
Miami, FL 33122
(No appointments, walk-ins only)

Two forms of personal identification must be presented:

- Florida state-issued document, e.g., Florida driver's license.
- Social security card, passport, birth certificate, or voter registration card.

For purposes of time and attendance, travel involved in obtaining a Common Access Card is considered work time. Please inform Ruth Almonte of AOML's Administrative Group (305-361-4367) when you have obtained a Common Access Card so your name can be added to AOML's weekly compliance reports.

Little Cayman Island Coral Observing Station Goes Live

Researchers with AOML's Ocean Chemistry Division, NOAA's International Activities Office, and the Central Caribbean Marine Institute (CCMI) launched a new coral reef monitoring station offshore of Little Cayman Island in July. The new station brings to fruition a seven-year effort between NOAA and CCMI to install a coral monitoring platform within Bloody Bay Marine Park. The Park was designated a marine protected area more than 25 years ago and serves as a habitat for a diverse assortment of fish and coral species.

Efforts to position, securely anchor, and vertically align the Little Cayman pylon were completed in early July.

The Little Cayman station is situated in 22 feet of water a short distance from the Little Cayman Research Centre. The Centre is an educational field facility of CCMI that's located in an isolated area with a sparse human population (~150 people) and easy access to both the shallow and deep coral reefs of Bloody Bay Marine Park.

On July 22nd, the station began transmitting data following the installation of a suite of atmospheric and oceanic sensors positioned along the station's 38-foot-long pylon. AOML's Mike Jankulak installed the electronics and atmospheric sensors at the top of the station, while Jim Hendee and Derek Manzello of AOML installed the subsurface oceanic sensors.

The Little Cayman ICON station with all of its atmospheric and oceanic sensors installed and functioning.

The new station is now part of NOAA's Integrated Coral Observing Network (ICON)—a collection of environmental monitoring platforms—that gather near real-time data for assessing the health of coral reefs. Other ICON sites are located in the Bahamas, St. Croix (U.S. Virgin Islands), and Puerto Rico.

ICON stations measure a wide range of local conditions (e.g., sea and air temperature, wind speed, wind gusts, wind direction, barometric pressure, precipitation, ultraviolet radiation, photosynthetically available radiation, and salinity) that are transmitted to AOML via satellite for processing by expert systems that use artificial intelligence technology. The data are then posted to NOAA's Coral Health and Monitoring Program web site (www.coral.noaa.gov) for use by researchers, marine-protected area personnel, fisherman, local boaters, and divers.

Derek Manzello, Mike Jankulak, and Jim Hendee of AOML, along with Jennifer DuPont from NOAA's International Activities Office, were all part of the team that helped implement the Little Cayman ICON station.

Data from the Little Cayman ICON station will also be supplied to the Cayman Islands Weather Service to improve the accuracy of its forecasts and to NOAA's National Weather Service. Additional sensors may likely be added to the station in the future to assist researchers with tracking environmental changes over the long term.

Funding for the station was provided by the government of the Cayman Islands, CCMI, NOAA's Coral Reef Conservation Program, and AOML.

Instruments Deployed in Support of Hurricane Operations

Three acoustic wave and current (AWAC) sensors were deployed in the Gulf of Mexico south of Mobile Bay, Alabama, by researchers with AOML's Ocean Chemistry Division on July 3rd. The sensors were mounted on the ocean floor in water depths ranging from 85-110 meters as part of a cooperative effort with the University of South Alabama.

Data from the sensors will aid in examining the impact of tropical cyclones and frontal passages on wave spectra and sea-surface height. The current deployment marks the third year the sensors have been used for data-gathering purposes during hurricane season. AOML staff will recover the sensors from the Gulf of Mexico in November 2009.

A pre-season survey of the Gulf of Mexico and its associated Loop Current using the NOAA P-3 aircraft was performed by AOML's hurricane researchers on July 16th. The mission included deployment of various airborne ocean profiling instruments that measure temperature, pressure, and salinity (AXBTs, AXCPs, and AXCTDs). The instruments were deployed to map the upper portion of the Loop Current circulation in the vicinity of a bottom-mounted instrument array of inverted echo sounders placed by the Mineral Management Service.

Data from the instruments will provide the initial conditions for AOML's ocean models to be run this summer as part of the demonstration phase of NOAA's Hurricane Forecast Improvement Project. Two University of Miami Rosenstiel School scientists and one of AOML's Hollings scholars working with the Hurricane Research Division this summer joined AOML scientists on the mission.

AOML Recycles...

- Aluminum
- Batteries
- Cardboard
- Glass
- Paper
- Plastic

TSG Operations Enhance Global Data Collection Efforts

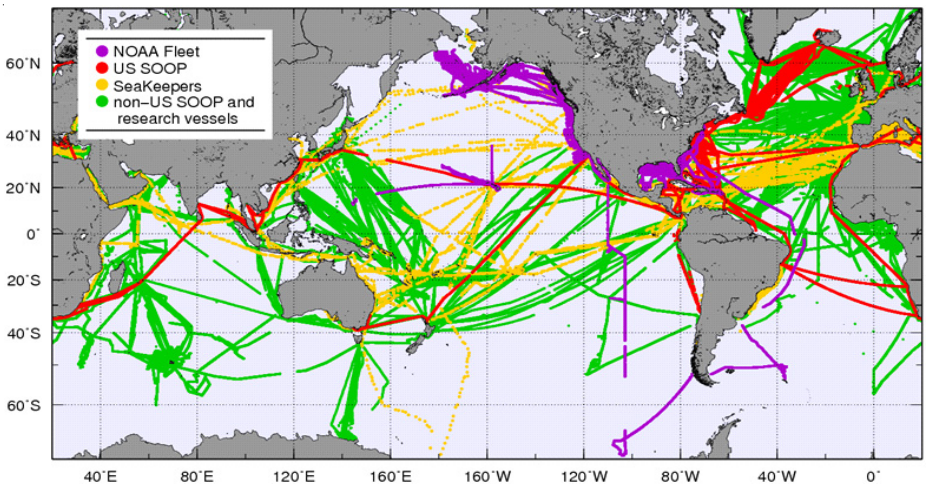
Francis Bringas and Gustavo Goni, Physical Oceanography Division

The thermosalinograph (TSG) operation is one of the components of the Ship of Opportunity Program (SOOP) at AOML, and has been producing oceanographic observations since 1991. TSGs are instruments that continuously measure sea surface temperature and sea surface salinity along a ship's cruise track. Research vessels gather TSG observations from various regions of the global ocean, while ships of opportunity—cruise and cargo vessels—obtain long time series of temperature and salinity data from frequently-repeated transects.

TSG observations from ships of opportunity and research vessels have been the foundation for understanding long-term changes in marine climate and are essential input to climate and weather forecast models.

AOML's TSG operations are based on obtaining data from NOAA's fleet of research vessels, as well as from ships of opportunity. Data are received in real-time mode, typically one file per day containing 24 hours of data, and are subjected to quality-control procedures.

Quality-control approved TSG records are distributed on the Global Telecommunication System (GTS) in real-time. The data are archived at the National Oceanographic Data Center (NODC) in Silver Spring, Maryland and the French Research Institute for Exploration of the Sea (IFREMER) in Brest, France. AOML is currently extending its quality-control procedures to develop a mechanism for automatically detecting equipment malfunctions and the need for instrument calibration.



Global distribution of TSG observations obtained from ships of the NOAA fleet, SOOP, SeaKeepers, and other non-U.S. SOOP and research vessels since 2001.

The graphic above shows the location of TSG observations produced by AOML and other institutions since 2001. TSG observations obtained from the NOAA fleet are predominantly gathered off U.S. coastal regions and represent more than 5.5 million records, of which more than 35% are located at latitudes above 45°. TSG observations obtained from ships of opportunity comprise more than 4.6 million records in the Atlantic Ocean, with almost 1 million records obtained at high latitudes.

The TSG data set, particularly high latitude observations, will soon be of great importance for two upcoming satellite missions. Salinity data at high latitudes will be crucial for validating and calibrating sea surface salinity fields obtained from the European Space Agency's SMOS (Soil Moisture and Ocean Salinity) mission, scheduled for launch in November 2009, and NASA's Aquarius mission, scheduled for launch in 2010.

SOOP's TSG observations have many applications including their use in climate and ocean dynamics research, determination of boundary regions in ocean currents, and as input for climate and weather forecast models. A large portion of the TSG operation also supports efforts to globally inventory carbon dioxide in the oceans, a project led at AOML by Dr. Rik Wanninkhof. TSG data have enhanced global data collection efforts for close to 20 years and have been critical to understanding long-term changes in the marine environment.

Congratulations

Zachary Gruskin, a long-time student intern with AOML's Hurricane Research Division (HRD), is the recipient of two scholarships as he begins his freshman year this fall at the University of Wisconsin. Gruskin, who began working with HRD scientists in 2003 as a 13-year old summer student volunteer, has been awarded a 2009 Freshman Undergraduate Scholarship from the American Meteorological Society. He has also been awarded the Theodore Herfurth Scholarship from the College of Letters and Science at the University of Wisconsin in Madison where he will major in meteorology.

Ramon Hurlockdick, an information technology specialist with AOML's Office of the Director, is NOAA's first full-time permanent federal employee selected to participate in the Office of Oceanic and Atmospheric Research's (OAR) Graduate Studies Program. The new OAR program aims to augment the scientific and technological skills, knowledge, and abilities of recipients by aiding their efforts to attend graduate study programs at accredited educational institutions. Through the support provided by OAR, Hurlockdick will pursue a doctorate in information systems at Nova Southestern University in Fort Lauderdale, Florida on a full-time basis for a one-year period.

Kevin Sullivan of AOML/CIMAS (above, center) visited China on June 27-July 4, 2009 to service an automated CO_2 system installed on the Chinese icebreaker *Xue Long* (Snow Dragon) as part of the SINO-U.S. collaboration in Arctic science sponsored by NOAA's Arctic Research Climate Program Office. Sullivan trained scientists of the 3rd Institute of Oceanography and Xiamen University in the use of a CO_2 data reduction program with an advanced graphical interface developed by Dr. Denis Pierrot of AOML/CIMAS. The training, attended by 10 scientists and graduate students, facilitated a knowledge transfer in CO_2 analysis, enabling Chinese scientists to contribute to international coordination efforts such as the Surface Ocean CO_2 Atlas (SOCAT) organized by the International Ocean Carbon Coordination Project (IOCCP.)

Welcome Aboard

NOAA Corps officer LT Hector Casanova returned to AOML in August to become the Laboratory's new Associate Director. Among his duties, Casanova will oversee facility maintenance operations, coordinate ship time aboard NOAA research vessels, and assist with dive missions. Casanova was previously assigned to AOML from 2004-2007 to provide support for the Ocean Chemistry Division. Prior to his arrival at AOML, Casanova served as the Operations and Executive Officer aboard the NOAA Ship *Gordon Gunter* stationed in Pascagoula, Mississippi.

Caridad Gonzalez joined the staff of AOML's Physical Oceanography Division in July as a CIMAS research associate to provide support for the Division's global oceanographic data collection efforts through the Ship of Opportunity Program. Gonzalez will work mainly on maintaining and upgrading the SEAS2000 software used to acquire and transmit data obtained from oceanographic instruments. She holds a B.S. degree in computer science and mathematics from the University of Havana in Havana, Cuba.

AOML's 2009 summer student interns, guided by mentors with the Hurricane Research (HRD), Ocean Chemistry (OCD), Physical Oceanography (PhOD), and Computer Networks and Services (CNSD) Divisions, performed a wide range of tasks in support of the Laboratory's research programs. Below is a listing of AOML's hard-working students and their mentors:

Kaniel Bramnick, Home-school student ..... Stanley Goldenberg (HRD)
Jonathan Davis, University of Miami ..... Thomas Carsey (OCD)
David DeMaria, Florida State University ..... Kathryn Sellwood (HRD)
Zachary Gruskin, University of Wisconsin ..... Robert Rogers (HRD)
Andres Hajjar, MAST Academy ..... Ulises Rivero (PhOD)
Pong-Ravee Halelamien, Ransom Everglades High School ..... Andrew Stefanick (PhOD)
Katherine Haralson, MAST Academy ..... Gustavo Goni (PhOD)
Thomas Hinson, Pennsylvania State University ..... Robert Rogers (HRD)
Evan Kalina, Florida State University (**Hollings Scholar**) ..... Joseph Cione (HRD)
Alice Licinio, Ransom Everglades High School ..... Andrew Stefanick (PhOD)
Marcos Mirabent, Edward Pace High School ..... John McKeever (CNSD)
Thomas Philp, University of Sheffield ..... Sim Aberson (HRD)
Carl Schroedl, Chapman University ..... Derek Manzello (OCD)
Heather Winter, University of Oklahoma (**Hollings Scholar**) ..... Sim Aberson (HRD)

AOML hosted a pizza party on June 30th to welcome its summer student interns to their new work environment. Student interns from NOAA's National Marine Fisheries Service, National Hurricane Center, and Aircraft Operations Center were also invited and in attendance.

Travel

Kevin Sullivan serviced an automated CO_2 system aboard the Chinese icebreaker *Xue Long* and trained scientists and graduate students in Xiamen, China on June 27-July 4, 2009.

Molly Baringer, Silvia Garzoli, Gustavo Goni, and Christopher Meinen attended a RAPID-South Atlantic Meridional Overturning Circulation meeting in Paris, France on June 30-July 4, 2009.

Molly Baringer and Christopher Meinen attended a RAPID-MOCHA (Meridional Overturning Circulation and Heatflux Array) meeting in Edinburgh, Scotland on July 6-9, 2009.

Rik Wanninkhof was an invited attendee at the Decadal Variations of the Ocean's Interior Carbon Cycle: Synthesis and Vulnerabilities Symposium in Ascona, Switzerland on July 13-17, 2009.

David Enfield and Christopher Meinen attended the U.S. CLIVAR Summit in Annapolis, Maryland on July 15-17, 2009.

Jack Stamates attended and made a presentation at the Coastal Zone 2009 Conference in Boston, Massachusetts on July 19-23, 2009.

George Halliwell, Carlisle Thacker, and Haoping Yang attended the MOCA-09 Joint Assembly in Montreal, Canada on July 19-24, 2009.

Jules Craynock, James Hendee, and Michael Jankulak completed the installation of a new Integrated Coral Observing Network (ICON) station offshore of Little Cayman Island in the Cayman Islands on July 20-24, 2009.

Sundararaman Gopalakrishnan made invited presentations at the University of Waterloo and the Canadian Meteorological and Oceanographic Society in Toronto, Canada on July 29, 2009.

Bob Atlas visited NASA's Jet Propulsion Laboratory in Pasadena, California on July 30-31st, attended the Optical Engineering and Applications Symposium in San Diego, California on August 2-6th, and presented a seminar at the University of California-Los Angeles on August 10, 2009.

Recent AOML Publications*

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*The names of AOML authors appear in bolded blue capital letters.

Keynotes is published bi-monthly by the Atlantic Oceanographic and Meteorological Laboratory to promote the research activities and accomplishments of staff members. Contributions 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).

Editors – Robert Atlas/Judith Gray

Publishing Editor/Writer – Gail Derr

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