



# AOML Keynotes

ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORY

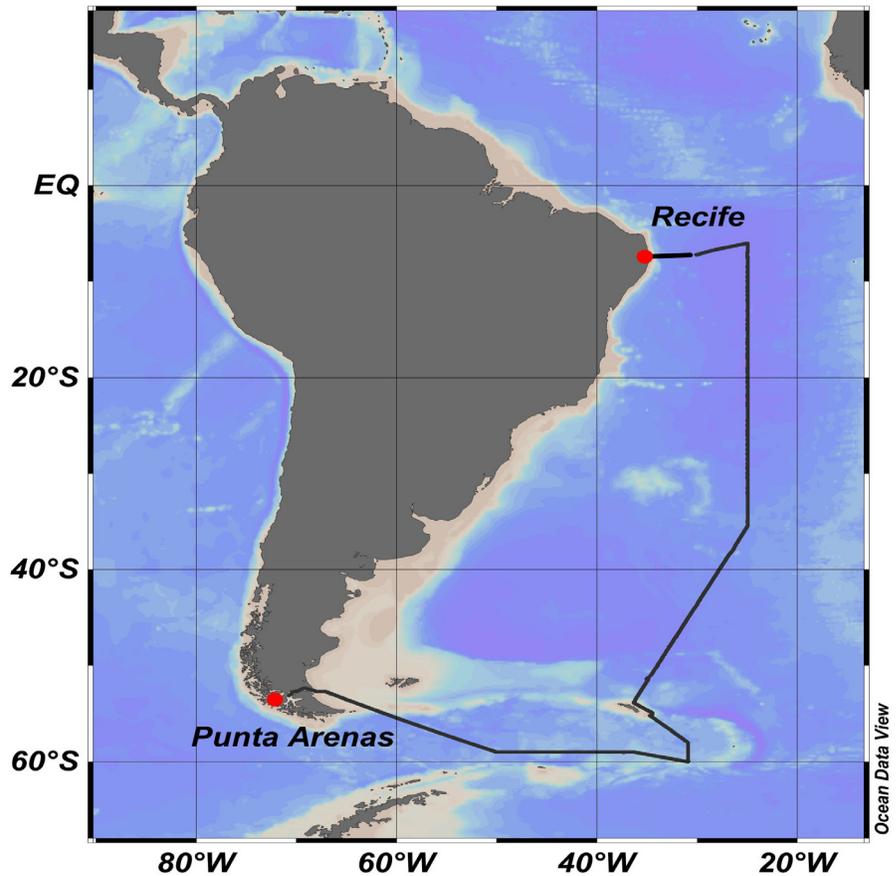
AOML is an environmental laboratory of NOAA's Office of Oceanic and Atmospheric Research on Virginia Key in Miami, Florida

## A16S Repeat Hydrography Cruise Tracks Climate Change in the South Atlantic

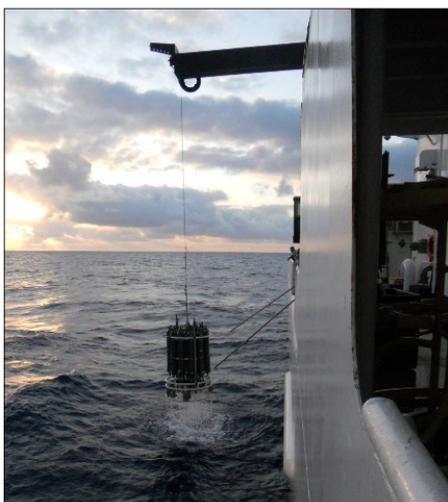
Scientists from two NOAA research laboratories and eight academic institutions embarked upon a 6000-mile journey through the South Atlantic in December as part of an international effort to reoccupy select transects of the world's oceans at approximately 10-year intervals. The cruise aboard the NOAA Ship *Ronald H. Brown* from 6-60°S was undertaken in support of the Global Ocean Sustained Hydrographic Investigation Program (GO-SHIP).

GO-SHIP focuses on the need to monitor inventories of carbon dioxide, heat, and freshwater and their transport in the oceans on a decadal basis. The A16S transect was previously occupied in 1989, 1991, and 2005.

The *Brown* departed Recife, Brazil on December 23rd for the GO-SHIP A16S repeat hydrography cruise. Drs. Rik Wanninkhof and Leticia Barbero of AOML's Ocean Chemistry and Ecosystems Division served as chief and co-chief scientists. AOML scientists Robert Castle, Charles Fischer, Jay Hooper, and Andrew Stefanick were also aboard the *Brown* as part of the scientific team.



Track of the A16S repeat hydrography cruise from Recife, Brazil to Punta Arenas, Chile. Researchers gathered samples from the balmy tropical seas of the South Atlantic to the frigid, turbulent waters of the Southern Ocean.



The 2000-pound CTD/rosette package is lifted out of the water after its journey to the deep.

During the transect through the South Atlantic, researchers deployed a CTD (conductivity-temperature-depth)/rosette package every 30 nautical miles to gather seawater samples from the ocean surface to the bottom. Once back on deck, the water was sampled for more than a dozen chemicals, ranging from classic oceanographic parameters such as salinity and oxygen, to more esoteric compounds such as tritium and Freon. Each serves a unique purpose in characterizing the ocean, its biogeochemical cycles, and changes thereof. In total, 113 CTD stations were completed and 14 Argo profiling floats were deployed.

The A16S cruise ended with the *Brown's* arrival in Punta Arenas, Chile on February 4, 2014. During their 43 days at sea, researchers observed a continued heating of deep water in the Brazil/Argentine basin, accelerating changes in inorganic carbon both from anthropogenic sources and natural variability, decreasing oxygen in the thermocline, and clear plumes of iron and aluminum inputs from the shelves of the South Georgia/Sandwich Islands. More findings are anticipated after final analyses and quality control of the data are completed.

The A16S cruise was jointly sponsored by the National Science Foundation and NOAA.

# Pulley Ridge Biophysical Connectivity: Project Update

The Connectivity of the Pulley Ridge and the South Florida Coral Reef Ecosystem investigative study aims to shed light on the physical and biological connectivity between Pulley Ridge, a mesophotic (light-limited, ~60-80 meters deep) reef located west of the Dry Tortugas, and the shallower reefs of the Dry Tortugas and Florida Keys National Marine Sanctuary.

Ryan Smith and George Halliwell of AOML's Physical Oceanography Division, both members of the project's physical oceanography subgroup, participated in the Third Annual Pulley Ridge All-PI meeting held at the University of Miami's Rosenstiel School (UM/RSMAS) on January 7-8, 2014.

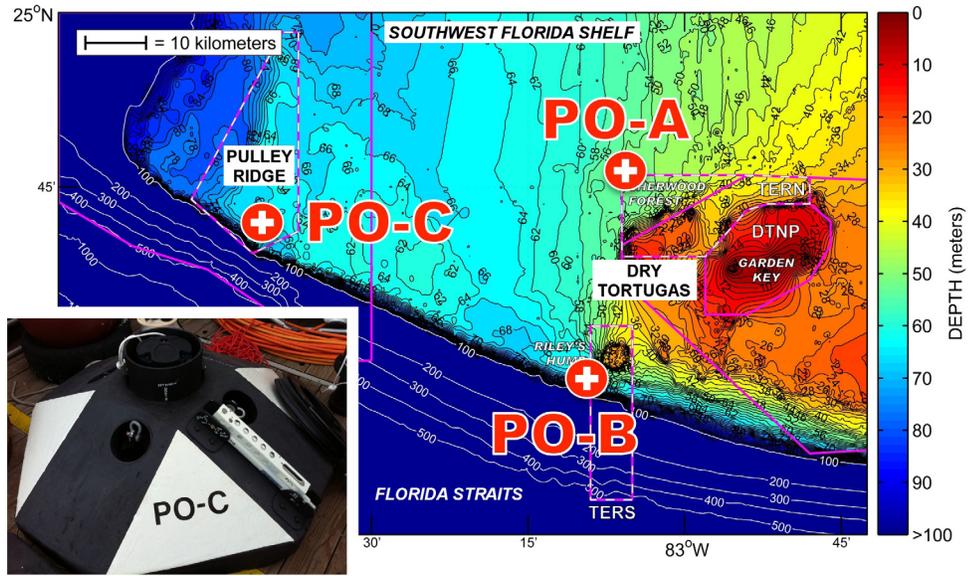


Figure 1. The three project physical oceanography moorings are located at the sites indicated (red circles). Each mooring contains an acoustic Doppler current profiler and a temperature salinity recorder (inset). Moorings will be recovered in August 2014, and should ultimately yield a 2-year time-series for each location. This array is the first of its kind for this region.

The subgroup is responsible for the collection and analysis of in situ current meter observations at Pulley Ridge and in the Dry Tortugas (Figure 1) and for the development of a regional model (Figure 2). Other subgroup partners include Villy Kourafalou (UM/RSMAS) and Arnoldo Valle-Levinson (University of Florida).

A preliminary analysis of current velocity time-series, recently recovered from project moorings, was presented at the meeting. These in situ records revealed direct Loop Current influence over the Southwest Florida Shelf at Pulley Ridge and the Dry Tortugas for an extended period between mid March 2013 and mid August 2013. This event decreased the

directional variability of the measured flow and increased current speeds, enhancing physical connectivity between the two sites. Initial results from the project's extended Florida Keys (eFKEYS) HYCOM model agree well with these moored observations.

This 5-year project, funded by NOAA's Center for Sponsored Coastal Ocean Research (CSCOR), is led by the University of Miami, and involves scientists from multiple universities, AOML, and two NOAA Cooperative Institutes: the Cooperative Institute for Marine and Atmospheric Studies (CIMAS) and the Cooperative Institute for Ocean Exploration Research and Technology (CIOERT).

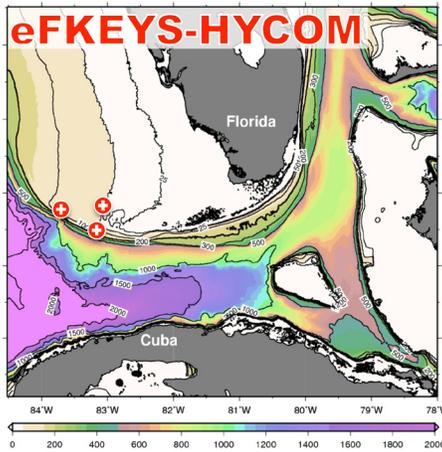


Figure 2. The extended Florida Keys (eFKEYS) HYCOM domain is shown. Adapted from the FKEYS HYCOM, this new version of the model extends further west to cover the Pulley Ridge, is nested within the GOM-HYCOM, and has a horizontal resolution up to 900 m (with 26 layers). Mooring locations are also indicated (red circles).

## NOAA Gulfstream-IV Tail Doppler Radar Ready for 2014 Hurricane Season

Engineers at NOAA's Aircraft Operations Center have completed final assessment of the tail Doppler radar (TDR) system on the Gulfstream-IV (G-IV) jet aircraft, and NOAA is now ready to observe tropical systems during the 2014 hurricane season using the G-IV TDR.

Scientists with AOML's Hurricane Research Division played a critical role in the development of the G-IV TDR. Specifically, they: (1) examined data, looked for problems, and reported their findings to NOAA and a contractor; (2) modified existing airborne Doppler quality control and analysis software to work with the newer data formats and antennas aboard the G-IV; and (3) evaluated strategies for the best use of the G-IV TDR data.

TDR data were collected in six tropical systems during the 2012 and 2013 Atlantic hurricane seasons. Fixes have been made to address various issues found in those data, and quality-controlled Doppler velocities and three-dimensional wind analyses were produced. As part of (3), HRD scientists made the requests for the G-IV flights into Gabrielle and Ingrid to evaluate the TDR for observing tropical cyclones.

Files of G-IV quality-controlled Doppler radial velocities were produced in flight during the 2013 hurricane season. The 2014 files will be transmitted in real time and made available for assimilation into NOAA's Hurricane Weather Research and Forecasting (HWRF) model. The high-resolution, three-dimensional images these data provide should improve the initial conditions of HWRF, resulting in improved hurricane intensity forecasts.



NOAA's Gulfstream-IV jet aircraft showing the exposed antenna plates for the tail Doppler radar instrument.

## AOML Mourns the Loss of Dr. Peter Rona, Former Marine Geophysicist

Dr. Peter Rona, an internationally renowned scientist and former marine geophysicist at AOML, died on February 19th from complications due to multiple myeloma. He was 79 years old.

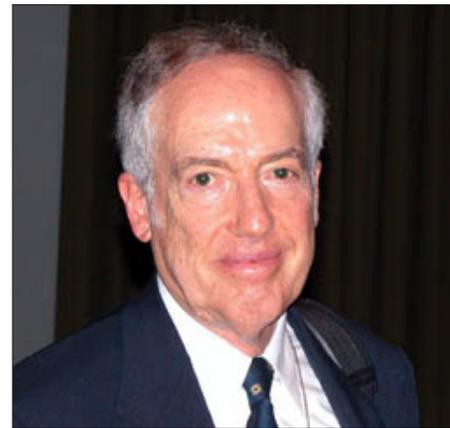
Peter worked as a senior researcher at AOML with the Marine Geology and Geophysics and Ocean Chemistry Divisions from 1969 to 1994. During his 25 years at AOML, he was a pioneer in the exploration of the deep sea floor and of hydrothermal mineral deposits at oceanic ridges. Peter studied ocean ridge crest processes and seafloor hydrothermal systems on numerous research cruises in the Atlantic and Pacific oceans.

He was a frequent diver in submersible vehicles and used acoustic methods to image, three-dimensionally reconstruct, and quantify hydrothermal plumes and diffuse flow.

In 1985, Peter led the expedition that discovered the first active submarine hydrothermal field at a slow-spreading oceanic ridge in the Atlantic, the Trans-Atlantic Geotraverse (TAG) Hydrothermal Field, as well as an array of unique, then unknown, marine life forms.

Peter retired from federal service in 1994 to become a professor of marine geology and geophysics at Rutgers University. For nearly 20 years he taught oceanography courses, mentored students, and continued research on a diverse number of projects.

Throughout his career, Peter was the recipient of numerous awards and honors including a Department of Commerce Gold Medal for exceptional scientific contributions related to his research on hydrothermal venting, a Francis P. Shepard Medal for Excellence in Marine Geology,



Dr. Peter A. Rona

and the Hans Pettersson Bronze Medal of the Royal Swedish Academy of Sciences.

He was a fellow of numerous scientific societies and a prolific author, with more than 250 published scientific papers to his credit.

## Data Pod System Undergoes Deep Water Testing in Florida Straits

On January 15th, staff from AOML's Physical Oceanography Division deployed a key prototype instrument system during a research cruise aboard the RV *F.G. Walton Smith*. Called the "Adaptable Bottom Instrument Information Shuttle System (ABISS)," or "data pod system" for short, this instrument package is designed to inexpensively move data from bottom-mounted oceanographic instruments to the surface and back to land via satellite.

The ABISS system has been under development at AOML for several years, and this prototype deployment about 20 miles east of Miami in the Straits of Florida is the first deep water test of the data pod system. For this test, the ABISS system is connected to an Inverted Echo Sounder (IES), and the instrument package will rest on the bottom of the Straits at approximately 800 meters depth for six months while the IES makes hourly measurements.

At predetermined intervals, the ABISS system will release expendable "data pods" that will float to the surface and transmit the data from the IES to land via the Iridium satellite network. The first data pod successfully surfaced and transmitted its data on February 14th. If all continues to go well, after the final data pod has been released the ABISS control

system and the IES will be recovered for future use.

Once fully developed and tested, the ABISS system will quickly be of significant benefit to two AOML projects: the Western Boundary Time Series project and the Southwest Atlantic MOC project.

ABISS will have additional beneficial applications to outside projects in the Southern Ocean, Indonesian Through-flow, and more. Further information about the ABISS data pod system can be found at [www.aoml.noaa.gov/phod/instrument\\_development/abiiss/index.php](http://www.aoml.noaa.gov/phod/instrument_development/abiiss/index.php).



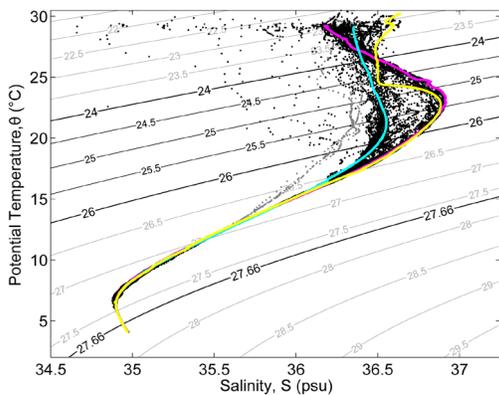
Scientists with AOML's Physical Oceanography Division deploy the ABISS package in the Straits of Florida from aboard the RV *F.G. Walton Smith*.

# AOML-SEFSC Deepwater Horizon “Far Field” Research Published

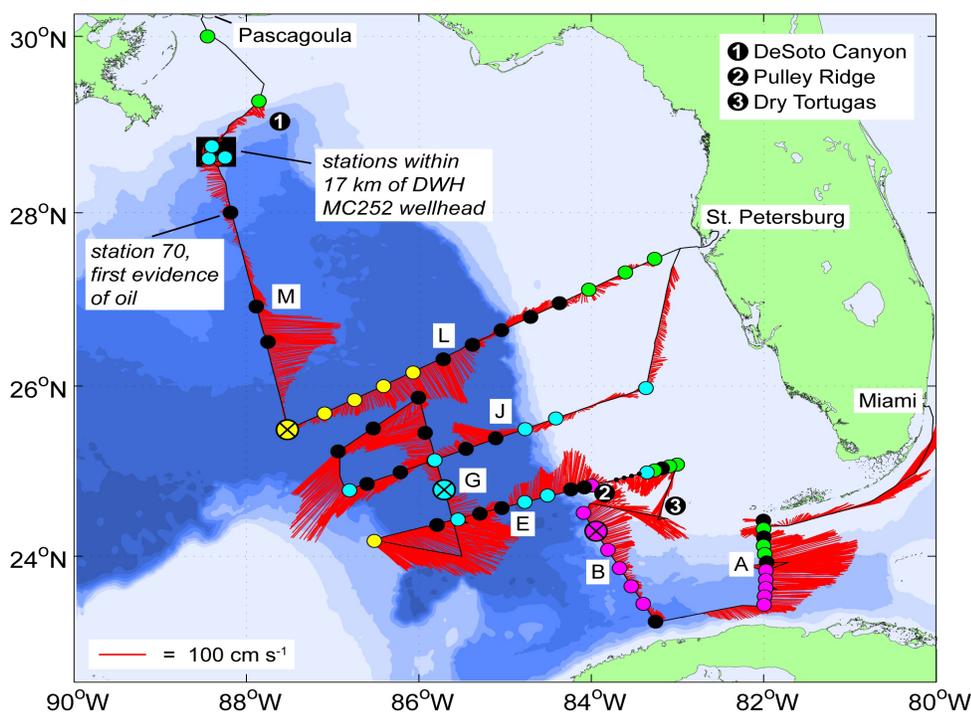
Results from partnered research conducted by AOML and NOAA’s Southeast Fisheries Science Center (SEFSC) in response to the 2010 Deepwater Horizon oil spill were recently published in *Continental Shelf Research*.<sup>\*</sup> AOML and SEFSC scientists report on the surface and subsurface connectivity across the eastern Gulf of Mexico during July 2010.

While oil was still flowing from the Macondo well following the Deepwater Horizon (DWH) platform explosion on April 20, 2010, drifter trajectories, satellite observations, and numerical simulations indicated a potential for direct connectivity between the northern Gulf of Mexico (GOM) and the Florida Straits via the Loop Current (LC) system. This pathway could have potentially entrained particles, including northern GOM contaminants related to the oil spill, carrying them directly towards the coastal ecosystems of south Florida and northern Cuba. To assess this connectivity, and to evaluate the potential oil impacts on economically important GOM fisheries, AOML and SEFSC scientists conducted an interdisciplinary survey across the eastern GOM during July 2010 aboard the NOAA Ship *Nancy Foster*.

The collected hydrographic data provided important in situ information about the surface and subsurface currents and water properties associated with the LC, the large anticyclonic Loop Current Ring (LCR) known as “Eddy Franklin” (EF), numerous cyclonic eddies, and the surrounding coastal waters of the GOM. Variations in the subsurface potential tem-



**Figure 1.** Relationship of potential temperature ( $\theta$ ) to salinity (S) for CTD profiles collected during the survey is shown over contours of constant  $\sigma_{\theta}$  (in  $\text{kg m}^{-3}$ ). Three prototypical profiles, selected from stations conducted during the July survey, have been highlighted: Gulf Common Water (GCW, blue), Loop Current Water (LCW, magenta), and Eddy Franklin Core Water (EFCW, yellow). Profile data collected between  $24.0 \leq \sigma_{\theta} \leq 26.0$  were used in the cast classification.



**Figure 2.** In situ surface current velocity from ADCP (red vectors) and CTD station markers are shown for the July 2010 survey. Marker colors indicate the station  $\theta$ -S profile classification as either GCW (blue), LCW (magenta), EFCW (yellow), Coastal Shelf Water (green), or mixed-interleaved (black). Stations lacking waters denser than  $\sigma_{\theta} = 24.0 \text{ kg m}^{-3}$  are shown as small black dots. Prototype profile locations are indicated by an “x” and an enlarged marker. Letters identify selected sections along the cruise track.

perature ( $\theta$ ) and salinity (S) relationships recorded during 73 conductivity, temperature, depth (CTD) casts were used to assess the level of physical connectivity across the survey region and to determine the degree of mixing and interleaving between the major circulation features.  $\theta$ -S signature groupings (Figure 1) were evaluated in combination with geostrophic surface currents derived from satellite altimetry and in situ current velocity fields obtained from lowered and hull-mounted acoustic Doppler current profilers (ADCP, 0- 2000 m). When the spatial distribution of the  $\theta$ -S signature groupings is combined with ADCP derived current vectors, the location of the various signature types in relation to the surface velocity associated with each circulation feature becomes evident (Figure 2).

Project analyses confirmed that by July 2010 a large LCR had become separated from the main LC by a cyclonic eddy, resulting in the loss of a direct transport mechanism from the northern GOM to the Florida Straits, leaving only indirect pathways available to potential contaminants. Additionally, with the exception of four

hydrographic stations occupied within 84 km of the wellhead, no evidence of oil was found during the survey on the surface or within the water column. These results corroborated analysis of satellite altimetry observations of the GOM surface circulation and verified official surface oil coverage forecasts where they intersected with the survey track. This cruise sampled the LC, LCR, and frontal eddies to a depth of 2000 m, with the results suggesting that any oil entrained by circulation features in prior months had either been weathered, consumed by bacteria, dispersed to undetectable levels, or was only present in unsurveyed areas.

The assembled subsurface measurements represent one of only a few data sets collected across the dominant GOM mesoscale circulation features at a time when there was great concern about the potential long-range spreading of DWH related contaminants. Direct observations such as these are critical for the assessment of particle trajectory and circulation models used during the spill, and for the improvement of future numerical forecast products.

<sup>\*</sup>Smith, R.H., E.M. Johns, G.J. Goni, J. Trinanes, R. Lumpkin, A.M. Wood, C.R. Kelble, S.R. Cummings, J.T. Lamkin, S. Privoznik, 2014: Oceanographic conditions in the Gulf of Mexico in July 2010, during the Deepwater Horizon oil spill. *Continental Shelf Research*, Available online 28 December 2013, ISSN 0278-4343, <http://dx.doi.org/10.1016/j.csr.2013.12.009>.

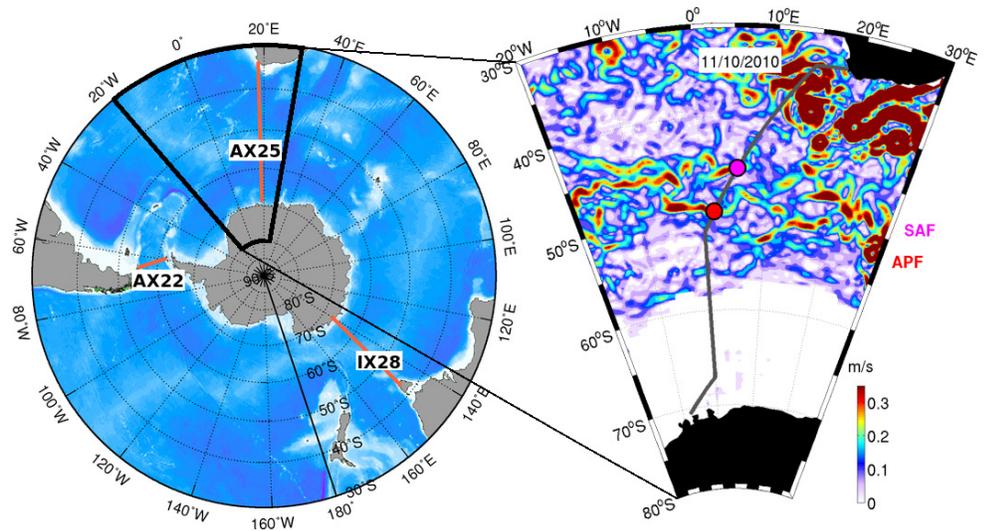
# Study Provides New Insights on the Antarctic Circumpolar Current

A study on the Antarctic Circumpolar Current (ACC) by researchers with AOML's Physical Oceanography Division and the Marine Research Institute of the University of Cape Town has been published online by the *Journal of Geophysical Research*.\* In this study, the authors used data from the AX25 repeat expendable bathythermograph (XBT) transect (which runs from South Africa to Antarctica) with hydrographic and satellite observations to assess the link between local wind forcing mechanisms, the variability in upper ocean temperatures, and the dynamics of the different fronts in the ACC region south of South Africa.

The authors report a mechanism by which local winds alter the structure of the ACC flow in the region. These changes in the local ACC structure were found to be due to anomalies of opposite signs in the transport of the Subantarctic Front (SAF) and Antarctic Polar Front (APF) caused by latitudinal shifts of the westerlies.

For example, during positive phases of the Southern Annular Mode, the southward displaced westerlies drive an intensification of the APF transport and a weakening of the SAF transport.

These results demonstrate that the structure the ACC transport can be longi-



**Left:** Location of the three repeat XBT transects (AX25, AX22, and IX28) in the Southern Ocean that measure the temperature of the upper ocean. **Right:** Altimetry-derived magnitude of surface geostrophic currents for November 10, 2010, showing the multi-front signature of the ACC, from which the Subantarctic Front and Antarctic Polar Front are highlighted. Overlaid is the location of AX25 transect (gray line) and the location of these two fronts on November 10, 2010 (shaded markers).

tudinally modulated by local winds, even though the net transport of this current is set by integrated winds over the Southern Ocean. This mechanism may have potential implications for the Atlantic-Indian ocean heat and mass exchanges, because

the SAF and APF carry water masses with different properties. Results obtained highlight the importance of repeat XBT temperature sections and their combined analysis with other in situ and remote sensing observations.

\*Domingues, R., G. Goni, S. Swart, and S. Dong, 2014: Wind forced variability of the Antarctic Circumpolar Current south of Africa between 1993 and 2010. *Journal of Geophysical Research*, Available online 18 February, <http://dx.doi.org/10.1002/2013JC008908>.

Researchers with AOML's Physical Oceanography Division are preparing to lead a multi-institutional project that will start this summer and involve the deployment of underwater gliders in the Caribbean Sea and tropical North Atlantic Ocean. These autonomous underwater vehicles measure a wide range of ocean parameters in real time such as temperature, salinity, oxygen, and current velocity. The project will last two years and its main goal is to provide targeted upper ocean observations to improve tropical cyclone intensification and seasonal forecasts.

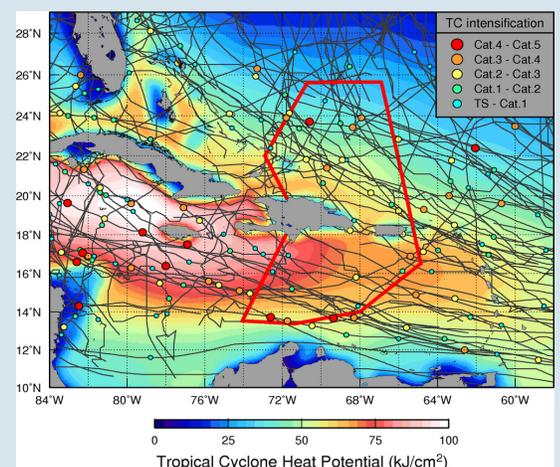
The thermal structure of the upper ocean in the Caribbean Sea/tropical North Atlantic has been linked to the rapid intensification of tropical cyclones and to seasonal Atlantic hurricane activity. Yet, less than 300 upper ocean thermal observations are gathered annually in the region, and sustained ocean observations are currently not in place.

With the deployment of two underwater gliders in 2014 and 2015, it is anticipated they will generate an estimated 3500-4500 temperature and salinity profiles annually during the two-year study. Additionally, current velocity profiles will be obtained in 2015 to assist hurricane forecast models reproduce key ocean dynamic processes associated with tropical storm-induced surface ocean cooling.

Some underwater glider observations during hurricane season will be targeted with the objective of directing the gliders under (or close to) the track of tropical cyclones. These observations will be planned with scientists from AOML's Hurricane Research Division (HRD) and will be part of the HRD field program specifically addressing the tropical cyclone ocean observations.

For more information about this project, visit [www.aoml.noaa.gov/phod/goos/gliders](http://www.aoml.noaa.gov/phod/goos/gliders).

**Upper right:** Underwater gliders provide a cost-effective means of gathering ocean observations. **Lower right:** Red solid line delineates the region where two gliders will be deployed in 2014-2015. Tracks of category 1-5 tropical cyclones (grey lines) are shown in a region of the Atlantic Warm Pool during 1993-2011, with circles indicating the location of their intensification. The background colors represent the Tropical Cyclone Heat Potential (proportional to the upper ocean heat content).



## Study Examines Accuracy of Florida Current Transport Estimates

The results of a new study by researchers with AOML's Physical Oceanography Division (PhOD) have been published online in the *Journal of Oceanic and Atmospheric Technology*.\* Mr. Rigoberto Garcia and Dr. Christopher Meinen of PhOD compared data from three observing systems—free-falling floats, lowered acoustic Doppler current profilers, and a submarine cable—to assess how accurately they estimated the volume transport of the Florida Current at 27°N in the Straits of Florida.

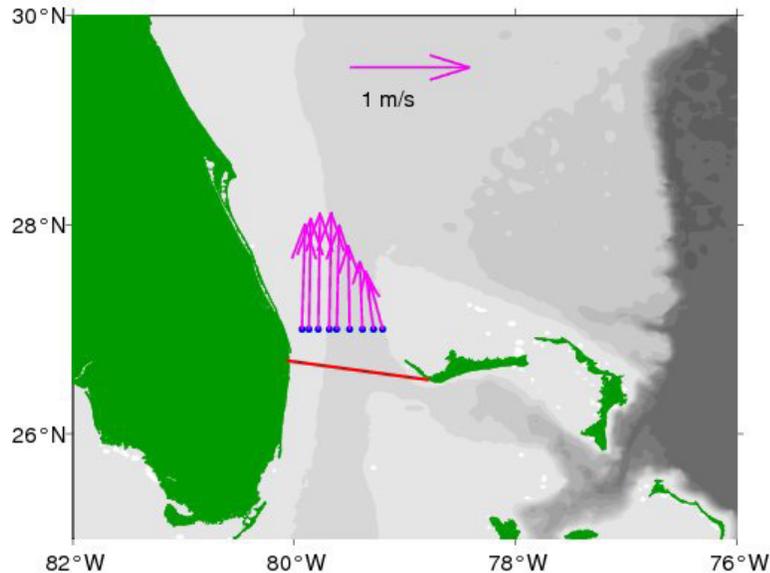
Submarine cable observations of the Florida Current have been collected as part of NOAA's Western Boundary Time Series project for more than 30 years, far longer than any comparable time series of oceanic transport in the world. These long-term observations have become one of the most crucial time series available for testing ocean and climate models.

Through the careful comparisons completed in the study, Garcia and Meinen were able to demonstrate that the daily estimates of the Florida Current transport are accurate to within roughly 5% of the long-term mean, while annual averages of the Florida Current transport can be

estimated to within about 1% of the long-term mean.

The study concludes that observations from the submarine cable are capable of detecting small but significant climate changes in the volume transport of the Florida Current.

On average, the Florida Current carries approximately 32 million cubic meters of water northward through the Straits of Florida every second and represents a major component of the oceanic system for redistributing heat and freshwater globally.



Map of the Straits of Florida study area illustrating the approximate cable location (red line) and the hydrographic stations used for monitoring the Florida Current transport (blue dots). The time-mean velocities estimated from more than 150 ship sections using free-falling floats are also shown.

\*Garcia, R.F., and C.S. Meinen, 2014: Accuracy of Florida Current volume transport measurements at 27°N using multiple observational techniques. *Journal of Atmospheric and Oceanic Technology*, Available online 7 February 2014, <http://dx.doi.org/10.1175/JTECH-D-13-00148.1>.

## AOML Researchers and Partners Produce New Time Series of South Atlantic MOC

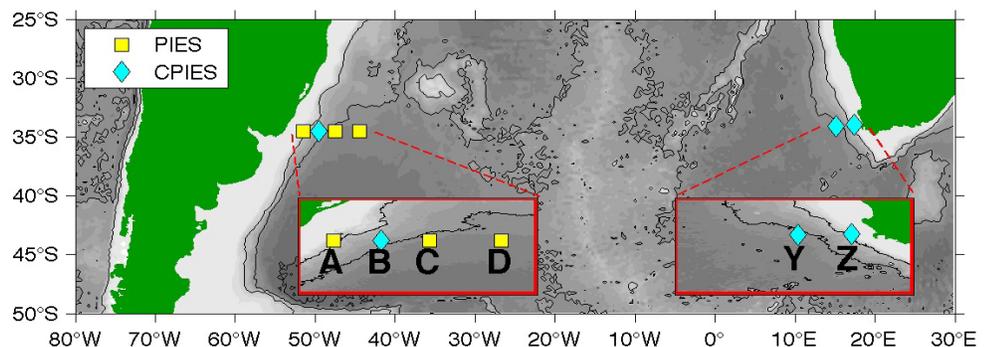
An international group of scientists lead by Dr. Christopher Meinen of AOML's Physical Oceanography Division has published the first-ever daily time series of Meridional Overturning Circulation (MOC) in the South Atlantic. In this new paper, published in the *Journal of Geophysical Research*,\* Meinen joined with Drs. Renelly Perez, Shenfu Dong, Silvia Garzoli, and Molly Baringer of AOML, and four international colleagues, to merge data collected from the SAM (Southwest Atlantic MOC) project with data from a parallel French project.

The MOC dominates the north-south transport of heat in the world's oceans. Variations in the MOC have been shown to correlate with societally-important factors such as precipitation patterns, sea surface temperatures, and hurricane intensification.

Due to an earlier collaboration in which AOML played a large role, daily time series estimates of the MOC were only available in the North Atlantic at 26.5°N. In the newer project located in the South

Atlantic, called the "Southwest Atlantic MOC" or SAM, researchers at AOML have taken a lead role in developing a basin-wide array to measure the MOC at 34.5°S. Working with partners in Argentina, Brazil, France, and South Africa, AOML scientists are bringing innovative techniques to a region where critical water mass changes occur in the MOC.

AOML researchers have measured the MOC in the South Atlantic using quarterly "snapshot" ship sections for nearly a decade. The SAM project, however, which began in 2009, will greatly benefit the continuing wealth of research in the South Atlantic by measuring the MOC variability at a much higher temporal resolution than has ever been available before.



Observations from two pilot boundary arrays in the South Atlantic were used to produce the first continuous in situ time series of the basin-wide meridional overturning circulation at 34.5°S over a 20-month period.

\*Meinen, C.S., S. Speich, R.C. Perez, S. Dong, A.R. Piola, S.L. Garzoli, M.O. Baringer, S. Gladyshev, and E.J.D. Campos, 2013: Temporal variability of the meridional overturning circulation at 34.5°S: Results from two pilot boundary arrays in the South Atlantic. *Journal of Geophysical Research*, 118(C12):6461-6478.

# AOML Oceanographer Honored with NOAA Distinguished Career Award

Dr. Silvia L. Garzoli, a Cooperative Institute scientist at AOML, is the recipient of a 2013 Distinguished Career Award from NOAA. Silvia received the accolade, one of the agency's highest honors, in recognition of her long-term research on Atlantic Ocean dynamics and extensive service to the oceanographic community.

Silvia began at AOML in 1996 as an oceanographer. She subsequently served as the director of AOML's Physical Oceanography Division and as AOML's Chief Scientist before retiring from federal service in 2012. Silvia remains a valued member of the NOAA-AOML science team through a position with the University of Miami's Cooperative Institute for Marine and Atmospheric Studies.

During her career, Silvia's research has been marked by the use of data from a variety of ocean-observing instruments that has led to improved understanding of the circulation pathways in the South Atlantic Ocean, the processes that control the flow of water across the equator, and variability and climate linkages of the Deep Western Boundary Current.

For more than a decade she has played a leading role in the expansion of the surface drifter, Argo profiling float, and

expensible bathythermograph programs. Data gathered from these programs enable researchers to monitor key oceanic variables—temperature, salinity, volume, heat, and freshwater transport—that are vital to operational weather forecasts, seasonal to interannual climate predictions, and climate research.

Silvia has led more than a dozen national and international field programs. As a recent example of the impact of her leadership, Silvia led the development of NOAA's response to a key, near-term priority in the 2007 U.S. Interagency Ocean Research Priorities Plan. She organized and assembled a team of national and international partners to plan a new observing system for the Meridional Overturning Circulation (MOC) in the South Atlantic.

Variations in the MOC have been linked to critical climate variables such as precipitation and surface air temperatures across the Northern Hemisphere. While full implementation of the South Atlantic MOC observing system is ongoing, 20 mooring have already been deployed in support of the basin-wide array.

Silvia's research has brought credit to both NOAA and AOML. She has written



Dr. Silvia L. Garzoli

or co-authored more than 100 peer-reviewed publications (with greater than 1300 citations by scientists in over 30 countries), mentored numerous early- and mid-career scientists, and provided strategic input to NOAA that will influence climate-related policies and the global ocean observing system for years to come. Congratulations to Dr. Silvia L. Garzoli for this well-deserved recognition.

Kristina Thoren, a former summer student intern at AOML, was a first prize winner in the senior division at the 2014 Broward County Science Fair in February. The data Kristina used for her science project were obtained during her internship with AOML's Environmental Microbiology Laboratory in the summer of 2013. Her AOML mentors were Drs. Christopher Sinigalliano and Maribeth Gidley.

Kristina's study examined the relationships between microbial air quality, water quality, and fecal indicator bacteria at recreational beaches using a molecular microbial source tracking approach. While collecting field samples as an intern, it became apparent to Kristina that fecal indicator bacteria were found within the seaweed biofilms present on many beaches which also matched bacteria collected from air samples from some beaches. This suggests that bacterial aerosols can be generated at some beaches and that microbial contaminants at the beach might impact both water and air quality.

The Environmental Protection Agency's method of collection of bacteria is from the swim zone. Kristina determined that also collecting from the swash zone (near shore) where higher levels of bacteria were present could be an improved method. Making this adjustment might better protect people from the risk of microbial contamination at the beach. In addition, her study found measuring solar light intensity in relation to bacterial population showed a link between times with varying light intensity and the amount of bacteria that was discovered, something beneficial to the general public.

With Kristina's win at the regional (county) level, she advances to the state level of competition. Her science project will be entered into the State Science and Engineering Fair of Florida in April 2014. Kristina is currently a senior at American Heritage Senior High School.



Kristina Thoren at the 2014 Broward County Science Fair on February 7th.

# AOML Welcomes Dr. Kathryn Sullivan, Acting NOAA Administrator



On Monday, February 3rd, Dr. Kathryn Sullivan, Acting NOAA Administrator, visited south Florida's NOAA facilities, including the Southeast Fisheries Science Center (SEFSC) and AOML. Dr. Sullivan toured both SEFSC and AOML and met with many staff members along the way. Her visit concluded with an all-hands meeting where she described her last visit to AOML as the Chief Scientist of NOAA immediately following Hurricane Andrew's devastating south Florida landfall in 1992. At the time, AOML presented Dr. Sullivan with the tattered NOAA flag that had flown during the storm's passage. Dr. Sullivan graciously returned it to AOML, stating the flag should remain with those who had similarly weathered the storm. Since then, the flag has been displayed in the AOML lobby. It can be seen in the two bottom images.



Howard (Howie) Friedman of AOML's Hurricane Research Division was recently honored by the South Florida Federal Executive Board (FEB). At the FEB's quarterly meeting in December 2013, former FEB chairperson Teresa Gulotta-Powers presented Howie with a plaque in recognition of his dedication and service as treasurer of the FEB during fiscal year 2013.



Left: AOML meteorologist/senior research scientist Tomislava (Tomi) Vukicevic and daughter Ana participated in the South Florida Federal Executive Board's Habitat for Humanity Blitz Build 2014 event on February 13th. Right: Tomi was part of a group of federal employees who volunteered to help build 10 houses for low income families in the greater Miami area.

Thank You!



AOML's 2013 Combined Federal Campaign program successfully concluded in January. Federal employees donated \$30,072 to charitable groups and organizations, an amount that represents 112% of AOML's projected goal for 2013. Thanks to everyone for their generosity and for their commitment to helping others.

## Farewell

Nelson Melo, a Cooperative Institute Senior Research Associate, moved on from AOML in January to pursue other professional interests at Florida International University. Nelson is working on a project funded by Alta Systems in Miami and the National Science Foundation. Alta Systems provides high resolution aerial photography of land-use, coastlines, and marine ecosystems, among other topics, of photographic interest. He will be developing sensors and remote sensing applications in the non-visible range of the spectrum for their existing aerial platforms.

Nelson worked with AOML's Physical Oceanography Division for 13 years and was an integral part of the South Florida Program. He was involved with at-sea data collection, moored and drifting instrumentation development, and project data analysis, with a special emphasis on remote sensing of ocean color. In recent years, Nelson pursued his interest in optical oceanography, working closely with satellite oceanographers at the University of South Florida to improve the algorithms that are used to interpret ocean color imagery in the shallow coastal waters of South Florida.



Lloyd Moore of AOML's Ocean Chemistry and Ecosystems Division (OCED) retired on January 31st after 28 years of federal service. During his years with OCED, Lloyd performed a multitude of tasks, including work with chlorophyll-a, microbiological, zooplankton, nutrient, and atmospheric samples. He also served as the OCED property manager and AOML Hazmat supervisor. Lloyd has returned to his hometown of Elizabeth City, North Carolina. Congratulations to Lloyd on the successful conclusion of his federal career and well-earned retirement.



Lloyd Moore bids farewell to coworkers and AOML Director Dr. Bob Atlas.

## Welcome Aboard

Lillian Estefan joined the Administrative Group of AOML's Office of the Director in January as an administrative assistant with the University of Miami's Cooperative Institute for Marine and Atmospheric Studies. Lillian will provide management support services to the Admin staff, as well as tend to a variety of financial, clerical, and procurement-related duties. She will also provide updates to the AOML Admin and NOAA financial management systems.



Dr. Paul Jones, a postdoctoral fellow with the National Research Council, joined the staff of AOML's Ocean Chemistry and Ecosystems Division in January. Paul will work with Drs. Derek Manzello and Ian Enochs of NOAA's Coral Health and Monitoring Program to determine how elevated nutrient levels influence the health of South Florida coral reef ecosystems. He recently earned his Ph.D. from the Marine Biology and Fisheries Division of the University of Miami's Rosenstiel School of Marine and Atmospheric Science where he worked with Dr. Andrew Baker on how environmental conditions influence the symbiont assemblage and health of South Florida coral species.



Dr. Joseph Prusa joined AOML's Hurricane Research Division in January as a visiting scientist. Joseph will work with Dr. Sundararaman Gopalakrishnan in the Modeling Group on numerical model developments for the next generation global to local HWRf system. Joseph holds a Ph.D. in mechanical engineering from the University of Illinois at Urbana-Champaign and worked for many years as an Associate Professor with Iowa State University's mechanical engineering faculty. In 2002, he created Teraflux Corporation in Boca Raton, Florida. Over the past 30 years, he has worked on a wide range of numerical problems in engineering and atmospheric flows.





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## Recent Publications *(AOML authors are denoted by bolded capital letters)*

**AKSOY, A., S.D. ABERSON, T. VUKICEVIC, K.J. SELLWOOD, S. LORSOLO, and X. ZHANG**, 2013: Assimilation of high-resolution tropical cyclone observations with an ensemble Kalman filter using NOAA/AOML/HRD's HEDAS: Evaluation of the 2008-2011 vortex-scale analyses. *Monthly Weather Review*, 141(6):1842-1865.

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Coddington, O., P. Pilewskie, K.S. Schmidt, P.J. McBride, and **T. VUKICEVIC**, 2013: Characterizing a new surface-based shortwave cloud retrieval technique, based on transmitted radiance for soil and vegetated surface types. *Atmosphere*, 4(1):48-71.

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