

NOAA Surveys Wreck of Historic U.S. Navy Dirigible

—By David Hall and Rachel Saunders

On a stormy February evening in 1935, a massive, cigar-shaped dirigible, the size of three 747s, plunged into the deep waters of the Pacific Ocean off Point Sur, Calif., the victim of violent weather.

USS Macon was one of the last great rigid airships built for the U.S. Navy. With a belly full of small planes that could be launched and retrieved in mid-air, *Macon* was to be the future of naval aviation. Instead its crash heralded the ultimate demise of dirigibles.

Now, 70 years after *Macon's* loss, researchers from NOAA's National Marine Sanctuary Program, the U.S. Geological Survey, Moss Landing Marine Laboratories and Monterey Bay Aquarium Research Institute are mapping the site of the wreck of *Macon* and four of its "parasite" aircraft.

During the first survey of the *Macon* site since the Navy and the research institute documented *Macon's* remains in 1990 and 1991, researchers operating from the NOAA Ship *McArthur II* in May have created a complete map of the wreck site.

"We discovered new debris fields that spread out over twice what we thought the size of the site would be," said the sanctuary program's Robert Schwemmer, co-principal *continued on page 6*

International Team Explores Pacific Submarine Volcanoes

—By Fred Gorell

A team of scientists from NOAA, the Universities of Washington and Oregon and two New Zealand institutes completed a five-week, NOAA-sponsored research cruise in May to an area of largely unexplored underwater volcanoes in the Pacific Ocean north of New Zealand.

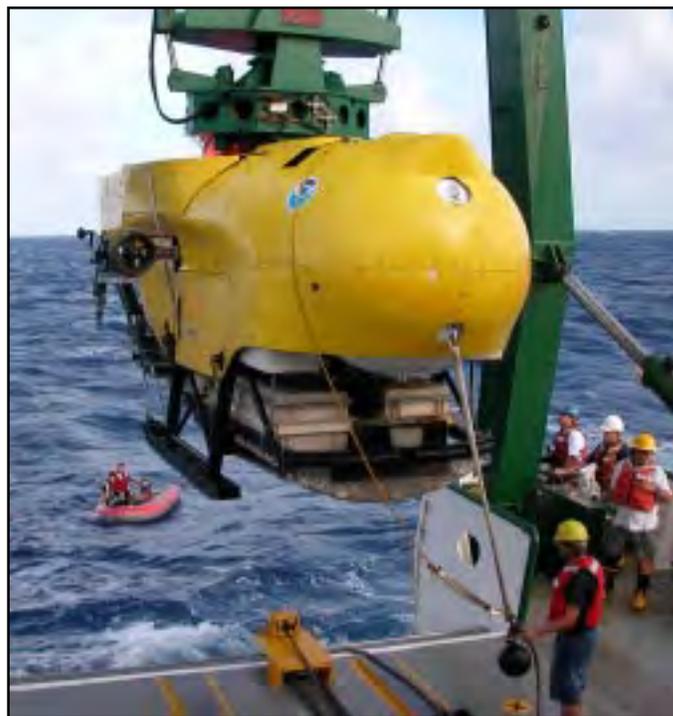
In the first-ever U.S. mission to the Kermadec Arc submarine island chain, scientists explored eight sub-sea volcanoes, seven of which had never been explored. They studied the effect of active volcanoes on the upper ocean, discovered at least one suspected new species of tube worms and documented a new range for a known species of deep-sea anglerfish.

To explore the submarine volcanoes, scientists working from the research vessel *Ka'imikai-o-Kanaloa*, nicknamed *KOK*, used a remotely-operated-vehicle and the human-occupied submersible, *Pisces V*, both operated by the Hawaii

Undersea Research Laboratory, one of six regional centers of the NOAA Undersea Research Program.

The expedition, called the New Zealand-American Submarine Ring of Fire, is one of a series of ongoing studies in a cruise aboard *KOK* by NOAA and other researchers through August. Study sites include Kermadec, American Samoa, Jarvis Island, Kingman Reef and Palmyra Atoll, all lying in a nearly straight line between Hawaii and New Zealand.

"This is a 'multi-everything' *continued on page 7*



William Chadwick/Oregon St. Univ.
Researchers deploy the manned submersible *Pisces V* from the stern deck of the research vessel *Ka'imikai-o-Kanaloa* to investigate a submarine volcano in the Pacific Ocean near New Zealand.

NOAA Commissions New Fisheries Ship in Alaska

—By Jeanne Kouhestani

The cold and intermittent drizzle at Pier 2 in Kodiak, Alaska, did little to dampen the enthusiasm of NOAA employees and local onlookers as the newly built fisheries survey vessel *Oscar Dyson* was commissioned into the NOAA Fleet on May 28.

The event took place against a backdrop of green-clad mountains that drifted in and out of view behind dense fog. The gleaming white ship was festooned with gaily colored service flags and smelled of fresh paint.

A large crowd broke away from Kodiak's popular crab festival nearby to view the ceremony, show their welcome to the newest members of the Kodiak community and honor the ship's namesake and his widow, Peggy Dyson-Malson.

Keynote speaker Sen. Ted Stevens of Alaska, who was instrumental in getting funding for the ship and having it homeported in Kodiak, arrived early to greet the crowd. Other principals were NOAA Administrator Vice Adm. Conrad C. Lautenbacher, Jr. (U.S. Navy, ret.) and Rear Adm. Samuel DeBow, Jr., director of NOAA Marine and Aviation Operations and the NOAA Corps. NOAA Fisheries was represented by James Coe, deputy director of the Alaska Fisheries Science Center. The ship's commanding officer, Cdr. Frank Wood, also spoke during the ceremony. Master of ceremonies was *Dyson* Executive Officer Lt.

Todd Bridgeman.

Dyson-Malson took part in the ceremony by carrying the ship's flags—the Union Jack, Under Secretary's flag and Commissioning Pennant—to Lt. Jesse Stark, who directed that they be raised and flown from the ship's masts. The formal ceremony putting the ship into service and official remarks were followed by a reception on the pier and tours of the ship.

"*Oscar Dyson* represents a



Jan Pennington for NOAA

The newly commissioned NOAA Ship *Oscar Dyson* conducts fisheries research in Alaska.

quantum leap in our ability to monitor the ecosystems in which fish live," Lautenbacher said following the ceremony. "It is designed to use every technological advance in doing fisheries research. Over the next eight to 10 years, we're going to get a whole new way of finding out what's going on in our oceans. We'll be able to characterize whole ecosystems in ways we've never seen before."

Oscar Dyson, named after the late Alaskan fishing industry leader, is the first ship in more than a quarter century to be designed to meet the

mission requirements of NOAA Fisheries. It is the first of four vessels of the same design to be built by the end of the decade.

The ship is the first U.S. vessel and one of only a few in the world to meet the International Council for the Exploration of the Seas requirements for acoustically quiet fishery research vessels. A quiet ship can study fish without substantially affecting their behavior.

"These requirements were developed by an international panel of acoustics experts, which included Dr. Jimmy Traynor of the Alaska Fisheries Science Center," Coe said. "This vessel is a fitting tribute to Dr. Traynor's legacy as well."

According to DeBow, when the ship was undergoing acoustic trials in the Gulf of Mexico, the ambient ocean noise was louder than the ship.

Dyson Chief Steward Rick Hargis, the last crew member to join the ship, recalled his first encounter with the ship in Puget Sound. He said the ship was so quiet, he thought it was in neutral. "It was spooky silent," he said.

"*Oscar Dyson* is one of the first ships we've had homeported in Alaska,

although we also have three Seattle-based ships working in the region. Since we're supporting the industry here, it makes sense to homeport it here," DeBow said. "This vessel will enhance our capability of conducting fisheries research in support of sustainable fisheries. At the same time, it will do oceanographic studies."

Oscar Dyson, which has been funded for 100 sea days this year, was set to begin its first mission, a Pollock survey, in June. Additional work on the ship itself will be resumed in October. ☺



Nancy Griffin.

Neal Dorst/NOAA

Nancy Griffin Is the June Employee of the Month

—By Gail Derr

Employee of the Month Nancy Griffin understands the importance of being precise. As a computer programmer with the Hurricane Research Division of NOAA's Atlantic Oceanographic and Meteorological Laboratory in Miami, Fla., she ensures that data gathered from instruments aboard NOAA's hurricane hunter aircraft are accurate and accessible.

Griffin has 25 years of experience in processing, analyzing and quality-controlling airborne Doppler radar data. Her skill and expertise enable her to not only understand and spot errors in the data, but also to answer technical questions otherwise referred to the division's science staff.

"Nancy is the first person anyone working with the airborne Doppler radar data interacts with," said Hurricane Research Division Director Frank Marks. "She is a major factor in many of our research collaborations, providing essential feedback to our partners

inside and outside of NOAA. I greatly respect her opinion on issues related to the data and its use."

Airborne Doppler radar data, often obtained by surveillance flights within the hurricane environment, provide critical information to forecasters about the direction and strength of the wind. These unique data are frequently requested by scientists in the federal, private and academic communities.

"We're the only ones in the world that have these data," Griffin said, as she explained the process of how they're preserved and archived on digital magnetic tapes. "They're used in forecast models and for research. Everything is based on the data. Quality control is a big, huge part of my job."

Griffin began her employment with NOAA in 1980 while attending the University of Miami as a computer science major. "I started working and loved it," Griffin said, "although it was tough in the beginning because I wasn't a meteorologist. Fortunately, I graduated with a minor in mathematics, which came in handy. Meteorology is all about math."

Airborne Doppler radar was just being introduced aboard NOAA's WP-3D aircraft when Griffin arrived on the scene. Although untested, scientists were hopeful the airborne instruments would enable them to obtain more accurate wind measurements. Griffin joined the effort, participating in the testing cycles for the first prototype instruments.

Airborne Doppler radar revolutionized the field of hurricane research. Instead of just obtaining wind measurements along the aircraft's flight track, scientists were now able to obtain a three-dimensional depiction of the winds within the entire inner core of a

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Ronald Guenther.

Dan Purcell/NOAA

Ronald Guenther Is the Team Member of the Month

—By Keli Tarp

During recent heavy rain storms in southern California, June Team Member of the Month Ronald Guenther identified and quickly resolved a software problem that prevented some NOAA weather radars from accurately estimating precipitation amounts.

Guenther, a senior software engineer with SI International working at the NOAA Radar Operations Center in Norman, Okla., is responsible for developing and maintaining software for the nation's NEXRAD weather radar network, also known as the Weather Surveillance Radar-1988 Doppler or WSR-88D.

Guenther discovered the problem existed at other radar locations as well, particularly at mountainous terrain sites. Working overtime on this complex, public safety-related problem, he traced the root cause to be new scientific applications software released in May 2004 that used the original site location data

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Focus On...

Headstart Turtle Returns to Nest on Galveston Island

—By Chris Smith

Members of a Galveston, Tex., Parks Board beach patrol were elated when they observed a Kemp's ridley sea turtle nesting at Sandhill Shores on the west end of Galveston Island late on the morning of May 16. The nest was behind a sand dune about 120 feet from the water.

Research fisheries biologists Ben Higgins and Heather Walker of the NOAA Fisheries Galveston Laboratory immediately responded to the beach patrol's call and retrieved 103 eggs, which they carefully

packed into a specially designed styrofoam egg transport container.

It is important to remove the eggs from the nesting site because there is little or no suitable nesting habitat on Galveston Island. The eggs were laid where they would have been flooded and drowned by the next high tide had they not been moved. The nesting site was also at risk from human and vehicular traffic as well as predation by dogs, racoons and fire ants.

Higgins and Walker carefully examined the turtle and immediately recognized it as a member of



Ben Higgins/NOAA

Texas A&M University graduate student Erin Seney attaches a satellite tracking transmitter to the shell of a female Kemp's ridley turtle that nested on Galveston Island.

the 1992 year class of the laboratory's Headstart Project, undertaken in cooperation with the U.S. Fish and Wildlife Service, National Park Service and their counterparts in Mexico.

"[The project] permitted certified NOAA Fisheries personnel to take eggs and hatchlings from Rancho Nuevo, Mexico, the only known Kemp's ridley nesting beach, from 1978 to 1992," said Protected Species Branch Chief Clark T. Fontaine, who planned and orchestrated the program. "Most of the eggs hatched, and we kept the hatchlings in captivity for eight to 12 months to get them past the most vulnerable period of their lives—the first year when they are most susceptible to natural predation. I have given a great deal of my life to rearing Headstart ridleys and I feel this one was one of my babies coming back home."

While in captivity, scientists kept the newly hatched Headstart turtles under constant observation and applied tags to each of them so that they could be identified in the future. When each reached a size a little larger than a compact disc, they were released into the wild, *continued on page 5*



Ben Higgins/NOAA

Dr. Joseph Flanagan, head veterinarian at the Houston Zoo, discovers developing follicles in the turtle during an ultrasound exam, indicating that the turtle will nest again this season.

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with the hope that they would return to Texas beaches to nest 10 to 15 years later.

The tags of the turtle nesting at Sandhill Shores indicated that she was first released on May 18, 1993, off Galveston.

The eggs from the May 16 nesting were transported to Padre Island National Seashore, where Linda Moorehead, a biologist with the Fish and Wildlife Service, will oversee their incubation.

The mother turtle was taken to the NOAA Fisheries Sea Turtle Rearing Facility in Galveston where Erin Seney and Andre Landry of Texas A&M University at Galveston fitted her with a satellite tag so that her movements could be tracked, then returned her to the Gulf of Mexico on May 17 close to where she had nested. That tag will enable the team to track the turtle to her next nesting site

“Female sea turtles invariably return to their natal beach, the beach where they hatched, to lay their eggs. That’s a process called imprinting. Imprinting is difficult to understand yet fairly easy to predict,” Higgins said. “While the process through which they ‘lock



Erin Seney/Texas A&M

By tracking the turtle, scientists hope to improve their chances of locating future nestings.

in’ the coordinates of that beach is not fully understood, we believe turtles imprint by using a combination of an internal magnetic compass and chemical smells, scents and tastes in the water or nesting beach sand.”

“This is the first Headstart turtle that we’ve recovered on the Upper Texas Coast with all four of its tags intact,” Higgins said. “Joseph Flanagan, senior veterinarian of the

Houston Zoo, performed an ultrasound on the turtle before we released it and discovered there are lots of developing follicles inside her, which means she should nest again in a few weeks. Each female may lay up to three clutches of eggs in a nesting season.”

By all indications, Fontaine’s vision is becoming a reality. There were four more Kemp’s ridley nests found on the upper Texas coast between May 28 and 30, including one on Matagorda Peninsula and three on Galveston Island. Seney and fisheries biologist Shanna Kethan of NOAA’s Galveston Laboratory were the primary responders, carefully recovering a total of 400 eggs and transporting them safely to Padre Island National Seashore for incubation.

Flanagan performed ultrasounds on two of the turtles, revealing numerous developing follicles in both, indicating that they will nest again this season.

“Thanks to all those who helped with the recovery and transport, these young turtles will have a fighting chance at survival and may return as adults,” Higgins said. 🐢



Erin Seney/Texas A&M

The Kemp’s ridley female turtle is released to the sea at Jamaica Beach on Galveston Island.

Macon

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investigator for the *Macon* expedition. "It was very exciting."

The expedition marked the sanctuary program's first maritime heritage expedition within the boundaries of Monterey Bay National Marine Sanctuary. The survey was the first of a two-phase research effort to inventory and characterize this cultural and historic resource.

The National Marine Sanctuaries Act mandates the management

and protection of submerged archaeological sites within the nation's marine sanctuaries.

Data collected during the survey will be used to guide a remotely operated vehicle, or ROV, during a follow-up expedition next year. The goal will be to create a photo mosaic of the wreck site that can be used to document changes since the very first surveys and to support a variety of outreach and educational initiatives.

"The remains of the *Macon* provide an excellent opportunity to study the relatively undisturbed archaeological remnants of a unique period of U.S. aviation history," Schwemmer said. "We're really looking forward to coming back to the site with an ROV in 2006."

Search and survey technology has evolved significantly since the *Macon* wreck was first discovered.

"The *Macon* was found because a fisherman dragged up pieces of the wreck," said the sanctuary's research coordinator, Andrew DeVogelaere. "Researchers then had to guess where it might be and poke around with a remotely operated vehicle. Now, we can use acoustic mapping to find shipwrecks and spend less time looking for a needle in a haystack. When we go back there next fall, we'll be

using a new generation of ROVs."

Built in 1933 as part of the U.S. Navy's lighter-than-air aviation program, the 785-foot, helium-filled *Macon* was the nation's largest airship. Championed by Navy Chief of Aeronautics Adm. William A. Moffett, *Macon* truly was a flying aircraft carrier. Like its sister ship, the *USS Akron*, *Macon* carried five Curtiss F9C-2 Sparrowhawk planes that were launched and recovered via a special trapeze

"The Macon is symbolic of the last gasp of rigid airships," said Bruce Terrel.

launch and recovery system. The small biplanes were intended to protect the aircraft in war and to serve as scouts.

Macon conducted many successful aircraft launches, including an infamous mission to clandestinely locate President Franklin Roosevelt while at sea in the Pacific aboard the cruiser *USS Houston*. Two of *Macon's* Sparrowhawks delivered a morning newspaper and a bag of mail to *Houston* to the total surprise of the ship's captain. The episode almost resulted in the court marshal of *Macon's* commander.

Macon was lost while flying north along the California coast to its homeport near San Jose after encountering severe wind gusts that put it into a downward roll. As the giant craft continued to drop, orders were given to jettison the fuel and water ballast tanks in an attempt to regain control of the airship. But nothing could stop its fatal plunge. *Macon* smacked tail first into the Pacific, floating for 40 minutes before slipping beneath the waves.

The Point Sur light station keeper who witnessed the crash recalled seeing the tail fin fly into several pieces. It was later determined that the aluminum-frame ring that supported the upper tail

collapsed, puncturing three of the airship's helium cells.

Macon and *Akron*, which suffered a similar fate, were state-of-the-art in concept, but they were vulnerable in practice. All of the Navy's dirigibles, except one, eventually crashed.

"The *Macon* is symbolic of the last gasp of rigid airships," said Bruce Terrell, senior marine archaeologist with the National Marine Sanctuary Program. "It wasn't the last airship built for the U.S. Navy, but its loss was one of the nails in the coffin for the U.S. rigid airship program."

Following *Macon's* demise, the Navy gave up on the use of rigid lighter-than-air craft. But the airships captured the public's imagination nevertheless.

"They are an artifact of the art deco era," Terrell said. "It's clear they really affected the public mind back then. We still associate large airships with the future, even though their heyday has come and gone. Imagine what it must have been like to see one of these things fly over your house. They were the size of battleships."

Telling *Macon's* story, researchers said, is an important aspect of the project. To that end, the Monterey Bay Sanctuary provided funding to the Maritime Museum of Monterey for a newly expanded exhibit on *Macon's* history. New exhibit elements include a Monterey Bay Aquarium Research Institute submersible and various historic artifacts. The sanctuary also plans to work with other community partners on *Macon*-related outreach over the coming year.

"The *Macon* is part of the history of this area," DeVogelaere said. "And it's a good way to get people to learn about aspects of NOAA that they may not be familiar with." ☺

Sub-sea Volcanoes

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cruise,” said Barbara Moore, director of NOAA’s Undersea Research Program in Silver Spring, Md. “It’s a multi-national collaboration between the U.S., New Zealand and Germany, it’s funded by two New Zealand institutes, as well as NURP and NOAA’s Office of Ocean Exploration, and it spans a dozen disciplines in marine science and ocean engineering.”

Robert Embley, Ring of Fire co-chief scientist and an oceanographer with NOAA’s Pacific Marine Environmental Laboratory in Seattle, Wash., described the Kermadec area as a subduction zone where tectonic plates converge and a chain of “restless” volcanoes is formed along the boundary.

“Most of Earth’s volcanic activity occurs unseen beneath hundreds to thousands of feet of ocean,” Embley said. “We need to explore and better understand [these places] to learn more about how our Earth works.”

Most of the volcanoes the U.S.-New Zealand team explored rise to the upper ocean, and many vent gasses into the sea and the air above it. The volcanoes, some quiet and some among the most active on Earth, are on the southern part of the same large tectonic ocean plate that generated last year’s catastrophic Indonesian tsunami.

The first volcano the team targeted is named Monowai. The site had historic evidence of earthquake activity on the volcano’s large cone, dating back to the 1940s. From the early 1990s, the French Polynesian Seismic Network recorded numerous earthquake swarms. In May of 2002, hydrophones maintained by the Pacific Marine Environmental Laboratory on the sea floor in the Pacific picked up the sounds of a very strong seismic event in the area.

“We wanted to dive on Monowai’s cone,” Embley said, “but it was an active volcano with reports of significant earthquake activity as recently as the first two days in March, and we had a very real concern about putting people at risk.”

On *KOK*, Embley met with David Butterfield, a chemical engineer with the University of Washington and NOAA’s Vents Program, Gary Massoth, co-chief scientist from New Zealand’s Institute of Geological and Nuclear Science, and Terry Kerby, HURL’s operations director and chief *Pisces* pilot. They spread out charts and data sheets on the table to help assess Monowai and the risk of diving on its cone. They saw evidence of unpredictable degassing, large landslides and probable underwater explosive activity.

Embley brought up last year’s Ring of Fire mission when the underwater robot ROPOS was pelted by stones and engulfed in sulfur-laced plumes from a sudden low-level eruption of an underwater volcano on the Mariana Arc. The scientists considered the risk of having molten sulfur fall on a human-occupied submersible if they dove on Monowai’s cone. When they compared a 1998 bathymetric survey with one in 2004, the decision became clear.

“It was stunning to see that a whole part of the volcano’s cone had collapsed between surveys,” Embley said. “We had other good targets and we decided that diving on the cone was too risky.”

Though not as great, there was even some risk to the ship. Extensive degassing could make the ship less buoyant by lowering the density of the ocean, and explosive activity could directly damage the vessel. The science team consulted with *KOK* Captain Ross Barnes and decided to steer clear of the very active cone.

Instead, *Pisces V* Co-pilot Steve Price dove on the large crater that formed Monowai’s caldera. “It was teeming with a diversity of life, with mussels, tubeworms, fish and crabs,” Price said. “Struggles for survival were playing out before our eyes. The incredible multitude of crabs in combat with each other for existence is an image I will never forget.”

“The 2005 mission was another opportunity to study the overlap between life based on sunlight and life based on chemicals,” Embley said. “We saw hydrothermal systems with very high gas contents well within the photic zone. Schools of fish interacted with abundant chemosynthetic life that included prolific microbial mats and areas dominated by beds of mussels.”

“Studies of extreme ocean environments, such as active submarine volcanoes, using new exploration technology could help us understand potential dangers to shipping from degassing events and from the rarer, but potentially very damaging, large-scale caldera-forming events that could generate ocean-wide tsunamis,” Embley said. “Understanding submarine volcanoes could also lead to new insights into ore-forming processes, including a better understanding of how they concentrate gold and other precious and exotic metals,” he said. “And, the technology and processes developed to explore our ocean can also have important implications and lessons for future remote explorations on other planets and moons in our solar system.”

“These are pathfinding missions that challenge us and other explorers and scientists to understand the fundamental processes of the ocean and how they affect our lives,” said Steve Hammond, acting director of NOAA’s Office of Ocean Exploration. ☺

Guenther

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delivered with radars. The site errors were caused by an incompatibility between the new software and low-resolution terrain data, resulting in a flawed radar blockage file.

Guenther acted quickly to not only fix it, but also improve the software and overall system performance.

Recognizing that new Global Positioning System technology, unavailable when the radars were originally deployed, would provide more accurate radar location data, Guenther applied GPS site location parameters and developed the capability to generate a new terrain relief data file. He then compared the new file to the problematic file and verified his solution. The Radar Operations Center immediately sent the new file, with loading procedures, to the Santa Ana, Calif., radar site for implementation.

Remarkably, this complex software development effort was completed within a 10-day period, enabling the center to provide a new blockage file to the site in advance of strong Pacific storms predicted for the next week.

"He worked extra hours to quickly generate new terrain relief data files for other high priority radar sites so they could be included in the next scheduled software release," said Rex Reed, the center's Engineering Branch chief. "This saved considerable staff time at field sites since the new terrain file could now be loaded as a part of a normal software package, rather than requiring hours of extra, complex system administration effort to remove and replace the terrain file as a separate action."

Guenther didn't stop there, Reed said. He went the "extra mile" to further improve the

software by adding recently available, higher-resolution terrain data to the new terrain files. The higher-resolution data were possible because of another of his initiatives. He noted radar data quality could be improved at all 158 WSR-88D radar sites by acquiring, processing and integrating more accurate terrain data from space-based radar mapping techniques collected during recent Space Shuttle missions. He proceeded to include the high-resolution data when generating the new radar terrain relief data files.

"Thus, Guenther not only managed to fix a critical error, he simultaneously improved the resolution of the terrain data to nine times higher resolution at the same time," Reed said.

"Forecasters at the San Diego and Los Angeles Weather Forecast Offices confirmed much improved radar-precipitation estimates," said Radar Operations Center Director Rich Vogt. "Guenther's initiative not only aided their ability to predict flash flooding during one of California's heaviest rainfall periods, but also improved NOAA's overall flash flood prediction capability."

A Philadelphia native, Guenther earned a Bachelor of Science degree in chemistry from Long Island University and a Masters degree in computer information science from Boston University. He has been involved with ground-based radars since the early 1970s and worked on the NEXRAD radar for 20 years, first as an Air Force officer and then with various contractors.

"I was involved in a project with the NEXRAD years ago doing maps for the overseas sites before the user communities had their own display systems," he said. "My kids would get excited when they showed a hurricane heading into the Caribbean, and my kids would say, 'That's my daddy's maps. My daddy did that'" ☺

Griffin

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hurricane. Quality-controlling the raw data, however, was labor intensive and required meticulous effort, with analyses often taking weeks or months to complete.

"The good thing about the airborne Doppler radar was that it was new, just like me," she said. "We all had to learn about airborne Doppler radar together."

With the assistance and support of Marks and the laboratory's radar group, Griffin wrote some of the computer software programs that processed, quality-controlled and graphically displayed the raw data they collected. "I didn't do this alone," Griffin said, acknowledging the scientific and technical contributions of others. "I'm just a piece of the puzzle."

In 1992, powerful Hurricane Andrew's landfall in south Florida gave Griffin a new understanding of the value of her work. Although accustomed to dealing with wind data in a theoretical setting, she had never experienced a hurricane of Andrew's magnitude.

"Even though it was really bad, it made me more appreciative of my job," Griffin said. "Andrew gave all of us that extra push to make certain we get it right." ☺

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