# NOAA REPORT

Vol. XIV, no. 9 www.publicaffairs.noaa.gov/nr September 2005

## Refurbished NOAA Ship *Fairweather* Returns to Duty

—By Danielle Swallow

When the NOAA Ship *Fairweather* was de-activated in 1988, few people would have guessed that the ship would return to service six years later and become a model for the NOAA fleet of the future. But after undergoing an extensive refurbishment and upgrade, the 38-year-old ship demonstrated a new, multi-mission capability this summer by supporting fisheries and oceanographic research while carrying out its traditional nautical charting mission.

The 231-foot *Fairweather* was re-activated in Ketchikan, Alaska, Aug. 18, 2004, after the work was completed on the ship.

Congress restored funding for *Fairweather* when it became apparent that the critical backlog of surveys in Alaska's vast waters, combined with a surge in deep-draft cruise liners, cargo vessels and oil tankers transiting the region, could compromise the safety of navigation. The ship was outfitted with the latest hydrographic survey technology, but more importantly, additional equipment was added to give *Fairweather* multi-mission capabilities so it could serve NOAA outside the ship's traditional responsibilities.

Less than a year back in operation, *Fairweather* got to test its mettle in responding to new and *continued on page 6*

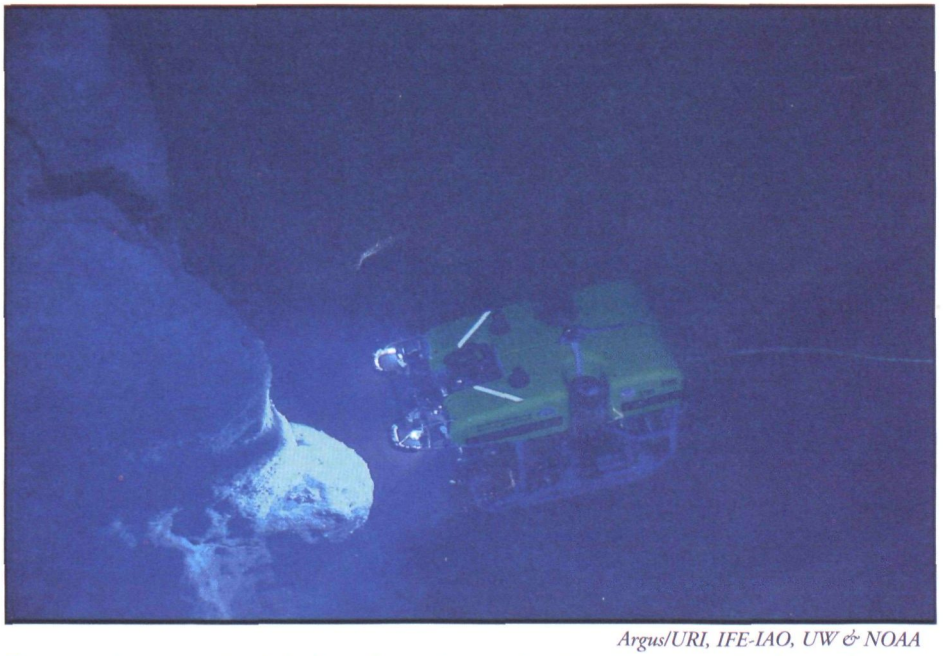
## Scientists At Sea, Ashore Explore Sub-sea Mountain

—By Fred Gorell

In a precedent-setting ocean expedition supported by NOAA in late July, scientists and technicians ashore at three major universities worked with data and images that were transmitted in near real-time via the NOAA Ship *Ronald H. Brown* from a sea floor that was thousands of miles away.

The data and images were collected by submersible robots exploring a unique field of tall, venting "chimneys" that rise from cracks in the side of a volcanically active underwater mountain the size of Mt. Rainier in the mid-Atlantic ocean. The chimneys form when mineral-rich seawater that is superheated by the Earth's molten core rises toward the sea floor and cools, causing minerals to precipitate and build up around the vent.

Scientists and technicians controlling the robots from *Ron Brown* collected the data and images, then forwarded them through satellite and high-speed Internet pathways to larger numbers of scientists ashore. The team aboard *Ron Brown* also delivered video streams from Lost City through the Internet with a less than two-second delay to anyone with Internet access, including *continued on page 2*



*Argus/URI, IFE-IAO, UW & NOAA*

*The remotely operated vehicle Hercules explores volcanic vents on the side of an underwater mountain in the mid-Atlantic Ocean, guided by scientists aboard the NOAA Ship Ron Brown.*

# Lost City

*continued from page 1*

audiences that had been assembled in museums, aquariums, science centers and schools, as well as to boys and girls clubs across the nation.

The Lost City mission had University of Rhode Island oceanography professor and expedition principal investigator Robert Ballard at sea on *Ron Brown*, while the mission's chief scientist, Debbie Kelley, operated not from the ship but from a specially designed science command center 4,500 miles away at the University of Washington.

On a typical ocean expedition, scientists on the ship would work in shipboard labs with the data and specimens they collected and rely on one another's expertise for an early understanding of the chemistry, geology and biology of their investigations, with scant outside help. But with the satellite and Internet technology of "tele-presence," the Lost City mission changed the rules of ocean research.

"Normally, on a deep ocean expedition I talk with the mission's chief scientist across a table on the research vessel," Ballard said. "In this case, we talked across the planet."

With Ballard shepherding operations at sea, Kelley and a dozen other scientists stood day and night watches in front of computers and large plasma screens filled with underwater images.

They were in turn connected to the "hub" center staffed by technicians at the University of Rhode Island.

One of the other spokes from the Rhode Island hub reached out to a science command center at the University of New Hampshire's Joint Hydrographic Center. Scientists there staffed the cruise round-the-clock to provide the ship near real-time processing of multi-beam sea floor mapping data acquired by the ship and to support navigation visualization for the operation of underwater robots.

"With science teams ashore at universities, more intellectual capital can be applied to the mission," Ballard said. "Past missions have been limited by ship-to-shore communications capacity, the finite number of berthing spaces on research vessels and by competing obligations which sometimes precluded top scientists from going to sea."

If relatively few scientists can sail on a mission, fewer still can dive in a human occupied vehicle. Though manned submersibles offer a number of benefits, they have limited battery power to illuminate and image large portions of the ocean floor for extended periods of time.

When Kelley led an expedition to the Lost City in 2003 using the manned submersible *Alvin*, her view of Lost City towers was through small portholes in the three-person submarine. "So you never get a large overview of what these structures look like," Kelley said.

Kelley said the improved imagery results from Lost City were immediately clear to her. She said she and other scientists ashore were in awe of the big, brightly lit images that streamed from the underwater robots *Hercules* and *Argus*, remotely controlled by the team aboard *Ron Brown*.

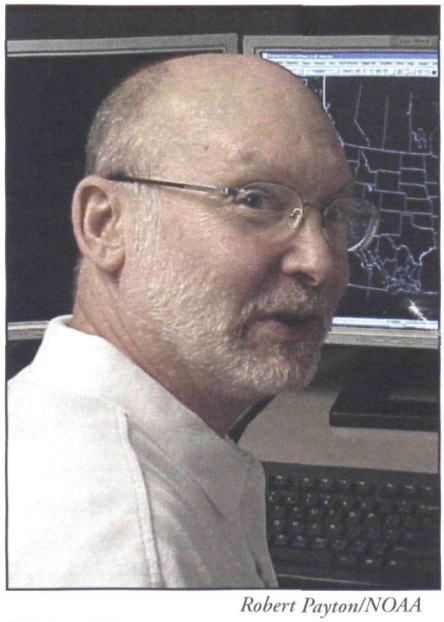
With *Argus* lowered into position 700 to 800 meters deep, *Hercules* operated six to 15 meters farther below, connected to *Argus* by a tether. Both robots were armed with cameras and lights. *Argus* was equipped with an impressive 1,200-watt light that illuminated large areas, including *Hercules*, as it worked near the chimney walls. Power for the remotely operated vehicle's lights, cameras and propulsion came from the ship through the wire and tether.

Lost City advanced technology started with extensive improve-

*continued on page 7*


*Dwight Coleman*

*The sub-sea robot Hercules, tethered to the NOAA Ship Ron Brown, is lowered into the mid-Atlantic Ocean above the "Lost City."*



*Robert Payton/NOAA*

*Michael Moss.*

# Michael Moss Is the Employee of the Month

—By Theresa Eisenman

Exceptional technical expertise coupled with a great sense of humor is what makes Employee of the Month Michael Moss invaluable in solving complex problems for NOAA's National Weather Service.

For more than 20 years, Moss has been a leading technical expert on computer systems used by Weather Service forecasters to analyze hydro-meteorological data and communicate forecasts and severe weather warnings to the public. But Moss didn't expect to become a top computer expert. He started his career as a meteorologist.

Originally from Long Island, N.Y., Moss' love of snow blossomed into a fascination with weather. "I remember my mother bringing home the *New York Times* and I would go nuts over the weather page," Moss said. "I was fortunate to study something that I truly enjoyed."

Moss earned his bachelor's degree, master's degree and Ph.D. in meteorology from Florida State University. He has also taken extensive course work in computer sciences.

With 36 years of federal service, Moss has been with NOAA since the agency's inception. He was a meteorologist with one of NOAA's predecessor agencies, the Environmental Science Services Administration, and later accepted a position with NOAA's National Hurricane Center Research Laboratory in Miami, Fla., where he designed innovative experiments and became one of the first to use a model to simulate a hurricane landfall.

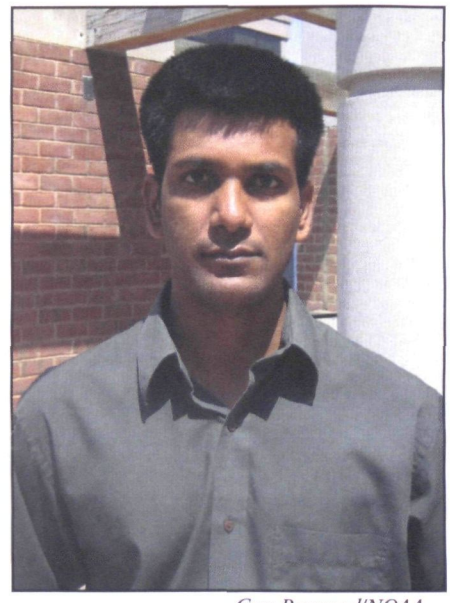
Moss is clearly passionate about weather, but said the highlight of his career was working in Silver Spring, Md., at NOAA's central facility for the Automated Field and Operation Service, which was a computerized system that allowed local Weather Service office staff to display weather data and maps and to create forecasts and text data. AFOS was replaced by the more complex Advanced Weather Interactive Processing System, and as the computer system "transitioned" so too did Moss.

AWIPS made Moss' job much more challenging. "With AFOS, I actually developed code. Because I'm not developing the AWIPS code, it's more difficult to debug it. I use my experience and work from the bottom up."

Moss is currently the workgroup leader for the AWIPS site support team, which is a small group of people that provides technical support to the more than 150 field offices using AWIPS.

According to his colleagues, Moss is a problem solver whose technical knowledge and advanced troubleshooting skills are legendary in the AWIPS community. National Weather Service field sites and AWIPS technical experts seek

*continued on page 8*



*Greg Raymond/NOAA*

*Krupal Chukka.*

# Krupal Chukka Is the Team Member of the Month

—By Jeanne G. Kouhestani

Team Member of the Month Krupal Chukka has changed the way NOAA's Commissioned Personnel Center does business. His smooth transitioning of paper-based systems to electronic-based systems has reaped tremendous benefits not only for the center but for the NOAA Corps officers it serves.

The Commissioned Personel Center, part of NOAA Marine and Aviation Operations, is the human resources office for the NOAA Corps. Before Chukka joined the CPC team in April 2003, the organization was stuck in old methods that ate up valuable time and required manual—and potentially risky—transport of critical documents.

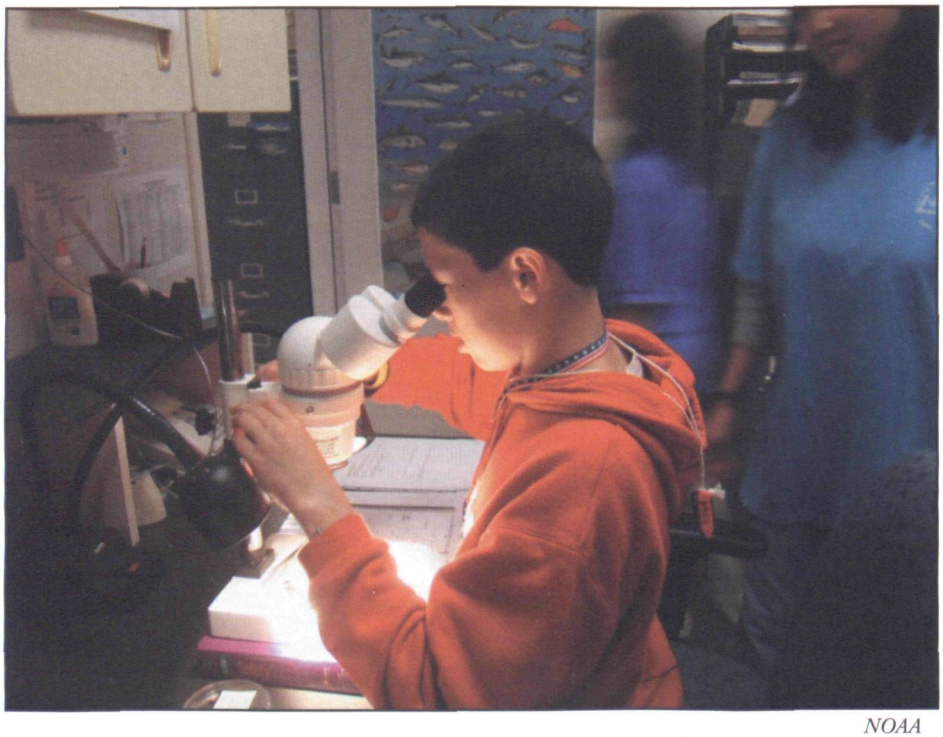
"Krupal is an outstanding member of the CPC team," said Roger Mason, the center's deputy director. "He is CPC's principal technical authority on information systems. He has analyzed very

*continued on page 8*

# Focus On...

NOAA

*NOAA scientist Michael Strick demonstrates ocean instruments to students at the third annual Science Camp at NOAA's Western Regional Center in Seattle, Wash.*



NOAA

*A Science Camp student examines simulated sea lion scat made of pudding, shells and octopus beaks to learn about marine mammal feeding habits.*

## Science Camp

—By Jordan Jobe

Fifty bleary-eyed middle school students slowly trickled into the auditorium of NOAA's Western Regional Center in Seattle, Wash., one day this summer to attend the third annual, week-long Middle School Science Camp, co-funded by the University of Washington Sea Grant program. The only sounds to be heard were occasional muted shrieks as a few students recognized friends. Most slumped low in their seats, looking around surreptitiously.

I was one of five teachers under contract from the Sea Grant program to guide Science Camp students and encourage critical thinking.

As name tags and notebooks were handed out, one eighth-grade boy admitted, "My dad's traveling this week. He made me sign up."

"Science is hard," said a seventh-grade girl.

"I want to be a marine biologist," an eighth-grade girl giggled. "I can't wait to see their lab."

The campers settled in for the first speaker of the day, Ted Buehner, a meteorologist with NOAA's National Weather Service forecast office in Seattle. While giving the campers a brief overview of the week ahead, he was interrupted by a mysterious phone call. The phone conversation was broadcast to the now more-alert students. It seemed that a "situation" had arisen, requiring the attention of our very own Science Camp.

The woman caller said she had been walking her dog in Explorer Park on Puget Sound when she noticed a huge pile of dead fish. She'd also heard strange barking noises coming from the water.

*conntinued on page 5*

*continued from page 4*

After hearing this staged conversation, the campers were instructed to group up and discuss several hypotheses regarding the problem.

After over a month away from school, presumably spent in various athletic camps or playing video games, my group of students had a difficult time coming up with feasible hypotheses. "There was a tsunami and the wave pushed all the fish ashore, and the barking was from sea lions that were hungry," one camper ventured.

The make-believe fish kill at Explorer Park was the central scientific scenario of the week. The goal for the campers was to participate in various hands-on science activities to acquire a knowledge base to re-evaluate their initial hypotheses.

Throughout the week, groups of 10 students rotated through six two-hour lab stations led by NOAA scientists

At the marine mammal station, campers got to search through simulated sea lion scat for evidence of their diet. At another station, campers learned how microscopic marine organisms are collected using a secchi disk and a plankton tow. Campers also learned how pollutants from various sources affect the Puget Sound watershed.

By the end of the week, most students seemed not only to have a better grasp of how to solve the fish kill situation, but to have participated in an activity that inspired them.

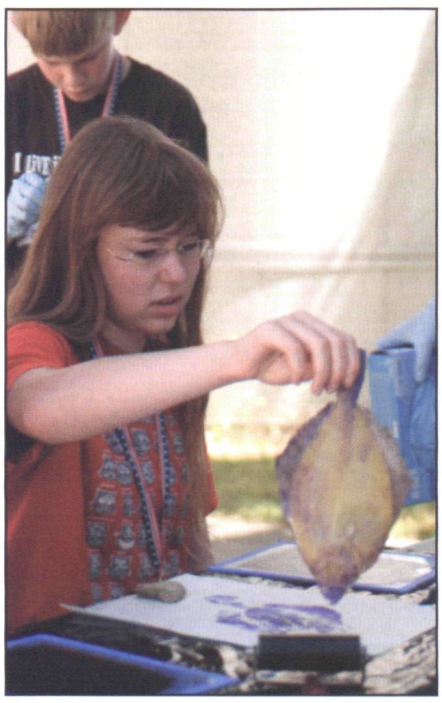
"I can't wait to go back to school so I can start biology," one eighth-grade girl said. "And I'm even kind of looking forward to learning more about physics."

NOAA

*NOAA scientist Rebecca Reuter helps students make fish prints.*

NOAA

*A camper explains his group's "environmental incident" findings to his family.*



NOAA

*A student examines a flounder during a "fish print" making session.*

*Robyn Ricks/UW Sea Grant*

*NOAA Ens. Misty Watson demonstrates a mud grabber for taking bottom samples from the bow of a NOAA research vessel.*

# Fairweather

*continued from page 1*

unexpected challenges.

First, the ship responded to a request from NOAA's National Data Buoy Center to recover a tsunami buoy that went adrift in the North Pacific Ocean in July. *Fairweather* was chosen for this assignment because of its close proximity to the DART buoy, short for Deep-Ocean Assessment and Reporting of Tsunamis. Because the ship was outfitted with a large A-frame during its refurbishment, the ship was able to hoist the heavy buoy out of the water safely.

Although NOAA's hydrographic survey ships do not normally require large A-frames for ocean mapping, a larger A-frame and a side-arm J-frame were installed so that the ship could support other programs as opportunities allow. Wet and dry labs were also added as well as extra deck space and berthing for scientists. This multi-mission capability enables *Fairweather* to make more efficient use of its sea days and leverage its equipment and technology for the benefit of all of NOAA.

"NOAA ships are corporate assets that need to serve a variety of NOAA programs," said Rear Adm. Samuel P. De Bow, Jr., director of NOAA Marine and Aviation Operations. "If we can equip them to handle more than their primary operations for a given line office, we will be able to 'piggyback' projects as opportunities allow."

*Fairweather* again demonstrated its multi-mission capability in late July by partnering with scientists from NOAA Fisheries and NOAA Research on an Ecosystems and Fisheries-Oceanography Coordinated Investigation cruise, or Eco-FOCI for short. Scientists and Fairweather crew members used the ship's J-frame and A-frame to conduct biological and oceanographic observations to better understand how climate variability affects the Gulf of Alaska ecosystem.

"We accomplished many of our goals, most importantly, completing the first-ever summer survey for fish larvae and zooplankton in the East Kodiak vicinity of the Gulf of Alaska," cruise chief scientist Janet Duffy-Anderson of the Alaska Fisheries Science Center wrote in an email to *Fairweather's* commanding officer, Capt. John Lowell. "This survey will add valuable new information on larval and early juvenile fish assemblages on the continental shelf and the availability of their prey."


*Lt. Mark Wetzler/NOAA*

*The NOAA Ship Fairweather maneuvers to retrieve a tsunami warn- ing buoy adrift in the Gulf of Alaska.*

Duffy-Anderson later said, "This was fortuitous for us because we typically don't have sea time on vessels in the summer. We have very little summer-collected information on the Gulf of Alaska ecosystem."

During the cruise, the ship also deployed six satellite-tracked drifter buoys that will be monitored over the next 18 months to provide information on currents and eddies in the Gulf of Alaska and Bering Sea. The team also collected data at various locations on oceanographic processes that affect fish populations and collected fish samples for studies on aging.

"The work with Eco-FOCI has allowed *Fairweather* to gain valuable experience with new deck equipment—winches, frames and scientific gear—installed as part of the multi-mission outfitting of the vessel," Lowell said. "This experience will be put to the test next year when the Alaska Fisheries Science Center uses the ship to support a new high-resolution side scan sonar system for benthic habitat mapping over large areas."

Once the Eco-FOCI objectives were met, *Fairweather* collected 110 nautical miles of multi-beam sonar data on its way back to port in support of a cooperative, multi-disciplinary effort between several NOAA line offices to map and characterize the sea floor, in particular, the 200-mile U.S. Exclusive Economic Zone that borders the country's coast.

The ship collected these sea floor data with new and improved data processing and acquisition systems

*continued on page 7*

# Fairweather

*continued from page 6*

developed by NOAA's Office of Coast Survey and the University of New Hampshire. *Fairweather's* new moving vessel profiler enables the ship to obtain sound velocity profiles to a depth of 200 meters while transiting at 12 knots. This eliminates the need for the vessel to stop and make oceanographic measurements every few hours. The result is high-quality bathymetric data collected over large areas, which saves time and effort.

De Bow said his vision is to transform the NOAA fleet into a multi-mission oriented fleet that is adaptive to changing priorities and program needs. "Expanding our ship capabilities so that they are able to support multiple programs is in keeping with the 'One NOAA' philosophy and makes our fleet more efficient," he said.

*Fairweather* will continue to carry out its traditional nautical charting mandate, but now has the capability to support other programs as opportunities allow. Similarly, the NOAA Ship *Oscar Dyson* and the new fishery survey vessels under construction are designed to support a variety of operations cost-effectively.

"The idea is not to divert a ship from its traditional or allocated mission, De Bow said, "but to make better use of our sea days and new technology by identifying opportunities where programs can partner together on a cruise."

*Fairweather's* recent successes provide a model for other NOAA ships to follow. By upgrading the ship's capabilities, the ship served several NOAA mission goals and four line offices in the space of one cruise.

"The flexibility works in everyone's favor, Duffy-Anderson said. "It is a win-win situation for all."

# Lost City

*continued from page 2*

ments to the ROVs.

Before the expedition, Ballard's team of operators and technicians from the Institute for Exploration and the University of Rhode Island changed the operating aspect of *Hercules*. Originally designed to explore and excavate shipwrecks, the ROV operated in a downward-looking way, as if "hunkering over its work," according to NOAA scientist and Lost City mission coordinator Catalina Martinez. But to explore up and down the tall towers of Lost City, *Hercules* was reconfigured to look and work ahead, rather than downward.

The team modified *Hercules'* high-tech manipulator arm for collecting samples, added accommodations for new sampling equipment and installed a bumper to protect the vehicle from the rock face of submerged towers.

*Hercules* was adapted to be able to sample at high pressures. A chemical sensor allowed scientists to know if a site was actively venting even if they did not see shimmering, superheated water. For collecting larger animals and numerous rock samples, additional specimen boxes were added to the vehicle

"We added a live video Web link on the home page for Lost City," said Mike Shelby, who manages NOAA's ocean explorer Web page. "While the link was active, we saw visitors go from zero to thousands per day, including a peak day of more than 5,700 visitors."

One of those visitors was an example of a scientific cross connection between the standard and high-speed Internet feeds. At the University of Washington's science command center, Jeff Karson, a professor of geology at Duke University, was on watch and viewing a high-speed video transmission when he spotted an unknown marine animal near one of Lost City's towers. Though Karson couldn't identify the animal, he knew someone who could. He called that scientist and led him to the standard Internet feed on NOAA's ocean exploration Web site, and the animal was identified.

One lesson learned from the mission was the need for a thorough understanding of the highly technical nature of the dive site to determine parameters within which the ship would perform and the ROVs would operate.

The relatively shallow depth at Lost City—700 to 800 meters—had the 5,000-pound underwater robots connected to the ship by a relatively short tether while operating around 200-foot-tall chimneys. "It required very tight control for sampling in very specific locations on extremely delicate spires," Martinez said. "Our greatest challenge on this expedition was the highly technical nature of the dive location, and the fact that the ship's dynamic positioning system had a difficult time performing the very tight station maneuvers required. Given these conditions," she said, "the ship and ROV crew did a remarkable job."

"I see the Lost City expedition as a possible model of how oceanography might be done in the future. Even with some problems, the technology was great," Kelley said.

"In general, we expect to see more ocean expeditions using telepresence to bring the science and excitement of deep sea explorations ashore," said Stephen Hammond, acting director of NOAA's Office of Ocean Exploration. "In concert with our partners in academia, we plan to put more scientists on NOAA-sponsored exploration teams—some at sea, some ashore—but all well equipped for success," he said.

# Krupal Chukka

*Continued from page 3*

complex information system issues and designed solutions, and his recommended solutions to problems have been adopted. All have benefitted from his talents and abilities."

Chukka, who has worked for Systems Consulting Group, LLC, for the past four years, was tasked by his company to work for CPC part time on Oracle database reports. Before he came, no IT person was on staff, and the Oracle database was not being used effectively. His part-time status soon changed as he analyzed the system, upgraded it, set up a server and moved the data into a different software system that didn't require an outside company to modify the data.

"I worked on what the system was lacking," Chukka said. "Now we can put things online. I created Java server pages to access officer personnel files online without going through any third-party document management software."

The result was "Virtual CPC," which allows all officers to have access to their personnel folders. Prior to his solution, officers had to visit the center or request a copy of their records to be sent to them. As officers need to review their files on a regular basis to make sure they are up-to-date for assignment or promotion reviews, the old system was inconvenient at best.

Chukka also devised a system whereby personnel records could be sorted and downloaded to CDs, rendering obsolete the system in which paper record files were hand-carried to officer review board meetings and back to CPC for re-filing. Now each board member receives a copy of a CD that includes all the files under review, while the paper files stay safely in-house.

"In addition to these major contributions, Chukka has developed scores of programs that have enhanced our capabilities to provide improved services to the customers we serve," Mason said. "His ability to adjust to last-minute changes is simply outstanding. Likewise, he has developed several programs that have greatly increased our capabilities to perform statistical analysis."

Chukka is from India, where he successfully competed against 100,000 other students for a graduate school scholarship, earning his MBA degree in management information systems. His undergraduate work included specializations in math, physics and computers

After working for an IT firm in India for more than two years, he competed once again for a special opportunity—this time to come to the United States to work for Colgate Palmolive in New Jersey. Three years ago he moved to Systems Consulting Group, LLC, which sent him to NOAA.

"I'm learning everyday at NOAA, and meeting new people," Chukka said.

"Working for CPC during the past two years has been a great opportunity for me to work on different kinds of systems with different people. It is a team. These are not only my ideas; everybody contributes. Lt. Cdr. Cecile Daniels had a vision to go to a portal Web site. Greg Raymond wanted to change paper files to CDs. Capt. Jon Bailey was kind enough to get the software we asked for. Roger Mason is always behind us, backing us up whenever he thinks an idea is good. These are just to name a few.

"I've worked in many companies through my contracting job, but the level of recognition you get here is far better. They encourage you to do new things. Everyone is open to new ideas," he said.

# Michael Moss

*continued from page 3*

out Moss when there is an obscure, difficult or critical AWIPS issue or they need expert advice on how the system software design may be improved. In addition, they said, Moss' good humor and eagerness to assist his fellow site support team members have been a great inspiration within the AWIPS Support Branch.

"Mike is always ready with an encouraging word or a helping hand during difficult or complex AWIPS situations," said Vico Baer, chief of the AWIPS Support Branch. "He is one of the unsung heroes who routinely puts service before self."

Moss said working with the field sites is what keeps him motivated. "I have done a lot of field support over my career, and we have intelligent, hard working, enthusiastic, well-intentioned, good people. When you are working to solve a problem for them, the field offices are with you. I like the fact that this job really gets to the bottom line—supporting the local offices."

Moss places a high value on staying challenged. "There is still a fire in me to learn something new and solve a complex problem," he said.

*The **NOAA Report** is a monthly publication for NOAA employees about the NOAA mission from the NOAA Office of Public, Constituent and Intergovernmental Affairs, Washington, D.C.*
Send comments and story ideas to:
**Editor, *The NOAA Report***
**P.O. Box 3234**
**Shepherdstown, WV 25443**
304-876-3628
**Email:** dane.konop@noaa.gov
***NOAA Report* Online:** *http://www.publicaffairs.noaa.gov/nr*
Jordan St. John, director, OPCIA
Dane Konop, editor

# National Oceanic and Atmospheric Administration

## ERRATA NOTICE

One or more conditions of the original document may affect the quality of the image, such as:

Discolored pages
Faded or light ink
Binding intrudes into the text

This has been a co-operative project between the NOAA Central Library and the Climate Database Modernization Program, National Climate Data Center (NCDC). To view the original document, please contact the NOAA Central Library in Silver Spring, MD at (301) 713-2607 x124 or Library.Reference@noaa.gov

HOV Services
Imaging Contractor
12200 Kiln Court
Beltsville, MD 20704-1387
July 23, 2010