BLUE BAYOU

Assuring Mississippi's Sea and Skies With Unmanned Systems

By Danielle Lucey

Hurricane Katrina might have been 10 years ago, but for the state of Mississippi, monitoring and preserving its stretch of the Gulf Coast is still at the forefront of its agenda. For a weekend in December, the state's National Oceans and Applications Research Center and ASSURE alliance showed *Unmanned Systems* how unmanned surface vessels and aircraft will play into its plans.

Mississippi Gov. Phil Bryant told how USVs may hold the key to getting data on the state's coastal waterways more effectively.

Bryant addressed the audience at an AUVSI event in Gulfport facilitated by the association's Mississippi Chapter. And before the end of the day, he was commanding the technology himself, steering an ASV Ltd. C-Worker 6 USV that was performing a bathymetric survey.

The system, which is owned by C&C Technologies, is being tested by the state's National Oceans and Applications Research Center for environmental monitoring and survey work offshore. Using software from EdgeTech, the system performed a demonstration for a group of media and other invited guests on how one of these surveys might work.

"Understanding our oceans — something that is 70 percent of this world — is something that we still lack," said then-AUVSI President and CEO Michael Toscano, speaking after Bryant. "And now you have the ability to extend the eyes and ears of a human being to understand what is happening to this planet from an environmental standpoint and also from a living standpoint."

Toscano said the industry now faces more of a leadership problem than a technical problem. Many people have proven they can fly, drive and navigate an unmanned system from any domain, and Mississippi is lucky to have a governor that under-

Photos: AUVSI.

stands how this technology would be beneficial, he said.

"You are very, very fortunate to have leaders that have vision and that have insight, because that is what is going to carry the day," Toscano said.

Bryant likened the potential of unmanned maritime systems to the current boom in unmanned aerial vehicles.

"If Google is talking about using UAVs to deliver packages, what will these ships deliver? What products will they carry on an unmanned vessels around the world?" he said. "It will be limitless."

During his time in office, Bryant has overseen the creation of NOARC, which he tasked with monitoring "from the blue sky to the bottom of the ocean," to get a better understanding of the Gulf of Mexico watershed. With the center, Bryant said he wanted to create something that affected Mississippi well beyond his governorship.

"Look out these windows," he told the crowd at Gulfport's Great Southern Club, which sits 15 floors above a panoramic view of the Gulf. "If we don't make sure that's there for our generations of children, we will have failed."

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After the event, the governor and attendees got some first-hand experience in how USVs work, with Bryant test-driving an ASV Ltd. C-Worker 6.

Though C&C Technologies is an oil and gas service provider, the day's mission showcased the vessel's environmental monitoring and surveying abilities.

"She's one of a kind," said ASV's Brian Anderson. "It's the only industrial-strength oil and gas service boat in the market right now."

Using an acoustic Doppler current profiler, the C-Worker used EdgeTech

6205 software to perform bathymetry scans in real time. By scanning the bottom of the waterway with this program, EdgeTech's Lisa Brisson explained how the system marries the data from multibeam and side scan sonars to get optimal data. The system works as a hybrid of the two to make a "new, reliable and efficient way of surveying shallow water," she said. The system can cover a swath 10 to 12 times the water depth using chirp pulses, which can be fine tuned for higher accuracy and extended range. The algorithm filters out any false soundings it receives from wake and air bubbles in the water column.

Traditionally, performing a two-square-kilometer survey in shallow water would take two to three days with either a towed array or by a person sloshing around in the water with a sensor on a stick.

"In shallow water, towing something behind you is very scary," said Brisson. With the USV using these sensors, it could perform the same survey in half a day.

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Getting a better idea of how much water is in a river is key to knowing if an area needs to be evacuated before a storm. And having those data as a benchmark to see how a river has changed after a hurricane is just as important.

On the second day of demonstrations, the ASSURE group used an Altivian Nova UAS owned by Mississippi State University to scan the Pearl River, which has a dramatically different flow now than it did prior to Hurricane Katrina. Before the storm, the river's western tributary contained the highest amount of water, but now scientist anticipate its other two branches feed the waterway more.

"Post-Katrina, everything changed," said Lee Hathcock, a researcher at MSU.

Mississippi Gov. Phil Bryant, right, pilots the USV next to Dave Rutter, manager of field demonstations for ASV.

A mix of Altavian employees and MSU researchers hand-launched the system off of a small vessel to image an area of the Pearl that the group has been imaged with the system twice before.

Flying at 600 feet in airspace owned by nearby NASA Stennis Space Center, the system autonomously flew a pattern, collecting high-resolution imagery with an 18-megapixel payload.

"We get lots of high-resolution imagery. We probably don't need that much, but it's also nice for other research," said Hathcock.

The team was careful to monitor the area while the aircraft was performing the survey. However, a notice to airmen issued that day did not stop a private helicopter pilot from flying low — around 400 feet — through the unmanned aircraft's airspace.

ASSURE, which stands for the Alliance for System Safety of UAS through Research Excellence, as of press time, was in a bid to become the Federal Aviation Administration's Center of Excellence for unmanned aircraft. If they win the contract, retired Gen. James Poss said the group is aiming to be operational by September 2015. The alliance is a blend of universities, corporations and government team members from around the country, but with a concentration of schools in Mississippi. Winning the contract is important, because it allows schools to get government-funded project money without going through the typical 18-month-plus process.

"What it does is it gets universities that have substantial ties with the FAA ... and kind of gives them what we call the mother of all contracting vehicles," said Poss. ∎