Marines Evaluate New Unmanned Maritime Technologies at BALTOPS

U.S. Marine Sgts. Hadden Sherman and Tyler Joles, explosive ordnance disposal (EOD) technicians, assigned to 4th Platoon Littoral Explosive Ordnance Neutralization (LEON), 1st EOD Company, 7th Engineer Support Battalion, 1st Marine Logistical Group, release an unmanned service vehicle known as Amy, used for sea floor mapping and mine hunting, as part of Baltic Operations (BALTOPS) 2021. *U.S. MARINE CORPS / Cpl. Robin Lewis*

Sailors and Marines worked together with unmanned technologies, never used before to conduct expeditionary mine countermeasures operations, during the recent Baltic Operations (BALTOPS) 2021 exercise in Germany.

Tony Brescia, a systems engineer with the Naval Air Warfare Center Aircraft Division at Patuxent River, Maryland, brought new and innovative technologies to BALTOPS 2021 to let warfighters experiment with the systems during a major exercise.

Brescia has been working with Arizona-based Hydronalix on developing its unmanned systems platforms and technologies through investments from the Navy's Small Business Innovation Research (SBIR) and Small Business Technology Transfer programs. Brescia has worked with the company to successfully transition its Emergency Integrated Lifesaving Lanyard (EMILY) USV, which is used for lifesaving, and the sonar-equipped version used for underwater surveys.

That work has evolved into two new platforms – the Amy and Nix USVs and a small unmanned aerial vehicle called Adapt, capable of carrying small payloads such as water bottles, food or

medicine.

“It’s scalable. By upscaling the propeller and motor combination, it can carry a bigger payload,” Brescia said of Adapt. “It’s a short-range, one-way disposable UAS. You tell it where to go on your smart device and the autopilot will take it there.”

EMILY, Amy, Nix and Adapt

The Marines took advantage of BALTOPS to evaluate the new technologies and the characteristics of the different systems, such as weight, range, payload and power.

“End-user feedback goes long way to set priorities,” Brescia said, “and to help us be sure we’re investing in the right technologies.”

According to Master Sgt. Matt Jackson, an explosive ordnance disposal technician with the Camp Pendleton-based USMC 4th Platoon Littoral Explosive Ordnance Neutralization (LEON) team at BALTOPS, the exercise gave the Marines the chance to use unmanned systems designed for explosive ordnance disposal (EOD) to detect explosive hazards in the littorals, but they can also provide commanders with information using unmanned systems.

“There’s a lot of things these sensors collect that can be federated up to higher echelons,” he said.

Jackson said the Marines used EMILY with the side-scan sonar to detect anomalies in very shallow water. But, while EMILY may be too small for Marine Corps EOD, Jackson said the larger Amy has the size and form factor to load up with sensors and acoustic, satellite and radio frequency communications gear to link divers and unmanned systems to the greater mesh network.

“We want to be able to tie that all together, from the undersea node all the way to space and to the command and

operations control," he said.

Jackson envisions using a second Amy to tow a magnetometer in the surf zone to "search the sea bottom to give a heat map of metallic signatures, so I know where to avoid, as well as a side-scan sonar towed under the surface to get bathymetric data such as depth and water temperature. That's valuable information."

When it comes to mines, on the beach or in the water approaching the beach, the Marines are a breaching force, not a mine clearance force. "We want to avoid any mines while our small units are trying to get ashore," Jackson said.

Nix is a relatively small USV that can carry a large volume.

"It has the capability to float an amount of weight. You can autonomously send it somewhere with gear, food, batteries, medical supplies or sensors," Jackson said. "For LEON, it's a little bit on the large size, because we have to operate from small boats. But we can tow it behind a boat, and then send it off when we get near its destination."

While many navies use USVs for environmental sensing and mine hunting, few navies have general-purpose USVs that can be used for general tasks. EOD is a just one niche in the Marine Corps. According to Jackson, there could be many uses for these vehicles.

"By demonstrating these systems for the Marine Corps, there may be other Marines out there who will say, 'Amy can work for us, too.' It could be for signals, recording, jamming or whatever. The same goes for Nix. Marines will find things to put in and move around in something like Nix."

Brescia described Nix as a "mini-connector" to haul 80 to 100 pounds of critical repair parts, food, water or ammo. "It's large enough to have a hybrid power supply, not just batteries, so it can stay out there for a long period of

time.”

U.S. Marine Sgts. Sherman and Joles of 4th Platoon Littoral Explosive Ordnance Neutralization (LEON) retrieve the Amy USV during BALTOPS 2021. It’s one of several new technologies tested as part of the exercise. *U.S. MARINE CORPS / Cpl. Robin Lewis*

Cheap Sensors Needed

Marines have been brought into a distributed maritime environment where they will be operating under a composite warfare command, with their own connectors and working as a stand-in force within a weapons engagement zone. That means below the threshold of conflict, the Marine Corps will be a persistent sensor for the Navy to deter or curb maligned behavior.

“We need to understand the underwater domain, and we need tools to sense things in it,” Jackson said. “We want to support our Marines organically to survey those waters in the littorals, and also feed the Navy with intelligence to paint a better picture for the overall fleet. It’s a capacity problem. To really conduct Distributed Maritime Operations, we need more sensors.”

That means the need to have effective and affordable systems that can be acquired and deployed in large numbers, which fits systems such as EMILY, Amy, Nix and Adapt.

Hydronalix CEO Tony Mulligan said the company’s unmanned systems are easy to use. Sailors or Marines only require a few minutes of training to be able to send off an Adapt drone using a smart phone app from a ship offshore, for example, to an exact spot on the beach or a person in need.

“There’s no pilot. There’s no ground station. There’s not even a radio. If a Corpsman needs to send plasma or morphine to a unit ashore three miles away, he loads the drone, clicks on

where he wants it to land and it flies right to that location. If an area has been devastated by an earthquake or a storm, and there are not safe places for helicopters to land, these drones could be used to deliver water or food to isolated or damaged areas," Mulligan said.

"You can be helping people before the helicopters get there, or for those victims in smaller numbers that might not be the top priority for the relief teams."

While they are reusable, and could be recovered, reloaded and sent off again, Mulligan said they are cheap enough so that it doesn't matter if they don't come back.