

## **MARINE SCIENCE TOOLS – AUTONOMOUS GLIDER**

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The College of Marine Science operates a fleet of autonomous gliders. These gliders are designed to deploy a variety of instruments for great lengths of time over great distances in the ocean. Some of the instruments that are deployed on it are a CTD, light instruments that can measure light both entering the ocean and reflected from the bottom, dissolved oxygen, and we can record fish sounds with them. We also have an acoustic transducer.

Gliders operate at depths up to 200 meters. We have a fleet of four of them, and we have one that can operate at the depths of a 1,000 meters. And the way they operate is pretty simple. We balance them so that they're neutrally buoyant in the water, they won't sink or they won't float. And just by pumping in a little bit of water, they will become heavier than water, and they would sink. If we expel the water, then they will float.

So what happens is the battery pack of the glider, under computer control, can be slid backwards or forwards to make it tail-heavy or nose-heavy. So when they want to go down, they slide the battery pack forward, the nose goes down, they pull the water in so that they sink, and then they glide down. They have an altimeter that says we're within a few meters to the bottom. It pulls the battery pack to the tail of the glider, which makes the nose go up. It expels the water, which becomes lighter, and then it comes up.

So by not having an form of propulsion, it's able to fly in what we call Yo patterns, after Yo-Yo, and it will fly for great distances. Unlike our other instruments, they are autonomous. We put them off the ship and we leave them in the ocean. They communicate while they're in the ocean to shore-based scientists and engineers through the use of satellite communications.

In the tail, there's a satellite antenna where it literally phones home through a satellite phone system. So at a preprogrammed time, the glider will come to the surface and raise its tail and then call home. And we can monitor the condition, the battery life, if the sensors are operating. We can change the parameters of the deployment while its at sea.

We have, at the College, deployed them in response to the Deepwater Horizon oil spill. They had hydrocarbon sensors and light sensors that we used to monitor the effects of the oil. And we've also deployed them-- we put one in off of Cape Canaveral in Florida, and we picked it up off the coast of North Carolina. And it went up and it was monitoring spawning and migration habits of certain fish. And so they were able to acoustically track these fish as they were in certain areas.