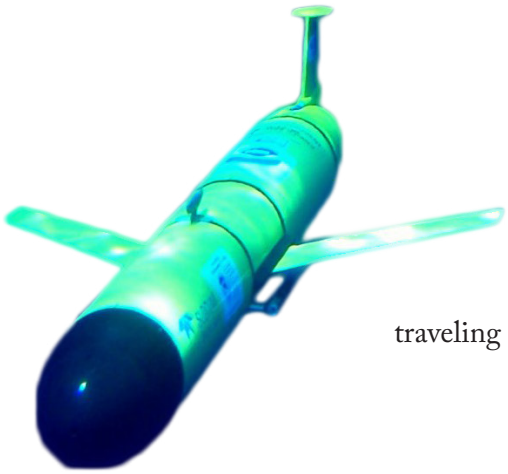
SUBMERSIBLE intelligence

CREATED WITH SUPPORT FROM A NAVY STTR CONTRACT, THE SLOCUM GLIDER COASTS AUTONOMOUSLY THROUGH THE OCEAN, HARVESTING DATA



The first person to sail around the world alone was Nova-Scotian adventurer Joshua Slocum. More than a century after he finished his three-year journey, the Slocum glider, an autonomous underwater vehicle, successfully completed the first trans-Atlantic passage of its kind, traveling from New Jersey to Spain.

All photos courtesy Ben Allsup, Teledyne

The trans-Atlantic project was led by researchers and students at Rutgers University, but the Slocum glider itself was conceived of by Douglas C. Webb, founder of Webb Research Corporation, originally based in Massachusetts. And in November of 2009, After 221 days at sea and 4,591 miles traveled at the casual speed of 4 centimeters per second, the Slocum glider did credit not only to its namesake but to its creator and to the governmental contracts that supported his innovation.

Doug Webb explained, "Nowadays there is a lot of interest in autonomous vehicles, and new versions are popping up what seems like every day, but back in 1985 when I started out, it was a novel idea. Oceanography was done with ships and crews, and I said to myself, there is no need to send 30 people out on a ship." At the time there were a few propeller vehicles in use, but no gliders. Autonomous propeller vehicles operate at a certain depth, which is effective if you need a vehicle to cruise at the same depth for a period of time, for example to search for mines.

In contrast, the Slocum glider is buoyancy driven. The glider is heavier than water and first sinks beneath the surface of the water. At a certain depth, the buoyancy of the glider changes and it starts to glide upwards. The Slocum gliders are used in oceanographic research and maritime reconnaissance, because they can measure a greater variety of data points collected from a vast underwater area, as opposed to propeller vehicles that can collect data only at one specific depth and location.

The gliders perform for months at a time with minimal oversight, collecting data and providing situational awareness over extended time periods and vast areas.

Now 88 years old, Doug Webb credits many passionate scientists and engineers at the Office of Naval Research (ONR) and academic institutions such as Rutgers University with the overall success of the Slocum glider: "I am enormously grateful for the ONR support of this research. Initially, we created a buoy called Apex, which was an underwater sensor that ascended to the surface every ten days measuring properties of the water and reporting its position. Each buoy does this continually for seven years and there are currently over 3,000 in use. The technology used for this sensor was the basis on which we conceived the Slocum glider."

Webb Research received a Small Business Technology Transfer (STTR) award from the Navy to develop the Slocum glider. Because the resulting demand by the Navy was so high, Doug Webb decided the glider would be better produced at scale by a larger company.

Off Cape Town, South Africa, a Slocum glider autonomously coasts across varying depths of water.

Deployed from the Rothera research station on Adelaide Island in the Antarctic, this Slocum glider will be able to operate smoothly and without interruption for weeks at a time.

In 2008, Webb Research was sold to Teledyne – which still manufactures the gliders today.

The Slocum glider has a wide variety of applications, from academic to commercial to military. In applications such as deep-water monitoring, marine mammal mitigation, and hydrocarbon detection and measurement, it provides a safer, more affordable alternative to ship-based operations. Once deployed, the gliders can be controlled remotely and adapted to emergency conditions via rapid sensor reconfiguration. The gliders perform for months at a time with minimal oversight, collecting data and providing situational awareness over extended time periods and vast areas. Slocum gliders operate at about 1 percent of the cost of traditional, ship-based operations, are independent from extreme weather conditions, and collect data continuously, regardless of circumstances.

After a decade of use and hundreds of millions in cost savings for military, academic, and civilian customers, the Slocum glider is still going strong. David Webb shows no signs of slowing down, either. He says he keeps "trying to retire," but to no avail. He's too excited about what's next: "Currently, we are testing a glider that's been running for 240 days," he said, "and with no external power supply, only depending on the ocean's thermal differences between the surface and the deep of the ocean, harvesting all the thermodynamic energy in its path!"

Webb Research, Corp. (Teledyne Technologies)

Modernization Priority: Autonomy

East Falmouth, MA (Thousand Oaks, CA) • STTR contract: N00014-98-C-0281 • Agency: Navy • Topic: N97T002, An Autonomous Gliding Vehicle for the Distributed Observation of the Littoral Environment