

## 'Flying' Underwater at the Bottom of the Planet



A robot glider like this one that "flies" underwater will soon be deployed in the waters off Antarctica. (Rutgers University)

### Robot Glider Remote Controlled 7,600 Miles Away From Antarctica in New Jersey

By CLAYTON SANDELL

**Dec. 14, 2006** — - An underwater robot glider that appears to "fly" as it gathers scientific data will soon be deployed in the frigid waters off the coast of Antarctica. But the scientists controlling its every move will be in New Jersey, about 7,600 miles away.

Researchers say the technology will help demonstrate the future of scientific exploration near the planet's south pole using remote controlled vehicles, while also helping provide a clearer picture of the effects of global warming on the region.

"It works very similar to a glider you'd use in the air," said Josh Kohut, a physical oceanographer and a member of the glider team at the Coastal Ocean Observation Laboratory at Rutgers University in New Jersey. "The big difference is that because we're in the ocean, we can essentially adjust gravity. Instead of just gliding down, we can have it glide up."

Kohut and colleagues say they believe this is the first time a glider like this has been deployed in Antarctic waters. It doesn't have a propeller, but instead sucks water in to begin its descent and purges it out to rise to the ocean's surface.

#### The Mission

Researchers plan to launch the glider from a vessel off the coast of the Antarctic Peninsula around Jan. 8. It is programmed to slowly dive to depths of up to approximately 650 feet, taking readings and gathering data along the way.

Every six hours, it will return to the surface and use a satellite orbiting in space to make a phone call back home. As it bobs in the surf, the glider's small antenna will transmit data via satellite back to the Rutgers lab thousands of miles away.

Controllers -- who refer to themselves as "pilots" -- will download the glider data and transmit new instructions as they monitor its journey on a computer.

### **Wave of the Future**

In the future, the Rutgers team envisions a fleet of remotely operated gliders that could offer a year-round scientific presence in Antarctica -- a part of the globe that traditionally has been difficult and expensive to monitor with much larger research vessels.

"These [explorers] don't get seasick. They don't get homesick," Kohut said. "We can have them out in areas where there are significant storms, gathering very valuable data where that would not have been collected otherwise."

However, it is uncertain how extremely cold water will affect the gliders. On previous missions in warmer climates, the batteries have lasted about 30 days with a range of about 300 to 400 miles.

"Colder water really zaps the batteries," said Oscar Schofield, a marine biologist and glider team member. "So we're trying to figure out what we can do to fly smarter. We're essentially trying to surf the currents to maximize the batteries."

Another concern is that the glider, which can cost up to \$100,000, may accidentally surface underneath a drifting iceberg, blocking its ability to phone home.

"That's one of the challenges we're having," Kohut said, noting that controllers will monitor satellite images to avoid icy areas.

The glider is programmed to dive again if it can't make a connection. If it is lost or damaged, there is a spare glider on the ship.

### **Watching the Warming**

A study published earlier this year in the journal *Science* found that Antarctic ice sheets are losing up to 36 cubic miles of ice every year.

"The Antarctic Peninsula is one of the three most rapidly warming regions on earth," said Antarctica expert Robert Bindshadler, a scientist with NASA's Goddard Space Flight Center.

Bindshadler, who has led more than a dozen expeditions to Antarctica, said parts of the Antarctic Peninsula have warmed 4.5 degrees Fahrenheit over the past 50 years. He said that observations on sea life in the Antarctic region are incomplete, making it hard to determine the precise impacts of climate change.

The Rutgers team hopes the glider will help fill in some of those blanks.

"It's warming so quickly, even trying to get a handle on what's driving the melting is a big scientific question," said Schofield.

As sea ice melts, for example, the researchers say the ocean surface is exposed to high winds that make the water more turbulent. This can displace tiny algae plants to lower depths, where they have less exposure to sunlight they need to thrive. The glider will help measure how well those plants-- a key part of the food chain-- are doing.

"The nutrients are generally deeper in the ocean, and if there's material in the water that's absorbing the light, that can affect the blooms that occur down there," said Kohut.

Less ice means fewer plant blooms, which scientists say negatively impacts animals all the way up the food chain.

"That's where the food is," said Schofield. "That's where you find tons of seals and whales, in part because you have all the plants growing there, and the krill are there."

The glider mission is being funded by the National Science Foundation and is being undertaken at the start of the International Polar Year, a massive multinational effort to comprehensively study the earth's polar regions.

"We've flown these gliders in a lot of places. But this will definitely be the most interesting," said Kohut.

Copyright © 2007 ABC News Internet Ventures