Antarctica-bound submarine to get Lake Tahoe test

David Perlman, Chronicle Science Editor

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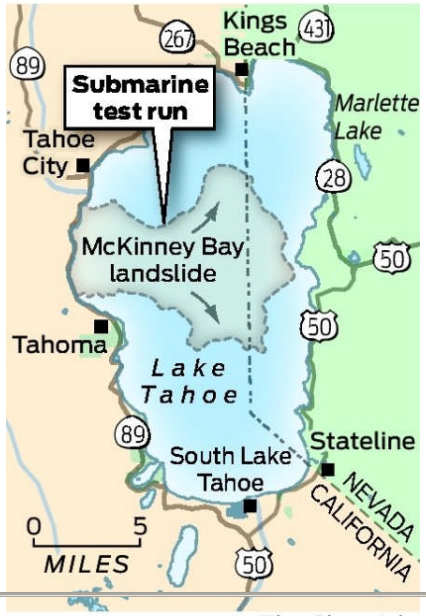
Lance Iversen / The Chronicle

Reed Scherer, a geologist on the research team, explains how the remote-control, yellow submarine works.



The Chronicle

An exotic new unmanned submarine, built to analyze the water and sediments moving at the base of a vast sheet of melting ice in Antarctica, will make its first science cruise closer to home - in the rocky depths of Lake Tahoe.

The Tahoe venture in March is planned as a test of the cigar-shaped, 2,200-pound, remote-control vehicle, but later in the year the submarine will play a unique role helping scientists understand the many effects of global warming on the ice-bound southern continent.

To explore those issues, a team led by scientists at Northern Illinois University and including nine other research centers has received $10 million in grants for a five-year project to sample in unprecedented detail how the planet's changing climate is altering the underside of the West Antarctic Ice Sheet.

They will work to determine how fast it is melting, how sediments are being gouged by the flowing meltwater and what kinds of microbial fossil plants still exist in that impenetrably dark region.

"It's an unknown world," said Ross Powell, a geologist at the university and leader of the project, "but with this remotely operated vehicle, we can begin to understand it."

Powell and geology colleague Reed Scherer demonstrated the vehicle's workings at the annual meeting of the American Geophysical Union in Moscone Center in San Francisco last week.

Trial run set for lake

Before the $2 million vehicle, known to underwater explorers as an ROV, reaches Antarctica, however, scientists from the California Geological Survey and Bay Area universities will use it to investigate a prominent and mysterious underwater feature studded with massive rocks off Tahoe's western shore.

It is known as the McKinney Bay landslide, and Gordon Seitz, an engineering geologist with the California Geological Survey, said the vehicle will be an ideal tool to examine its details. Scientists want to learn how and when the slide crashed into the lake, and how it might be related to three major earthquake faults whose traces lie along the bottom of the lake.

The huge slide is generally considered to have occurred about 55,000 years ago, Seitz said, but other scientists have dated it about 7,000 years ago. It is famed for having touched off a full-scale tsunami - more correctly known as a seiche - with huge waves crashing all the way across the lake.

Long and slender

The new submarine was built by DOER, a small marine engineering firm in Alameda that specializes in undersea robotics. The letters stand for Deep Ocean Exploration and Research, says its president, Liz Taylor.

The sub is 28 feet long and only 22 inches in diameter when it is tightly closed along its entire length.

But when it is opened for work, Powell explained, the vehicle holds dozens of instruments, including five cameras, a water sampler, a sediment corer, a current meter, a robotic arm for collecting samples, an acoustic sounder and even a mapping system.

Once shipped to Antarctica later next year, the vehicle will be towed to an exploration site on the Ross Ice Shelf. A powerful hose carrying boiling water from the surface will melt a hole 30 inches wide and more than 3,000 feet down through the thick ice so the tethered sub can be lowered vertically into the water below.

Then it will swivel on its tether by remote control until it lies horizontally, and opens up along its entire length so all its instruments can operate and send the data, the images, and the sediment samples they gather up to the scientists on the ice above.

The vehicle and all its innards, Powell said, represent "a feat of ingenuity, engineering and technology to explore parts of our planet that have never been seen before."

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