

# DEIMOS joins MARS and its satellite of instruments on seafloor

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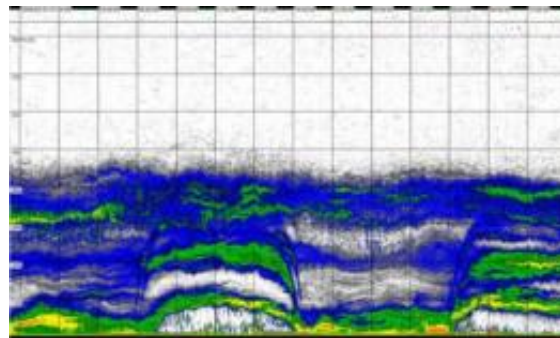
DEIMOS consists of an echosounder -- encased in a 17-inch diameter sphere of thick glass and then in a yellow plastic cover -- and a transducer set in a metal frame. Here Knut Brekke, a pilot of the remotely operated vehicle that will deploy DEIMOS, checks the set up. Credit: D. Kreisberg/University of Washington

The planet Mars has a moon named Deimos, so it seems only appropriate that the ocean observatory MARS in Monterey Bay have its own DEIMOS. This DEIMOS, however, is an underwater acoustic package designed to monitor movements of fish and zooplankton.

MARS, which stands for Monterey Accelerated Research System, consists of a node the size of two compact cars that serves as both a power strip and a high-speed internet connection for scientific instruments. Connected to the California coast by a 35-mile-long cable carrying power and data, [MARS](#) went live late last fall 3,000 feet below the surface in Monterey Bay.

Most recently connected to the node is the University of Washington-designed DEIMOS, which stands for Deepwater Echo Integrating

Marine Observatory System. DEIMOS uses an [echo sounder](#) to transmit and receive an [acoustic signal](#) used to reveal what's in a narrow cone of water above the instrument. DEIMOS can discern everything from [zooplankton](#) to whales.



An echogram displays the relative density of aquatic organisms from the seafloor to the surface of Monterey Bay. Vertical movement of zooplankton and fish, usually deeper during day and dispersed in surface waters at night, are displayed over a 42-hour period. The seabottom is located at the top of the image and the ocean surface is at the bottom. Credit: University of Washington

DEIMOS was connected to MARS Feb. 28. For the past two weeks John Horne, UW associate professor of aquatic and fisheries sciences and leader of the DEIMOS project, has been able to sit in his office in Seattle and see the data as it is collected.

Scientists need to know the density, distribution and dynamics of what's living in the water to understand how ocean life responds to tides, nutrients upwelling from [deeper waters](#), storms, the changing seasons or El Niño events, Horne says. That information can then be used to investigate effects of long-term environmental changes.

It's not new for biologists to use echo sounders.

What's new is that Horne's package can be controlled from land and operate far longer than those relying on batteries, thanks to the power supplied via MARS. Horne said it took more than six [car batteries](#) to provide power for one week to an echo sounder he mounted on a buoy for a past project. To operate for a year on the seafloor, one can't very well deploy an echo sounder package and 312 car batteries.

The Monterey Bay Aquarium Research Institute operates MARS as a test platform for the National Science Foundation's Ocean Observatories Initiative. Researchers use MARS to test instruments before they are hooked up to deep-sea observatories off the U.S. and elsewhere.

MARS enables existing instruments to be used in new ways and the invention of entirely new instruments. Horne says DEIMOS shows what's possible, even without a lot of money.

Horne and UW research scientists David Barbee and Dick Kreisberg did the design and engineering using off-the-shelf components costing roughly \$14,500. The package includes a Simrad Fisheries echo sounder - similar to what fishermen use to locate fish - on loan from Kongsberg Underwater Technology, which has its U.S. headquarters in Lynnwood, Wash. The whole package had to meet certain size and weight restrictions, for example weighing less than 300 pounds, to be deployed by ROV Ventana, one of the institute's remotely operated vehicles.

In addition to the restrictions on size, the UW team faced other challenges such as working out Internet protocols to communicate with the institute's computer system and navigate firewalls without compromising security, Horne says.

DEIMOS emits an acoustic signal that spreads out in a cone shape from the 16.5-inch diameter transducer to a 115-yard circular area at the surface of the ocean and has been designed to not disturb marine mammals or other animals that are being monitored. Look for more about DEIMOS at <http://www.acoustics.washington.edu/>.

Horne says he plans to coordinate acoustic data

from DEIMOS with what is being recorded by a special low-light video camera called Eye-in-the-Sea that is also connected to MARS. Developed under the direction of marine biologist Edie Widder, the system records deep-sea animals in the area.

Source: University of Washington ([news](#) : [web](#))

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