WHOI CELEBRATES OPENING OF NEW LAB

Scientists and engineers moved in August into the newest laboratory at Woods Hole Oceanographic Institution (WHOI)—a 27,000-square-foot, "green"-designed building that provides space for major efforts to create long-term ocean observatories.

The Laboratory for Ocean Sensors and Observing Systems (LOSOS) will house researchers working on the Ocean Observatories Initiative (OOI), a multimillion-dollar effort funded by the National Science Foundation to build and operate networks of moored buoys, undersea cabled systems, sensors, and autonomous underwater vehicles over the coming decades. The OOI networks will provide real-time, 24/7 data to researchers working to understand the intricacies of ocean circulation, chemistry, and biology and how these may be changing as Earth's climate changes. OOI occupies most of the new building, including the central high bay, built to accommodate tall buoys and equipped with a 10-ton-capacity bridge crane for hoisting them.

Three other programs share the building:

- The Martha's Vineyard Coastal Observatory (MVCO) operations group, which has maintained a cabled underwater ocean-observing facility at the island since 2001.
- The National Ocean Bottom Seismograph Instrument Pool (OBSIP), which builds and operates seafloor instruments to detect undersea earthquakes, volcanoes, landslides, and other ground-shaking events.
- The Environmental Sample Processor (ESP) program, which deploys new robotic underwater labs-in-canisters. ESPs can identify marine organisms in the ocean, including harmful algae and their toxins, and transmit information in near-real time to scientists ashore.

"This new lab building brings the team developing OOI observing systems together under one roof in a beautiful modern building, providing opportunities to interact and share technologies with WHOI staff," said John Trowbridge, co-head, with Robert Weller, of the WHOI-led portion of OOI.

"It's much more than just having a shiny new building," said WHOI biologist Heidi Sosik, chief scientist of the MVCO. "Different ocean-observing groups are coming together in one place. We can more easily share ideas and cross-fertilize, and that will make more innovation happen more quickly."

Room for expanding research

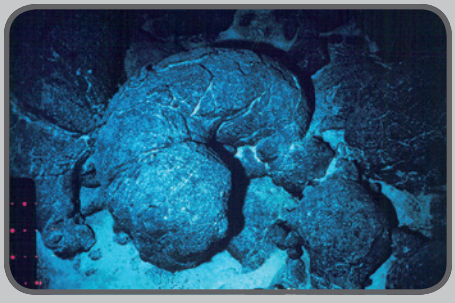
WHOI received an $8.1 million grant from the National Institute of Standards and Technology (NIST) to fund construction of a new scientific research facility as part of the American Recovery and Reinvestment Act. WHOI contributed $4 million. NIST Deputy Director Willie May attended the building's official opening on Sept. 20, 2012.

The building, tailored to occupants' specific needs, is WHOI's first LEED (Leadership in Energy and Environmental Design)-certified laboratory. LEED ratings, developed by the U.S. Green Building Council, assess buildings for materials and methods that foster human and environmental health. The new lab, designed

Tom Kleindinst, WHOI

WHOI President and Director Susan Avery and Willie May, deputy director of the National Institute of Standards and Technology, cut the ceremonial ribbon to open the NIST-funded Laboratory for Ocean Sensors and Observing Systems at WHOI.

SERENDIPITOUSLY SNAGGED FROM THE SEAFLOOR



Magma erupting at the seafloor often forms "pillow" lava. Molten rock at 2,200°F hits 35°F seawater, and "within a fraction of a second, a glassy skin forms on the lava surface, encapsulating a blob of lava," said WHOI volcanologist Adam Soule. "Continued injection of lava causes the pillow to stretch and expand, like a water balloon."

In 2010, Karen Harpp of Colgate University led a multi-institutional expedition off the Galápagos Islands to explore seafloor volcanism. To collect seafloor rock samples, scientists cast a dredge on a cable into the deep. Somehow, the cable snagged a huge pillow lava in a nook between two bulbous lobes and wrenched it up from the seafloor.

The pillow lava weighed nearly 800 pounds. "It is among the largest lava samples ever collected from the seafloor," said WHOI marine geologist Dan Fornari. He arranged to send the lava back to WHOI, where he and other scientists, including Soule, geochemist Mark Kurz, and geologist Eric Mittelstaedt, could analyze it further.

by Ellenzweig Associates of Cambridge, Mass., includes features that contribute to sustainability and efficiency.

The space provides improved work environments and more room for research programs that have outgrown other space at WHOI. Tall external doors allow forklifts into lab rooms, and monorail tracks for hoists run along ceilings. A controlled environmental chamber will allow electronics testing in varied temperatures.

All labs have access to the roof for cables that will carry high-bandwidth data via satellite from deployed instruments. An innovative new operations center room is planned, with support from a private donation, to be lined with screens displaying data streaming from at-sea instruments in near-real time.

Tom Kleindinst, WHOI

WHOI's newest building: the Laboratory for Ocean Sensors and Observing Systems

Features designed for OOI include an inventory-control room with controlled access, and wide internal doors from second-floor lab space into the high bay so that trucks can lift heavy or large equipment directly to the lab. Upstairs, laminate countertops dissipate static electric charges so engineers working on electronics can avoid inadvertent damage to circuitry. A 15-foot-long tank will allow instrument ballast tests.

In the OBSIP testing lab, a granite floor slab is entirely separated from the rest of the building for testing seismic instruments without exposure to the vibrations a building produces.

"This promises to be quieter, seismically, than the ad-hoc test space that we constructed in a corner of our old lab on the WHOI dock," said geologist John Collins, who leads the OBSIP group.

The building incorporates several efficiencies, including 95 percent combustion efficiency boilers, radiant-heat flooring in the high bay, and energy-saving fluorescent lights directed upward for diffuse, eye-friendly illumination.

"We've ended up with a building that is 13 to 14 percent more energy-efficient than a traditional building," said Ernest Charette, WHOI's director of construction projects. For healthy indoor air quality, the building's flooring, sealants, adhesives, and other materials were selected to minimize volatile organic compounds.

To address sustainability, WHOI set aside conservation land to offset land disturbances and installed water-sparing landscaping. One important feature might even seem mundane: washing. Maintaining observing systems means pulling buoys from the ocean, cleaning off marine organisms that grow on them, and preparing them for re-deployment. The building includes a high-pressure washing station to reclaim, filter, and capture runoff liquid and debris before it seeps into surrounding land.

—Kate Madin

The scientists wanted to look inside the pillow lava, so they brought it to a rock quarry in Rhode Island equipped with mammoth saws that usually cut large slabs of granite. Inside of the cut-open pillow lava, they found something that had never been observed before. Embedded within the lava were pockets of sediments from the seafloor.

The scientists surmised that as the lava was squeezed out onto the seafloor like toothpaste coming out of a tube, sediments were captured within it. In the sediments were shells of tiny organisms. WHOI scientist Andrea Hawkes extracted a preserved shell and dated it at 40,000 years old. So the lava was at least that old.

The cut lava now rests in the foyer of Clark Laboratory at WHOI—one part as a display telling the tale of its discovery, another part as a table, where scientists (from left, Fornari, Kurz, Soule, and Mittelstaedt) and visitors can rest their coffee mugs and feet on something that came from deep within the Earth and the bottom of the ocean.

Photos from L to R: Courtesy of WHOI Archives; Dan Fornari, WHOI; Tom Kleindinst, WHOI; Dan Fornari, WHOI; Tom Kleindinst, WHOI; Katherine Spencer Joyce, WHOI