Ocean Observatories Initiative cable connects to bring ocean data to shore

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The Ocean Observatories Initiative (OOI) program is installing the undersea cable that will link scientists and others on land to data streaming from an extensive array of next-generation sensors located in the ocean and on the seafloor, marking progress in construction of the first U.S. regional cabled ocean observatory.

The OOI, a program funded by the National Science Foundation, is planned as a networked infrastructure of sensor systems that will address vital science questions by measuring physical, chemical, geological and biological variables of the ocean.

The Regional Scale Nodes (RSN) component of the OOI establishes an interactive network of ocean observing sensors, instruments, and moorings in the Northeast Pacific ocean connected by 900 kilometers (~ 560 miles) of electro-optical cable and designed to operate continuously for 25 years.

During the installation process, the fiber-optic cable is placed on the ocean floor by a commercial cable ship, the *TE Subcom Dependable*. This week the cable was pulled ashore through a previously installed conduit and was "landed" on the beach at Pacific City, Ore., where it will be connected to a shore station located one mile north. Remaining at-sea installation will take place through much of August.

The cabled network features two submarine cables extending from the shore station to two main study sites: one cable reaches Hydrate Ridge, approximately 120 kilometers (~75 miles) to the southwest of Pacific City, and loops back on the continental shelf to link cabled moorings of the Coastal Scale Nodes Oregon Line along the OOI's Endurance Array site. The second cable extends 500 kilometers (~ 310 miles) west to the Axial Seamount study site on the Juan de Fuca Ridge. Each primary instrumented site will offer two-way communication between land and sea and will be supplied with up to 10 gigabits per second of telecommunications bandwidth and 8 kilowatts of power. Data will be collected from the sea surface to the seafloor and transmitted to shore in near-real time via the Internet.

The OOI fiber-optic cable is placed on the ocean floor off the coast of Oregon by a commercial cable ship, the TE Subcom Dependable. (Photo provided by TE Subcom)"With the landing of the OOI undersea cable we see connection of a tangible piece of the OOI's unique infrastructure that will bring to shore data from multiple sensors and instruments and change the way we conduct ocean observation for decades to come," said Tim Cowles, Vice President & Director of Ocean Observing at the Consortium for Ocean Leadership. "This is a significant step forward in the construction of the OOI and moves us closer to our goal of providing the sustained observations needed to help us better understand and manage our oceans."

The OOI will provide research scientists, educators, students and the public with unparalleled access to the physical, chemical, geological and biological phenomena of the ocean. Sustained ocean observations and interactions that span decades rather than days will allow ocean exploration and discovery to move into previously unimaginable realms. Greater knowledge of the ocean's interrelated systems is vital for increased understanding their effects on biodiversity, ocean and coastal ecosystems, ecosystem health and climate change.

According to John R. Delaney, Director and Principal Investigator of the OOI Regional Scale Nodes and University of Washington Professor of Oceanography, the study sites selected off the Oregon Coast offer a representative suite of natural phenomena that occur throughout the world's oceans and seafloors. "The OOI regional cabled network will enable scientists to conduct local investigations of such global processes as climate-influencing ocean currents, active earthquake zones, creation of new seafloor, and rich environments of marine plants and animals."

Progress on this component of the OOI has been taking place for many months. In March 2011 the program completed the Horizontal Directional Drilling (HDD) process necessary to install the power and data undersea cable at Pacific City. HDD is a common technique used to install cables, pipelines, fiber-optic ducts and other types of buried infrastructure under environmentally sensitive areas or technically difficult sites. The first step in the HDD process involved drilling under the beach and surf zone to install two horizontal sub-sea bed conduits running from the beach to an offshore location so that the two cables will remain buried from the offshore location to the beach manhole.

The University of Washington is leading the OOI cabled component effort and has contracted with L3 MariPro Inc., Goleta, Calif., for the design and build of the OOI RSN primary infrastructure.

The OOI Program is managed and coordinated by the OOI Project Office at the Consortium for Ocean Leadership, in Washington, D.C., and is responsible for construction and initial operations of the OOI network.

In addition to University of Washington, three other Implementing Organizations are responsible for construction and development of the overall program. Woods Hole Oceanographic Institution and its partners, Oregon State University and Scripps Institution of Oceanography, are responsible for the coastal and global moorings and their autonomous vehicles. The University of California, San Diego, is implementing the cyberinfrastructure component. Rutgers, the State University of New Jersey, with its partners University of Maine and Raytheon Mission Operations and Services, is responsible for the education and public engagement software infrastructure.