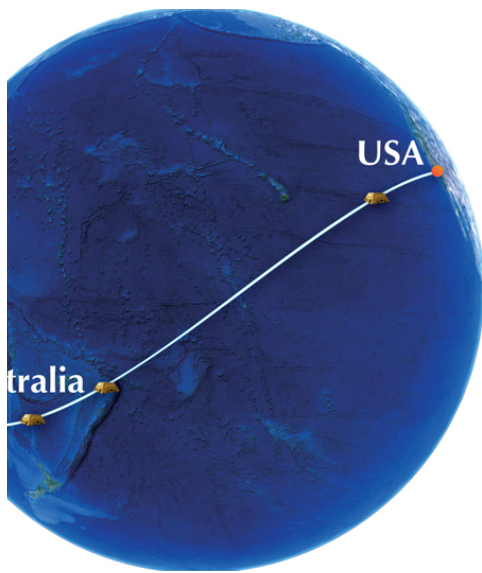


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## Cables Spanning Pacific Ocean Seafloor to Give Ocean Science a New Edge

**Scripps researchers, NOAA and TE SubCom agree to pursue science ports on transcontinental fiber optic cable lines to help monitor earthquakes, tsunamis and other forces**



*3D perspective depiction of a transcontinental fiber optic cable with scientific instrument ports.*

Marine scientists and a commercial telecommunications company are exploring partnerships that could dramatically advance scientists' ability to observe and study ocean processes, provide early alerts for potential disasters and study deep Earth geodynamics.

Scientists from Scripps Institution of Oceanography at UC San Diego and engineers at NOAA's Pacific Marine Environmental Laboratory (PMEL) are in the initial discussion stages with Morristown, N.J.-based TE SubCom, a TE Connectivity Ltd. company and an industry pioneer in undersea communications technology, to integrate scientific instruments onto thousands of miles of seafloor communication cables across the Pacific Ocean.

The data collected will be open and available to the global scientific community.

"This is the first time a commercial telecommunications company's cable installations will be deployed with embedded science sensors," said John Orcutt, a distinguished professor of geophysics at Scripps and one of the leaders of the project. "It provides us with a whole new world of capability."

The exploratory partnership between Scripps researchers, NOAA and TE SubCom is in the formative stages seeking funding for engineering and operations and looking at new approaches to collect high-bandwidth ocean data from the seafloor.

“This is an exciting opportunity to launch a new direction in subsea telecommunications, as there is significant potential in opening up data and power connectivity along undersea cables,” said Mark Englund, managing director, TE SubCom. “TE SubCom has a solution for ocean connectivity with unprecedented performance-to-cost ratios, and together with Scripps and PMEL, we have the right ingredients to make cable-based ocean connectivity a reality in every major ocean.”

The initial project is envisioned to focus along a cable route spanning 12,950 kilometers (8,105 miles) from Sydney to Auckland and across the Pacific Ocean to Los Angeles. Initial efforts are exploring the use of seismometers, pressure gauges and temperature sensors for hazard warning and mitigation. As funding develops, sensors could be deployed on future cables for the first time at 75 kilometers (47 miles) spacing. The sensors could allow NOAA scientists to measure the size and direction of tsunamis propagating across the ocean more precisely and to alert disaster management officials and first responders more quickly. The installation on the seafloor cable has the potential to greatly reduce long-term costs for tsunami monitoring, while at the same time dramatically increasing sensor density, accuracy and reliability.

“We’ve seen an unprecedented number of large and devastating tsunamis over the last several years,” said Christopher Sabine, Director of NOAA-PMEL. “We must explore new approaches for improving tsunami detection at lower costs while maintaining our existing capabilities.”

The fiber optic cable is capable of transmitting data at a maximum of 40 gigabits per second from deep-sea locations where gaps of instrument coverage currently exist. For comparison, the entire print collection of the Library of Congress could be transmitted over the link in just more than 30 minutes.

“More than 70 percent of the world is water and we need to understand much more of it,” said Orcutt, a scientist at the Cecil H. and Ida M. Green Institute of Geophysics and Planetary Physics at Scripps. “If this project expands to other oceans it could change the face of oceanography.”

The collaborators hope the academic-government-industry project will create a handful of new jobs, primarily in data management and near-real-time analysis, while providing the scientific community with an invaluable stream of data.

In addition to seismometers and pressure gauges, the scientific ports along the cable line could eventually include a comprehensive suite of sensors such as climate instruments (acoustic tomography and water column temperature and conductivity, for example) to measure ocean warming.

“We strive to explore new ways of observing the ocean that are innovative as well as cost-effective. This three-way collaboration between academia, government and industry could change the way we work,” said Sabine.

Scripps research geophysicist Frank Vernon, deputy director of the NSF Ocean Observatories Initiative Cyberinfrastructure program, is expected to use seismological data from the project to supplement details of Pacific Ocean earthquakes and develop deep images across the Pacific that presently are not possible.

“Currently we don’t have enough seismometers out there, so this effort will help us better understand the world beneath us,” said Vernon. “This includes our understanding of the plates, the interfaces inside the Earth and structural components from the crust down to the core.”

### **About Scripps Institution of Oceanography**

Scripps Institution of Oceanography at University of California, San Diego, is one of the oldest, largest and most important centers for global science research and education in the world. Now in its second century of discovery, the scientific scope of the institution has grown to include biological, physical, chemical, geological, geophysical and atmospheric studies of the earth as a system. Hundreds of research programs covering a wide range of scientific areas are under way today in 65 countries. The institution has a staff of about 1,400, and annual expenditures of approximately \$170 million from federal, state and private sources. Scripps operates robotic networks, and one of the largest U.S. academic fleets with four oceanographic research ships and one research platform for worldwide exploration. Learn more at [scripps.ucsd.edu](http://scripps.ucsd.edu).

### **About UC San Diego**

Fifty years ago, the founders of the University of California, San Diego, had one criterion for the campus: It must be distinctive. Since then, UC San Diego has achieved the extraordinary in education, research and innovation. Sixteen Nobel laureates have taught on campus; stellar faculty members have been awarded Fields Medals, Pulitzer Prizes, McArthur Fellowships and many other honors. UC San Diego—recognized as one of the top ten public universities by *U.S. News & World Report* and named by the *Washington Monthly* as number one in the nation in rankings measuring “what colleges are doing for the country”—is widely acknowledged for its local impact, national influence and global reach. UC San Diego is celebrating 50 years of visionaries, innovators and overachievers. [www.50th.ucsd.edu](http://www.50th.ucsd.edu)

## **About TE SubCom**

TE SubCom (SubCom), a TE Connectivity Ltd. company, is an industry pioneer in undersea communications technology and marine services and a leading global supplier for today's undersea communications requirements. Drawing on its heritage of technical innovation and industry recognized performance, SubCom delivers the most reliable, high quality solutions to organizations with undersea communications needs vital to their core mission. The company designs, manufactures and installs systems around the world, and has deployed more than 490,000km of subsea communication cable—or enough to circle the earth more than 12 times at the equator. SubCom's global presence, backed by industry leading research and development laboratories, manufacturing facilities, installation and maintenance ships, depots, and management team work together to implement integrated solutions and network upgrades, with unsurpassed reliability, that support the needs of telecommunications, internet providers, offshore and science customers worldwide.

For more information visit [www.SubCom.com](http://www.SubCom.com).

## **About TE Connectivity**

TE Connectivity is a global, \$14 billion company that designs and manufactures approximately 500,000 products that connect and protect the flow of power and data inside the products that touch every aspect of our lives. Our nearly 100,000 employees partner with customers in virtually every industry—from consumer electronics, energy and healthcare, to automotive, aerospace and communication networks—enabling smarter, faster, better technologies to connect products to possibilities. More information on TE Connectivity can be found at <http://www.te.com>.

## **About NOAA-PMEL**

NOAA's Pacific Marine Environmental Laboratory (PMEL) conducts interdisciplinary scientific investigations in oceanography and atmospheric science. PMEL programs focus on open ocean observations in support of long-term monitoring and prediction of the ocean environment on time scales from hours to decades. Studies are conducted to improve our understanding of the complex physical and geochemical processes operating in the world oceans, to define the forcing functions and processes driving ocean circulation and the global climate system, and to improve environmental forecasting capabilities and other supporting services for marine commerce and fisheries. More at [www.pmel.noaa.gov](http://www.pmel.noaa.gov)

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