UNDERSEA TELECOM CABLES CAN BE USED AS EARTHQUAKE MONITORING NETWORKS: STUDY

Relevant for: Geography | Topic: Important Geophysical phenomena - Earthquakes, Tsunamis & Volcanoes

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Fibre-optic cables that make up the global undersea telecommunications network may help researchers assess offshore earthquakes, and hidden geologic structures in the depths of the ocean, according to a study.

The study, published in the journal *Science*, describes an experiment which turned a 20 kilometre section of undersea fibre-optic cable into the equivalent of 10,000 seismic stations monitoring quakes along the ocean floor.

The researchers, including those from the University of California (UC) Berkeley in the U.S., recorded a 3.5 magnitude earthquake, and seismic scattering from underwater fault zones during their four-day experiment.

They used a technique where a device with components for creating, manipulating and detecting light sent short pulses of laser down the cable, and detected how this was backscattered due to strain in the cable caused by stretching.

The researchers then measured the scattering at every two metres of the cable, and turned a 20-kilometre section into 10,000 individual motion sensors.

They said the technique could be used to map a previously unknown fault system, and observe several dynamic tidal and storm-driven processes in the water column above.

The technique called Distributed Acoustic Sensing, was earlier tested with fibre-optic cables on land, but can now be used to obtain data on quakes happening under the sea, where few seismic stations exist, they said.

The researchers said the new system is sensitive to changes of nanometres to hundreds of picometres for every metre of cable length — a change happening at the scale of one part in a billion.

"There is a huge need for seafloor seismology. Any instrumentation you get out into the ocean, even if it is only for the first 50 kilometers from shore, will be very useful," said study lead author Nate Lindsey from UC Berkeley.

The scientists hope to use the dense fibre-optic networks around the world, spanning more than 10 million kilometers, on both land and under the sea to measure the sensitive seismic movements on the Earth.

"This is really a study on the frontier of seismology, the first time anyone has used offshore fibreoptic cables for looking at these types of oceanographic signals or for imaging fault structures. One of the blank spots in the seismographic network worldwide is in the oceans," said study coauthor Jonathan Ajo-Franklin from Rice University in the U.S.

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