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FOR IMMEDIATE RELEASE

Ocean Drilling Program Extends Global Seismic Network to the Deep Oceans

New drilling technology may open exploration of Earth's currently-inaccessible interiors

The global network of on-land seismic stations provides sufficient earthquake monitoring capabilities for large parts of the Earth's surface in continental regions and some islands. However, oceanic regions that cover approximately 70 percent of Earth's surface remain largely unmonitored creating large "holes" in the worldwide data coverage for low magnitude earthquakes and for the Earth's deep interior. Scientists with the Ocean Drilling Program (ODP) will install one of many planned Geophysical Ocean Bottom Observatories (GOBO) in which a permanent seismograph station will be established for monitoring earthquake activity.

Representing seven countries, scientists aboard the *JOIDES Resolution* will drill into the oceanic basement of the Indian Ocean, a region of the world where there is a lack of ocean-bottom seismograph stations. The drill hole will be located on the Ninetyeast Ridge between India and Australia. In addition to this installation, a series of seismic experiments involving the drill ship, as well as the German research vessel *Sonne*, are also planned to completely characterize the site.

"During the past 10 years our knowledge of deep Earth interior processes has greatly improved with the development of new generations of global seismic monitoring networks," says Dr. John Casey, chief scientist for the expedition and professor at the University of Houston. "The need for ocean-bottom observatories is driven by the lack of observations in large tracts of the world ocean where neither continents nor islands are available to place observatories, especially in the southern hemisphere."

Earthquakes, which are the result of sudden and rapid earth movements along faults can be detected by seismographs -- instruments that respond to very small ground vibrations, velocities and accelerations. These movements are associated with the motion of seismic waves which can be detected by seismograph stations even when the sources of these waves occur at great distances from the stations. Data collected from the network of existing seismic stations has provided remarkable seismic tomographic images for Earth's deep interior. These tomographic images can be compared to what an x-ray image reveals about the human body. This is one of the few ways geologists can study Earth's deep interior and its behavior.

A global network of on-land seismic stations called the Worldwide Standard Seismograph Network (WWSSN), used for monitoring earthquake activity, was established in 1962. Seismic data from this network accelerated advances in seismology and were a great source of new discoveries up to the 1970s. These discoveries enabled seismologists to understand the distribution and patterns of moderate to strong earthquakes in the regions of the world that were subject to significant earthquake risk.

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In the early '70s the global network also provided critical data in understanding plate tectonics, a major revolution in Earth sciences theory. The theory states that Earth's surface can be divided into a small number of large spherical caps or plates that are in motion with respect to each other. The boundaries of the plates where the motions are taken up by active faulting are the zones of major earthquake (or seismic) activity.

ODP testing new technology for deep ocean drilling

Before laying the groundwork for the new seismic observatory, ODP will test a new drilling system designed to drill large-diameter casing into hard fractured rock on the sea floor. The new drilling system, called water hammer drilling, uses a percussion drill similar to a jack hammer but is driven by fluid rather than air. The new drilling system will create a 375 mm borehole while simultaneously inserting 340 mm casing into the borehole, immediately behind the drill bit. Drilling in casing in this way is an attempt to stabilize the borehole as it is being drilled. This is accomplished by isolating the fractured rock from the borehole with the casing.

"Working in deep oceans is a major and interesting engineering challenge," says Tom Pettigrew, chief engineer for the expedition. "As an engineer, designing new functional tools and techniques in and of itself is quite rewarding. Seeing these tools and techniques used by scientists to expand our knowledge of Earth's inner processes is most gratifying."

Three test sites have been selected on the Southwest Indian Ridge in the Indian Ocean. The water depths at the test sites range from 700 m to 3000 m. If the tests are successful, reentry systems will be placed on the stable boreholes in the Southwest Indian Ridge. These systems will allow scientists to return to these locations to conduct future experiments.

The water hammer drilling system may also be used to establish scientific boreholes on the mid-ocean ridges and other hard fractured rock formations around the world which would allow scientists to study parts of Earth currently inaccessible because of technical limitations.

The expedition, referred to as ODP Leg 179, will begin when the ship departs Cape Town, South Africa 21 April and concludes with a port call in Darwin, Australia 6 June.

The Ocean Drilling Program, an international partnership of scientific institutions and governments, explores the history and evolution of Earth's crust. The Ocean Drilling Program is funded principally by the National Science Foundation, with substantial contributions from its international partners. These include the Federal Republic of Germany, France, Japan, the United Kingdom, the Australia/ Canada/ Chinese Taipei/ Korea Consortium for Ocean Drilling, the European Science Foundation Consortium for Ocean Drilling (Belgium, Denmark, Finland, Iceland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and Turkey) and the People's Republic of China. The program is managed by Joint Oceanographic Institutions, a consortium of 10 U.S. institutions, with Texas A&M University responsible for science operations. Lamont-Doherty Earth Observatory is the operator for downhole logging.

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In addition, the ODP Web Site includes much additional information on this leg (Leg 179 Scientific Prospectus) and will carry weekly reports on progress as the leg proceeds.
http://www-odp.tamu.edu