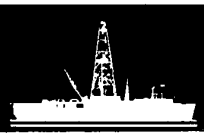
NEWS RELEASE
Ocean Drilling Program



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Leg 112.2

College Station, Tx -- Twenty-seven scientists from seven countries recently explored an active continental margin and the chemical convolutions caused by marine life buried beneath the edge of the South American continent off Peru.

During 50 days of operation in November and December, scientists on board JOIDES Resolution, drill ship for the Ocean Drilling Program (ODP), drilled between the Peru-Chile deep-sea trench and the coastline, an area formed by two converging plates. Their purpose was to investigate the geological history of the continental margin as it has evolved over the last 60 million years. Within this time frame, they searched the margin's sedimentation pattern for clues about the history of coastal upwelling, and the local and global record of climate, sea-level changes and ocean circulation.

The entire western edge of the South American continent is an active margin which is formed by two converging tectonic plates. In this instance, the Nazca Plate is being subducted under the South American continental plate at the rate of almost 17 centimeters a year (about seven inches). Earthquakes, volcanoes and majestic mountain ranges are characteristics of active margins, and this part of South

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America is no exception. The Peruvian coastline, however, has a benign side to her destructive qualities. The region has a history of intense upwelling which occurs when wind following the coastline blows the surface water away. Nutrient-rich bottom water rises to replace the missing surface water, creating in this case the world's most fertile environment for marine life.

The continental plates of convergent margins usually grow because thick layers of sediment are added in a process called accretion which occurs when slivers of the material from the subducting plate are plastered onto the overriding plate. Drilling results show that accretion has not been continuous since the Nazca Plate began sliding under the continental block 200 million years ago, as would be expected. Instead the sediments glided underneath the continent, leaving little or no build up. The process was radically altered about 16 million years ago when an increased supply of sediments filling the trench began rapidly piling onto the edge of the continental plate. The increasing load and changing subduction mechanisms have simultaneously caused the continental edge to submerge to a present depth of 5,000 meters, more than three miles deep.

Coinciding with the submerging continental edge, and contributing to the growing accretionary prism, is an incredible output of sediment from a biological factory that produces microscopic algal remains. The abundance of decomposed algae are a result of the nutrient-rich waters formed by upwelling in shallow waters (less than 200 meters deep). Underneath this zone of intense biological activity lie layer upon layer of sediment, their alternating bands of color revealing a

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pattern of oxygen-rich and oxygen-deprived marine environments that have altered in response to ancient fluctuations in sea levels, climate and ocean circulation.

Even today, the Peru Margin is one of the most fertile parts of the world's oceans and is known for its wealth of marine life. Exhumed whale bones a few million years old show that this rich marine life existed over a considerable amount of time. Worms, found living at a record depth of 49 meters (162 feet) beneath the seafloor, feast on approximately 50,000-year-old organic matter buried in the sediment layers. But bacteria are the major consumers in this underwater universe. The products of their biochemical activity enable scientists to track the record of the region's marine past.

Characteristic sediments containing minerals such as calcite, dolomite and various forms of phosphorites and cherts are formed as by-products of the bacteria's intricate biochemical processes. The quantity, and absence or presence of these minerals signify ancient upwelling regimes, and the appearance -- or facies -- of the sediments reveal seawater levels and patterns of the oceans' circulation through time.

One completely unexpected and fascinating phenomenon that the scientists discovered was an extremely high concentration of dissolved salts in pore waters. The tentative conclusion is that a saline brine, covering the entire shelf region, underlies the uppermost 300 meters (990 feet) of sediments. The brine replenishes the supply of dissolved sulfate, which in turn enhances the bacteria's ability to ingest the organic matter in the sediments. The brine layer also

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provides dissolved salts that increase the amount of chemically formed minerals.

Results from the program's twelfth cruise will take years to analyze. Of particular interest to scientists is the origin and dimensions of the brine layer. They will also examine the composition of the accretionary wedge, a margin feature perhaps caused by an intricate interdependence between normal tectonic movement and a sediment buildup created by organic activity of extraordinary complexity.

Co-chief scientists for the cruise were Dr. Erwin Suess of Oregon State University, Corvallis, and Dr. Roland von Huene, U.S.G.S., Menlo Park, Calif. Dr. Kay-Christian Emeis was the ODP staff scientist.

JOIDES Resolution, registered as SEDCO/BP 471, is the research vessel for ODP which is funded by the United States National Science Foundation, Canada, the European Science Foundation Consortium for the Ocean Drilling Program, France, Japan, West Germany and the United Kingdom.

The 470-foot-long drill ship's derrick towers 200 feet above the waterline. A seven-story laboratory stack provides facilities for on board examination of sediment and hard-rock cores. Laboratories contain space and equipment for studies in chemical, gas and physical properties, paleontology, petrology, paleomagnetics and sedimentology. Marine geophysics research is conducted while the ship is under way.

Texas A&M University, as Science Operator, operates and staffs the drill ship and retrieves cores from strategic sites around the world. The Science Operator also ensures that adequate scientific analyses are performed on the cores. To do this, Texas A&M maintains

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shipboard scientific labs, provides logistical and technical support for shipboard scientific teams, manages post-cruise activities, is curator for the cores and of the scientific results.

Lamont-Doherty Geological Observatory of Columbia University is responsible for downhole logging.

Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES), an international group of scientists, provides scientific planning and program advice. Joint Oceanographic Institutions (JOI, Inc.), a nonprofit consortium of 10 major U.S. oceanographic institutions, manages the program.

"The ship is currently drilling in the Weddell Sea," said Dr. Philip D. Rabinowitz, director of ODP. "Scientists are studying the Antarctic's history of glaciation and circumpolar currents. They are also investigating the tectonic history of the region, specifically the processes which separated the South American and Antarctic continents," Rabinowitz said.

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(Note: JOIDES institutions are: University of California at San Diego, Scripps Institution of Oceanography; Columbia University, Lamont-Doherty Geological Observatory; University of Hawaii, Hawaii Institute of Geophysics; University of Miami, Rosenstiel School of Marine and Atmospheric Science; Oregon State University, College of Oceanography; University of Rhode Island, Graduate School of Oceanography; Texas A&M University, Department of Oceanography; University of Texas at Austin, Institute of Geophysics; University of Washington, College of Ocean and Fishery Sciences; and Woods Hole Oceanographic Institution.

Non-U.S. members are Department of Energy, Mines, and Resources, Earth Sciences Sector, Canada; European Science Foundation Consortium for the Ocean Drilling Program: Belgium, Denmark, Finland, Iceland, Italy, Greece, the Netherlands, Norway, Spain, Sweden, Switzerland and Turkey; Bundesanstalt fur Geowissenschaften und Rohstoffe, Federal Republic of Germany; Institut Francais de Recherche pour l'Exploitation de la Mer, France; University of Tokyo, Ocean Research Institute, Japan; and Natural Environment Research Council, United Kingdom.)

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