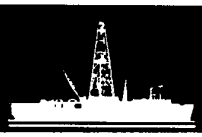
# NEWS RELEASE
## Ocean Drilling Program



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Leg 114.2

COLLEGE STATION, TX -- On a map the eastern coastline of South America resembles a giant question mark punctuated by the Antarctic Peninsula, a curvilinear fragment of land separated by the Drake Passage.

During the past two months, scientists have taken an important step toward finding the geologic answer to this metaphorical question mark. They investigated two major tectonic events -- the movement and deformation of Earth's crust -- that caused the Drake Passage to open and an underwater ridge to separate. By finding out more about these marine passages, scientists can determine how the circum-Antarctic current developed, eventually transforming the continent into the cold, barren land of today. They can also document how cold Antarctic waters have changed the world's climatic history over time.

The scientists on board JOIDES Resolution, drill ship for the Ocean Drilling Program, battled gale-force winds and high waves to drill 12 holes at seven sites in the environmentally hostile South Atlantic. They retrieved almost 1.4 miles of sediment cores which contain a 90-million-year record of the region's climate, oceanography

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and geology.

One of the cruise's primary objectives was to investigate how the development of marine passages has influenced the deep- and surface-water flow between the South Atlantic and Weddell Sea basins.

The mid-ocean ridge, an enormous underwater mountain chain, snakes down the middle of the Atlantic, branching off abruptly at the Weddell Sea. In the South Atlantic, off the tip of South America, an abnormally high rate of volcanic activity occurred at the ridge, lasting until about 65 million years ago. The volcanoes built a huge underwater rise perpendicular to the ridge that acted as a barrier to any deep-water exchange between the Weddell basins and the Atlantic Ocean.

The rise began rifting apart about 38 million years ago, swinging open like giant underwater gates. The gateway then allowed cold, dense water from the Weddell Sea to flow north into the Atlantic Ocean. These waters today extend as far north as 40 degrees latitude or about as far as New Jersey. The mingling of the cold bottom waters and the less dense waters at the equator represent an important mechanism of heat exchange that directly affects Earth's climate.

The ship, by drilling deep holes beneath the seafloor, can recover complete sequences of geologic events to which scientists on board can assign a geologic date. The cores drilled on one of the rises indicate a hiatus, a gap in the recovery of fossil evidence, occuring about 40 million years ago and lasting for the next two to five million years.

Scientists believe that the dense bottom waters flowing for the

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first time through the newly created gateway caused the hiatus. The dense water eroded or removed topographical features and microfossil evidence for several meters below the ocean floor. The hiatus, therefore, indicates increasing deep-current flow between the Weddell Basin and the South Atlantic.

A second hiatus, lasting from 26 to 7 million years, heralds the northward advance of the Antarctic convergence resulting from intensified circum-Antarctic flow as the Drake Passage opened between South America and Antarctica. Both events -- the separation of the rises and the opening of the Drake Passage -- played critical roles in allowing cold bottom water to make its way into the Atlantic.

Meteor Rise, the most northerly site drilled on Leg 114, remained north of Antarctic surface waters throughout most of this period of activity. The site, therefore, was relatively undamaged by the ravishment of the deep-water current. The nearly continuous record obtained from this site shows dramatic cyclic changes documenting glacial and interglacial periods. Scientists on the cruise are especially excited about this information because it is the first evidence from the Southern Hemisphere that can be linked with the glacial cycles of the Northern Hemisphere. The cores are also critical for comparative studies in correlating the geology of the Southern Hemisphere with other critical events in Earth's history.

Scientists also documented how the Antarctic Circumpolar Current evolved through time. When South America and Antarctica were still connected, warm shallow waters from the subtropical Atlantic, Indian and Pacific oceans could flow down to the Antarctic continent,

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affecting its climate and temperature. Between 20 to 25 million years ago, the Drake Passage opened, terminating the connection between South America and Antarctica. Antarctica then became completely isolated from all other land masses, surrounded by the continously circling Antarctic Circumpolar Current, the coldest and densest water in the world.

The current's development is directly tied to the formation and growth of the Antarctic ice sheets which in turn contributed glacial water to the flow making its way up the Atlantic through the now-opened gateway in the Atlantic.

Results from the cruise combined with those from a previous expedition in the Weddell Sea form a three-dimensional profile of a region sensitive to changes in the Antarctic Circumpolar Current and deep-water circulation as well as changes in bottom water communication between Antarctic basins and the South Atlantic.

The crew on the 14th cruise faced the worst weather yet in the program's 27 months of sailing. Drilling in latitudes that mariners refer to as the roaring forties and fifties, the ship survived the most rigorous test of its operating capabilities to date. Despite winds blowing more than 41 knots (strong gale) and waves running 12 to 16 feet or higher during half the cruise, drilling was stopped for only one-and-a-half days. JOIDES Resolution was able to keep position over drill holes in water depths up to 15,000 feet (4600 meters) of water, while enduring sustained winds over 65 knots and 30-foot-high waves.

Co-chief scientists for the cruise were Dr. Paul F. Ciesielski of

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the University of Florida, Gainesville, and Dr. Yngve Kristoffersen of the University of Bergen, Bergen, Norway. Dr. Brad Clement was the ODP staff scientist from Texas A&M University.

JOIDES Resolution sailed from the Falkland Islands, March 14, 1987, and arrived at Port Louis, Mauritius, May 13, 1987. Nineteen scientists from the U.S., Canada, France, the Federal Republic of Germany, Italy, Norway and the United Kingdom participated in the cruise.

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, Federal Republic of Germany, France, Japan 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 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.

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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.

(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.)

Scientists on the cruise were Paul F. Ciesielski, co-chief, University of Florida, Gainesville; Yngve Kristofferson, co-chief, University of Bergen, Norway; Brad Clement, ODP staff scientist, Texas A&M University, College Station; Jason A. Crux, BP Research Centre, Middlesex, U.K.; Juliane Fenner, University of Kiel, Federal Republic of Germany; Ernest A. Hailwood, Southampton University, United Kingdom; David A. Hodell, University of Florida, Gainesville; Miriam F. Katz, Lamont-Doherty Geological Observatory, Palisades, New York; Philip Froelich, Lamont-Doherty Geological Observatory, Palisades, New York; Hsin Yi Ling, Northern Illinois University, DeKalb; Daniel W. Muller, University of Florida, Gainesville; Campbell J. Mwenifumbo, Geological Survey of Canada, Ottawa, Ontario; David C. Nobes, University of Waterloo, Ontario, Canada; Marisa Nocchi, University of Perugia, Italy; Detlef A. Warnke, California State University, Hayward; Frances Westall, Alfred Wegener Institut, Bremerhaven, Federal Republic of Germany; Robert Bourrouilh, Universite de Pau, France; Jean-Pierre Blangy, Stanford University, California; Jurgen Mienert, University of Kiel, Federal Republic of Germany.