

# OCEAN DRILLING PROGRAM

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FOR IMMEDIATE RELEASE

## Scientists Study Earth's Transformation From a "Hothouse" to "Icehouse" World

The Antarctic ice sheet is the largest accumulation of ice on Earth and should it melt, sea level would rise by 50-60 m. The Southern Ocean surrounding Antarctica consists of a ring of cold water that thermally insulates Antarctica from warmer waters to the north. The Antarctic ice sheet and the adjacent Southern Ocean act together to form the Antarctic ocean-cryosphere system that represents one of the most important components of the Earth's climate system.

The Ocean Drilling Program (ODP) will be sending an international scientific party of 25 scientists from nine member countries to reconstruct historical climate models by using a variety of recently developed methods. ODP scientists, aboard the world's largest scientific drill ship *JOIDES Resolution*, will sail near the Weddell Sea to study the history of Antarctic ice build-up. This research will enable scientists to better understand when the ice sheet was formed and how stable it has remained.

"The build-up of the Antarctic Ice Sheet around 40 million years ago led to dramatic changes in the Earth's climate system and biosphere," says Dr. David A. Hodell, a co-chief scientist for the upcoming expedition in the Antarctic and researcher at the University of Florida. "Earth's climate changed from a relatively warm 'hothouse' world to a cold 'icehouse' world."

The development of a more frigid global climate was further reinforced around three million years ago when large ice sheets formed on northern hemisphere continents, and the cryosphere became bipolar. Since then, polar ice sheets have experienced growth (glaciation) and decay (deglaciation) at regular intervals that have been paced by changes in the distribution of solar radiation caused by variations in the Earth's orbit. Although scientists recognize that the Southern Ocean has played a major role in defining the Earth's climate system, many questions remain regarding the history of climatic and oceanographic changes in this remote region.

"The ability to resolve short-term climate change depends upon how fast sediments accumulate on the sea floor," explains Hodell. "We will drill in zones of high sediment accumulation rates in order to resolve climatic changes that lasted for centuries to millennia. Recovery of sediment cores deposited at high rates will permit a direct comparison of marine and ice core records to understand how the ocean-atmosphere system behaved during the last four cycles of glacial-to-interglacial climate change."

Previous climate change research at these time scales has been accomplished by studying Antarctic ice cores, such as the Vostok ice core that provides a climatic record extending back to 425,000 years.

Such study should shed new light on the connections between southern and northern hemispheres, the causes of glacial-to-interglacial climate change, and how fast climate can change from one state to another. ODP core samples will also be used to test if the abrupt,

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## INTERNATIONAL PARTNERS:

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millennial-scale climate oscillations, called Dansgaard-Oeschger events, found in ice and sediment cores in the North Atlantic during the last glaciation are also expressed in the Southern Ocean. By examining the nature and rates of past climate change preserved in sediment cores from the Southern Ocean, scientists hope to gain insight about future climate changes.

This expedition brings ODP scientists back to Antarctic waters for the first time in 10 years. These waters are often rough, due to strong winds and are infamous as "roaring forties" and the "screaming fifties." The scientific payoffs are potentially high, however, because few high-quality continuous sediment sequences have been recovered from the Southern Ocean using modern coring techniques. During the past several years, scientists have been studying the Atlantic Ocean from nearly pole-to-pole to determine historic changes in Earth's climate. This expedition, ODP Leg 177, represents the southernmost anchor of ocean-drilled sites needed to complete the Atlantic transect.

Leg 177 research will have implications for assessing the stability of the Antarctic ice sheet under "warmer-than-present" climate that is anticipated to result from anthropogenic emissions of greenhouse gases to the atmosphere. The stability of the Antarctic ice sheet in response to global warming is one of the outstanding questions in climate change research because of its effect on global sea level.

After departing Capetown on Dec. 15, the *JOIDES Resolution* will drill six sites across the Southern Ocean near the Weddell Sea. The deepest site may be up to 700 meters below the seafloor and may recover sediments as old as 40 - 50 million years. The southernmost drill site is in the vicinity of a small volcanic island called Bouvet (Norway), which is the world's most remote island. From there, the *JOIDES Resolution* and scientific party will sail westward to the southern tip of South America, where the cruise will end on Feb. 9, 1998 in the Chilean harbor of Punta Arenas.

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, and the United Kingdom. Australia, Canada, Chinese Taipei, and Korea hold a joint partnership. Another partner is the European Science Foundation, consisting of Belgium, Denmark, Finland, Iceland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and Turkey. 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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# OCEAN DRILLING PROGRAM

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People's Republic of China  
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The Netherlands  
Turkey  
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## NEWS ADVISORY

## HIGH SCHOOL STUDENTS TO VISIT WORLD'S LARGEST SCIENTIFIC DRILL SHIP

**Wednesday, 15 April 9:00 AM - Noon — Media Preview**

Media are invited to accompany South African high school students as they tour *JOIDES Resolution* (pronounced JOY-DEEZ), the research vessel for the Ocean Drilling Program (ODP). This unique 143 meter-long drillship retrieves sediment and rock samples from deep below the seafloor in water depths as great as 6000 meters. It is the only research vessel of its kind in the world.

ODP scientists will lead groups of students through the ship laboratories and living quarters. They will view the research and drilling equipment, sediment and rock samples and hear about the technology used to drill beneath the seafloor. The ship is outfitted with 12 laboratories and has the most advanced equipment enabling scientists to conduct research while at sea.

The research vessel will depart Thursday, 16 April for the next expedition, Leg 179, in the Indian Ocean. Using new drilling technology, scientists will install one of many planned Geophysical Ocean Bottom Observatories (GOBO) in which seismographs will monitor earthquake activity and Earth's magnetic field and gravity. This research will enable scientists to better understand Earth's interior processes (press release available).

**Location: No. 2 Jetty, Victoria Basin at the Waterfront**

## Participating High Schools:

9:00 Tondagalu High School

10:00 Rustenburg High School

11:00 Queens Park High School

## Scientists available for interviews:

Prof John Compton, University of Cape Town

Ms. Rochelle Wigley, Scientist Leg 175, University Cape Town

Dr. Jeff Fox, Director of Science Operations, Ocean Drilling Program

Dr. Jack Casey, Chief Scientist Leg 179, University of Houston, USA

**Note:** For safety reasons, all visitors onboard the ship must be 14 years of age or older.

The Ocean Drilling Program (ODP) is an international partnership of scientists and research institutions organized to explore the history and structure of Earth through scientific ocean drilling. During these scientific cruises, each approximately eight weeks long, the research vessel drills holes deep into the seafloor. From these holes, scientists retrieve sediment, rock samples and geophysical data from the layers beneath the seafloor. These layers span millions of years of Earth's geologic history. ODP provides samples, shipboard and shore-based facilities for the study of these samples, and downhole measurements (e.g., wireline logging) and opportunities for special experiments to determine *in situ* conditions. ODP is primarily funded by the US National Science Foundation and research agencies in 21 international partners.

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