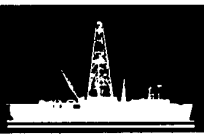
# NEWS RELEASE
## Ocean Drilling Program



**For information:**
**Karen Riedel**
**Ocean Drilling Program**
**Texas A&M University**
**College Station, TX 77840**
**(409) 845-9322**

Nov. 13, 1987

Leg 117.2

COLLEGE STATION, TX -- For the first time scientists can reconstruct the origin and evolution of the southwest monsoon, the dominant atmospheric phenomenon that determines the fate of millions of Asians and Africans.

Scientists on board JOIDES Resolution, drill ship for the Ocean Drilling Program, recovered a record-breaking 4300 meters of sediment from the northwest Arabian Sea. The scientific expedition was one segment in an 18-month investigation of the geologic history of the Indian Ocean.

During September and October, 25 scientists from the United States, Canada, Japan, France, the Federal Republic of Germany, the Netherlands, Sweden, Oman and the United Kingdom used their broad range of experience and diverse backgrounds to resolve questions about the monsoon's circulation system through time. One of their main goals was to understand how the changes in Earth's orbit around the sun and the Himalayan uplift have affected the monsoon's cycle during the past 10 million years.

To study the monsoon's history, they drilled for sediments from

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beneath the seafloor at 12 sites, one on the enormous submarine sediment pile known as the Indus Fan; three on the offshore Owen Ridge and eight on the continental margin off Oman. Sediment samples from these areas contain evidence of changes in climate, biologic productivity and structure and position of the continents through time.

Today, the Arabian Sea is one of the world oceans' most fertile areas. The southwest monsoon winds literally blow the top layer of water away from the coast, causing cold, nutrient-rich waters from the bottom to rise to the surface. The phenomenon, called upwelling, is also found in other areas around the world where strong winds dominate like the northwest coast of Africa and the Peruvian coast of South America.

The southwest Indian monsoon dramatically affects global climate. Today its force dominates the critical rainfall patterns of Asia and Africa as well as regional atmospheric and oceanographic conditions. The almost three miles of sediment samples retrieved on this cruise will allow scientists to trace the monsoon's initiation and patterns of intensity during the last 10 million years.

The history of upwelling lies in the microskeletons of tiny organisms buried deep within the layers of sediments. By examining these microscopic fossils on board the ship, scientists were able to place the onset of the monsoon cycle during the Miocene, about 8 to 10 million years ago. Before that period, sediments revealed a low rate of biologic productivity in the Arabian Sea.

Although variations over thousands of years appear to correlate

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with changes in Earth's orbit, scientists had to turn to another geologic phenomenon--the Himalayan uplift--to explain long-term changes in monsoon-generated upwelling which has varied considerably since the Miocene.

The Himalayan mountain chain is a giant wrinkle on the face of Earth, caused by the northward-moving Indian subcontinent colliding with the large piece of Earth's crust known as the Asian Plate. The mountain chain's uplift began 15-20 million years ago, but its elevation, like the strenth of the monsoon, has varied through time. Computer-generated models of atmospheric circulation suggest that the greater the height of the Himalayas and the Tibetan Plateau, the stronger the pressure cells of central Asia and the Indian Ocean, resulting in a stronger monsoon. Changes in the elevation of the Tibetan Plateau and the Himalayas, therefore, may play a leading role in controlling the long-term nature of the monsoon.

Information gained by reconstructing the monsoon's evolution and variability will help researchers better understand both human history and global climatic behavior on a scale of millions of years.

Another cruise objective was to explore the tectonic and sediment composition of the Oman margin, the area immediately seaward of Oman. Results show that the composition of the water and sediment on the margin have changed drastically since the Pliocene (within the last 2 to 3 million years). Sediments older than 1.5 million years contain fine laminations that are preserved by the absence of bioturbation during times of oxygen-depleted waters. These laminations were not found during the past 1.5 million years, indicating the presence of

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add three more oxygen-rich waters.

The environment that produced and preserved the laminated sediments could be directly connected to changes in the monsoon's intensity. One possibility is that when the monsoon is at its strongest, the upwelling produces a high concentration of organic matter near the surface. More organic matter in the surface waters means that more oxygen is consumed by oxidation of organic matter in the underlying water column. A strong monsoon, therefore, would be associated with oxygen-poor water and laminated sediments. Other circulation processes, however, may modify this simple sequence of events. One of the research goals of the Leg 117 scientists is to understand the environments associated with these organic-rich sediments.

Co-chief scientists for the cruise were Dr. Warren Prell, Brown University, Providence, Rhode Island, and Dr. Nobuaki Niitsuma, Shizuoka University, Shizuoka, Japan. Dr. Kay-Christian Emeis, Texas A&M University, College Station, was staff scientist.

The cruise, the 17th for the ODP, departed Colombo, Sri Lanka, on August 19 and arrived in Port Louis, Mauritius on October 17.

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

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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.

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

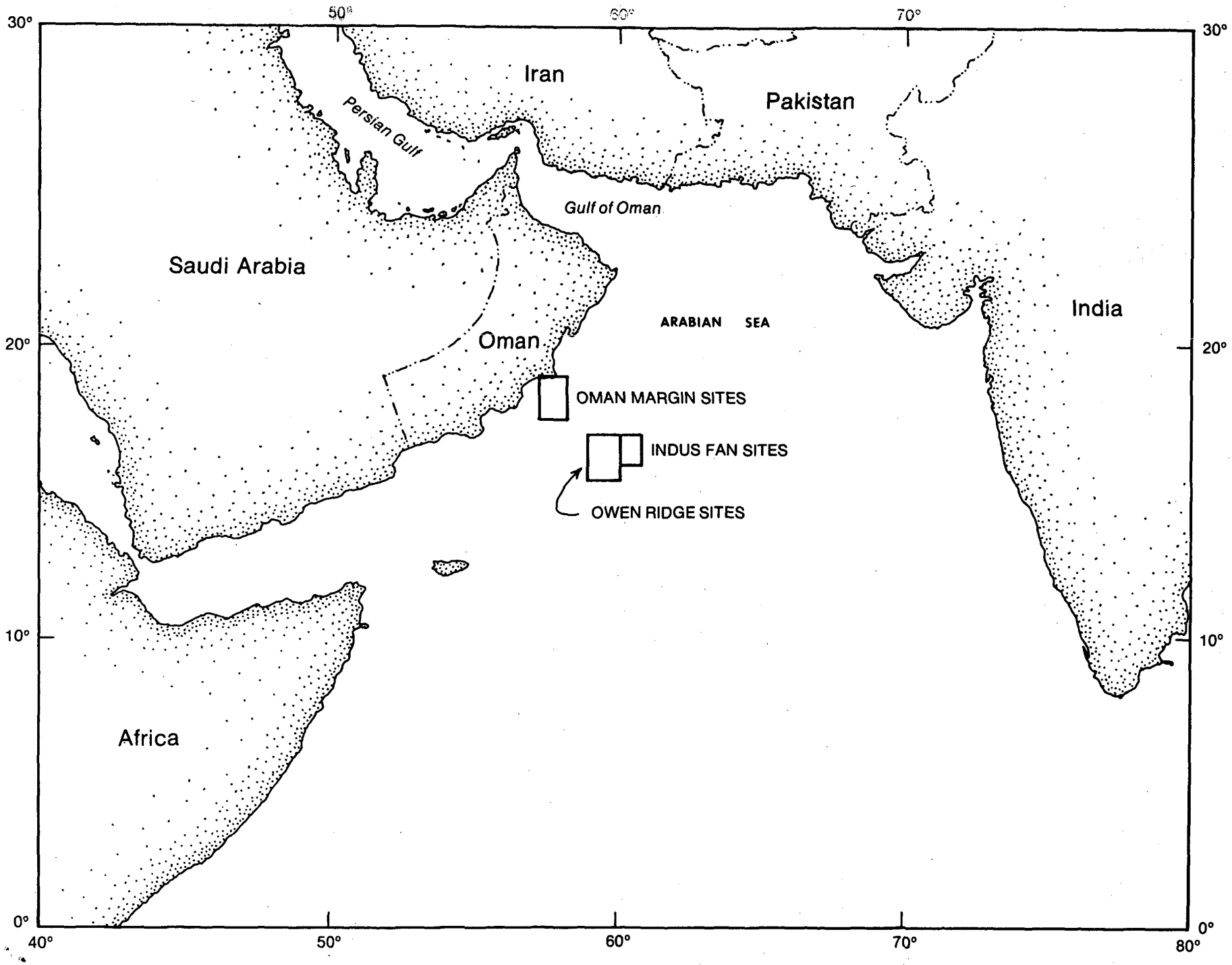
Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES), an international group of scientists, provides scientific planning and program advice. Joint Oceanographic Institutions (JOI, Inc.), a nonprofit consortium of 10 major U.S. oceanographic institutions, manages the program.

"ODP has dedicated 18 months to drilling in the Indian Ocean, the most concentrated scientific drilling ever done in that body of water," said Dr. Philip D. Rabinowitz, director. After drilling into bare rock on the Southwest Indian Ridge on the next cruise, the ship will spend four months drilling in the Antarctic," Rabinowitz said.

(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 Leg 118 were: Warren L. Prell, co-chief scientist, Brown University, Providence, RI; Nobuaki Niitsuma, co-chief scientist, Shizuoka University, Shizuoka, Japan; Kay-Christian Emeis, ODP staff scientist, Texas A&M University, College Station; Ahmed Nasser Khalfan Al-Thobbah, Ministry of Petroleum and Minerals, Muscat, Sultanate of Oman; Azher Khalid Sulaiman Al-Sulaiman, Ministry of Petroleum and Minerals, Muscat, Sultanate of Oman; David Anderson, Brown University, Providence, RI; Ross Barnes, Rosario Geoscience Associates, Anacortes, WA; Roman A. Bilak, Calgary, Alberta, Canada; Jan Bloemendal, University of Rhode Island, Narragansett, RI; Cynthia J. Bray, Cornell University, Ithaca, NY; William H. Busch, University of New Orleans, LA; Steven C. Clemens, Brown University, Providence, RI; Pierre Debrabant, Universite de Lille-Flandres Artois, Villeneuve D'Ascq, France; Peter De Menocal, Lamont-Doherty Geological Observatory, Palisades, NY; H. Lo Ten Haven, Institute of Petroleum and Organic Geochemistry, Juelich, Federal Republic of Germany; Akira Hayashida, Laboratory of Earth Science, Kyoto, Japan; J. Otto R. Hermelin, University of Stockholm, Sweden; Richard Jarrard, Lamont-Doherty Geological Observatory; Lawrence A. Krissek, Ohio State University, Columbus; Dick Kroon, Vrije Universiteit, Amsterdam, The Netherlands; David M. Murray, Brown University, Providence, RI; Catherine Nigrini, La Habra Heights, CA; T. F. Pedersen, University of British Columbia, Vancouver, Canada; Werner Ricken, Institut fuer Geologie und Palaeontologie, Tuebingen, West Germany; Graham B. Shimmield, University of Edinburgh, Scotland; Stacia A. Spaulding, University Nebraska, Lincoln; Toshiaki Takayama, Kanazawa University, Kanazawa, Japan; Graham P. Weedon, University of Cambridge, Cambridge, United Kingdom.




Leg 117: Owen Margin /Owen Ridge/ Indus Fan