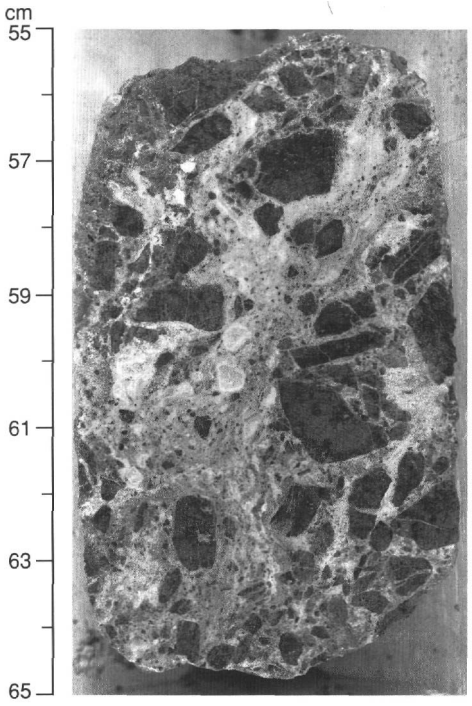
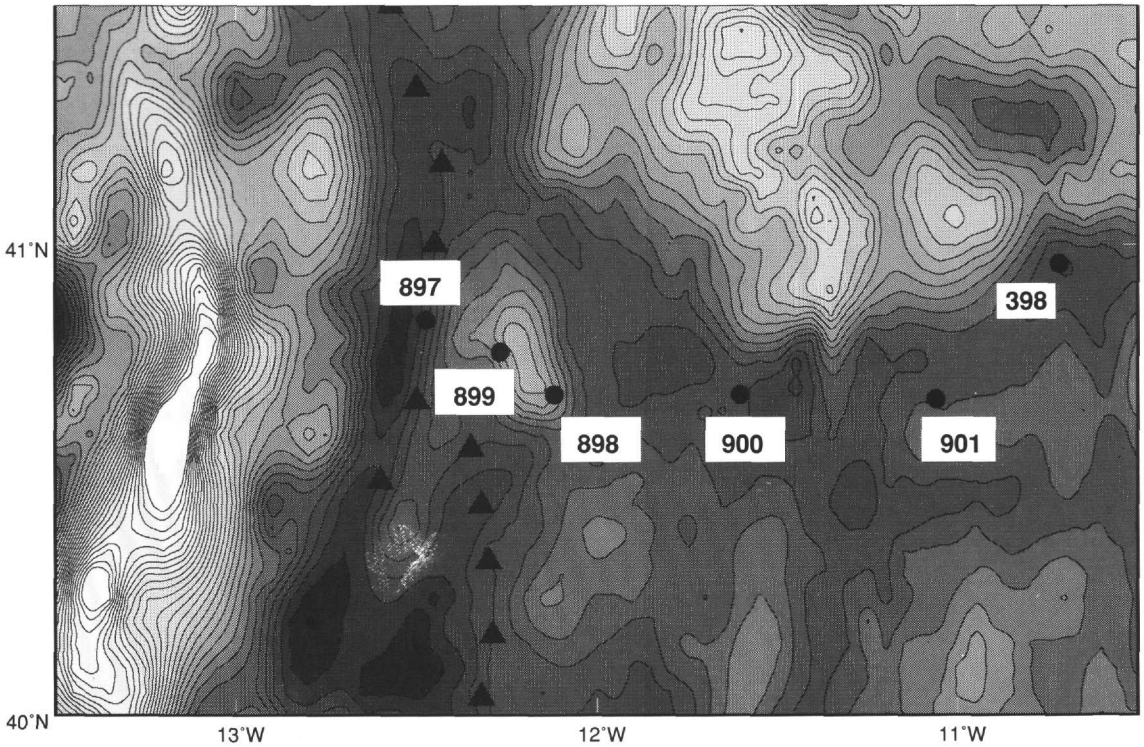
FRONTISPIECE



Cataclastic breccia typical of the shallow acoustic basement on the Iberia Abyssal Plain margin. This sample (Interval 149-897C-64R-4, 55-65 cm) is from Site 897 and consists of angular blocks of serpentinized peridotite in a serpentine and calcite matrix.



Locations of Leg 149 (and Site 398 of Leg 47B) superimposed on a magnetic anomaly contour chart of the Iberia Abyssal Plain (P.R. Miles, J. Verhoef, and R. Macnab, pers. comm., 1993). The anomalies have been reduced to the pole so that the location of an anomaly approximates the location of the source rock. Contour interval 25 nT, contour range +500 (lightest gray) to -250 nT (darkest gray). The large anomaly at about 13°10'W is anomaly J; the east side of the linear concave-to-the-west negative anomaly at 12°40'W probably represents the trace of the peridotite basement ridge drilled at Site 897.

PROCEEDINGS OF THE OCEAN DRILLING PROGRAM

VOLUME 149

INITIAL REPORTS

IBERIA ABYSSAL PLAIN

Covering Leg 149 of the cruises of the Drilling Vessel *JOIDES Resolution,*
Balboa Harbor, Panama, to Lisbon, Portugal, Sites 897-901,
10 March-25 May 1993

Dale S. Sawyer, Robert B. Whitmarsh, Adam Klaus,
Marie-Odile Beslier, Eric S. Collins, Maria Carmen Comas,
Guy Cornen, Eric de Kaenel, Luis de Menezes Pinheiro, Elisabeth Gervais,
Ian L. Gibson, Dennis L. Harry, Michael A. Hobart, Toshiya Kanamatsu,
Charlotte M. Krawczyk, Li Liu, Jeremy C. Lofts, Kathleen M. Marsaglia,
Philip A. Meyers, Doris Milkert, Kitty Lou Milliken, Julia K. Morgan,
Pedro Ramirez, Karl E. Seifert, Timothy Shaw, Chris Wilson,
Chuan Yin, Xixi Zhao
Shipboard Scientists

Adam Klaus
Shipboard Staff Scientist

Prepared by the
OCEAN DRILLING PROGRAM
TEXAS A&M UNIVERSITY

Sondra K. Stewart
Volume Editor

in cooperation with the
NATIONAL SCIENCE FOUNDATION
and
JOINT OCEANOGRAPHIC INSTITUTIONS, INC.

This publication was prepared by the Ocean Drilling Program, Texas A&M University, as an account of work performed under the international Ocean Drilling Program, which is managed by Joint Oceanographic Institutions, Inc., under contract with the National Science Foundation. Funding for the program was provided by the following agencies at the time of this cruise:

Canada/Australia Consortium for the Ocean Drilling Program, Department of Energy, Mines and Resources (Canada), and Department of Primary Industries and Energy (Australia)

Deutsche Forschungsgemeinschaft (Federal Republic of Germany)

European Science Foundation Consortium for Ocean Drilling (Belgium, Denmark, Finland, Iceland, Italy, Greece, The Netherlands, Norway, Spain, Sweden, Switzerland, and Turkey)

Institut Français de Recherche pour l'Exploitation de la Mer (France)

National Science Foundation (United States)

Natural Environment Research Council (United Kingdom)

University of Tokyo, Ocean Research Institute (Japan)

Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the National Science Foundation, the participating agencies, Joint Oceanographic Institutions, Inc., Texas A&M University, or Texas A&M Research Foundation.

It is recommended that reference to the whole or to part of this volume be made in one of the following forms, as appropriate:

Sawyer, D.S., Whitmarsh, R.B., Klaus A., et al., 1994. *Proc. ODP, Init. Repts.,* 149: College Station, TX (Ocean Drilling Program).

Shipboard Scientific Party, 1994. Site 897. *In* Sawyer, D.S., Whitmarsh, R.B., Klaus A., et al., *Proc. ODP, Init. Repts.,* 149: College Station, TX (Ocean Drilling Program), 41-113.

Effective Publication Dates of ODP *Proceedings*

According to the International Code of Zoological Nomenclature, the date of publication of a work and of a contained name or statement affecting nomenclature is the date on which the publication was mailed to subscribers, placed on sale, or when the whole edition is distributed free of charge, mailed to institutions and individuals to whom free copies are distributed. The mailing date, *not the printed date,* is the correct one.

The mailing dates of recent *Proceedings of the Ocean Drilling Program* are as follows:

Volume 145 *(Initial Reports):* July 1993
Volume 146 *(Initial Reports):* February 1994
Volumes 147/148 *(Initial Reports):* December 1993
Volumes 133/132 *(Scientific Results):* November 1993
Volume 135 *(Scientific Results):* May 1994
Volume 136 *(Scientific Results):* December 1993

Distribution

Copies of this publication may be obtained from Publications Distribution Center, Ocean Drilling Program, 1000 Discovery Drive, College Station, Texas 77845-9547, U.S.A. Orders for copies will require advance payment. See current ODP publication list for price and availability of this publication.

Printed June 1994

ISSN 0884-5883
Library of Congress 87-655-674

Printed in Canada by D.W. Friesen & Sons Ltd.

The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences-Permanence of Paper for Printed Library Materials, ANSI Z39.48-1984∞

Foreword

By the National Science Foundation

The Ocean Drilling Program (ODP) is a major component of the National Science Foundation's continuing commitment to the study of the geologic processes that have shaped our planet and modified its environment. The scientific problems being addressed range from the geologic history and structure of continental margins to the processes responsible for the formation and alteration of the ocean's crust. In a time of enhanced public and scientific interest in problems of global change, ODP provides critical data on changes in ocean circulation, chemistry, and biologic productivity and their relation to changes in atmospheric circulation and glacial conditions. The Ocean Drilling Program has a unique role in addressing these problems, since it is the only facility for continuously sampling the geologic record of the ocean basins, which cover 70% of our planet.

The ODP is the successor to the Deep Sea Drilling Project (DSDP), which was a global reconnaissance of the ocean basins. DSDP began operations in 1968 at Scripps Institution of Oceanography, using a 400-foot drillship, the *Glomar Challenger*. DSDP was supported initially by only the National Science Foundation, with extensive involvement of international scientists who were invited to participate on drilling cruises. As this international interest continued to grow in the early 1970's, formal participation in the project was offered to the international geoscience community. In 1975, five nations (France, the Federal Republic of Germany, Japan, the United Kingdom, and the Soviet Union) accepted this commitment to joint planning and conduct of the project, as well as to financial support for operations. This International Phase of Ocean Drilling (IPOD) continued to 1983. Although the *Challenger* had reached the limits of her capabilities, the remarkable scientific success of the DSDP and the new questions it had generated demanded a continuing capability for drilling in the oceans.

The Ocean Drilling Program was organized, international participation was coordinated, a new drillship (the *JOIDES Resolution*) was contracted and outfitted, and her first cruise sailed in early 1985, within 18 months of the retirement of the *Challenger*. This is a remarkable accomplishment that reflects the efforts and excellence of the Joint Oceanographic Institutions, Inc. (prime contractor for ODP), Texas A&M University (science and ship operator), Lamont-Doherty Earth Observatory (logging operator), and the international science community in organizing and planning the new program. It was argued in planning for the ODP that a larger drillship was required to provide space for the increasing U.S. and international demand for shipboard participation, improved and expanded laboratory capabilities, and improvements in coring and logging systems. A larger and better equipped vessel would also provide better stability and working conditions in high-latitude regions of the oceans. The success of the *JOIDES Resolution* has proven the wisdom of these early arguments.

ODP now has operated in all oceans except the ice-covered Arctic. We have drilled above the Arctic circle and within sight of the Antarctic continent. Over 1000 scientists from 25 nations have participated in the initial ODP cruises. The larger scientific parties have allowed an increased emphasis on student participation and training aboard ship. The state-of-the-art laboratories support rapid and complete initial analyses of samples that provide both scientific results and guide subsequent shore-based studies. Nearly 1000 additional scientists have used these data and requested samples from the program's core and data archives for continuing study. The geochemical and geophysical logging capability is unsurpassed in either academia or industry and has provided remarkable new data with which to study the Earth. New experiments to measure and monitor geologic processes have been deployed in ODP boreholes.

The international commitment to ocean drilling has increased in the ODP. In addition to our four partners in IPOD—France, the Federal Republic of Germany, Japan, and the United Kingdom—two consortia have joined ODP: Canada-Australia and the European Science Foundation (representing Belgium, Denmark, Finland, Greece, Iceland, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and Turkey). The 19 countries of the ODP represent the community of nations that have a global interest in the geosciences and oceanography. This global scientific participation has assured the program's scientific excellence by focusing and integrating the combined scientific knowledge and capabilities of the

program's 19 nations. It has allowed problems of a global nature to be addressed by providing databases and background studies which are openly shared for planning and interpreting drilling results. It has eased problems of access to territorial waters, allowing comparative studies to be done among oceans. Finally, the international sharing of program costs has allowed this important and large program to proceed without detrimental impact to the research budgets of any one nation.

The Ocean Drilling Program, like its predecessor, DSDP, serves as a model for planning, conducting, and financing research to address problems of global importance. The National Science Foundation is proud to have a leading role in this unique international program, and we look forward to its continuing success.

Walter E. Massey
Director
National Science Foundation

Washington, D.C.

Foreword

By Joint Oceanographic Institutions, Inc.

This volume presents scientific and engineering results from the Ocean Drilling Program (ODP). The papers presented here address the scientific and technical goals of the program, which include providing a global description of geological and geophysical structures including passive and active margins and sediment history, and studying in detail areas of major geophysical activity such as mid-ocean ridges and the associated hydrothermal circulations.

The Ocean Drilling Program, an international activity, operates a specially equipped deep-sea drilling ship, the *JOIDES Resolution* (Sedco/BP 471), which contains state-of-the-art laboratories, equipment, and computers. The ship is 471 feet (144 meters) long, is 70 feet (21 meters) wide, and has a displacement of 18,600 short tons. Her derrick towers 211 feet (64 meters) above the waterline, and a computer-controlled dynamic-positioning system stabilizes the ship over a specific location while drilling in water depths up to 27,000 feet (8230 meters). The drilling system collects cores from beneath the seafloor with a derrick and drawworks that can handle 30,000 feet (9144 meters) of drill pipe. More than 12,000 square feet (1115 square meters) of space distributed throughout the ship is devoted to scientific laboratories and equipment. The ship sails with a scientific and technical crew of 51 and a ship's crew (including the drill crew) of 62. The size and ice-strengthening of the ship allow drilling in high seas and ice-infested areas as well as permitting a large group of multidisciplinary scientists to interact as part of the scientific party.

Logging, or measurements in the drilled holes, is an important part of the program. ODP provides a full suite of geochemical and geophysical measurements for every hole deeper than 1300 feet (400 meters). For each such hole, there are lowerings of basic oil-industry tools: nuclear, sonic, and electrical. In addition, a borehole televiewer is available for imaging the wall of the hole, a 12-channel logging tool provides accurate velocity and elastic property measurements as well as sonic waveforms for spectral analysis of energy propagation near the wall of the hole, and a vertical seismic profiler can record reflectors from below the total depth of the hole.

The management of the Ocean Drilling Program involves a partnership of scientists and governments. International oversight and coordination are provided by the ODP Council, a governmental consultative body of the partner countries, which is chaired by a representative from the United States National Science Foundation. The ODP Council periodically reviews the general progress of the program and discusses financial plans and other management issues. Overall scientific and management guidance is provided to the operators of the program by representatives from the group of institutions involved in the program, called the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES).

The Executive Committee (EXCOM), made up of the administrative heads of the JOIDES institutions, provides general oversight for ODP. The Planning Committee (PCOM), with its advisory structure, is made up of working scientists and provides scientific advice and detailed planning. PCOM has a network of panels and working groups that screen drilling proposals, evaluate instrumentation and measurement techniques, and assess geophysical-survey data and other safety and siting information. PCOM uses the recommendations of the panels and committees to select drilling targets, to specify the location and major scientific objectives of each two-month drilling segment or leg, and to provide the science operator with nominations for co-chief scientists.

Joint Oceanographic Institutions, Inc. (JOI), a nonprofit consortium of U.S. oceanographic institutions, serves as the National Science Foundation's prime contractor for ODP. JOI is responsible for seeing that the scientific objectives, plans, and recommendations of the JOIDES committees are translated into scientific operations consistent with scientific advice and budgetary constraints. JOI subcontracts the operations of the program to two universities: Texas A&M University and Lamont-Doherty Earth Observatory of Columbia University. JOI is also responsible for managing the U.S. contribution to ODP.

Texas A&M University (TAMU) serves as science operator for ODP. In this capacity, TAMU is responsible for planning the specific ship operations, actual drilling schedules, and final scientific rosters, which are developed in close cooperation with PCOM and the relevant

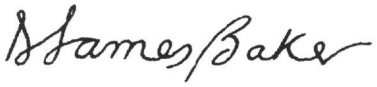
panels. The science operator also ensures that adequate scientific analyses are performed on the cores by maintaining the shipboard scientific laboratories and computers and by providing logistical and technical support for shipboard scientific teams. Onshore, TAMU manages scientific activities after each leg, is curator for the cores, distributes samples, and coordinates the editing and publication of scientific results.

Lamont-Doherty Earth Observatory (LDEO) of Columbia University is responsible for the program's logging operation, including processing the data and providing assistance to scientists for data analysis. The ODP Data Bank, a repository for geophysical data, is also managed by LDEO.

Core samples from ODP and the previous Deep Sea Drilling Project are stored for future investigation at three sites: ODP Pacific and Indian Ocean cores at TAMU, ODP and DSDP Atlantic and Antarctic cores at LDEO, and DSDP Pacific and Indian Ocean cores at the Scripps Institution of Oceanography.

Scientific achievements of ODP include new information on early seafloor spreading and how continents separate and the margins evolve. The oldest Pacific crust has been drilled and sampled. We have new insights into glacial cycles and the fluctuations of ocean currents throughout geological time. Many of the scientific goals can be met only with new technology; thus the program has focused on engineering as well as science. To date, ODP engineers have demonstrated the capability to drill on bare rock at mid-ocean-ridge sites and have developed techniques for drilling in high-temperature and corrosive regions typical of hydrothermal vent areas. A new diamond coring system promises better core recovery in difficult areas.

In addition, ODP is cooperating closely with other geological and geophysical programs; for example, in 1991 the first hole was drilled by ODP for emplacement of a seismometer near Hawaii for the Ocean Seismic Network. JOI is pleased to have been able to play a facilitating role in the Ocean Drilling Program and its cooperative activities, and we are looking forward to many new results to come.



D. James Baker
President
Joint Oceanographic Institutions, Inc.

Washington, D.C.

OCEAN DRILLING PROGRAM

MEMBER ORGANIZATIONS OF THE JOINT OCEANOGRAPHIC INSTITUTIONS FOR DEEP EARTH SAMPLING (JOIDES):

University of California at San Diego, Scripps Institution of Oceanography

Columbia University, Lamont-Doherty Earth Observatory

University of Hawaii, School of Ocean and Earth Science and Technology

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, College of Geosciences and Maritime Studies

University of Texas at Austin, Institute for Geophysics

University of Washington, College of Ocean and Fishery Sciences

Woods Hole Oceanographic Institution

Canada/Australia Consortium for the Ocean Drilling Program, Department of Energy, Mines and Resources (Canada) and Department of Primary Industries and Energy (Australia)

European Science Foundation Consortium for Ocean Drilling, Belgium, Denmark, Finland, Iceland, Italy, Greece, The Netherlands, Norway, Spain, Sweden, Switzerland, and Turkey

Federal Republic of Germany, Bundesanstalt für Geowissenschaften und Rohstoffe

France, Institut Français de Recherche pour 1'Exploitation de la Mer

Japan, University of Tokyo, Ocean Research Institute

United Kingdom, Natural Environment Research Council

PRIME CONTRACTOR

Joint Oceanographic Institutions, Inc.
Washington, D.C.

Thomas E. Pyle
Director, Ocean Drilling Programs

OPERATING INSTITUTION

College of Geosciences and Maritime Studies
Texas A&M University
College Station, Texas

Robert A. Duce
Dean

OCEAN DRILLING PROGRAM

Philip D. Rabinowitz
Director

Timothy J.G. Francis
Deputy Director

Richard G. McPherson
Administrator

Jack G. Baldauf, Manager
Science Operations

Barry W. Harding, Manager
Engineering and Drilling Operations

Russell B. Merrill, Curator and Manager
Science Services

Robert E. Olivas, Manager
Technical and Logistics Support

John Coyne, Manager
Information Services

LOGGING OPERATOR

Borehole Research Group
Lamont-Doherty Earth Observatory
Columbia University
Palisades, New York

David Goldberg, Head

PARTICIPANTS ABOARD THE *JOIDES RESOLUTION* FOR LEG 149*

Dale S. Sawyer
Co-Chief Scientist
Department of Geology and Geophysics
Weiss School of Natural Sciences
Rice University
P.O. Box 1892
Houston, Texas 77251
U.S.A.

Robert B. Whitmarsh
Co-Chief Scientist
Deacon Laboratory
Institute of Oceanographic Sciences
Brook Road
Wormley, Godalming
Surrey GU8 5UB
United Kingdom

Adam Klaus
ODP Staff Scientist
Ocean Drilling Program
Texas A&M University Research Park
1000 Discovery Drive
College Station, Texas 77845-9547
U.S.A.

Marie-Odile Beslier
Structural Geologist
Laboratoire de Géodynamique Sous-Marine, CNRS
Université Pierre et Marie Curie
B.P. 48
F-06230 Villefranche sur Mer
France

Eric S. Collins
Paleontologist (benthic foraminifers)
Centre for Marine Geology
Dalhousie University
Halifax, Nova Scotia B3H 4J1
Canada

María Carmen Comas
Sedimentologist
Instituto Andaluz de Geologia Mediterranea
Universidad de Granada, CSIC
Avenida Fuentenueva s/n
E-18002 Granada
Spain

Guy Cornen
Igneous Petrologist
Laboratoire de Pétrologie
Sciences de la Terre
Université de Nantes
2 rue de la Houssinière
F-44072 Nantes Cedex 03
France

Eric de Kaenel
Paleontologist (calcareous nannofossils)
Department of Geology
Florida State University
Tallahassee, Florida 32306-3026
U.S.A.

Luis de Menezes Pinheiro
Physical Properties Specialist
Departamento de Geociencias
Universidade de Aveiro
3800 Aveiro
Portugal

Elisabeth Gervais
Paleontologist (planktonic foraminifers)
INTERGEOS
Statenhof
Reaal 5Q
2353 TK Leiderdorp
The Netherlands

Ian L. Gibson
Igneous Petrologist
Department of Earth Sciences
University of Waterloo
Waterloo, Ontario N2L 3G1
Canada

Dennis L. Harry
Physical Properties Specialist
Department of Geology and Geophysics
Rice University
P.O. Box 1892
Houston, Texas 77251
U.S.A.

Michael A. Hobart
LDEO Logging Scientist
Borehole Research Group
Lamont-Doherty Earth Observatory
Columbia University
Palisades, New York 10964
U.S.A.

Toshiya Kanamatsu
Paleomagnetist
Ocean Research Institute
University of Tokyo
1-15-1 Minamidai, Nakano-ku
Tokyo 164
Japan

Charlotte M. Krawczyk
Physical Properties Specialist
Forschungszentrum für Marine Geowissenschaften
GEOMAR
Wischhofstraße 1-3, Gebäude 4
D-2300 Kiel 14
Federal Republic of Germany

* Addresses at time of cruise.

Li Liu
Paleontologist (calcareous nannofossils)
Department of Geology
Florida State University
Tallahassee, Florida 32306-3026
U.S.A.

Jeremy C. Lofts
JOIDES Logging Scientist
Borehole Research
Department of Geology
University of Leicester
University Road
Leicester LE1 7RH
United Kingdom

Kathleen M. Marsaglia
Sedimentologist
Department of Geological Sciences
University of Texas at El Paso
El Paso, Texas 79968-0555
U.S.A.

Philip A. Meyers
Organic Geochemist
Department of Geological Sciences
University of Michigan
Ann Arbor, Michigan 48109-1063
U.S.A.

Doris Milkert
Sedimentologist
Geologisch-Paläontologisches Institut und Museum
Universität Kiel
Olshausenstrasse 40-60
D-2300 Kiel
Federal Republic of Germany

Kitty Lou Milliken
Sedimentologist
Department of Geological Sciences
University of Texas at Austin
Austin, Texas 78712-51640
U.S.A.

Julia K. Morgan
Physical Properties Specialist
Department of Geological Sciences
Cornell University
Ithaca, New York 14853-1504
U.S.A.

Pedro Ramirez
Sedimentologist
Department of Geological Sciences
California State University
5151 State University Drive
Los Angeles, California 90032-8203
U.S.A.

Karl E. Seifert
Igneous Petrologist
Department of Geological Sciences
Iowa State University
Ames, Iowa 50011
U.S.A.

Timothy Shaw
Inorganic Geochemist
Chesapeake Biological Laboratory
Center for Environmental and Estuarine Studies
University of Maryland System
P.O. Box 38
Solomons, Maryland 20688-0038
U.S.A.

Chris Wilson
Sedimentologist
Department of Earth Sciences
Open University
Milton Keynes MK7 6AA
United Kingdom

Chuan Yin
LDEO Logging Trainee
Lamont-Doherty Earth Observatory
Columbia University
Palisades, New York 10964
U.S.A.

Xixi Zhao
Paleomagnetist
Institute of Tectonics
Department of Earth Sciences
University of California, Santa Cruz
Santa Cruz, California 95064
U.S.A.

SEDCO OFFICIALS

Captain Edwin G. Oonk, Leg 149B
Captain Anthony Ribbens, Leg 149C
Master of the Drilling Vessel
Overseas Drilling Ltd.
SEDCO/Forex
707 Texas Avenue South, Suite 103D
College Station, Texas 77840-1917
U.S.A.

Kenneth D. Home, Leg 149B
Bob Caldow, Leg 149C
Drilling Superintendent
Overseas Drilling Ltd.
SEDCO/Forex
707 Texas Avenue South, Suite 103D
College Station, Texas 77840-1917
U.S.A.

ODP ENGINEERING AND OPERATIONS PERSONNEL

Scott McGrath	Development Engineer
Eugene Pollard	Operations Superintendent

ODP TECHNICAL AND LOGISTICS PERSONNEL, LEG 149B

Johanna Adams	Marine Laboratory Specialist/JOI
Roger Ball	Marine Electronics Specialist
Bradley Cook	Marine Laboratory Specialist/Photographer
John Coyne	Database Supervisor
John R. Eastlund	Marine Computer Specialist/System Manager
Ted ("Gus") Gustafson	Marine Laboratory Specialist/Thin Section
Michiko Hitchcox	Marine Laboratory Specialist/Yeoperson
Brad Julson	Laboratory Officer
Andrea Leader	Marine Laboratory Specialist/JOI
Jaquelyn K. Ledbetter	Marine Laboratory Specialist/Downhole Laboratory
Eric Meissner	Marine Electronics and Underway
Claudia Muller	Marine Laboratory Specialist/Physical Properties
Robert E. Olivas	Marine Laboratory Specialist/Storekeeper
Chieh Peng	Marine Laboratory Specialist/Chemistry
Philip Rumford	Marine Laboratory Specialist/Chemistry
Don Sims	Marine Laboratory Specialist/X-ray
Lorraine Southey	Marine Laboratory Specialist/Curatorial Representative
Monica Sweitzer	Marine Laboratory Specialist/Paleomagnetics
Barry Weber	Marine Computer Specialist/System Manager and Underway

ODP TECHNICAL AND LOGISTICS PERSONNEL, LEG 149C

Wendy J. Autio	Senior Marine Laboratory Specialist/X-ray
Timothy Bronk	Marine Laboratory Specialist/Thin Section
Brenda Jo Claesgens	Marine Laboratory Specialist/Yeoperson
Bradley Cook	Marine Laboratory Specialist/Photographer
John R. Eastlund	Marine Computer Specialist/System Manager
Dennis K. Graham	Marine Laboratory Specialist/Chemistry
Margaret Hastedt	Marine Laboratory Specialist/Paleomagnetics
Brad Julson	Laboratory Officer
Kazushi ("Kuro") Kuroki	Marine Laboratory Specialist/X-ray
Jaquelyn K. Ledbetter	Marine Laboratory Specialist/Downhole Laboratory
Jon S. Lloyd	Marine Laboratory SpecialistPhysical Properties
Erinn McCarty	Marine Laboratory Specialist/Curatorial Representative
Dwight E. Mossman	Marine Laboratory Specialist/Underway
Robert E. Olivas	Marine Laboratory Specialist/Storekeeper
Anne Pimmel	Marine Laboratory Specialist/Chemistry
Mary Reagan	Marine Laboratory Specialist/JOI
William Stevens	Marine Electronics Specialist
Mark Watson	Marine Electronics Specialist
Barry Weber	Marine Computer Specialist/System Manager and Underway

Ocean Drilling Program Publications Staff

Publications Supervisor
William D. Rose

Chief Editor
Ann Klaus

Editors
Chryseis O. Fox
Eva M. Maddox
Jennifer A. Marin
Nancy K. McQuistion
Sondra K. Stewart

Chief Production Editor
Jennifer Pattison Hall

Production Editors
Mauri L. Coulter
Jaime A. Gracia (this volume)

Senior Publications Coordinator
Janalisa Braziel Soltis

Publications Coordinator
Gudelia ("Gigi") Delgado

Publications Distribution Specialist
Fabiola Muñoz Byrne

Data Entry/Copier Operator
Ann Mitchell

Senior Photographer
John W. Beck

Photographer
Barry C. Cochran

Chief Illustrator
Deborah L. Partain

Illustrators
Melany R. Borsack
Michelle Cady (lead, this volume)
Michelle Curtis
Garnet D. Gaither
Linda C. Orsi

Production Assistants
Carrie R. Castillón
Mary Elizabeth Mitchell
Alexandra F. Moreno

TABLE OF CONTENTS

VOLUME 149—INITIAL REPORTS

BACK-POCKET FIGURES

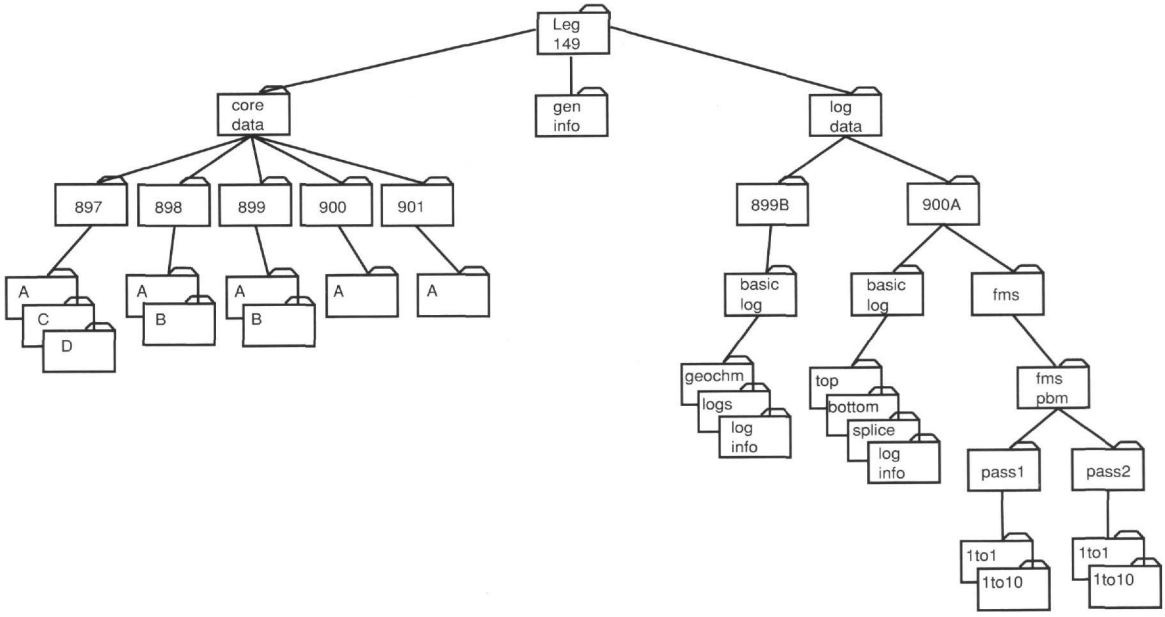
CD-ROM MATERIALS

GENERAL INFORMATION directory
- Format documentation file (this file)
- INDEX file (contents)
- Software documentation file

LOGGING DATA directory
- README document
- HOLE NUMBER subdirectory
  - Conventional logging subdirectory
    - General information subdirectory
    - Acronyms and units file
    - Processing history of logging data
    - Logging data subdirectory
      - Individual tool data files
  - FMS subdirectory
    - FMS DIP subdirectory
      - Dipmeter files in ASCII format
    - FMS images in portable bit map (PBM - 8-bit binary)
    - Format subdirectory
      - Information about processing file
      - 1:1 ratio image raster files (every 10 m) subdirectory
      - Data files
        - Raster documentation file
      - 1:10 ratio image raster files (every 100 m) subdirectory
        - Data files
        - Raster documentation file
  - Temperature data subdirectory
    - Temperature data in ASCII format file

CORE DATA directory
- README document
- SITE number subdirectory
- GRAPE documentation file
- Magnetic susceptibility documentation file
- Index properties documentation
- HOLE number subdirectory
- GRAPE data file
- MAGSUS data file
- Index properties data file

Schematic diagram of CD-ROM file organization.



ACKNOWLEDGMENTS

Leg 149 was the first of what was intended to be a series of legs to study North Atlantic nonvolcanic rifted margins. We hope that the members of the North Atlantic Rifted Margins Detailed Planning Group (NARM DPG) will be pleased with this volume, the first fruit of their labors, and we thank them and many members of the scientific community for their encouragement. We also thank the Portuguese government for permission to drill in Portuguese waters.

Leg 149 was unusual, possibly unique, in that we worked with both the SEDCO crews and nearly all the ODP seagoing technicians under Lab Officer Brad Julson. We found both teams to be efficient and professional and thank them for their help and dedication in achieving our scientific objectives. We particularly appreciated the flexibility and creativity of the drillers, which enabled us to extract the maximum hole from the time allotted to us. We answer the obvious, but delicate, question posed of those who have sailed with both crews by stating that each crew is certainly better than the other! Ashore, our assistance from ODP staff was no less dedicated. The compilation of the volume was coordinated during the post-cruise meeting by Fabiola Byrne, and it was edited by Sondra Stewart. Debbie Partain directed the preparation of the illustrations.