



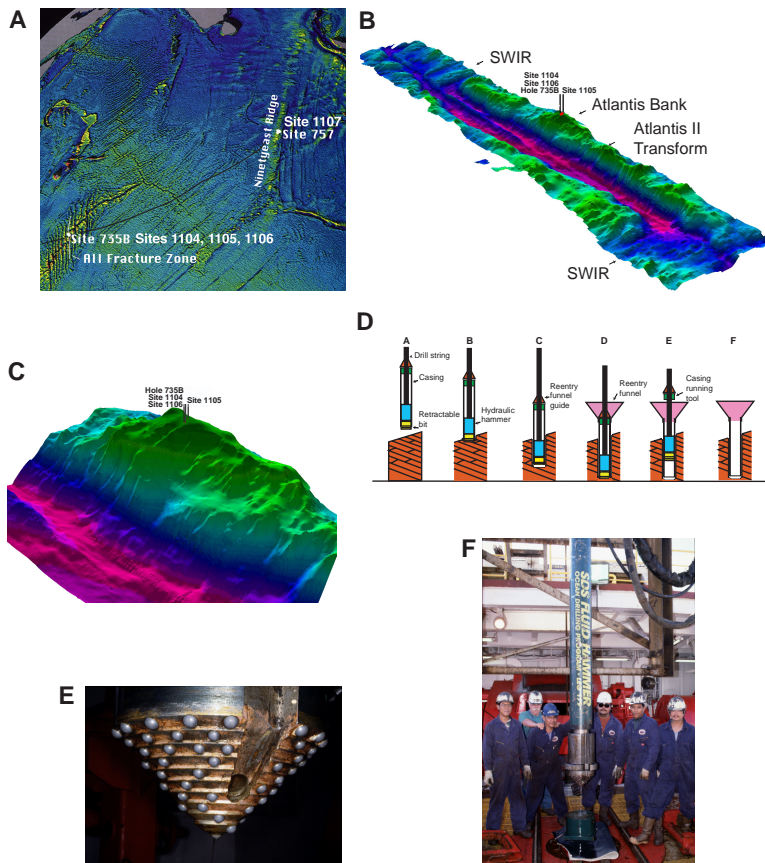
**VOLUME 179
INITIAL REPORTS**

**HAMMER DRILLING
AND NERO
ATLANTIS BANK,
SOUTHWEST INDIAN RIDGE**

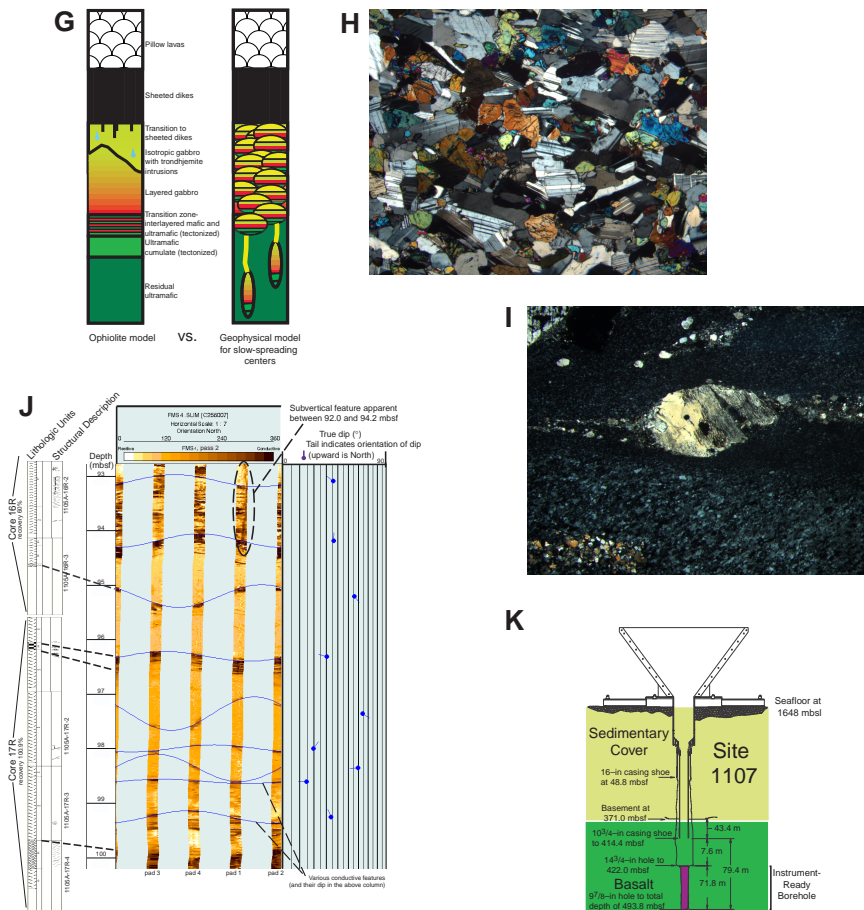
SITES 1104–1107

**PROCEEDINGS OF THE
OCEAN DRILLING PROGRAM**

Prepared by the
OCEAN DRILLING PROGRAM,
TEXAS A&M UNIVERSITY
in cooperation with the
NATIONAL SCIENCE FOUNDATION
and
JOINT OCEANOGRAPHIC INSTITUTIONS,
INC.



Frontispiece. A. Leg 179 operations area within the Indian Ocean, which included the Atlantis Bank along the Atlantis II Transform for hammer drilling (Sites 1104 and 1106) and contingency coring of gabbroic rocks (Site 1105) and the Ninetyeast Ridge (Site 1107) for the geophysical ocean-bottom observatory site. B. A **QuickTime** movie of the bathymetry of the Atlantis II Transform, which offsets the Southwest Indian Ridge (SWIR), showing the position of the Atlantis Bank. C. Close-up of the Atlantis Bank where gabbroic rocks were drilled using the hammer drill and the standard rotary core barrel drilling systems. D. Schematic view of the hammer drill-in casing system that was tested. E. Percussion bit deployed with the hammer drill-in casing system at Sites 1104 and 1106. F. Fully assembled SDS hammer drill-in casing system on the rig floor of the *JOIDES Resolution*. (Continued on next page.)



Frontispiece (continued). **G.** Schematic columns showing the differences between the ophiolite model of oceanic crust and upper mantle, identifying typical major lithologic units, vs. a geophysical model of slow-spreading oceanic crust, which predicts only small ephemeral magma chambers. These models will be tested with results of the sampling of the plutonic foundations of the oceanic crust from the contingency Hole 1105A. **H.** Igneous textured olivine gabbro from Hole 1105A. **I.** Highly deformed porphyroclastic mylonite textured metagabbro from Hole 1105A. **J.** Formation MicroScanner imaging of layered gabbroic rocks with lithologic and structural correlations in the core from Hole 1105A. **K.** Schematic diagram showing the geometry and structure of Site 1107 ready for deployment of a geophysical ocean-bottom observatory at the Ninetyeast Ridge.

PROCEEDINGS OF THE OCEAN DRILLING PROGRAM

Volume 179

Initial Reports

Hammer Drilling and NERO

Covering Leg 179 of the cruises of the Drilling Vessel *JOIDES Resolution*

Atlantis Bank, Southwest Indian Ridge

Sites 1104–1107

9 April–7 June 1998

SHIPBOARD ENGINEERS/SCIENTISTS

Thomas J. Pettigrew, John F. Casey, D. Jay Miller,
Eiichiro Araki, Remi Boissonnas, Robert Busby, Florence Einaudi,
Martin Gerdom, Zhong Ping Guo, Hartley Hopkins, Greg Myers,
Dasari Gopala Rao, Tsugio Shibata, Peter Thy

SHIPBOARD STAFF SCIENTIST

D. Jay Miller

VOLUME EDITOR

John M. Scroggs

Reference to the whole or to part of this volume should be made as follows:

Printed booklet citation for Chapter 1:

Shipboard Scientific Party, 1999. Leg 179 Summary. *In* Pettigrew, T.L., Casey, J.F., Miller, D.J., et al., *Proc. ODP, Init. Repts.*, 179: College Station, TX (Ocean Drilling Program), 1–26.

CD-ROM volume citation:

Pettigrew, T.L., Casey, J.F., Miller, D.J., et al., *Proc. ODP, Init. Repts.*, 179 [CD-ROM]. Available from: Ocean Drilling Program, Texas A&M University, College Station, TX 77845-9547, U.S.A.

CD-ROM chapter citation:

Shipboard Scientific Party, 1999. Hammer Drill Site (1104 and 1106) and Site 1105. *In* Pettigrew, T.L., Casey, J.F., Miller, D.J., et al., *Proc. ODP, Init. Repts.*, 179, 1–183 [CD-ROM]. Available from: Ocean Drilling Program, Texas A&M University, College Station, TX 77845-9547, U.S.A.

This volume also appears on the World Wide Web. See www-odp.tamu.edu/publications/ for available volumes and Web citation formats.

ISSN

Printed booklet: 0884-5883; CD-ROM volume: 1096-2522; WWW volume: 1096-2158
Library of Congress 87-642-462

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 printing date*, is the correct one.

The printing date of this volume: July 1999

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

Volume 175 (*Initial Reports*): November 1998

Volume 176 (*Initial Reports*): June 1999

Volume 177 (*Initial Reports*): May 1999

Volumes 159/159T (*Scientific Results*): October 1998

Volume 160 (*Scientific Results*): September 1998

Volume 161 (*Scientific Results*): February 1999

Copies of this publication may be obtained from Publications Distribution Center, Ocean Drilling Program, 1000 Discovery Drive, College Station, TX 77845-9547, U.S.A. See the ODP publication list at www-odp.tamu.edu/publications/ or contact ODP for prices and ordering information. Orders for copies require advance payment.

PUBLISHER'S NOTES

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:

Australia/Canada/Chinese Taipei/Korea Consortium for Ocean Drilling: Department of Primary Industries and Energy (Australia), Natural Resources Canada (Canada), National Taiwan University in Taipei, and Korean Institute for Geology, Mining and Minerals

Deutsche Forschungsgemeinschaft (Federal Republic of Germany)

European Science Foundation Consortium for Ocean Drilling (Belgium, Denmark, Finland, Iceland, Italy, The Netherlands, Norway, Portugal, 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, 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.

Abbreviations for names of organizations and publications in ODP reference lists follow the style given in *Chemical Abstracts Service Source Index* (published by American Chemical Society).

The bulk of the shipboard-collected data from this leg is available on the World Wide Web and is accessible at www-odp.tamu.edu/database. If you cannot access this site or need additional data, please contact the ODP Data Librarian, Ocean Drilling Program, Texas A&M University, College Station, TX 77845-9547, U.S.A. (e-mail: database@odp.tamu.edu).

Supplemental data on the volume CD-ROM were provided by the authors and may not conform to ODP publication formats.

A site map showing the drilling locations for this leg and maps showing the drilling locations of all Ocean Drilling Program (ODP) and Deep Sea Drilling Project (DSDP) drilling sites are available on the volume CD in PDF format.

Beginning with *Initial Reports* Volume 176 and *Scientific Results* Volume 169, all *Proceedings* volumes will be published on CD-ROM and the World Wide Web at www-odp.tamu.edu/publications.

Initial Reports

Booklet format: ISSN 0884-5883
CD-ROM format: ISSN 1096-2522
WWW format: ISSN 1096-2158

Scientific Results

Book: ISSN 0884-5891
CD-ROM format: ISSN 1096-2514
WWW format: ISSN 1096-7451

Cover photograph of the hammer drill and Chief Engineer Tom Pettigrew by ODP Photographer Roy Davis.

FOREWORD

BY JOINT OCEANOGRAPHIC INSTITUTIONS, INC.

This volume presents scientific and engineering results from the Ocean Drilling Program (ODP). These results address the scientific and technical goals of the program, which are focused on the study of the dynamics of Earth's interior and environment.

ODP, an international partnership of scientists and research institutions from 22 countries, operates the drillship *JOIDES Resolution*. This state-of-the-art research vessel contains seven levels of laboratories and other scientific facilities required for carrying out the program's objectives.

The management of ODP involves a partnership of scientists and governments. International oversight and coordination are provided by the ODP Council, which is made up of representatives from the member countries. Overall scientific and management guidance is provided by representatives from the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES).

Joint Oceanographic Institutions, Inc. (JOI), a nonprofit consortium of eleven U.S. oceanographic institutions, serves as the National Science Foundation's prime contractor for ODP. JOI implements scientific objectives, plans, and recommendations of the JOIDES committees through major subcontracts to Texas A&M University (TAMU) for science operations and to Lamont-Doherty Earth Observatory (LDEO) of Columbia University for logging services.

JOI, TAMU, and LDEO have worked together successfully for many years to manage the Ocean Drilling Program. We look forward to many exciting discoveries and continued international collaboration as we further our scientific mission, especially the planning for the future of ocean drilling beyond 2003.

James D. Watkins
Admiral, U.S. Navy (Retired)
President, Joint Oceanographic Institutions, Inc., Washington, D.C.

OCEAN DRILLING PROGRAM*

National Science Foundation
 4201 Wilson Boulevard
 Arlington, VA 22230, U.S.A.
 Tel: (703) 306-1581; Fax: (703) 306-0390
 Web site: www.nsf.gov

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 Oceanic and
 Atmospheric Sciences

University of Rhode Island, Graduate School of
 Oceanography

Rutgers, The State University of New Jersey,
 Institute of Marine and Coastal Sciences

Texas A&M University, College of Geosciences

University of Texas at Austin, Institute for
 Geophysics

University of Washington, College of Ocean and
 Fishery Sciences

* At time of publication. See [Publisher's Notes, p. 7](#), for list of funding agencies at time of cruise. For an up-to-date list of current member organizations and office contact information, see the ODP Web site: www.oceandrilling.org.

Woods Hole Oceanographic Institution

Australia/Canada/Chinese Taipei/Korea Consortium for Ocean Drilling: Department of Primary Industries and Energy (Australia), Natural Resources Canada (Canada), National Taiwan University in Taipei, and Korean Institute for Geology, Mining and Minerals

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

Federal Republic of Germany, Bundesanstalt für Geowissenschaften und Rohstoffe

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

Japan, University of Tokyo, Ocean Research Institute

People's Republic of China, Marine High-Technology Bureau of the State Science and Technology Commission of the People's Republic of China

United Kingdom, Natural Environment Research Council

OCEAN DRILLING PROGRAM (ODP)

Web site: www.oceandrilling.org

ODP SCIENCE ADVISORY STRUCTURE (JOIDES)

JOIDES Office

GEOMAR Research Center

Wischhofstrasse 1-3, Building 4

D-24148 Kiel, Federal Republic of Germany

Tel: 49 (431) 600-2821; Fax: 49 (431) 600-2847

E-mail: joides@geomar.de

Web site: www.joides.geomar.de

ODP PROGRAM MANAGER

Joint Oceanographic Institutions, Inc.

1755 Massachusetts Avenue, NW, Suite 800

Washington, DC 20036-2102, U.S.A.

Tel: (202) 232-3900; Fax: (202) 462-8754

E-mail: joi@brook.edu

Web site: www.joi-odp.org

ODP SCIENCE OPERATOR

Ocean Drilling Program
Texas A&M University
1000 Discovery Drive
College Station, TX 77845-9547, U.S.A.
Tel: (409) 845-2673; Fax: (409) 845-4857
E-mail: odp@odp.tamu.edu
Web site: www-odp.tamu.edu

ODP LOGGING SERVICES

Borehole Research Group
Lamont-Doherty Earth Observatory
Columbia University
P.O. Box 1000, Route 9W
Palisades, NY 10964, U.S.A.
Tel: (914) 365-8672; Fax: (914) 365-3182
E-mail: borehole@ldeo.columbia.edu
Web site: www.ldeo.columbia.edu/BRG/ODP

ODP SITE SURVEY DATA BANK

Lamont-Doherty Earth Observatory
Columbia University
P.O. Box 1000, Route 9W
Palisades, NY 10964, U.S.A.
Tel: (914) 365-8542; Fax: (914) 365-3159
E-mail: odp@ldeo.columbia.edu
Web site: www.ldeo.columbia.edu/databank

LEG 179 PARTICIPANTS*

SHIPBOARD SCIENTIFIC PARTY

Tom Pettigrew
Chief Engineer

Ocean Drilling Program
1000 Discovery Drive
College Station, TX 77845-9547
U.S.A.

tom_pettigrew@odp.tamu.edu

John F. Casey
Chief Scientist

Department of Geosciences
University of Houston
4800 Calhoun Road
Houston, TX 77204-5503
U.S.A.

jfcasey@uh.edu

D. Jay Miller
Staff Scientist

Ocean Drilling Program
1000 Discovery Drive
College Station, TX 77845-9547
U.S.A.

jay_miller@odp.tamu.edu

Eiichiro Araki
Strainmeter Technician

Marine Geology and Geophysics
Ocean Research Institute
University of Tokyo
1-15-1 Manumit
Nakano-ku, Tokyo
Japan

araki@ori.u-tokyo.ac.jp

*Addresses at time of cruise.

Remi Boissonas**LDEO Logging Trainee**

Borehole Research Group
Lamont-Doherty Earth Observatory
Columbia University
Route 9W
Palisades, NY 10964
U.S.A.
remi@ldeo.columbia.edu

Robert Busby**Ocean-Bottom Seismometer Specialist**

Channel Z Seismometry
37 Haynes Avenue
Falmouth, MA 02540
U.S.A.
busby@ldeo.columbia.edu

Florence Einaudi**LDEO Logging Trainee**

CEREGEM Europole de l'Arbois
BP 80, 13545 Aix en Provence
Cedex 4
France
einaudi@cerege.fr

Martin Gerdom**VSP Scientist**

GEOMAR
Research Center for Marine Geosciences
Wischhofstrasse 1-3, Building 8C/Room 202
D-24148 Kiel
Federal Republic of Germany
mgerdom@geomar.de

Zhong Ping Guo**Petrologist**

Department of Geosciences
University of Houston
4800 Calhoun Road
Houston, TX 77204-5503
U.S.A.
zpguo@uh.edu

Hartley Hoskins**VSP Scientist**

Department of Geology and Geophysics
Woods Hole Oceanographic Institution
360 Woods Hole Road
Woods Hole, MA 02543
U.S.A.
hhoskins@whoi.edu

Greg Myers**LDEO Logging Scientist**

Borehole Research Group
Lamont-Doherty Earth Observatory
Columbia University
Route 9W
Palisades, NY 10964
U.S.A.

gmyers@ldeo.columbia.edu

Dasari Gopala Rao**Paleontologist (nannofossils)**

National Institute of Oceanography
Donapaula 403004, Goa
India 229102

gopalrao@darya.nio.org or
gopalrao@csnio.ren.nic.in

Tsugio Shibata**Petrologist**

Faculty of Science
Department of Earth Sciences
Okayama University
1-1, Tsushimanaka 3 Chome
Okayama 700-8530
Japan

shibata@cc.okayama-u.ac.jp

Peter Thy**Petrologist**

Department of Geology
University of California at Davis
Davis, CA 95616
U.S.A.

thy@geology.ucdavis.edu

SEDCO OFFICIALS**Captain Anthony Ribbens****Master of the Drilling Vessel**

Overseas Drilling Ltd.
707 Texas Avenue South, Suite 213D
College Station, TX 77840-1917
U.S.A.

Robert Caldwell**Drilling Superintendent**

Overseas Drilling Ltd.
707 Texas Avenue South, Suite 213D
College Station, TX 77840-1917
U.S.A.

CONSULTING ENGINEERS**Taras Olijnyk**

SDS Digger Tools, Ltd.

Paul Speight

SDS Digger Tools, Ltd.

ODP SHIPBOARD PERSONNEL**Pattie Baucom**

Marine Laboratory Specialist

Jerry Bode

Marine Laboratory Specialist (Assistant Curator)

Johannes Calitz

Marine Electronics Specialist

Roy Davis

Marine Laboratory Specialist (Photographer)

Sandy Dillard

Marine Laboratory Specialist (Storekeeper)

John Eastlund

Marine Computer Specialist

Glenn Foss

Operations Manager

Burney Hamlin

Laboratory Officer

Leon Holloway

Development Engineer

Jim Ippoliti

Marine Electronics Specialist

Steve Kittredge

Schlumberger Logging Engineer

Kuro Kuroki

Assistant Laboratory Specialist

Jaque Ledbetter

Marine Laboratory Specialist (X-ray)

Prentiss Lund

Marine Laboratory Specialist

Erinn McCarty

Marine Laboratory Specialist (Curator)

Erik Moortgat

Marine Laboratory Specialist (Chemistry)

David Morley

Marine Computer Specialist

Matt O'Regan

Marine Laboratory Specialist (Paleomagnetism)

Anne Pimmel

Marine Laboratory Specialist (Chemistry)

Mads Rasted

Marine Laboratory Specialist

Jo Ribbens

Marine Laboratory Specialist (Yeoperson)

ODP PUBLICATIONS STAFF*

Amy Brundeen
Production Editor

Coleena Burt
Illustrator

Jaime Cawthron
Student Assistant

Gudelia (“Gigi”) Delgado
Senior Publications
Coordinator

Patrick H. Edwards
Production Editor

Edward W. Flax
Student Assistant

Phyllis M. Garman
Editor

Jaime A. Gracia
Senior Production Editor

Lea Elaine Green†
Production Editor

Ann Klaus
Publication Services Manager

Ginny Lowe
Editor

Nancy H. Luedke
Illustrator

Angeline T. Miller
Senior Editor

Mary Elizabeth Mitchell
Production Assistant

Susan Nessler
Editor

Deborah L. Partain
Senior Illustrator

Katerina E. Petronotis
WWW Administrator

M. Kathleen Phillips
Publications Specialist

Ruth N. Riegel
Editor

Jennifer Pattison Rumford
Electronic Publications
Specialist

John M. Scroggs†
Editor

Karen E. Wagner†
Illustrator

Eric S. Wilfong
Assistant Editor

Ann Yeager
Distribution Specialist

*At time of publication.

†Lead staff members for this volume.

ACKNOWLEDGMENTS

The Leg 179 Shipboard Scientific Party thanks Captain Tom Ribbens and the officers and crew of the *JOIDES Resolution*. We also thank the Ocean Drilling Program (ODP) staff who helped make it possible for the rather small shipboard scientific party to respond to a very successful contingency Hole 1105A drilled along the Atlantis II Transform. We recovered far more gabbroic material than anticipated in the prospectus. The staff provided the support necessary to describe, analyze, and sample 143 m of gabbroic core drilled in six days. Put into perspective, this recovery exceeded the total recovery of gabbro during Legs 147 and 153, which were devoted to drilling the plutonic foundations of the oceanic crust. We also thank Schlumberger Engineer Steve Kittredge and the Lamont-Doherty Earth Observatory Logging Services staff members, who expertly and thoughtfully logged Hole 1105A and provided us with the first high-quality Formation MicroScanner images of a hole drilled into oceanic gabbros.

We also greatly appreciated the efforts of Dr. Henry Dick and the captain, staff, and crew of the *James Clark Ross*, who effected a transfer of site survey bathymetry and sample location data at sea. This data collected over the Atlantis Bank allowed us to select the unanticipated contingency Site 1105. Dr. Dick has also been a tireless champion of drilling along the Southwest Indian Ridge and largely provided the background data necessary for selection of the hammer test site.

We express our gratitude to those who helped us on the rig floor to conduct the first tests of the hammer drill and complete the leg's primary objectives, literally in the nick of time. The entire Sedco crew was very helpful and instrumental in accomplishing the difficult task of testing the hammer drill. Invaluable input was provided by Rig Superintendent Bob Caldow, Tool Pusher Scott Pederson, and Core Technicians Bill Lee and Tim McCown. We would also like to thank SDS Digger Tools, Ltd., for providing the water hammers and bits. Special thanks go to SDS Engineers Taras Olijnyk and Paul Speight and ODP Special Tools Engineer Leon Holloway, who spent long hours on the rig floor looking after the hammers and coaching the drillers on hammer drill operational techniques. The entire rig

floor crew expertly adapted to the hammer drill tests, suffered through intense vibrations on the rig floor during the hammer drilling, and drilled with magnificent efficiency to complete Hole 1105A on the Atlantis Bank and Hole 1107A on the Ninetyeast Ridge in difficult sea states. Together with Drill Pipe Operator John Powell, they also expertly reentered hard-rock Hole 1105A under both difficult sea-state and bottom conditions. This ultimately allowed us to deepen the hole significantly. Lastly, their diligent efforts and expertise are largely responsible for successfully completing the Ninetyeast Ridge Observatory (NERO) hole just before the scheduled departure time. The hole will house the first downhole geophysical observatory in a remote part of the Indian Plate and should fill one of six major gaps in worldwide seismic coverage. We also thank Drs. John Orcutt, Jean-Paul Montagner, and Susan Humphris for their helpful comments during the leg regarding requirements for the NERO Hole.

We thank the Sedco crew members for their long and tireless efforts in repairing the *JOIDES Resolution's* guidehorn, damaged during a previous leg, without which we would have been more seriously delayed in Capetown. We likewise thank the captain, crew, and ODP staff for their perseverance on a cruise made difficult because of delays in leaving port, errant supply shipments, long transits, and nearly continuous high sea states throughout the leg. They willingly responded in a positive way to a two-day leg extension resulting from these difficulties. This extension caused considerable inconvenience for many on the leg who had to rearrange previous commitments. Even with the extension, the significant amount of time lost during the leg resulted in cancellation of certain ancillary programs. The most difficult and complex of these was a proposed two-ship seismic experiment with the German research vessel *Sonne*, which was involved in seismic experiments near the NERO Site. Although scheduled for the last two days at the NERO site, the experiments would have interfered with the primary objective of completing the NERO hole, which was completed only hours before our scheduled departure. We particularly thank Dr. Ernst Fleuh and the scientific staff of the *Sonne*, as well as others whose experiments were affected, for their understanding of the unanticipated logistical and operational difficulties incurred during the leg.

Finally, we wish to thank the ODP Publication Services staff members, who helped us to complete this volume and present World Wide Web-based data in a more innovative manner.

CD-ROM CONTENTS: CHAPTERS

1. Leg 179 Summary
2. Site Abstracts
3. Explanatory Notes
4. Hammer Drill Site (1104 and 1106) and Site 1105
5. NERO Site (1107)

CD-ROM CONTENTS: CORE DESCRIPTIONS

Digital images and visual core descriptions (VCDs) are included in this section. VCDs and thin-section data tables are combined into one PDF file.

Site 1105

[Visual Core Descriptions · Thin Sections](#)

CD-ROM CONTENTS: ASCII TABLES

This CD-ROM contains an ASCII version of **Table T15: Major oxide and trace element analyses of gabbros from Hole 1105A**, from Chapter 4, Hammer Drill Site (1104 and 1106) and Site 1105.

You can access this file directly from this PDF file. Depending on your computer platform, the following information applies.

PC COMPUTERS

By default, clicking on a filename with a .TXT extension will launch the Notepad application. You can configure your computer's operating system so that files on this CD with .TXT extensions automatically open in other software, such as Microsoft Excel. Follow these steps from the pull-down menu: Windows 95 and NT operating systems: View > Options > File Types; Windows 98 systems: View > Folder Options > File Types; and Windows 3.1 systems: File Manager > File > Associate.

MAC COMPUTERS

All table files with .TXT extensions will automatically open into Excel. If you do not have Excel installed on your computer, you may view these files through other spreadsheet or text-editor programs. Open the application of your choice, select File > Open, and open the ASCII file.

UNIX COMPUTERS

You can open files with .TXT extensions in any text editor or spreadsheet program, but not directly from PDF files.

CD-ROM CONTENTS: QUICKTIME MOVIE

This CD-ROM contains a QuickTime movie file that shows the bathymetry of the Atlantis II Transform, which offsets the Southwest Indian Ridge, showing the position of the Atlantis Bank. The user can manually rotate and zoom in on the image. Please note that QuickTime Version 4.0 software is provided on the CD, but is only available for the Macintosh and PC platforms.

LEG179.MOV

CD-ROM CONTENTS: SUPPLEMENTARY MATERIALS

The 179 *Initial Reports* CD-ROM contains supplementary data provided by the volume authors.

APPENDIX

The Appendix contains the igneous data collected during this leg, which are recorded in a set of seven Microsoft Excel spreadsheets. The files within the Appendix are explained in detail in the README.TXT file. The “APPENDIX” directory contains the following Excel 5.0 (.XLS) and ASCII (.TXT) files:

AT1.XLS and **AT1.TXT**: Piece length log.

AT2.XLS and **AT2.TXT**: Igneous/metamorphic core log. (Note: The macro in Appendix Table 2 only works in the Excel version.)

AT3.XLS and **AT3.TXT**: Structure log.

AT4.XLS and **AT4.TXT**: Whole-core magnetic susceptibility data.

AT5.XLS and **AT5.TXT**: Split-core cryogenic magnetometer data.

AT6.XLS and **AT6.TXT**: Compressional wave velocity data for Hole 1105A.

AT7.XLS and **AT7.TXT**: Index properties data for Hole 1105A.

README.TXT

PHOTOMICROGRAPHS

The “PHOTOMIC” directory includes supplementary data—a photomicrograph log, photomicrographs, scales, and a readme file. This directory contains the following ASCII (.TXT), Microsoft Excel 5.0 (.XLS), TIF (.TIF), and Adobe Illustrator 7.0 (.AI) files:

PHOTOMIC (Photomicrographs)

README.TXT

PHOTOLOG.XLS

PHOTOTIF (72 individual photomicrographs)

SCALES (Scale bars)

2X.AI

5X.AI

10X.AI

20X.AI

Prints of any of the photomicrograph images may be requested from the Data Librarian of the Ocean Drilling Program by e-mail at database@odp.tamu.edu.

CD-ROM CONTENTS: DRILLING LOCATIONS MAPS

A site map showing the drilling locations for this leg and maps showing the drilling locations of all Ocean Drilling Program (ODP) and Deep Sea Drilling Project (DSDP) drilling sites are available in PDF format.

ODP Leg 179 Site Map

ODP Map (Legs 100–179)

DSDP Map (Legs 1–96)

RELATED CD-ROM MATERIAL

LOGGING AND CORE DATA

A second CD-ROM, called Log and Core Data, was produced in conjunction with this leg. The Log and Core Data CD contains Leg 179 depth-shifted and processed logging data and ODP core data (shipboard index properties, magnetic susceptibility, natural gamma, paleomagnetism, split-core *P*-wave, and X-ray fluorescence). The logging data are provided by the Borehole Research Group at the Lamont-Doherty Earth Observatory, ODP Logging Services Operator for ODP.

The majority of the data included in this CD are available on the World Wide Web at www.ldeo.columbia.edu/BRG/ODP. If you cannot access this site or want to order the CD, please contact the ODP Logging Services Operator at the Lamont-Doherty Earth Observatory; Tel: (914) 365-8672; Fax: (914) 365-3182; E-mail: borehole@ldeo.columbia.edu.

CD-ROM DIRECTORY STRUCTURE

179IR.PDF (Preliminary pages and table of contents)		
README.PDF (Information about the volume CD-ROM)		
README.TXT (Information about the volume CD-ROM in ASCII format)		
ACROREAD (Acrobat Reader 3.0 installation software and instructions for different platforms)	3.0	MAC
		WIN
		UNIX
README.TXT		
MAPS (Drilling location maps)	179_MAP.PDF (Leg 179 site map)	
	ODPMAP.PDF (ODP map, Legs 100 through 179)	
	DSDPMAP.PDF (DSDP map, Legs 1 through 96)	
VOLUME (Leg 179 <i>Initial Reports</i> volume)	CHAPTERS (Volume chapters)	Leg 179 Summary: CHAP_01.PDF
		Site Abstracts: CHAP_02.PDF
		Explanatory Notes: CHAP_03.PDF
		Hammer Drill Site (1104 and 1106) and Site 1105: CHAP_04.PDF
		NERO Site (1107): CHAP_05.PDF
	CORES (Visual core descriptions, thin-section data tables, and digital core images)	Site 1105: COR_1105.PDF
		IMAGES
	TABLES (Data table from Chapter 4)	04_15.TXT (Gabbro analyses)
	LEG179.MOV (Interactive bathymetry map)	
	INDEX.PDX (Acrobat file used to enable Acrobat Search of the 179 <i>Initial Reports</i>)	
SUPP_MAT (Supplementary materials)	APPENDIX (ASCII and Excel Appendix tables)	README.TXT
		AT1.TXT & AT1.XLS (Piece length log)
		AT2.TXT & AT2.XLS (Igneous/metamorphic core log)
		AT3.TXT & AT3.XLS (Structure log)
		AT4.TXT & AT4.XLS (Magnetic susceptibility data)
		AT5.TXT & AT5.XLS (Cryogenic magnetometer data)
		AT6.TXT & AT6.XLS (P-wave velocity log)
	AT7.TXT & AT7.XLS (Index properties data)	
	PHOTOMIC (Scanned photomicrographs)	README.TXT
		PHOTOLOG.XLS (Photomicrograph log)
		PHOTOTIF (Individual photomicrographs)
		SCALES

CD-ROM DIRECTORY STRUCTURE (CONTINUED)

ODPINDEX

(Compiled Electronic Index
of the *Proceedings of the
Ocean Drilling Program*)

101NDX.PDF through 161NDX.PDF (Index files)

NDX.PDX

(Adobe Acrobat file used to enable Acrobat Search of
the Compiled Electronic Index)

QUIKTIME

(QuickTime 4.0 installation
software and instructions for
different platforms)

4.0

MAC

WIN

README.TXT