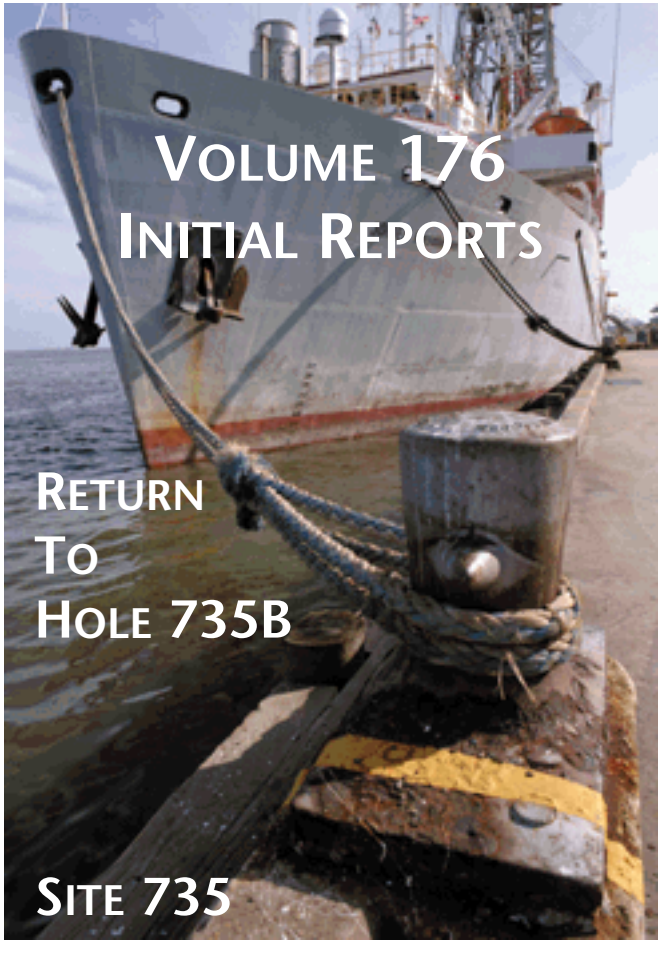
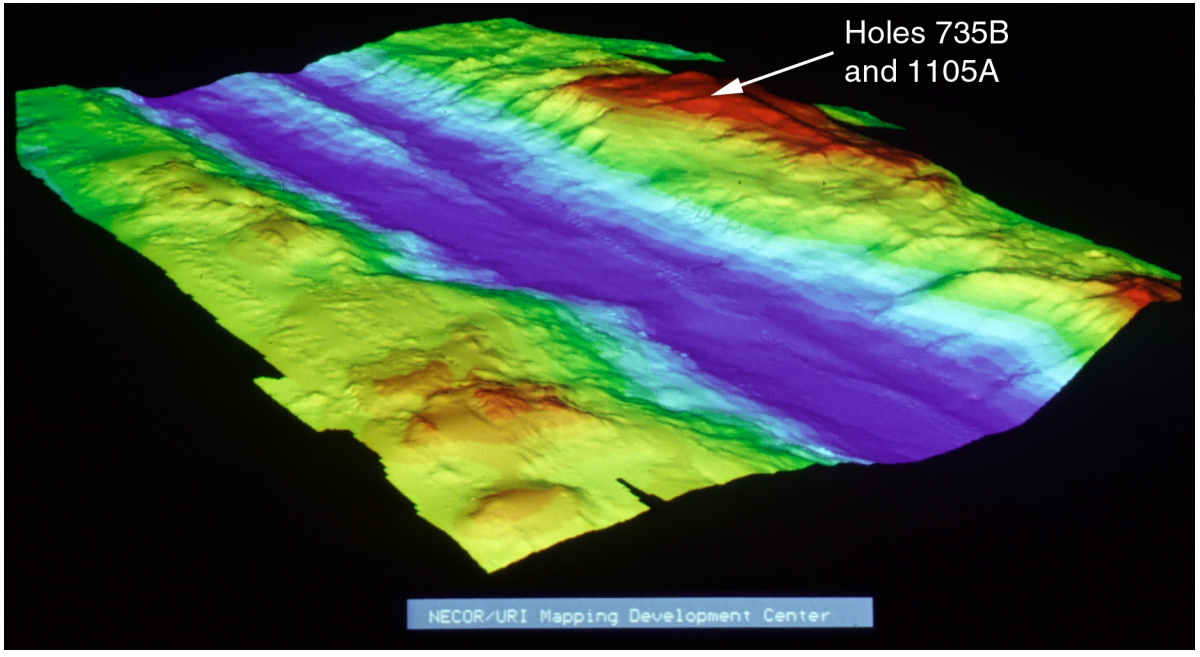


PROCEEDINGS OF THE OCEAN DRILLING PROGRAM

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



Frontispiece. Three-dimensional shaded-relief image of the Atlantis II Transform Valley from 32°25′S to 33°05′S and from 56°46′E to 57°20′E looking northeast (data from Dick et al., 1991[1]). The view shows Atlantis Bank and the location of Ocean Drilling Program Holes 735B and 1105A from across the transform. The image covers an area of ~3850 km^2 (28 nmi × 40 nmi) with a maximum relief of 5.7 km from the valley floor to the crest of Atlantis Bank.

---

[1]Dick, H.J.B., Schouten, H., Meyer, P.S., Gallo, D.G., Berg, H., Tyce, R., Patriat, P., Johnson, K., Snow, J., and Fisher, A., 1991. Bathymetric map of the Atlantis II Fracture Zone, Southwest Indian Ridge. *In* Von Herzen, R.P., Robinson, P.T., et al., *Proc. ODP, Sci. Results,* 118: College Station, TX (Ocean Drilling Program), foldout map.

Proceedings of the Ocean Drilling Program

Volume 176
Initial Reports
Return to Hole 735B

Covering Leg 176 of the cruises of the Drilling Vessel *JOIDES Resolution*
Cape Town, South Africa, to Cape Town, South Africa
Site 735
8 October–9 December 1997

SHIPBOARD SCIENTISTS
Henry J.B. Dick, James H. Natland, D. Jay Miller,
Jeffrey C. Alt, Wolfgang Bach, Daniel Bideau, Jeffrey S. Gee, Sarah Haggas,
Jan G.H. Hertogen, Greg Hirth, Paul Martin Holm, Benoit Ildefonse, Gerardo J. Iturrino,
Barbara E. John, Deborah S. Kelley, Eiichi Kikawa, Andrew Kingdon, Petrus J. Le Roux,
Jinichiro Maeda, Peter S. Meyer, H. Richard Naslund, Yaoling Niu, Paul T. Robinson,
Jonathan E. Snow, Ralph A. Stephen, Patrick W. Trimby, Horst-Ulrich Worm, Aaron Yoshinobu

SHIPBOARD STAFF SCIENTIST
D. Jay Miller

VOLUME EDITORS
Jennifer A. Marin and 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 176 Summary. *In* Dick, H.J.B., Natland, J.H., Miller, D.J., et al., *Proc. ODP, Init. Repts.,* 176: College Station, TX (Ocean Drilling Program), 1–70.

CD-ROM volume citation:
Dick, H.J.B., Natland, J.H., Miller, D.J., et al., 1999. *Proc. ODP, Init. Repts.,* 176 [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. Site 735. *In* Dick, H.J.B., Natland, J.H., Miller, D.J., et al., *Proc. ODP, Init. Repts.,* 176, 1–314 [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; World Wide Web 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: June 1999

The mailing dates of recent *Proceedings of the Ocean Drilling Program:*
Volumes 174A/174AX/174B (*Initial Reports*): November 1998
Volume 175 (*Initial Reports*): November 1998
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)

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 *JOIDES Resolution* by ODP Photographer John Beck.

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

Woods Hole Oceanographic Institution

* At time of publication. See **Publisher's Notes, p. 6**, 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.**

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 176 Participants*

Shipboard Scientific Party

Henry J.B. Dick
Co-Chief Scientist
Department of Geology and Geophysics
Woods Hole Oceanographic Institution
360 Woods Hole Road
Mail Stop #8
Woods Hole, MA 02543
U.S.A.
hdick@whoi.edu

James H. Natland
Co-Chief Scientist
Rosenstiel School of Marine and Atmospheric Science
University of Miami
4600 Rickenbacker Causeway
Miami, FL 33149-1098
U.S.A.
natland@mail.rsmas.miami.edu

D. Jay Miller
Staff Scientist
Ocean Drilling Program
Texas A&M University
1000 Discovery Drive
College Station, TX 77845
U.S.A.
jay_miller@odp.tamu.edu

Jeffrey C. Alt
Metamorphic Petrologist
Department of Geological Sciences
University of Michigan
2534 C.C. Little Building
425 East University
Ann Arbor, MI 48109-1063
U.S.A.
jalt@umich.edu

*Addresses at time of cruise.

Wolfgang Bach
Metamorphic Petrologist
Department of Geology and Geophysics
Woods Hole Oceanographic Institution
360 Woods Hole Road
Mail Stop #8
Woods Hole, MA 02543
U.S.A.
wbach@whoi.edu

Daniel Bideau
Metamorphic Petrologist
Département Géosciences Marines
Institut Français de Recherche pour
l'Exploitation de la Mer
Centre de Brest
BP 70
Plouzané cedex 29280
France
dbideau@ifremer.fr

Jeffrey S. Gee
Paleomagnetist
Scripps Institution of Oceanography
University of California, San Diego
Mail Code 0215
La Jolla, CA 92093-0215
U.S.A.
jsgee@ucsd.edu

Sarah Haggas
LDEO Logging Trainee
Department of Geology
University of Leicester
University Road
Leicester LE1 7RH
United Kingdom
slh19@le.ac.uk

Jan G.H. Hertogen
Geochemist
Afdeling Fysico-chemische geologie
Katholieke Universiteit Leuven
Celestijnenlaan 200 C
B-3001 Leuven-Heverlee
Belgium
jan.hertogen@geo.kuleuven.ac.be

Greg Hirth
Physical Properties Specialist/Structural Geologist
Department of Geology and Geophysics
Woods Hole Oceanographic Institution
360 Woods Hole Road
Mail Stop #8
Woods Hole, MA 02543
U.S.A.
ghirth@whoi.edu

Paul Martin Holm
Igneous Petrologist
Geologisk Institut
Københavns Universitet
Øster Voldgade 10
København DK 1350
Denmark
paulmh@geo.geol.ku.dk

Benoit Ildefonse
Structural Geologist
Laboratoire de Tectonophysique
Université Montpellier II
ISTEEM
34095 Montpellier cedex 05
France
benoit@dstu.univ-montp2.fr

Gerardo J. Iturrino
LDEO Logging Scientist
Borehole Research Group
Lamont-Doherty Earth Observatory
Columbia University
Route 9W
Palisades, NY 10964
U.S.A.
iturrino@ldeo.columbia.edu

Barbara E. John
Structural Geologist
Department of Geology and Geophysics
University of Wyoming
Laramie, WY 82071
U.S.A.
bjohn@uwyo.edu

Deborah S. Kelley
Metamorphic Petrologist
School of Oceanography
University of Washington
Box 357940
Seattle, WA 98195
U.S.A.
kelley@ocean.washington.edu

Eiichi Kikawa
Paleomagnetist
Global Environmental Laboratory
University of Toyama
3190 Gofuku
Toyama 930
Japan
kikawa@edu.toyama-u.ac.jp

Andrew Kingdon
Physical Properties Specialist
British Geological Survey
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
United Kingdom
aki@bgs.ac.uk

Petrus J. Le Roux
Igneous Petrologist
Department of Geological Sciences
University of Cape Town
Rondebosch 7700
South Africa
pleroux@geology.uct.ac.za

Jinichiro Maeda
Igneous Petrologist
Department of Earth and Planetary Sciences
Graduate School of Science
Hokkaido University
N-10, W-8 Kita-ku
Sapporo, Hokkaido 060
Japan
jinm@cosmos.sci.hokudai.ac.jp

Peter S. Meyer
Igneous Petrologist
Department of Geology and Geophysics
Woods Hole Oceanographic Institution
360 Woods Hole Road
Mail Stop #8
Woods Hole, MA 02543
U.S.A.
pmeyer@whoi.edu

H. Richard Naslund
Igneous Petrologist
Department of Geological Sciences
State University of New York, Binghamton
Binghamton, NY 13902-6000
U.S.A.
naslund@binghamton.edu

Yaoling Niu
Petrologist
Department of Earth Sciences
The University of Queensland
Brisbane, Queensland 4072
Australia
niu@earthsciences.uq.edu.au

Paul T. Robinson
Metamorphic Petrologist
Centre for Marine Geology
Dalhousie University
Halifax, NS B3H 3J5
Canada
robinso@is.dal.ca

Jonathan E. Snow
Igneous Petrologist
Abteilung Geochemie
Max-Planck-Institut für Chemie
Postfach 3060
55020 Mainz
Federal Republic of Germany
jesnow@geobar.mpch-mainz.mpg.de

Ralph A. Stephen
Physical Properties Specialist/Downhole Tools Specialist
Department of Geology and Geophysics
Woods Hole Oceanographic Institution
360 Woods Hole Road
Mail Stop #24
Woods Hole, MA 02543
U.S.A.
rstephen@whoi.edu

Patrick W. Trimby
Structural Geologist
Department of Earth Sciences
University of Liverpool
Brownlow Street
P.O. Box 147
Liverpool L69 3BX
United Kingdom
patster@liv.ac.uk

Horst-Ulrich Worm
Downhole Tools Specialist
Institut für Geophysik
Universität Göttingen
Herzberger Landstrasse 180
Göttingen 37075
Federal Republic of Germany
huworm@t-online.de

Aaron Yoshinobu
Structural Geologist
Department of Earth Sciences
University of Southern California
3651 University Avenue
Los Angeles, CA 90089-0740
U.S.A.
yoshinob@usc.edu

SEDCO OFFICIALS

Captain Edwin G. Oonk
Master of the Drilling Vessel
Overseas Drilling Ltd.
707 Texas Avenue South, Suite 213D
College Station, TX 77840-1917
U.S.A.

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

ODP Shipboard Personnel

John Dyke
Marine Logistics Coordinator (Storekeeper)

Dave Fackler
Computer Programmer

Tim Fulton
Marine Laboratory Specialist (Photography)

Dennis Graham
Marine Laboratory Specialist (Underway Geophysics)

Gus Gustafson
Marine Laboratory Specialist (Thin Section/ Downhole Tools)

Michelle L. Hardee
Marine Laboratory Specialist

Margaret Hastedt
Marine Computer Specialist

Michiko Hitchcox
Marine Laboratory Specialist (Yeoperson)

Melissa McEwen
Marine Laboratory Specialist (Physical Properties)

Eric Meissner
Marine Electronics Specialist

Mike O'Connell
Schlumberger Logging Engineer

Ofeigur Ofeigsson
Marine Laboratory Specialist

Bob Olivas
Marine Laboratory Specialist (X-ray)

Drew Patrick
Marine Laboratory Specialist (Assistant Curator)

Chieh Peng
Marine Laboratory Specialist (Chemistry)

Don Sims
Assistant Laboratory Officer, Marine Laboratory Specialist (X-ray)

ODP Shipboard Personnel (continued)

Lorraine Southey
Marine Laboratory Specialist (Curation)

Larry St. John
Marine Electronics Specialist

Chris Stephens
Marine Computer Specialist

Mike Storms
Operations Manager

ODP Publications Staff*

Amy Brundeen†
Production Editor

Coleena Burt†
Illustrator

Jaime Lea 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

Caressa F. Inman
Student Assistant

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.

Dedication

Among the many people who contribute to the day-to-day and leg-to-leg success of the Ocean Drilling Program, some carry out their tasks with particular skill and distinction. With this publication of the *Initial Reports* Volume 176, we would like to recognize one individual who stands out, in our estimation, as a friend, a gentleman, a seaman, a leader, and a crucial contributor, not just to our drilling leg, but to the Ocean Drilling Program as a whole.

A wall plaque on the Bridge Deck of *JOIDES Resolution* lists Captain Ed Oonk as master of the vessel during virtually every alternate leg of drilling beginning with Leg 101. Captain Oonk was master during both Legs 118 and 176; thus, he served during all of the drilling at Site 735, which is the only deep hole in the lower ocean crust. Captain Oonk, his officers, and crew were with us from the start and at the end of a scientific venture that spanned 10 years. (Continued on next page.)

Leg 176 was Captain Oonk's final leg as master of *JOIDES Resolution.* We all enjoyed a special retirement celebration for him as we sailed from Site 735 to Cape Town. We were privileged to acknowledge his skilled seamanship, his judgment during those days of high wind and rough seas when it was difficult to continue drilling, the thorough safety program he supervised (including the boat drills when all of us, scientists included, actually learned something about how to stay alive at sea), and the high morale of his crew, which he promoted by word and deed. We knew we were on a well-managed ship, and this made all our work that much easier to accomplish.

It is fair to say, as even Captain Oonk himself might admit, that *JOIDES Resolution* is still afloat and that the Ocean Drilling Program itself persists because he and his crew knew what to do, and how to do it, through some desperate hours in a severe storm that suddenly trapped the vessel near the dangerous coast of Greenland during Leg 163. At that time the day-to-day activities and skills of a working captain and crew were challenged to the utmost, to the extent that survival itself hung in the balance.

However, simply from the perspective of Leg 176, we would like to acknowledge the special contribution that Captain Oonk made over two legs of drilling at our location in the Indian Ocean. A great deal of our success and certainly the quality of our time at sea can be attributed to him. He is the best of friends and the finest of shipmates. We shall miss his judgment, good humor, and wise counsel when we sail again. We are pleased and proud to be able to dedicate this *Initial Reports* Volume 176 to Captain Ed Oonk.

Acknowledgments

The Leg 176 Shipboard Scientific Party thanks Captain Ed Oonk and the officers and crew of *JOIDES Resolution*, as well as the staff of the Ocean Drilling Program, for helping to make our deep-drilling venture into the lower ocean crust on the Southwest Indian Ridge a success. We especially thank Operations Manager Mike Storms, Drilling Superintendent Wayne Malone, and the rig-floor drilling crew for their efforts to make Hole 735B so deep and for recovering so much spectacular core. Both Wayne and Rig Superintendent Pepe Estevez made their second venture to Hole 735B during Leg 176, 10 years after Leg 118.

We also thank the marine technical staff, headed by Laboratory Specialist Dennis Graham, who made it possible for nearly two dozen scientists to describe and analyze the record 866 m of rock recovered without tripping over themselves or anyone else. The gabbros are an unprecedented contribution to the scientific study of Earth's crust, and they provide the first clear picture of the structure and composition of the lower ocean crust. Shipboard Curator Lorraine Southey worked unstintingly to properly acquire and record thousands of shipboard and shore-based samples. Three of the marine technical staff participated in the drilling at Hole 735B during both Legs 118 and 176. Marine Lab Specialist Ted "Gus" Gustafson ably made more than 200 polished thin sections for us. Yeoperson Michiko Hitchcox displayed her usual exemplary efficiency and good humor. Don Sims was instrumental in the XRF laboratory.

The preparation of this volume was facilitated by the efforts of Editor John Scroggs, Production Editor Amy Brundeen, and Illustrator Coleena Burt. They were ably assisted in various capacities by Marianne Gorecki, Katerina Petronotis, Angeline Miller, Susan Freeman, and others. We thank them, one and all.

CD-ROM Contents: Chapters

1. Leg 176 Summary
2. Explanatory Notes
3. Site 735
4. Bathymetry of Atlantis Bank—Atlantis II Fracture Zone: Southwest Indian Ridge (oversized map)

CD-ROM Contents: Core Descriptions

Digital images and visual core descriptions (VCDs) are included in this section.

Site 735

Visual Core Descriptions: 176-735B-89R through 126R
176-735B-127R through 155R
176-735B-156R through 180R
176-735B-181R through 210R

Thin Sections

CD-ROM Contents: ASCII Tables

This CD-ROM contains ASCII versions of some of the **data tables** presented in Chapter 3. A complete listing of the ASCII data tables can be found on the next page.

You can access these files directly from the PDF files. 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.

Chapter 3, Site 735

CD-ROM Contents: Supplementary Materials

The supplementary materials are divided into two directories, APPENDIX and PHOTOMIC.

The APPENDIX directory contains linked and independent spreadsheets of Leg 176 igneous data. For detailed information on the spreadsheets, see **"Appendix,"** p. 31, in the "Leg 176 Summary" chapter. For detailed information about the linked spreadsheets, see **"Linked Spreadsheets,"** p. 8, in the "Explanatory Notes" chapter. These files were created in Microsoft Excel 5.0 (.XLS extension) and ASCII (.TXT extension).

The PHOTOMIC directory contains the individual photomicrographs, a photomicrograph log, a set of rulers, and axioscope and binocular scales. A readme file is included. These files were created in Microsoft Excel 5.0 (.XLS extension), Adobe Illustrator 6.0 (.AI extension), Canvas 3.5 (.CVS extension), and TIF format (.TIF).

APPENDIX
- CORESUMM (Complete coring summary)
  - **CORESUM.XLS**
- CURATION (Curation spreadsheets)
  - **PIECELOG.XLS** (Piece length log)
  - **SECTNLOG.XLS** (Section depth log)
  - **TS_LOG.XLS** (Thin section log)
- DPTHSMTH (Depth log)
  - EXCOM
    - DEPTHS.XLA (Excel add-in function; Note: may not operate in all software versions.)
  - **DEPTHS.XLS** (Depth log)
  - **MACDEPTH.XLS** (Depth log with macro)
  - SMOOTH
    - **SMOOTEST.XLS** (Smoothing algorithm)
    - SMOOTH.XLA (Excel add-in function; Note: may not operate in all software versions.)
    - **SMOOTH.XLS** (Smoothing algorithm)
- IGNEOUS (Lithology and contact reference log)
  - **README.TXT**
  - **176GEOCH.XLS** (Chemical compositions)
  - **I_COMM.XLS** (Igneous comment log)
  - **I_LITH.XLS** (Igneous lithology log)
  - **I_MIN.XLS** (Mineral log)
  - **I_OPAQUE.XLS** (Oxide log)
  - **I_TEX.XLS** (Mineral texture log)
  - **I_VEIN.XLS** (Igneous vein log)
- METAMORP (Metamorphic petrology spreadsheets)
  - **BGALTLOG.XLS** (Alteration log)

- **T_S_LOG.XLS** (Thin section log)
- **VEIN%DEP.XLS** (Core vein percent)
- **VEINLOG.XLS** (Vein length log)

STRUCTUR (Sructural geology spreadsheets)
- MAC_ONLY (For Macintosh users only)
  - app2truedip1
    - **app2truedip-68020nofpu** (Application program)
    - **app2truedip-ppc** (Application program)
    - **app2truedip.readme** (Readme file)
    - **appdip.test.in** (Text document)
  - LtoPprog Folder
    - **LinesToPlane** (Application program)
    - **LtoPlane.txt** (WriteNow document)
    - **LtoPtest.dat** (Microsoft Word text document)
  - **app2truedip1.sea** (Application program)
  - **StereoplotXL** (Application program; Note: only works on Macs running OS version 8.1 or lower.)
- SPRDSHTS
  - **CPFABRIC.XLS** (Crystal-plastic fabric curatorial data)
  - **FAULTS.XLS** (Fault curatorial data)
  - **INTENSTY.XLS** (Microfracture intensity data)
  - **MAGMATIC.XLS** (Magmatic fabric data)
  - **PLASTIC.XLS** (Crystal-plastic fabric data)
  - **STRUCLOG.XLS** (Structure log)
  - **VEINDPTH.XLS** (Vein depth data)
  - **VEINS.XLS** (Vein curatorial data)
  - **XCUT.XLS** (Cross-cutting relationships)

PHOTOMIC (Photomicrographs)
- **README.TXT**
- PHOTOLOG (Photomicrograph log)
  - **PHOT_R2.XLS**
  - **PHOT_R3.XLS**
  - **PHOT_R4.XLS**
  - **PHOT_R5.XLS**
  - **PHOT_R6.XLS**
  - **PHOT_R7.XLS**
  - **PHOT_R8.XLS**
- PHOTOTIF (102 individual photomicrographs)
- **RULERS.AI**
- SCALES (Axioscope and binocular scales)
  - AXIOSCOP
    - **MAG100X.CVS**
    - **MAG100X.TIF**
    - **MAG10X.CVS**
    - **MAG10X.TIF**
    - **MAG1X.CVS**
    - **MAG1X.TIF**
    - **MAG20X.CVS**

MAG2P5X.CVS
MAG2P5X.TIF
MAG50X.CVS
MAG50X.TIF
MAG5X.CVS
MAG5X.TIF

BINOCULR

MAG1P2.CVS
MAG1P2.TIF
MAG1P6.CVS
MAG1P6.TIF
MAG1X.CVS
MAG1X.TIF
MAGP6X.CVS
MAGP6X.TIF
MAGP8X.CVS
MAGP8X.TIF

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 176 Site Map

ODP Map (Legs 100–176)

DSDP Map (Legs 1–96)

Related CD-ROM Material

Logging & 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 176 depth-shifted and processed logging data and ODP core data (shipboard gamma-ray attenuation porosity evaluator, index properties, magnetic susceptibility, *P*-wave, and natural gamma). The logging data are provided by the Borehole Research Group at the Lamont-Doherty Earth Observatory (LDEO), 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