

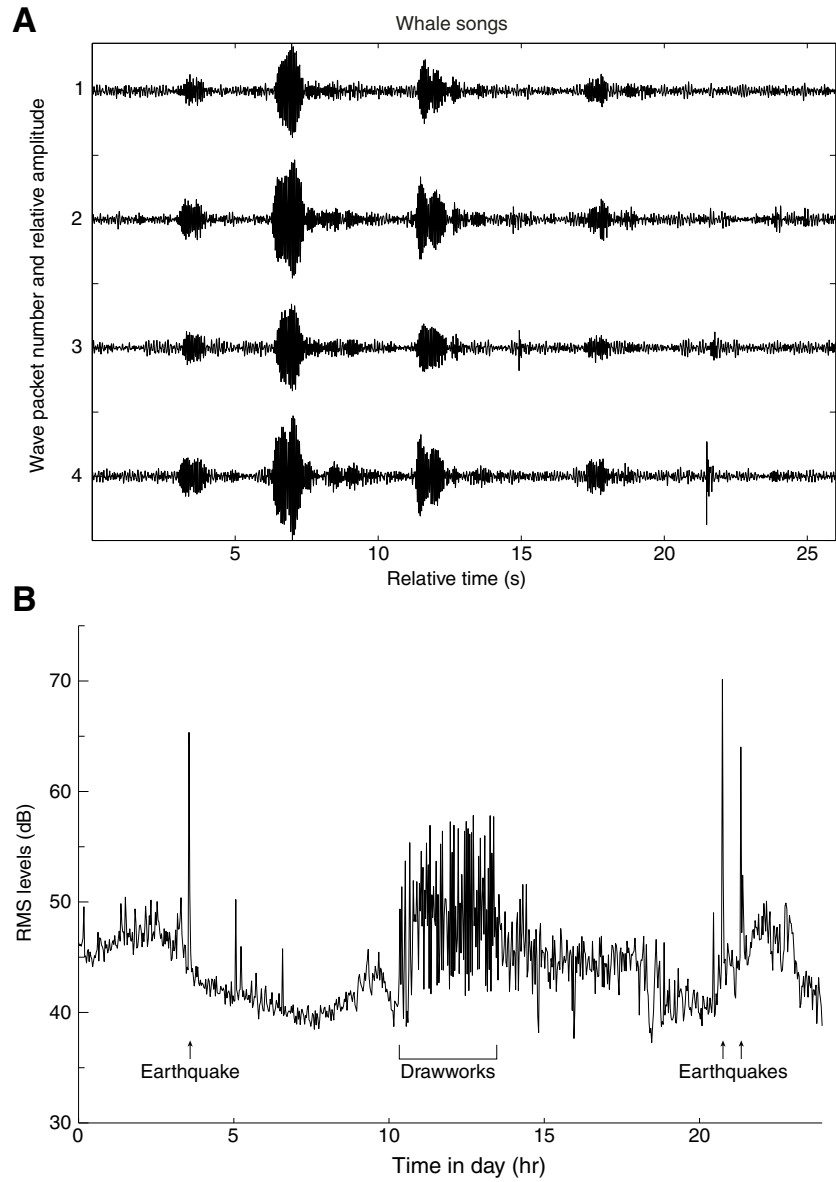
VOLUME 200

INITIAL REPORTS

**DRILLING AT THE HAWAII-2 OBSERVATORY (H2O)
AND THE NUUANU LANDSLIDE
SITES 1223 AND 1224**

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.



(Caption shown on next page.)

Frontispiece (continued). (Figure shown on previous page.) The University of Hawaii operates a broadband three-component seafloor seismometer at the Hawaii-2 Observatory (Duennebier et al., 2000, 2002). While drilling at the site, data from the observatory showed environmental noise as well as drilling-related noise from the *JOIDES Resolution*. **A.** These time series of vertical motion of the seafloor show four wave packets of fin-back whale songs. For each wave packet the whale emits a wavelet ~1 s long. The four wavelets in each wave packet correspond to various sound propagation paths in the ocean. Although we did not visually observe whales while we were at Site 1224, whale calls were frequently observed in the seismic data. **B.** Root-mean-square (RMS) levels are a convenient way to summarize the seismic data. This figure shows RMS levels of horizontal motion in an octave band centered at 8 Hz for 7 January 2002. The T-phases from three earthquakes as well as drawworks noise from the *JOIDES Resolution* can be identified.

References

- Duennebier, F.K., Butler, R., Chave, A., Harris, D., Jolly, J., and Babinec, J., 2000. Broadband seismograms from the Hawaii-2 Observatory [paper presented at Am. Geophys. Union Mtg., San Francisco, Fall 2000].
- Duennebier, F.K., Harris, D.W., Jolly, J., Babinec, J., Copson, D., and Stiffel, K., 2002. The Hawaii-2 Observatory seismic system. *IEEE J. Oceanic Eng.*, 27:212–217.

PROCEEDINGS OF THE OCEAN DRILLING PROGRAM

Volume 200

Initial Reports

Drilling at the Hawaii-2 Observatory (H2O)
and the Nuuanu Landslide

Covering Leg 200 of the cruises of the Drilling Vessel *JOIDES Resolution*
Honolulu, Hawaii, to San Diego, California

Sites 1223 and 1224

16 December 2001–27 January 2002

SHIPBOARD SCIENTISTS

Ralph A. Stephen, Junzo Kasahara, Gary D. Acton,
R. Scott Calhoun, Satoru Haraguchi, Hartley Hoskins, Steven Kittredge, Michele Lustrino, Werner Manz, Mikako Nakamura,
James H. Natland, Ingun Nielsen, Heather Paul, Gabriela Schumann-Kindel, Sarah Sherman, Yue-Feng Sun, John Wilson

SHIPBOARD STAFF SCIENTIST

Gary D. Acton

VOLUME EDITOR

Heather Nevill

VOLUME GRAPHIC DESIGNER

Kathryn M. Kozelsky

VOLUME PRODUCTION EDITOR

Kenneth R. Sherar

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

Print citation for Chapter 1:

Shipboard Scientific Party, 2003. Leg 200 summary. *In* Stephen, R.A., Kasahara, J., Acton, G.D., et al., *Proc. ODP, Init. Repts., 200*: College Station TX (Ocean Drilling Program), 1–72.

CD-ROM volume citation:

Stephen, R.A., Kasahara, J., Acton, G.D., et al., 2003. *Proc. ODP, Init. Repts., 200* [CD-ROM]. Available from: Ocean Drilling Program, Texas A&M University, College Station TX 77845-9547, USA.

CD-ROM chapter citation:

Shipboard Scientific Party, 2003. Site 1223. *In* Stephen, R.A., Kasahara, J., Acton, G.D., et al., *Proc. ODP, Init. Repts., 200*, 1–159 [CD-ROM]. Available from: Ocean Drilling Program, Texas A&M University, College Station TX 77845-9547, USA.

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

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: January 2003

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

Volume 197 (*Initial Reports*): August 2002

Volume 198 (*Initial Reports*): October 2002

Volume 199 (*Initial Reports*): November 2002

Volume 176 (*Scientific Results*): December 2002

Volume 178 (*Scientific Results*): December 2002

Volume 180 (*Scientific Results*): September 2002

Copies of this publication may be obtained from Publications Distribution Center, Ocean Drilling Program, Texas A&M University, 1000 Discovery Drive, College Station TX 77845-9547, USA. 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.

ISSN

Book: 0884-5883; CD-ROM: 1096-2522; World Wide Web: 1096-2158

Library of Congress 87-642-462

PUBLISHER'S NOTES

This volume also appears on the World Wide Web. Any scientific corrections, revisions, or additions will be noted in the chapter (see "Chapter Notes") at www-odp.tamu.edu/publications.

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, 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, Ireland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland)

Institut National des Sciences de l'Univers–Centre National de la Recherche Scientifique (INSU-CNRS) (France)

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

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.

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, USA. E-mail: database@odpemail.tamu.edu.

Supplemental data were provided by the authors and may not conform to ODP publication formats. Some close-up photographs of very dark cores have been tonally enhanced to better illustrate particular features of interest.

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-ROM in PDF format. These maps were produced using Generic Mapping Tools (GMT) of Paul Wessel and Walter H.F. Smith (gmt.soest.hawaii.edu).

Cover photograph is fungal hyphae within a carbonate-filled cavity in a massive tholeiitic lava flow unit. The photograph was taken by microbiologist Gabriela Schumann-Kindel.

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, the evolution of oceanic crust, and the fluctuations of climate. In addition, study of the Earth's deep biosphere is an emergent research objective.

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 eight 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 18 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 geochemical and geophysical well-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.

Steven R. Bohlen

President of the Joint Oceanographic Institutions and Executive Director of the Ocean Drilling Programs
Washington, D.C.

OCEAN DRILLING PROGRAM*

National Science Foundation
 4201 Wilson Boulevard
 Arlington VA 22230, USA
 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)

Columbia University, Lamont-Doherty Earth
 Observatory

Florida State University

Oregon State University, College of Oceanic and
 Atmospheric Sciences

Pennsylvania State University, College of Earth
 and Mineral Sciences

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

Stanford University, School of Earth Sciences

Texas A&M University, College of Geosciences

University of California at San Diego, Scripps
 Institution of Oceanography

University of California, Santa Cruz

University of Florida

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

University of Miami, Rosenstiel School of Marine
 and Atmospheric Science

University of Michigan, College of Literature,
 Science, and the Arts

University of Rhode Island, Graduate School of
 Oceanography

University of South Florida, College of Marine
 Science

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. 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.

Australia/Canada/Chinese Taipei/Korea Consortium for Ocean Drilling: Department of Primary Industries and Energy (Australia), Natural Resources 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, Ireland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland)

Federal Republic of Germany, Bundesanstalt für Geowissenschaften und Rohstoffe

France, Institut National des Sciences de l'Univers—Centre National de la Recherche Scientifique (INSU-CNRS)

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

University of Miami—RSMAS
4600 Rickenbacker Causeway
Miami FL 33149, USA

Tel: (305) 361-4668; Fax: (305) 361-4632

E-mail: joides@rsmas.miami.edu

Web site: joides.rsmas.miami.edu

ODP PROGRAM MANAGER

Joint Oceanographic Institutions, Inc.
1755 Massachusetts Avenue, NW, Suite 700
Washington DC 20036-2102, USA
Tel: (202) 232-3900; Fax: (202) 462-8754
E-mail: joi@joiscience.org
Web site: www.joiscience.org

ODP SCIENCE OPERATOR

Ocean Drilling Program
Texas A&M University
1000 Discovery Drive
College Station TX 77845-9547, USA
Tel: (979) 845-2673; Fax: (979) 845-4857
E-mail: odp@odpemail.tamu.edu
Web site: www-odp.tamu.edu

ODP LOGGING SERVICES OPERATOR

Borehole Research Group
Lamont-Doherty Earth Observatory
of Columbia University
PO Box 1000, 61 Route 9W
Palisades NY 10964, USA
Tel: (845) 365-8341; Fax: (845) 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
of Columbia University
PO Box 1000, 61 Route 9W
Palisades NY 10964, USA
Tel: (845) 365-8542; Fax: (845) 365-8159
E-mail: odp@ldeo.columbia.edu
Web site: www.ldeo.columbia.edu/databank

LEG 200 PARTICIPANTS*

SHIPBOARD SCIENTIFIC PARTY

Ralph A. Stephen
Co-Chief Scientist

Department of Geology and Geophysics
Woods Hole Oceanographic Institution
MS 24
360 Woods Hole Road
Woods Hole MA 02543-1542
USA
rstephen@whoi.edu

Junzo Kasahara
Co-Chief Scientist

Earthquake Research Institute
University of Tokyo
1-1-1 Yayoi, Bunkyo-ku
Tokyo 113-0032
Japan
kasa2@eri.u-tokyo.ac.jp

Gary D. Acton
Staff Scientist

Ocean Drilling Program
Texas A&M University
1000 Discovery Drive
College Station TX 77845-9547
USA
acton@odpemail.tamu.edu

R. Scott Calhoun
Sedimentologist

1914 37th Place East
Seattle WA 98112
USA
rscalhoun@hotmail.com

Satoru Haraguchi
Igneous Petrologist

Ocean Research Institute
University of Tokyo
1-15-1, Minamidai, Nakano
Tokyo 164-8639
Japan
haraguti@ori.u-tokyo.ac.jp

Hartley Hoskins
Seismologist

Computer and Information Services
Woods Hole Oceanographic Institution
MS 46
360 Woods Hole Road
Woods Hole MA 02543-1542
USA
hhoskins@whoi.edu

*Addresses at time of cruise, except where updated by the leg participants before publication.

Steven Kittredge
Schlumberger Engineer
911 Center Point Road
Carrollton GA 30117
kittredge1@webster.oilfield.slb.com

Michele Lustrino
Igneous Petrologist
Dipartimento di Scienze della Terra
Università La Sapienza
Piazzale Aldo Moro 5
00185 Rome
Italy
michele.lustrino@uniroma1.it

Werner Manz
Microbiologist
Universität Göttingen
Göttinger Zentrum Geowissenschaften (GZG)
Goldschmidtstrasse 3
37077 Göttingen
Germany
wernermanz@web.de

Mikako Nakamura
Physical Properties Specialist
Earthquake Research Institute
University of Tokyo
1-1-1 Yayoi, Bunkyo-ku
Tokyo 113-0032
Japan
mikako@eri.u-tokyo.ac.jp

James H. Natland
Igneous Petrologist
Rosenstiel School of Marine and Atmospheric
Science
University of Miami
4600 Rickenbacker Causeway
Miami FL 33149-1098
USA
jnatland@rsmas.miami.edu

Ingun Nielsen
Student Trainee
Geologisk Institut
University of Copenhagen
Oster Voldgade 10
1350 Copenhagen
Denmark
ingun_ziska@hotmail.com

Heather Paul
Student Trainee
Acadia University
ASU Box 6897
Wolfville NS B0P 1X0
Canada
028148p@acadiau.ca

Gabriela Schumann-Kindel**Microbiologist**

Universität Göttingen
Göttinger Zentrum Geowissenschaften (GZG)
Goldschmidtstrasse 3
37077 Göttingen
Germany
gschuma@gwdg.de

Sarah Sherman**Igneous Petrologist**

Department of Geology and Geophysics/SOEST
University of Hawaii at Manoa
1618 East-West Road, Post 617A
Honolulu HI 96822
USA
macbeanur@yahoo.com

Yue-Feng Sun**Logging Staff Scientist**

Lamont-Doherty Earth Observatory
of Columbia University
PO Box 1000, 61 Route 9W
Borehole Research Group
Palisades NY 10964
USA
sunyf@ldeo.columbia.edu

John Wilson**Sedimentologist**

Geology Department
Royal Holloway University of London, Egham
Egham, Surrey TW20 0EX
United Kingdom
j.wilson@gl.rhul.ac.uk

TRANSOCEAN SEDCO FOREX OFFICIALS**Peter Mowat****Master of the Drilling Vessel**

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

Scott Pederson**Drilling Superintendent**

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

ODP SHIPBOARD PERSONNEL**Tim Bronk**

Assistant Laboratory Officer

Shannon Center

Marine Laboratory Specialist (Photographer)

Lisa Crowder

Marine Laboratory Specialist (Yeoperson)

Sandy Dillard

Marine Laboratory Specialist
(Downhole Tools/Thin Sections)

Karen Graber

Staff Researcher

Margaret Hastedt

Marine Computer Specialist

Dwight Hornbacher

Programmer

Jessica Huckemeyer

Marine Laboratory Specialist (Curator)

W. Brian Jonasson

Operations Manager

Jurie Kotze

Marine Electronics Specialist

Alexis Lambeck

Marine Laboratory Specialist (Core)

Bill Mills

Laboratory Officer

Erik Moortgat

Marine Computer Specialist

Pieter Pretorius

Marine Electronics Specialist

Mads Radsted

Marine Laboratory Specialist (Paleomagnetism)

Patrick Riley

Marine Laboratory Specialist (Physical
Properties)

Johanna Suhonen

Marine Laboratory Specialist
(Underway Geophysics)

Bruce Tate

Operations Engineer

Bob Wheatley

Marine Laboratory Specialist (X-Ray)

ODP PUBLICATIONS STAFF*

Karen Benson

Production Editor

Mary Chapman

Editor

Gudelia (“Gigi”) Delgado

Senior Publications
Coordinator

Patrick H. Edwards

Production Editor III

Jaime A. Gracia

Senior Production Editor

Mendy A. Harrison

Assistant Editor

Ann Klaus

Publication Services Manager

Kathryn M. Kozelsky

Graphic Designer

Jennie L. Lamb

Graphic Designer II

Nancy H. Luedke

Graphic Designer II

Krista L. May

Editor

Amy McLeod

Student Assistant

Angeline T. Miller

Senior Editor

Mary Elizabeth Mitchell

Publications Coordinator
Assistant

Heather M. Nevill

Editor

Deborah L. Partain

Senior Graphic Designer

Lorri L. Peters

Associate Editor

Katerina E. Petronotis

WWW Administrator

M. Kathleen Phillips

Publications Specialist

Jennifer Pattison Rumford

Electronic Publications
Specialist

Kenneth Sherar

Production Editor II

Ann Yeager

Distribution Specialist

*At time of publication.

ACKNOWLEDGMENTS

The Ocean Drilling Program (ODP) Leg 200 Scientific Party wishes to thank everyone who sailed aboard the *JOIDES Resolution* for making the cruise so successful and enjoyable. Our particular thanks go to Captain Peter Mowat, Drilling Superintendent Scott Pederson, and ODP Operations Manager Brian Jonasson.

ODP owes much of its success to its ability to continually support shipboard scientists from diverse backgrounds who address a broad range of topics. That ODP can maintain these services leg after leg for >15 yr can be attributed to the excellence of the shipboard technical support team. The ODP technical staff on Leg 200, under the supervision of the ODP Laboratory Officer Bill Mills, was no exception. They were very competent, professional, and efficient and very adept in dealing with the range of personalities on the scientific staff.

Because the focus of Leg 200 was on basement drilling, we did not have a paleontologist on board. We appreciate the assistance of John Firth and Bob Goll at ODP/TAMU (Texas A&M University) for their postcruise paleontological analyses of sediments at Sites 1223 and 1224. Bob provided most of the observations for the “Biostratigraphy” section of the “Site 1223” chapter, and John provided most of the observations for the “Biostratigraphy” section of the “Site 1224” chapter.

The Transocean Sedco Forex team was excellent. Ship and drilling operations were carried out in a safe, professional, and efficient manner. Scott Pederson, in addition to all of his duties as drilling superintendent, provided engineering drawings of the reentry cone/casing system and of the free-fall funnel for the *Initial Reports* volume.

The Catamar team, under the direction of Alex Da Silva, handles the hotel services on the ship and must be commended for excellent service on the leg. The meals were of high quality with good selection and were served in a professional and efficient manner. The Christmas dinner was a particularly memorable event. Menus were printed in advance. The galley was decorated with table cloths, table ornaments, and electronic candles. The meal was served by the Catamar staff in waiter’s uniforms. This effort was well beyond the call of duty. Overall, the Catamar services were excellent and contributed substantially to the morale of those aboard the ship during the leg.

Shore-based scientists played a substantial role on the leg. We thank Dr. Mike Garcia for proposing the Nuuanu Landslide site. Dr. Fred Duennebier, Dave Harris, Jim Jolly, and Jim Babinec faithfully transmitted data from the Hawaii-2 Observatory seismometer to the ship on a daily basis during the cruise. We are grateful for the help and encouragement given to the proponents of Leg 200 by all the panel members and reviewers who steered the drilling proposals to a successful conclusion. We are also grateful to the JOIDES organization, to ODP management at TAMU, and to the administrative, academic, and research institutions from the many countries involved that provided the financial and logistical support to prepare and complete this venture, including the prior scientific work on which the leg was founded.

The skills, patience, hard work, and competence of the ODP Publication Services staff have been instrumental in the timely production of this volume.

CD-ROM CONTENTS: CHAPTERS

- 1. Leg 200 Summary**
Shipboard Scientific Party
- 2. Explanatory Notes**
Shipboard Scientific Party
- 3. Site 1223**
Shipboard Scientific Party
- 4. Site 1224**
Shipboard Scientific Party

CD-ROM CONTENTS: CORE DESCRIPTIONS

Visual core descriptions (VCDs) and smear slide and thin section data tables are included in this section. ASCII versions of the smear slide data tables are also available (see [“ASCII Tables”](#)).

Site 1223

[Visual Core Descriptions](#) · [Smear Slides](#) · [Thin Sections](#)

Site 1224

[Visual Core Descriptions](#) · [Smear Slides](#) · [Thin Sections](#)

CD-ROM CONTENTS: ASCII TABLES

This CD-ROM contains **ASCII** versions of selected expanded coring summary, paleomagnetic, thermal conductivity, lithologic age, moisture and density, anhysteretic and isothermal remanent magnetization, and *P*-wave velocity data tables from the text and all of the **smear slide data tables** presented under "Core Descriptions." A complete listing of the ASCII tables can be found listed below.

You can access these data directly from the PDF files. Depending on your computer platform, the following information applies.

PC COMPUTERS

By default, double-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; and Windows 98, 2000, ME, and XP systems: View > Folder Options > File Types.

MACINTOSH 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](#)

[Chapter 4](#)

[Smear slide data tables](#)

Chapter 3, Site 1223

Table T2. Expanded coring summary, Site 1223.

Table T8. Drilling-disturbed intervals and gaps that affect paleomagnetic results, Hole 1223A.

Table T9. Paleomagnetic data from archive-half sections, Hole 1223A.

Table T10. Principal component analysis results from paleomagnetic data from archive-half sections, Hole 1223A.

Table T11. Paleomagnetic data from discrete samples, Hole 1223A.

Table T12. An hysteretic remanent magnetization (ARM) data from discrete samples, Hole 1223A.

Table T13. Isothermal remanent magnetization (IRM) data from discrete samples, Hole 1223A.

Table T14. Principal component analysis results from paleomagnetic data from discrete samples, Hole 1223A.

Table T16. Ages of lithologic units, Hole 1223A.

Table T17. Thermal conductivity measurements, Hole 1223A.

Table T18. Moisture and density, Hole 1223A.

Table T19. *P*-wave velocity sensor (PWS) measurements, Hole 1223A.

Chapter 4, Site 1224

Table T3. Expanded coring summary.

Table T7. Moisture and density, Site 1224.

Table T8. Thermal conductivity measurements, Site 1224.

Table T9. *P*-wave sensor (PWS) measurements, Site 1224.

Smear Slide Data Tables

Site 1223 smear slide table.

Site 1224 smear slide table.

CD-ROM CONTENTS: SUPPLEMENTARY MATERIAL

The *Initial Reports* CD-ROM contains supplementary data files presented in Microsoft PowerPoint and ASCII. The PowerPoint files present all the petrographic features of volcanic basement at Site 1224. The first four files deal mainly with petrographic definitions and the classification of the massive lava flows (phenocrysts and groundmass); the next two files deal with pillow-related features; and the last two files deal mainly with alteration. The photomicrograph log is presented in ASCII. Supplementary material files are located in the SUPP_MAT directory.

PETROL

PET_IA.PPT
PET_IB.PPT
PET_IC.PPT
PET_ID.PPT
PET_IIA.PPT
PET_IIB.PPT
PET_IIIA.PPT
PET_IIIB.PPT

PHOTOMIC

PHOTOMIC.TXT

CD-ROM CONTENTS: DRILLING LOCATION 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.

[ODP Leg 200 Site Map](#)

[ODP Map](#) (Legs 100–200)

[DSDP Map](#) (Legs 1–96)

RELATED LEG DATA

DOWNHOLE LOGGING AND CORE DATA

A CD-ROM that contains Leg 200 depth-shifted and processed logging data and ODP core data was produced in conjunction with this leg and is included with the printed version of this volume. The "Log and Core Data" CD contains logging data provided by the Borehole Research Group at the Lamont-Doherty Earth Observatory, Logging Services Operator for ODP, and ODP core data (gamma ray attenuation bulk density, moisture and density, magnetic susceptibility, natural gamma radiation, *P*-wave velocity, and color reflectance).

Most of the logging and core data included on 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 of Columbia University, PO Box 1000, 61 Route 9W, Palisades NY 10964, USA; Tel: (845) 365-8341; Fax: (845) 365-3182; E-mail: borehole@ldeo.columbia.edu.

The majority of the core data on the CD are available on the Web at www-odp.tamu.edu/database. If you cannot access the ODP database or need additional data, please contact: ODP Data Librarian, Ocean Drilling Program, Texas A&M University, 1000 Discovery Drive, College Station TX 77845-9547, USA; Tel: (979) 845-8495; Fax: (979) 458-1617; E-mail: database@odpemail.tamu.edu.

COMPILED ELECTRONIC INDEX

The Compiled Electronic Index of the *Proceedings of the Ocean Drilling Program* included on the volume CD-ROM contains individual indexes of Volumes 101–173, 174B–176, 178, and 180. The indexes are contained in the directory titled ODPINDEX and are named ###NDX.PDF (### = the leg number). These indexes can be searched individually or collectively.

CD-ROM DIRECTORY STRUCTURE

200IR.PDF

(Preliminary pages and table of contents)

README.PDF

(Information about the volume CD-ROM)

README.TXT

(ASCII version of information about the volume CD-ROM)

ACROREAD

(Acrobat Reader installation software and instructions for different platforms)

MAC

WINDOWS

UNIX

README.TXT

MAPS

(Drilling location maps)

200_MAP.PDF

(Leg 200 site map)

ODPMAP.PDF

(ODP map, Legs 100 through 200)

DSDPMAP.PDF

(DSDP map, Legs 1 through 96)

VOLUME

(Leg 200 *Initial Reports* volume)

CHAPTERS

(Volume chapters)

IR200_01.PDF (Leg 200 Summary)

IR200_02.PDF (Explanatory Notes)

IR200_03.PDF (Site 1223)

IR200_04.PDF (Site 1224)

CORES

(Visual core descriptions, smear slide and thin section data tables, and digital core images)

COR_1223.PDF (Site 1223)

COR_1224.PDF (Site 1224)

IMAGES (PDF files of core images)

TABLES

(ASCII versions of expanded coring summary, paleomagnetic, thermal conductivity, lithologic age, moisture and density, anhysteretic and isothermal remanent magnetization, *P*-wave velocity, and smear slide data tables)

IR200_03 (Site 1223)

IR200_04 (Site 1224)

S_SLIDES (Sites 1223 and 1224)

README.TXT

INDEX.PDX

(Acrobat file used to enable Acrobat Search of the 200 *Initial Reports*)

SUPP_MAT

(Supplementary Material)

PETROL

(PowerPoint presentations of petrographic features of volcanic basement at Site 1224)

PET_IA.PPT (Phenocrysts and groundmass, Part 1)

PET_IB.PPT (Phenocrysts and groundmass, Part 2)

PET_IC.PPT (Phenocrysts and groundmass, Part 3)

PET_ID.PPT (Phenocrysts and groundmass, Part 4)

PET_IIA.PPT (Pillow-related features, Part 1)

PET_IIB.PPT (Pillow-related features, Part 2)

PET_IIIA.PPT (Alteration, Part 1)

PET_IIIB.PPT (Alteration, Part 2)

(Continued on next page)

CD-ROM DIRECTORY STRUCTURE (CONTINUED)

SUPP_MAT

(Supplementary Material)
(continued)

PHOTOMIC

(ASCII photomicrograph log)

PHOTOMIC.TXT (Photomicrograph log)

README.TXT

ODPINDEX

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

**101NDX.PDF through 173NDX.PDF, 174BNDX.PDF
through 176NDX.PDF, 178NDX.PDF, and
180NDX.PDF**

(Index files)

NDX.PDX

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