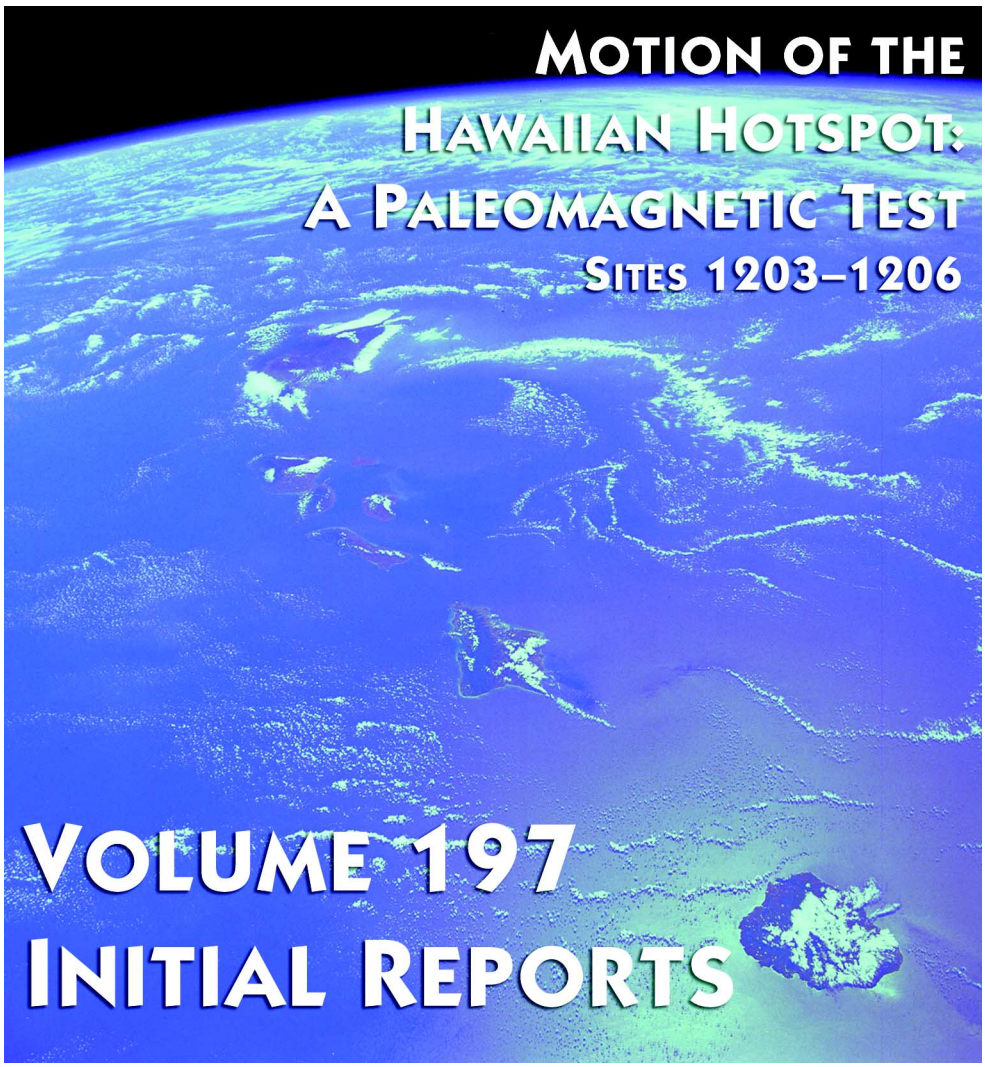

PROCEEDINGS OF THE OCEAN DRILLING PROGRAM

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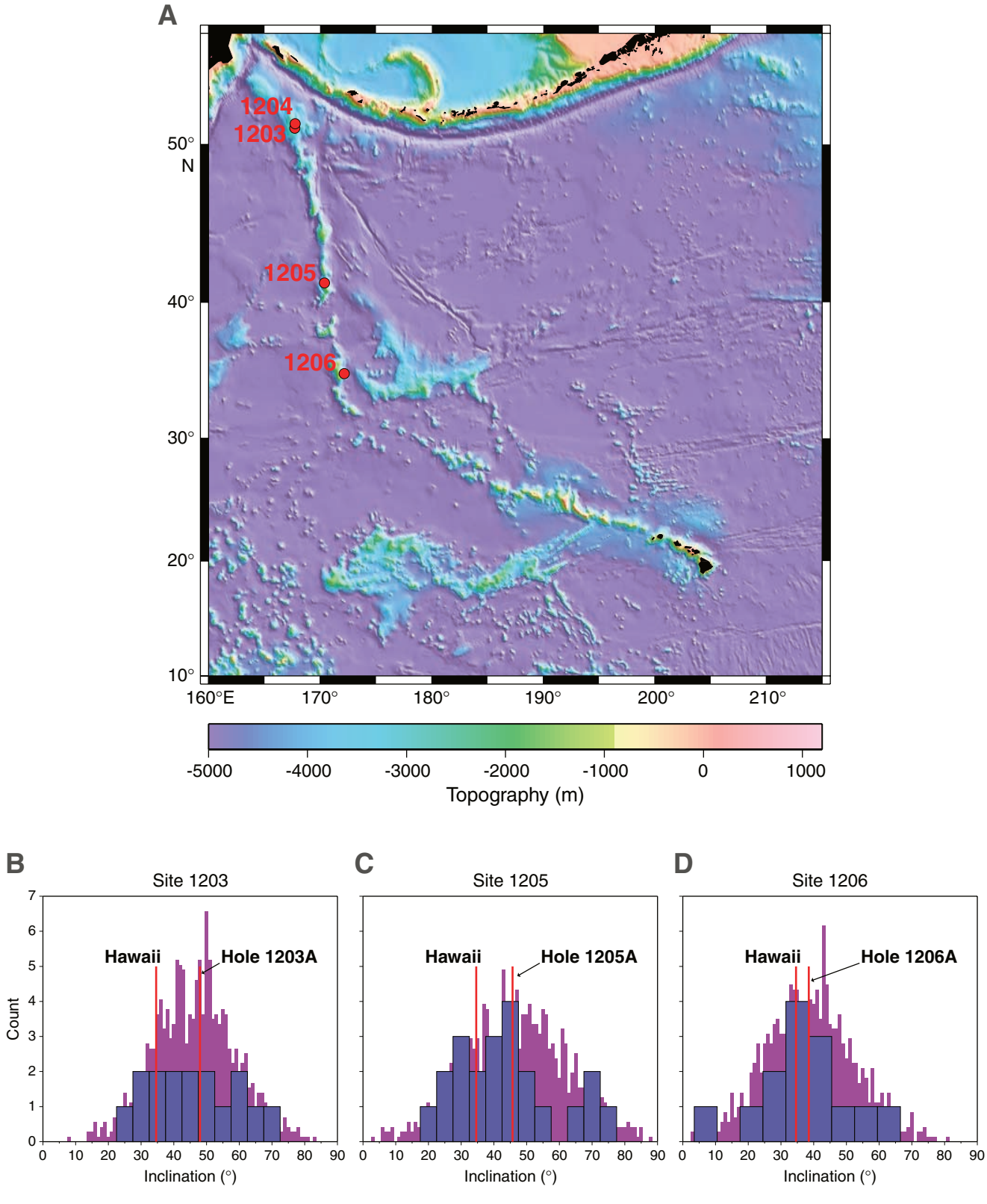
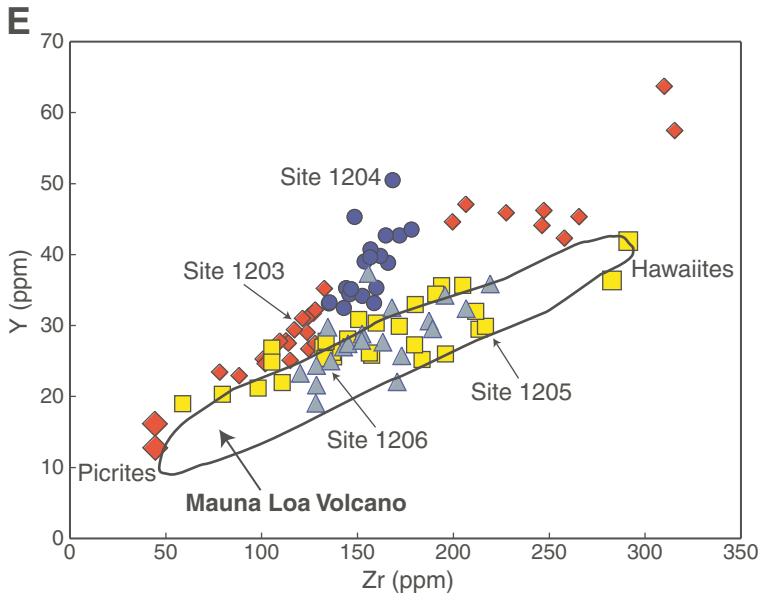
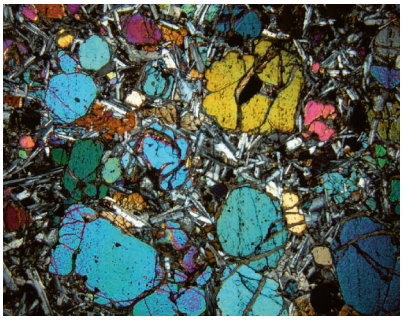
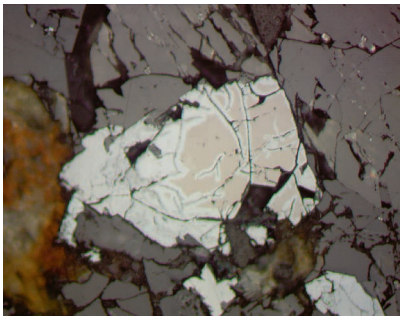
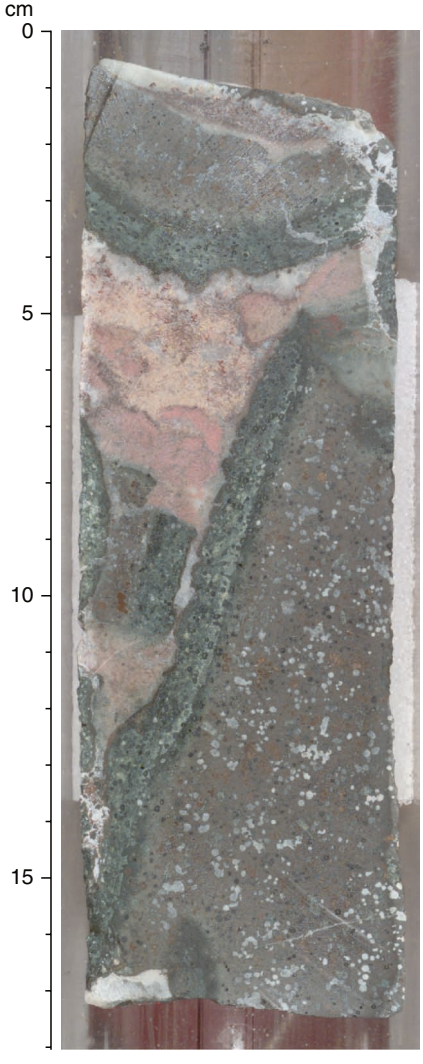


Frontispiece. (Continued on next two pages.)









Frontispiece (continued). (Caption on next page.)

Frontispiece (continued). (**Figure shown on previous two pages.**)

A. Seafloor topography of the Hawaiian-Emperor volcanic chain in the northwest Pacific Basin (after Tarduno and Cottrell, 1997; Wessel and Smith, 1998). Leg 197 sites are labeled.

B–D. Histograms of inclination values derived from principal-component analyses of stepwise alternating-field demagnetization data from lavas recovered at Leg 197 sites (blue). These are compared with a synthetic Fisher distribution (purple) (Fisher, 1953) having the same precision parameter (*k*) as the experimental data. Red lines indicate the inclination value for Hawaii and the calculated inclination value for Leg 197 sites.

E. Plot of Zr vs. Y for all Leg 197 basement shipboard geochemical data compared with Mauna Loa Volcano (data from Rhodes, 1996).

F. Photomicrograph of the olivine-rich zone in basement Unit 16 (cross-polarized light; field of view = 5 mm) (Sample 197-1203A-37R-3 [Piece 1A, 10–13 cm]).

G. Photomicrographs of zonation in plagioclase from basement lavas at Site 1203 (cross-polarized light; field of view = 1.25 mm) (Sample 197-1203A-35R-4 [Piece 1F, 47–49 cm]).

H. Photomicrograph of maghemite alteration (white) of primary titanomagnetite (pink) in Site 1204 basalt (reflected light; field of view = 1.25 mm) (Sample 197-1204B-8R-3 [Piece 8, 55–57 cm]).

I. Close-up photograph of interval 197-1203A-41R-2, 0–17 cm, showing partially altered glassy lobe margins with calcareous interlobe sediment.

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Proceedings of the Ocean Drilling Program

Volume 197
Initial Reports
Motion of the Hawaiian Hotspot: A Paleomagnetic Test

Covering Leg 197 of the cruises of the Drilling Vessel *JOIDES Resolution*
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1 July–27 August 2001

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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 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-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 a space shuttle photograph of the Hawaiian Island chain from Kauai (lower right) to the Big Island of Hawaii (upper left). This chain and its extension in a series of seamounts in the northwest Pacific form the basis of many of our ideas about geodynamics. Leg 197 tested whether the hotspot source currently under the Big Island was drifting in the mantle during the formation of volcanic edifices 81–43 m.y. ago (the Emperor Seamounts). Image courtesy of Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center. Photo taken during Mission STS026 (Roll 43, Frame 82) and can be found at **eol.jsc.nasa.gov**.

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 16 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.

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Several groups played a vital role as we prepared for Leg 197. The Data Repository at Lamont-Doherty Earth Observatory provided continual help in our efforts to locate and compile older seismic data. Carolyn Degnan at the U.S. Geological Survey helped in preparing electronic files of contoured bathymetric maps for the Emperor Seamounts merged with track-line plots of existing seismic data. Bruce Warren and Breck Owens of Woods Hole Oceanographic Institution assisted us in acquiring electronic files defining the seaward limits of the Russian Exclusive Economic Zone.

We thank all those on board the *JOIDES Resolution* for making our time at sea a pleasure and our program a scientific success. In particular, we are indebted to Operations Manager Ron Grout for his sage advice and deployment of superior drill bits that led to our record-setting basement penetration and high core recovery. Bill Mills, Gus Gustafson, and Dennis Graham accepted with gusto our underway seismic program, which required the installation of new recording software and its integration into the environment of the underway laboratory and implementation of surveying procedures that challenged equipment capabilities. All of these operational essentials were carried out flawlessly. We thank Wayne Malone and the dynamic positioning crew for their remarkable work, which allowed reentries without free-fall funnels. Joe (Bubba) Attryde helped with a wide range of shipboard activities, using his outstanding abilities to design and fashion crucial devices from scratch. We owe a special debt to Michiko Hitchcox, Paula Weiss, and Anastasia Ledwon for the surprise brownie parties. Finally, we thank the ODP Publications Services staff, who made production of this volume efficient and enjoyable.

CD-ROM Contents: Chapters

CD-ROM Contents: Core Descriptions

Visual core descriptions (VCDs), smear slide data tables, thin section logs, sedimentary thin section and thin section data tables, alteration and vein logs, digital core images, and photomicrographs are included in this section. ASCII versions of the smear slide data tables are also available (see **"ASCII Tables"**). The photomicrograph log can be found in the PHOTOMIC directory.

Site 1203

Visual Core Descriptions · **Smear Slides** · **Thin Sections** · **Alteration Log** · **Vein Log**

Site 1204

Visual Core Descriptions · **Smear Slides** · **Thin Sections** · **Alteration Log** · **Vein Log**

Site 1205

Visual Core Descriptions · **Smear Slides** · **Thin Sections** · **Alteration Log** · **Vein Log**

Site 1206

Visual Core Descriptions · **Thin Sections** · **Alteration Log** · **Vein Log**

CD-ROM Contents: ASCII Tables

This CD-ROM contains **ASCII** versions of physical properties and ICP major and trace element data and all of the 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
Chapter 5
Chapter 6
Smear slide data tables

Chapter 3, Site 1203

Table T8. Whole-rock major and trace elements for basement rocks determined by ICP-AES, Hole 1203A.
Table T11. Magnetic susceptibility measurements, Site 1203.
Table T12. GRA bulk density measurements, Site 1203.
Table T13. Natural gamma ray measurements, Site 1203.
Table T14. Thermal conductivity, Site 1203.
Table T15. Index properties, Site 1203.
Table T16. *P*-wave velocity, Site 1203.

Chapter 4, Site 1204

Table T7. Whole-rock major and trace element abundances in basalts determined by ICP-AES, Site 1204.
Table T11. Magnetic susceptibility measurements, Site 1204.
Table T12. GRA bulk density measurements, Site 1204.
Table T13. Natural gamma ray measurements, Site 1204.
Table T14. Thermal conductivity measurements, Site 1204.
Table T15. Index properties, Site 1204.
Table T16. Compressional wave velocity measurements, Site 1204.

Chapter 5, Site 1205

Table T8. Major and trace element concentrations in lavas determined by ICP-AES, Hole 1205A.
Table T11. Magnetic susceptibility measurements, Site 1205.
Table T12. GRA bulk density measurements, Site 1205.
Table T13. Natural gamma ray measurements, Site 1205.
Table T14. Thermal conductivity measurements, Site 1205.
Table T15. Index properties, Site 1205.
Table T16. Compressional wave velocity measurements, Site 1205.

Chapter 6, Site 1206

Smear Slide Data Tables

CD-ROM Contents: Oversized Figure

The following oversized figure is available on the volume CD-ROM in PDF format.

Chapter 3, Figure F23. A graphic log illustrating the characteristic structures of pahoehoe sheet lobes at Site 1203 (Unit 11; Sections 197-1203-32R-2, 5 cm, to 32R-5, 73 cm).

CD-ROM Contents: Supplementary Material

The *Initial Reports* CD-ROM contains supplementary data files presented in ASCII format. The files present raw X-ray diffraction (XRD) data values. Supplementary material files are located in the SUPP_MAT directory.

XRD_DATA
XRD_1203
01R1W102.UDI
01R1W124.UDI
02R2W103.UDI
02R2W119.UDI
03R2W128.UDI
03R2W80.UDI
03R2W9.UDI
03R4W49.UDI
04R1W71.UDI
04R2W6.UDI
04R2W6A.UDI
05R2W135.UDI
05R2W35.UDI
07R3W95.UDI
07R5W57.UDI
07R6W57.UDI
08R1W97.UDI
08R3W129.UDI
08R3W36.UDI
09R1W119.UDI
09R1W147.UDI
09R2W58.UDI
10R1W25.UDI
10R2W11.UDI
10R2W23.UDI
11R1W74.UDI
11R1W80.UDI
11R4W66.UDI
12R1W24.UDI
12R2W36.UDI
12R2W74.UDI
12R3W73.UDI

13R1W26.UDI
13R1W74.UDI
13R2W18.UDI
14R1W35.UDI
14R2W120.UDI
14R3W25.UDI
14R3W3.UDI
15R2W75.UDI
15R2W83.UDI
16R2W68.UDI
16R3W65.UDI
16R3W7.UDI
17R2W103.UDI
17R2W29.UDI
17R2W49.UDI
17R2W91.UDI
17R3W15.UDI
17R3W22.UDI
19R5W36C.UDI
20R6W90.UDI
21R1W141.UDI
21R1W70.UDI
25R1W110.UDI
29R1W148.UDI
29R2W137.UDI
29R2W83.UDI
29R3W119.UDI
29R3W128.UDI
31R2W61.UDI
32R1W22.UDI
32R1W74.UDI
36R1W37C.UDI
36R3W10C.UDI
36R3W29.UDI
36R3W97.UDI
37R2W16.UDI
37R2W28.UDI
37R2W54.UDI
39R4W49.UDI
40R2W26.UDI
41R1W83.UDI
57R1W108.UDI
59R2W51C.UDI
62R3W48C.UDI
63R5W130.UDI
63R5W35.UDI
QTZ0714.UDI
QTZ0714A.UDI
QTZ0715.UDI
QTZ0716.UDI
QTZ0717.UDI
QTZ0718.UDI
QTZ0719.UDI
QTZ0720.UDI
QTZ0721A.UDI
QTZ0721B.UDI
QTZ0722A.UDI
QTZ0808.UDI
QTZ0809.UDI

XRD_1204
02R3W124.UDI
03R1W47.UDI
03R2W97.UDI
12R1W28.UDI
QTZ0728.UDI
QTZ0802.UDI

XRD_1205
06R3W79.UDI
18R5W21.UDI
34R1W85.UDI
35R3W97.UDI
36R1W10.UDI
QTZ0812.UDI

XRD_1206
04R2W92.UDI
06R1W62.UDI
18R1W43.UDI
21R3W28.UDI
36R3W36.UDI
36R3W36A.UDI
QTZ0817.UDI
QTZ0819.UDI
QTZ0820.UDI

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 format.

ODP Leg 197 Site Map

ODP Map (Legs 100–197)

DSDP Map (Legs 1–96)

Related Leg Data

Downhole Logging and Core Data

A second CD-ROM is included with this volume. The "Log and Core Data" CD contains Leg 197 depth-shifted and processed downhole logging data and shipboard core logging data (color reflectance, gamma ray attenuation bulk density, magnetic susceptibility, moisture and density, and natural gamma radiation). The downhole logging data are provided by the Borehole Research Group at the Lamont-Doherty Earth Observatory, Wireline Logging Operator for ODP.

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, Columbia University, 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, and 175. 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