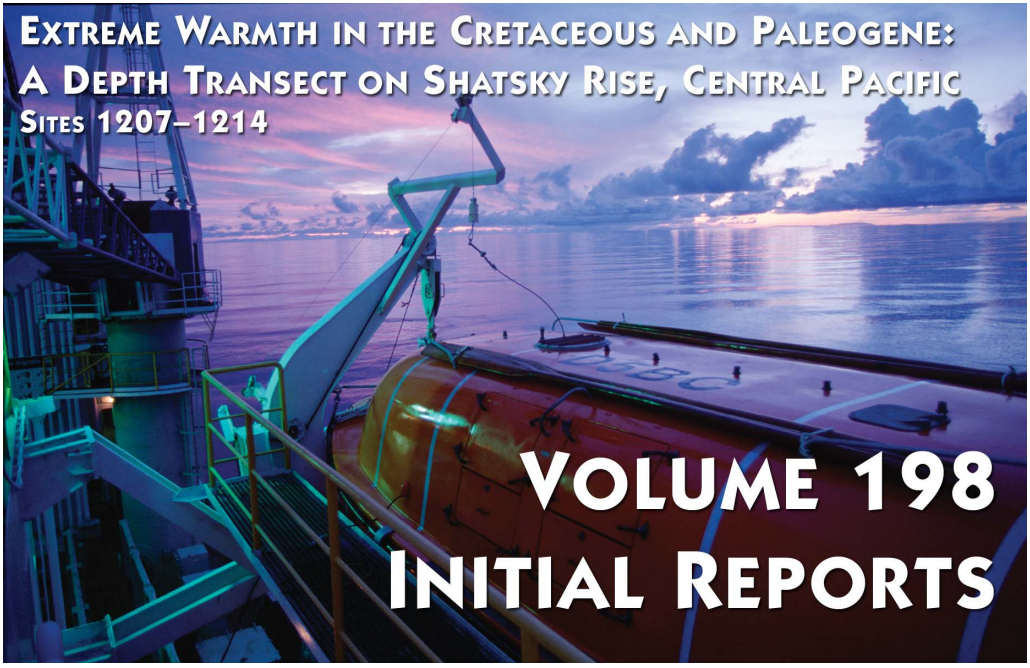

Proceedings of the Ocean Drilling Program

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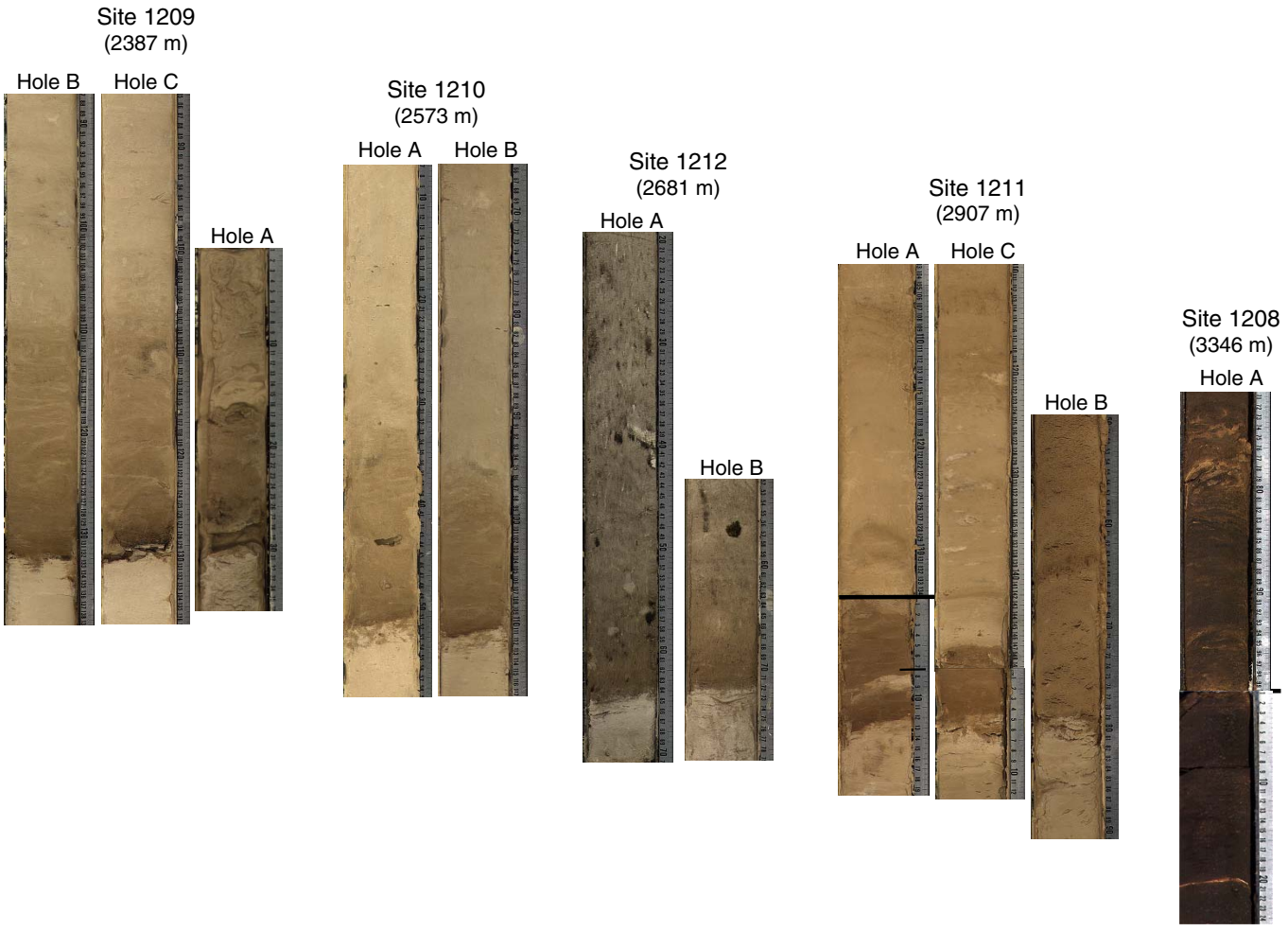

Frontispiece. Paleocene–Eocene Thermal Maximum on Shatsky Rise in Sections 198-1208A-36X-2 and 36X-CC; 198-1209A-21H-7, 198-1209B-22H-1, and 198-1209C-11H-3; 198-1210A-20H-6 and 198-1210B-20H-3; 198-1211A-13H-6, 13H-5, 198-1211B-13H-4 (unconformity above clay-rich seam), 198-1211C-13H-2, and 13H-3; and 198-1212A-10H-1 and 198-1212B-9H-5. Water depth is represented in meters.

Proceedings of the Ocean Drilling Program

Volume 198
Initial Reports
Extreme Warmth in the Cretaceous and Paleogene:
A Depth Transect on Shatsky Rise, Central Pacific

Covering Leg 198 of the cruises of the Drilling Vessel *JOIDES Resolution*
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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:

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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**.

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 the view of a sunrise from aboard 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, 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.

Steven R. Bohlen
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Florida State University

Oregon State University, College of Oceanic and Atmospheric Sciences

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

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University of Miami, Rosenstiel School of Marine and Atmospheric Science

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University of Rhode Island, Graduate School of Oceanography

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.**

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Japan, University of Tokyo, Ocean Research Institute

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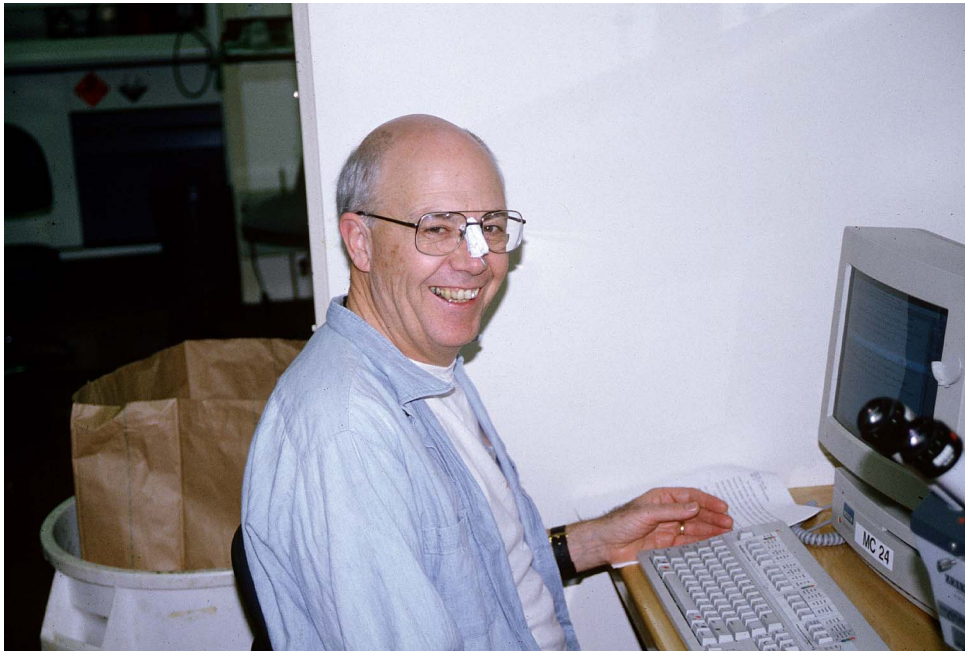
Dedication



This volume is dedicated to the late William V. Sliter, who for many years spearheaded the effort to drill Shatsky Rise. Bill combined his wealth of knowledge on Cretaceous oceanic anoxic events, planktonic foraminiferal biostratigraphy and paleoecology, the geology of the Pacific, and the stratigraphy of Shatsky Rise in a drilling proposal that was highly ranked for many years, but not drilled due to concerns over recovery in chert-chalk sections. In the year before he passed away, Bill was heavily involved in the revision of the drilling proposal that ultimately led to scheduling of the Shatsky Rise leg. His knowledge of the stratigraphy of the rise was crucial in the selection of the sites that we drilled. We deeply regret that Bill was not with us on Leg 198 to continue to share his experience, to enliven the scientific party with his stories, humor, and trademark pranks, and to share with us the many successes and surprises of the Shatsky Rise drilling expedition.

CD-ROM Contents: Chapters

CD-ROM Contents: Core Descriptions

Visual core descriptions (VCDs); smear slide, thin section, and sedimentary thin section data tables; and digital core images are included in this section. ASCII versions of the smear slide and sedimentary thin section data tables are also available (see **"ASCII Tables"**).

Site 1207

Visual Core Descriptions · Smear Slides · Thin Sections

Site 1208

Visual Core Descriptions · Smear Slides

Site 1209

Visual Core Descriptions · Smear Slides

Site 1210

Visual Core Descriptions · Smear Slides · Thin Sections

Site 1211

Visual Core Descriptions · Smear Slides

Site 1212

Visual Core Descriptions · Smear Slides

Site 1213

Visual Core Descriptions · Smear Slides · Thin Sections

Site 1214

Visual Core Descriptions · Smear Slides

CD-ROM Contents: ASCII Tables

This CD-ROM contains ASCII versions of the structural geology data table and of the **smear slide data tables** and **thin section 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.

Smear slide data tables **Thin section data tables**

Smear Slide Data Tables

Site 1207 smear slide table.
Site 1208 smear slide table.
Site 1209 smear slide table.
Site 1210 smear slide table.
Site 1211 smear slide table.
Site 1212 smear slide table.
Site 1213 smear slide table.
Site 1214 smear slide table.

Thin Section Data Tables

Site 1207 sedimentary thin section table.
Site 1210 sedimentary thin section table.
Site 1213 sedimentary thin section table.
Site 1213 igneous rocks.
Site 1213 metamorphic rocks.

CD-ROM Contents: Oversized Figures

Chapter 11, Figures F7 and F8 are printed on the oversized foldout that is located in the front pocket of this publication. Figures F7 through F14 are available as oversized figures in PDF format on the *Initial Reports* CD-ROM included with this publication.

Chapter 11, Figure F7. Top: Seismic lines (5A and 5C) collected over the North High showing the location of Site 1207. Bathymetric map displays the location of all North High seismic lines collected; bold white lines show the location of seismic lines 5A and 5C. Bottom: Seismic lines (8 and 11B) collected over the Central High showing the location of Site 1208.

Chapter 11, Figure F8. Seismic lines (14A, 14C, 17A, and 17B) collected over the South High showing the locations of Sites 1209, 1210, 1211, 1213, and 1214. Bathymetric map shows the locations of all the South High seismic lines collected.

Chapter 11, Figure F9. Top: Seismic line 3 collected over the Thompson Trough on the Papanin Ridge. Bottom: Seismic line 4 collected during the transit from the Thompson Trough to the North High survey area.

Chapter 11, Figure F10. Seismic lines 5B and 6 collected over the North High. Middle and bottom: Seismic line 7 collected during the transit from the North High to the Central High.

Chapter 11, Figure F11. Seismic line 9 collected over the Central High.

Chapter 11, Figure F12. Top, middle, and bottom: Seismic lines 10, 11A, and 11C collected over the Central High.

Chapter 11, Figure F13. Top: Seismic lines 12 and 13 collected during the transit from the Central High to the South High. Middle and bottom: Seismic lines 14B and 14C collected over the South High.

Chapter 11, Figure F14. Top and middle: Seismic lines 15 and 16 collected over the South High. Bottom: Seismic lines 17C and 17D collected during the transit from the South High to Guam.

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 198 Site Map

ODP Map (Legs 100–198)

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 198 depth-shifted and processed downhole logging data and shipboard core logging data (gamma ray attenuation bulk density, magnetic susceptibility, natural gamma radiation, *P*-wave velocity, moisture and density, and color reflectance). 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 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, 175, 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

- **198IR.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 installation software and instructions for different platforms)
  - **MAC**
  - **WINDOWS**
  - **UNIX**
  - **README.TXT**
- **MAPS** (Drilling location maps)
  - **198_MAP.PDF** (Leg 198 site map)
  - **ODPMAP.PDF** (ODP map, Legs 100 through 198)
  - **DSDPMAP.PDF** (DSDP map, Legs 1 through 96)
- **VOLUME** (Leg 198 *Initial Reports* volume)
  - **CHAPTERS** (Volume chapters)
    - **IR198_01.PDF** (Leg 198 Summary)
    - **IR198_02.PDF** (Explanatory Notes)
    - **IR198_03.PDF** (Site 1207)
    - **IR198_04.PDF** (Site 1208)
    - **IR198_05.PDF** (Site 1209)
    - **IR198_06.PDF** (Site 1210)
    - **IR198_07.PDF** (Site 1211)
    - **IR198_08.PDF** (Site 1212)
    - **IR198_09.PDF** (Site 1213)
    - **IR198_10.PDF** (Site 1214)
    - **IR198_11.PDF** (Data Report: High-Resolution Site Survey Seismic Reflection Data for ODP Leg 198 Drilling on Shatsky Rise)
  - **CORES** (Visual core descriptions, smear slide data tables, thin section data tables, and digital core images)
    - **COR_1207.PDF** (Site 1207)
    - **COR_1208.PDF** (Site 1208)
    - **COR_1209.PDF** (Site 1209)
    - **COR_1210.PDF** (Site 1210)
    - **COR_1211.PDF** (Site 1211)
    - **COR_1212.PDF** (Site 1212)
    - **COR_1213.PDF** (Site 1213)
    - **COR_1214.PDF** (Site 1214)
    - **IMAGES** (PDF files of core images)
  - **TABLES** (Data tables in ASCII format of smear slide data and thin section data)
    - **S_SLIDES** (Sites 1207 through 1214)
    - **T_SECT** (Sites 1207,1210, and 1213)
    - **README.TXT**
  - **OVERSIZE** (Large-format figures)
    - **IR198_11** (Chapter 11 files)
  - **INDEX.PDX** (Acrobat file used to enable Acrobat Search of the 198 *Initial Reports*)

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