Photograph illustrating core temperature measurements being made on the catwalk of the JOIDES Resolution during Leg 164. Thirty thermocouple probes are inserted into the core through small holes in the core liner as the data are logged on a personal computer. Temperature measurements are useful for detecting gas hydrate because gas hydrate decomposition is endothermic. Thus, anomalously low temperatures may indicate areas where gas hydrate is decomposing or has decomposed.
PROCEEDINGS
OF THE
OCEAN DRILLING
PROGRAM

VOLUME 164
INITIAL REPORTS
GAS HYDRATE SAMPLING ON THE BLAKE RIDGE AND CAROLINA RISE

Covering Leg 164 of the cruises of the Drilling Vessel JOIDES Resolution,
Halifax, Nova Scotia, to Miami, Florida, Sites 991–997,
31 October–19 December 1995

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in cooperation with the
NATIONAL SCIENCE FOUNDATION
and
JOINT OCEANOGRAPHIC INSTITUTIONS, INC.
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:

Canada/Australia Consortium for the Ocean Drilling Program, Department of Energy, Mines and Resources (Canada), and Department of Primary Industries and Energy (Australia)

Deutsche Forschungsgemeinschaft (Federal Republic of Germany)

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

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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.

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

Print citation:


Electronic citation:


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 printed date, is the correct one.

The mailing dates of recent Proceedings of the Ocean Drilling Program are as follows:

Volume 160 (Initial Reports): April 1996
Volume 161 (Initial Reports): June 1996
Volume 162 (Initial Reports): September 1996
Volume 148 (Scientific Results): April 1996
Volume 149 (Scientific Results): April 1996
Volume 150 (Scientific Results): October 1996

Distribution

Copies of this publication may be obtained from Publications Distribution Center, Ocean Drilling Program, 1000 Discovery Drive, College Station, Texas 77845-9547, U.S.A. Orders for copies will require advance payment. See current ODP publication list for price and availability of this publication.

Printed November 1996

ISSN 0884-5883
Library of Congress 87-655-674

Printed in Canada by Friesens.
Foreword
By the National Science Foundation

The National Science Foundation is proud to play a leading role in partnership with the U.S. oceanographic community in the operation and management of the Ocean Drilling Program (ODP). We are equally proud of the cooperation and commitment of our international partners, who contribute both financial and intellectual resources required to maintain the high quality of this unique program. The Ocean Drilling Program, like its predecessor, the Deep Sea Drilling Project (DSDP), is a model for the organization and planning of research to address global scientific problems that are of high priority internationally and of long-term interest to the scientific community and general public.

Major scientific themes guiding the development of specific drilling cruises range from determining the causes and effects of oceanic and climatic variability to understanding the circulation of fluids in the ocean crust and the resultant formation of mineral deposits. Although such studies are at the forefront of basic scientific inquiry into the processes that control and modify the global environment, they are equally important in providing the background for assessing man's impact on the global environment or for projecting resource availability for future generations.

The transition from the DSDP to the ODP was marked by a number of changes. The 471-foot JOIDES Resolution, which replaced the Glomar Challenger, has allowed larger scientific parties and the participation of more graduate students, a larger laboratory and technical capability, and operations in more hostile ocean regions. The JOIDES Resolution has drilled in all of the world's oceans, from the marginal ice regions of the Arctic to within sight of the Antarctic continent. Over 1,200 scientists and students from 26 nations have participated on project cruises. Cores recovered from the cruises and stored in ODP repositories in the United States and Europe have provided samples to an additional 1,000 scientists for longer term post-cruise research investigations. The downhole geochemical and geophysical logging program, unsurpassed in either academia or industry, is providing remarkable new data with which to study the Earth.

In 1994, NSF and our international partners renewed our commitment to the program for its final phase. Of the 20 countries that supported ODP initially, only one, Russia, has been unable to continue for financial reasons. As the reputation and scientific impact of the program continue to grow internationally, we hope to add additional members and new scientific constituencies. This global scientific participation continues to assure the program's scientific excellence by focusing and integrating the combined scientific knowledge and capabilities of its member nations.

We wish the program smooth sailing and good drilling!

Neal Lane
Director
National Science Foundation
Arlington, Virginia
This volume presents scientific and engineering results from the Ocean Drilling Program (ODP). The papers presented here address the scientific and technical goals of the program, which include providing a global description of geological and geophysical structures including passive and active margins and sediment history, and studying in detail areas of major geophysical activity such as mid-ocean ridges and the associated hydrothermal circulations.

The Ocean Drilling Program, an international activity, operates a specially equipped deep-sea drilling ship, the JOIDES Resolution (Sedco/BP 471), which contains state-of-the-art laboratories, equipment, and computers. The ship is 471 feet (144 meters) long, is 70 feet (21 meters) wide, and has a displacement of 18,600 short tons. Her derrick towers 211 feet (64 meters) above the waterline, and a computer-controlled dynamic-positioning system stabilizes the ship over a specific location while drilling in water depths up to 27,000 feet (8230 meters). The drilling system collects cores from beneath the seafloor with a derrick and drawworks that can handle 30,000 feet (9144 meters) of drill pipe. More than 12,000 square feet (1115 square meters) of space distributed throughout the ship is devoted to scientific laboratories and equipment. The ship sails with a scientific and technical crew of 51 and a ship’s crew (including the drill crew) of 62. The size and ice-strengthening of the ship allow drilling in high seas and ice-infested areas as well as permit a large group of multidisciplinary scientists to interact as part of the scientific party.

Logging, or measurements in the drilled holes, is an important part of the program. ODP provides a full suite of geochemical and geophysical measurements for every hole deeper than 1300 feet (400 meters). For each such hole, there are lowerings of basic oil-industry tools: nuclear, sonic, and electrical. In addition, a Formation MicroScanner is available for high-resolution imaging the wall of the hole, a 12-channel logging tool provides accurate velocity and elastic property measurements as well as sonic waveforms for spectral analysis of energy propagation near the wall of the hole, and a vertical seismic profiler can record reflectors from below the total depth of the hole.

The management of the Ocean Drilling Program involves a partnership of scientists and governments. International oversight and coordination are provided by the ODP Council, a governmental consultative body of the partner countries, which is chaired by a representative from the United States National Science Foundation (NSF). The ODP Council periodically reviews the general progress of the program and discusses financial plans and other management issues. Overall scientific and management guidance is provided to the operators of the program by representatives from the group of institutions involved in the program, called the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES).

The Executive Committee (EXCOM), made up of the administrative heads of the JOIDES institutions, provides general oversight for ODP. The Planning Committee (PCOM), with its advisory structure, is made up of working scientists and provides scientific advice and detailed planning. PCOM has a network of panels and working groups that screen drilling proposals, evaluate instrumentation and measurement techniques, and assess geophysical-survey data and other safety and siting information. PCOM uses the recommendations of the panels and committees to select drilling targets, to specify the location and major scientific objectives of each two-month drilling segment or leg, and to provide the science operator with nominations for co-chief scientists.

Joint Oceanographic Institutions, Inc. (JOI), a nonprofit consortium of U.S. oceanographic institutions, serves as the National Science Foundation’s prime contractor for ODP. JOI is responsible for seeing that the scientific objectives, plans, and recommendations of the JOIDES committees are translated into scientific operations consistent with scientific advice and budgetary constraints. JOI subcontracts the operations of the program to two universities: Texas A&M University and Lamont-Doherty Earth Observatory.
of Columbia University. JOI is also responsible for managing the U.S. contribution to ODP under a separate cooperative agreement with NSF.

Texas A&M University (TAMU) serves as science operator for ODP. In this capacity, TAMU is responsible for planning the specific ship operations, actual drilling schedules, and final scientific rosters, which are developed in close cooperation with PCOM and the relevant panels. The science operator also ensures that adequate scientific analyses are performed on the cores by maintaining the shipboard scientific laboratories and computers and by providing logistical and technical support for shipboard scientific teams. Onshore, TAMU manages scientific activities after each leg, is curator for the cores, distributes samples, and coordinates the editing and publication of scientific results.

Lamont-Doherty Earth Observatory (LDEO) of Columbia University is responsible for the program's logging operation, including processing the data and providing assistance to scientists for data analysis. The ODP Data Bank, a repository for geophysical data, is also managed by LDEO.

Core samples from ODP and the previous Deep Sea Drilling Project are stored for future investigation at four sites: ODP Pacific and Indian Ocean cores at TAMU, DSDP Pacific and Indian Ocean cores at the Scripps Institution of Oceanography, ODP and DSDP Atlantic and Antarctic cores through Leg 150 at LDEO, and ODP Atlantic and Antarctic cores since Leg 151 at the University of Bremen, Federal Republic of Germany.

Scientific achievements of ODP include new information on early seafloor spreading and how continents separate and the margins evolve. The oldest Pacific crust has been drilled and sampled. We have new insights into glacial cycles and the fluctuations of ocean currents throughout geological time. ODP has also provided valuable data that shed light on fluid pathways through the lithosphere, global climate change both in the Arctic and near the equator, past sea-level change, seafloor mineralization, the complex tectonic evolution of oceanic crust, and the evolution of passive continental margins.

Many of the scientific goals can be met only with new technology; thus the program has focused on engineering as well as science. To date, ODP engineers have demonstrated the capability to drill on bare rock at mid-ocean-ridge sites and have developed techniques for drilling in high-temperature and corrosive regions typical of hydrothermal vent areas. A new diamond coring system promises better core recovery in difficult areas. In a close collaborative effort between ODP engineers and scientists, a system has been developed that seals selected boreholes ("CORKs") and monitors downhole temperature, pressure, and fluid composition for up to three years. When possible, ODP is also taking advantage of industry techniques such as logging while drilling, to obtain continuous downhole information in difficult-to-drill formations.

JOI is pleased to have been able to play a facilitating role in the Ocean Drilling Program and its cooperative activities, and we are looking forward to many new, exciting results in the future.

James D. Watkins
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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).

*At time of publication.
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CD-ROM

Leg 164 Materials

There are two CD-ROMs in the back of this volume. One is a “data-only” CD-ROM containing depth-shifted and processed logging data provided by the Borehole Research Group at the Lamont-Doherty Earth Observatory. This CD-ROM also contains shipboard GRAPE (gamma-ray attenuation porosity evaluator), index property, magnetic susceptibility, and natural gamma data of cores collected on board the JOIDES Resolution during Leg 164. CD-ROM production was carried out by the Borehole Research Group at the Lamont-Doherty Earth Observatory, Wireline Logging Operator for ODP. The second CD-ROM contains an electronic version of the Leg 164 Initial Reports volume in Adobe Acrobat, tab delimited ASCII files of all the tables from the volume, and vane shear and index properties data for Sites 991 through 997.

Core Log and Core Data Directory Structure:

NIH IMAGE directory
GENERAL INFORMATION directory
Acronyms file
Compression documentation file
Format documentation file
Index file
Readme file
Software documentation file
LOG DATA directory
HOLE number subdirectory
Conventional Logs subdirectory
Acronyms and units file
Compression documentation (when applicable)
Log Data subdirectories
Individual tool data files
Processing documentation
FMS and Dipmeter Data subdirectory
Dipmeter in ASCII format file(s)
FMS images in PBM (portable bit map—8 bit binary) format subdirectory
1:1 ratio images subdirectory
Data files (every 10 m)
Raster documentation file
1:10 ratio images subdirectory
Data files (every 100 m)
Raster documentation file
CORE DATA directory
README document
CORELOG.MCD data file
SITE number subdirectory
HOLE number subdirectory
GRAPE data file
INDEX data file
MAGSUS data file
NATGAM data file
GRAPE documentation file
Index properties documentation file
Magnetic susceptibility documentation file
Natural gamma documentation file

The above structure is identical for each site and hole.

The INDEX.DOC file contains a summary of all the files loaded on the CD-ROM.

The software documentation file in the GEN_INFO directory contains information on which software packages work best to import PBM (portable bit map—8 bit binary) raster files. It also includes network sources for the graphics software and data compression information. The README file gives information on whom to contact with any questions about the production of or data on the CD-ROM.

All of the ASCII files (with the exception of the sonic waveform files [SWF files]) are tab delimited for compatibility with most spreadsheet and database programs.
Holes that have more than one logging pass with the same tools are labeled Main and Repeat for conventional logs, or Pass 1, Pass 2, etc., for FMS. If the files are not in separate directories they may just be annotated with “m” and “r” or “1” and “2” in the data filenames when there is room for only one character. Holes that have long logging runs are often divided into UPPER and LOWER directories. The files may just be annotated with “u” or “l” in the data filenames where space permits. Check the documentation file for a given directory if it is not clear to you.

In the FMS-PBM format directory there are two subdirectories: 1:1 ratio with maximum 10-m-long image raster files and 1:10 ratio with maximum 100-m-long image raster files. The image raster files are named according to their depth interval. The raster documentation files contain image file parameter information necessary for use with most graphic software packages.

Summary of Log Data:

Hole 994C:
- Conventional logs
- Geochemical logs (element and oxide wt%)
- Sonic waveforms
- Temperature logs

Hole 994D:
- Conventional logs
- Sonic waveforms

Hole 995B:
- Conventional logs
- Geochemical logs (element and oxide wt%)
- High-resolution logs
- FMS data
- Sonic waveforms
- Temperature logs

Hole 997B:
- Conventional logs
- FMS data
- Geochemical logs (element and oxide wt%)
- Sonic waveforms
- Temperature logs

Summary of ODP Core Data:

Site 991:
Hole A:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Site 992:
Hole A:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Site 993:
Hole A:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Site 994:
Hole A:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Hole B:
- grape.dat
- magsus.dat
- natgam.dat
- pwave.dat

Hole C:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Hole D:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Site 995:
Hole A:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave1.dat
- pwave2.dat

Hole B:
- index.dat

Site 996:
Hole A:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Hole B:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Hole C:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Hole D:
- grape.dat
- index.dat

Site 997:
Hole A:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Hole B:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Hole C:
- grape.dat
- index.dat
- magsus.dat
- natgam.dat
- pwave.dat

Hole D:
- grape.dat
- index.dat

Site 998:
Hole A:
Table Directory Structure:

All tables in this volume appear on the ODP CD-ROM in the Leg 164 Tables directory.

Chapter 2, Explanatory Notes:

Table 1. Positions of diagnostic peaks used for the identification of minerals and estimates of their abundances in X-ray diffractograms: 2_tbl1.txt
Table 2. Relative standard deviations for analyses of dissolved species in pore water during Leg 164: 2_tbl2.txt
Table 3. Approximate vertical resolution of logging tools used during Leg 164: 2_tbl3.txt
Table 4. Summary of logging tool specifics and their applications during Leg 164: 2_tbl4.txt
Table 5. Oxide factors used in normalizing elements to 100% and converting elements to oxides: 2_tbl5.txt

Chapter 3, Seismic Acquisition System Grounding and Noise:

Table 1. Noise peaks and probable sources: 3_tbl1.txt

Chapter 5, Sites 991/992/993:

Table 1. Coring summary for Sites 991, 992, and 993: 5_tbl1.txt
Table 2. Main diffraction peak areas and weight percentage proportions for minerals identified in samples from Holes 991A, 992A, and 993A: 5_tbl2.txt
Table 3. Chemistry of water samples from the PCS and FWS, Hole 991B: 5_tbl3.txt
Table 4. Composition of headspace gas in sediment from Holes 991A, 992A, and 993A: 5_tbl4.txt
Table 5. Composition of free gas collected in syringes from sediments at Sites 991 and 993: 5_tbl5.txt
Table 6. Volumes of gas collected as whole-core sections warmed to room temperature within gas-collection chambers, Sites 991, 992, and 993: 5_tbl6.txt
Table 7. Composition of the gas collected from whole 1.5-m sections from Sites 991 and 993: 5_tbl7.txt
Table 8. Carbonate, carbon, nitrogen, and sulfur contents in sediments from Sites 991, 992, and 993: 5_tbl8.txt
Table 9. Rock-Eval analyses of sediments from Sites 991, 992, and 993: 5_tbl9.txt
Table 10. Interstitial-water data for Sites 991, 992, and 993: 5_tbl10.txt
Table 11. Index properties of sediment samples from Holes 991A, 992A, and 993A: 5_tbl11.txt

Table 6, Site 994:

Table 1. Coring summary for Site 994: 6_tbl1.txt
Table 2. Main diffraction peak areas, d-values, and weight percentage proportions for minerals identified in samples from Hole 994C: 6_tbl2.txt
Table 3. Results of gas and geochemical analyses of gas hydrate from Site 994: 6_tbl3.txt
Table 4. Volumes of gas collected from whole-core sections (<1.5 m in length) warmed to room temperature inside gas-collection chambers: 6_tbl4.txt
Table 5. Description of PCS deployment at Site 994: 6_tbl5.txt
Table 6. Gas composition of PCS and WSTP samples, Hole 994C: 6_tbl6.txt
Table 7. Chemistry of water samples from the PCS and WSTP, surface seawater, and drilling mud filtrate at Site 994: 6_tbl7.txt
Table 8. Description of FWS and WSTP deployment at Site 994: 6_tbl8.txt
Table 9. Composition of headspace gas in sediment from Hole 994C: 6_tbl9.txt
Table 10. Methane concentrations from the four uppermost cores: 6_tbl10.txt
Table 11. Composition of free gas collected in syringes from sediments at Site 994: 6_tbl11.txt
Table 12. Composition of gas released from gas-collection chambers, Hole 994A: 6_tbl12.txt
Table 13. Composition of gas released from gas-collection chambers after various degassing periods, Hole 994D: 6_tbl13.txt
Table 14. Carbonate, carbon, nitrogen, and sulfur contents in sediments from Site 994: 6_tbl14.txt
Table 15. Rock-Eval analysis of sediment from Hole 994C: 6_tbl15.txt
Table 16. Interstitial-water data for Site 994: 6_tbl16.txt
Table 17. Index properties of sediment samples from Hole 994C: 6_tbl17.txt
Table 18. Depths of vertical seismic profile stations, type of clamp, and number of traces picked for traveltime calculations: 6_tbl18.txt
Table 19. Carbon/oxygen elemental ratios as measured with the GLT in Hole 994C: 6_tbl19.txt
Table 20. Compressional and shear wave acoustic data measured with the LDEO-SST in Hole 994C: 6_tbl20.txt
Table 21. In situ temperature measurements in Hole 994C: 6_tbl21.txt
Table 22. Top and base of gas hydrate distribution: 6_tbl22.txt

Chapter 7, Site 995:
Table 1. Coring summary for Site 995: 7_tbl1.txt
Table 2. Main diffraction peak areas, d-values, and weight percentage proportions for minerals identified in samples from Hole 995A: 7_tbl2.txt
Table 3. Average and minimum temperatures for individual slab samples from Hole 995A: 7_tbl3.txt
Table 4. Average and minimum temperatures of cores from Hole 995A as measured on the catwalk immediately after recovery: 7_tbl4.txt
Table 5. Temperatures of cores from Hole 995B as measured on the catwalk immediately after recovery: 7_tbl5.txt
Table 6. Volumes of gas collected from 1.5-m whole-core sections as they warmed to room temperature inside the gas-collection chambers: 7_tbl6.txt
Table 7. Description of PCS deployment at Site 995: 7_tbl7.txt
Table 8. Gas composition of samples from the PCS at Site 995: 7_tbl8.txt
Table 9. Chemistry of water samples from the PCS at Site 995: 7_tbl9.txt
Table 10. Physical properties of sediment samples from the PCS, Hole 995A: 7_tbl10.txt
Table 11. Description of WSTP deployment at Site 995: 7_tbl11.txt
Table 12. Chemistry of water samples from the WSTP and proportion of seawater, coil water, and interstitial water at Site 995: 7_tbl12.txt
Table 13. Composition of headspace gas in sediment from Hole 995A: 7_tbl13.txt
Table 14. Composition of free gas collected in syringes from sediment from Site 995: 7_tbl14.txt
Table 15. Composition of gases from Site 995 collected in gas-collection chambers: 7_tbl15.txt
Table 16. Carbonate, carbon, nitrogen, and sulfur contents in sediment from Site 995: 7_tbl16.txt
Table 17. Rock-Eval analysis of sediment from Hole 995A: 7_tbl17.txt
Table 18. Interstitial-water chemistry data for Site 995: 7_tbl18.txt
Table 19. Chloride concentrations and sediment temperatures of interstitial-water samples: 7_tbl19.txt
Table 20. Chemical analyses of unstored and stored samples showing the difference between measurements made at different times after core collection: 7_tbl20.txt
Table 21. Index properties of sediment samples from Hole 995A: 7_tbl21.txt
Table 22. Depth of vertical seismic profile stations, type of VSP, and number of air gun shots used in traveltime calculations: 7_tbl22.txt
Table 23. Carbon-oxygen elemental ratios as measured with the GLT in Hole 995B: 7_tbl23.txt
Table 24. In situ temperature measurements in Holes 995A and 995B: 7_tbl24.txt
Table 25. Top and base of gas hydrate distribution: 7_tbl25.txt

Chapter 8, Site 996:
Table 1. Coring summary for Site 996: 8_tbl1.txt
Table 2. Approximate depths of carbonate concretions recovered at Site 996: 8_tbl2.txt
Table 3. Main diffraction peak areas, d-values, and weight percentage proportions for minerals identified in samples from Site 996: 8_tbl3.txt
Table 4. Composition and gas volumes measured from samples of gas hydrate that were dissociated within a sealed dissociation chamber or gas bags: 8_tbl4.txt
Table 5. Volumes of gas collected from 1.5-m whole-core sections as they warmed to room temperature inside gas collection chambers: 8_tbl5.txt
Table 6. Description of PCS deployment at Site 996: 8_tbl6.txt
Table 7. Gas composition of samples from the PCS at Site 996: 8_tbl7.txt
Table 8. Composition of headspace gas in sediment from Site 996: 8_tbl8.txt
Table 9. Composition of free gas collected in syringes from sediments at Site 996: 8_tbl9.txt
Table 10. Composition of gas collected in gas-collection chambers at Site 996: 8_tbl10.txt
Table 11. Carbonate, carbon, nitrogen, and sulfur contents in sediment from Site 996: 8_tbl11.txt
Table 12. Interstitial-water data for Site 996: 8_tbl12.txt
Table 13. Index properties of sediment samples from Site 996: 8_tbl13.txt

Chapter 9, Site 997:
Table 1. Coring summary for Site 997: 9_tbl1.txt
Table 2. List of glauconite and foraminifer beds and representative occurrences of specific diagenetic minerals in Site 997 samples: 9_tbl2.txt
Table 3. Main diffraction peak areas, d-values, and weight percentage proportions for minerals identified in samples from Site 997: 9_tbl3.txt

Table 4. Average and minimum temperatures of cores from Holes 997A and 997B as measured on the catwalk immediately after recovery: 9_tbl4.txt

Table 5. Volumes of gas collected from 1.5-m whole-core sections as they warmed to room temperature inside the gas-collection chambers: 9_tbl5.txt

Table 6. Description of PCS deployment at Site 997: 9_tbl6.txt

Table 7. Gas composition of samples from the PCS at Site 997: 9_tbl7.txt

Table 8. Physical properties of sediment samples from the PCS, Hole 997A: 9_tbl8.txt

Table 9. Chemistry of water samples from the PCS at Site 997: 9_tbl9.txt

Table 10. Description of WSTP and FWS deployment at Site 997: 9_tbl10.txt

Table 11. Chemistry of water samples from the WSTP and proportion of seawater, coil water, and interstitial water, Hole 997A: 9_tbl11.txt

Table 12. Composition of headspace gas in sediment from Site 997: 9_tbl12.txt

Table 13. Composition of free gas collected in syringes from sediment from Site 997: 9_tbl13.txt

Table 14. Composition of gas collected in gas-collection chambers, Site 997: 9_tbl14.txt

Table 15. Carbonate, carbon, nitrogen, and sulfur contents in sediments from Site 997: 9_tbl15.txt

Table 16. Rock-Eval analysis of sediment from Site 997: 9_tbl16.txt

Table 17. Interstitial-water chemistry data for Site 997: 9_tbl17.txt

Table 18. Index properties of sediment samples from Site 997: 9_tbl18.txt

Table 19. In situ temperature measurements in Hole 997A: 9_tbl19.txt

Table 20. Top and base of gas hydrate distribution: 9_tbl20.txt

Vane Shear Data Directory:

Vane shear data for Sites 991 through 997 appear on the ODP CD-ROM.

vs991a.txt
vs992a.txt
vs993a.txt
vs994a.txt
vs994c.txt
vs996a.txt
vs996b.txt
vs996c.txt
vs996d.txt
vs997a.txt

Index Properties Data Directory:

The ODP CD-ROM also contains index properties data for Sites 991 through 997.

ip991a.txt
ip992a.txt
ip993a.txt
ip994a.txt
ip994c.txt
ip994d.txt
ip995a1.txt
ip995a2.txt
ip995b.txt
ip996a.txt
ip996b.txt
ip996c.txt
ip996d.txt
ip996e.txt
ip997a.txt
ip997b.txt
We truly appreciate all the hard work of everyone involved with Leg 164 of the Ocean Drilling Program. The scientific successes of Leg 164 would not have been possible without the assistance of a large group of people who helped to plan and execute the drilling and geophysical program.

Our successful program was a culmination of a long planning effort involving many proponents and the related thematic and service panels of the JOIDES advisory structure. We especially thank Mahlon Ball and the rest of the Pollution Prevention and Safety Panel for allowing us to drill through the bottom-simulating reflector. Bill Dillon provided much of the site-survey data.

We would like to thank the ODP marine technicians, under the leadership of Lab Officer Brad Julson, who provided a well-organized, productive, and effective working atmosphere on board. The marine technicians deserve special thanks for constantly putting up with an overcrowded catwalk full of eager scientists, who repeatedly removed potentially gas hydrate-bearing core sections before the cores were curated, and for squeezing a record number of pore-water samples.

We would also like to give special thanks to Captain Anthony Ribbens, ODP Drilling Superintendent Eugene Pollard, Sedco Drilling Superintendent Bob Caldwell, and their hard-working crews. The 27 scientists were pampered by the service of the Catermar crew in the JOIDES Resolution’s hotel.

We thank Captain Dick Ogus and the crew of the Cape Hatteras for their assistance with the walk-away vertical seismic profile program. The Cape Hatteras also ferried critical supplies, mail, several visitors, and sick personnel to and from the beach. The personnel transfers provided one of the favorite photographic opportunities of the leg. Quentin Lewis and the Marine Department at the Duke University Marine Lab coordinated these shipments, making mid-leg tool repairs possible.

We thank the governments of all the participating countries for supporting this international program. Fortunately, the U.S. government allowed federal employees to stay on board during the infamous federal government shutdown.

We thank and/or apologize to the families and loved ones we left behind during the leg while we selfishly pursued our interests.

The scientific party also thanks the members of the ODP Publications Department for their tremendous efforts in handling and transforming our site reports into this cruise volume.