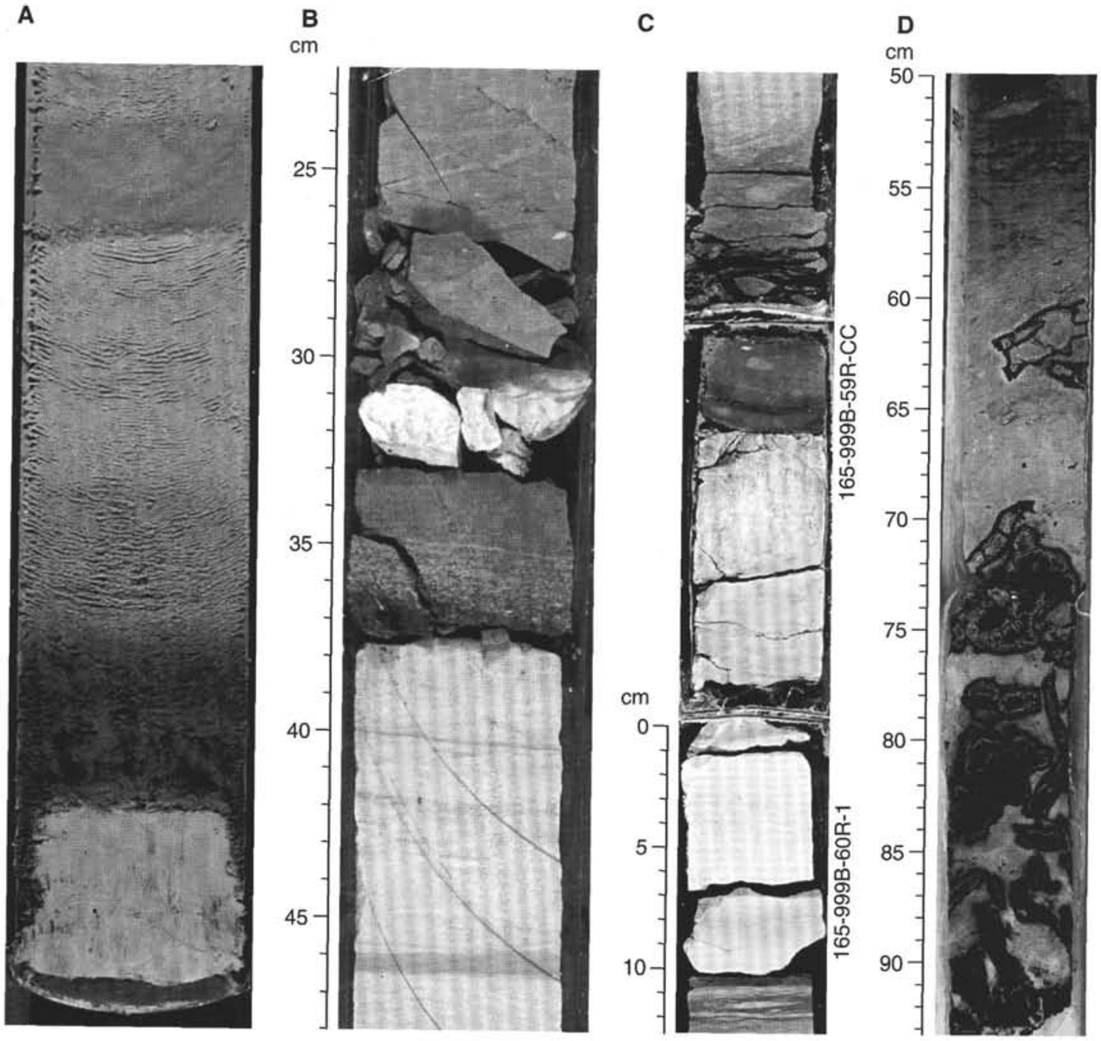

A. The basal part of a middle Miocene volcanic ash layer at Section 165-998A-16H-4. The ash layer has a total thickness of 96 cm.

B. Cretaceous/Tertiary boundary impact ejecta deposit in Section 165-1001B-18R-5. The dark greenish gray unit is composed of impact spherules altered to smectite.

C. Cretaceous/Tertiary boundary in Hole 999B. The K/T boundary occurs in the upper part of Core 60R (at 10 cm on the scale) and is overlain by a white limestone with bluish streaks.

D. Contact between basaltic basement of the Caribbean Igneous Plateau and overlying Campanian clayey limestone in Section 165-1001A-52R-6. The top of the basalt lava flow is scoriaceous.

PROCEEDINGS OF THE OCEAN DRILLING PROGRAM

VOLUME 165
INITIAL REPORTS
CARIBBEAN OCEAN HISTORY AND THE CRETACEOUS/TERTIARY BOUNDARY EVENT

Covering Leg 165 of the cruises of the Drilling Vessel *JOIDES Resolution*,
Miami, Florida, to San Juan, Puerto Rico, Sites 998–1002,
19 December 1995–17 February 1996

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in cooperation with the
NATIONAL SCIENCE FOUNDATION
and
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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

Neal Lane
Director
National Science Foundation
Arlington, Virginia

Foreword

By Joint Oceanographic Institutions, Inc.

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.

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CD-ROM MATERIALS

The CD-ROMs are located in the back of this volume. The "Log and Core Data" CD-ROM contains 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 properties, magnetic susceptibility, *P*-wave, and natural gamma data of cores collected on board the *JOIDES Resolution* during Leg 165. The CD-ROM was produced by the Borehole Research Group at the Lamont-Doherty Earth Observatory, Wireline Logging Operator for ODP. The "*Proceedings, Initial Reports*" CD-ROM material includes an electronic version of the Leg 165 *Initial Reports* volume in Adobe Acrobat and ASCII tab-delimited versions of selected tables.

LOG AND CORE DATA CD 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 image 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 in each site and/or hole.

The INDEX 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 file names 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 file names 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 998B:
  - Conventional logs
  - FMS data
  - Geochemical logs (element and oxide weight %)
  - GHMT data
  - High resolution logs
  - Sonic waveforms
  - Temperature logs
- Hole 999B:
  - Conventional logs
  - Geochemical logs (element and oxide weight %)
  - FMS data
  - High resolution logs
  - Sonic waveforms
- Hole 1000B:
  - Conventional logs
  - FMS data
  - GHMT data
  - High resolution logs
  - Sonic waveforms
  - Temperature logs
- Hole 1001A:
  - Conventional logs
  - FMS data
  - GHMT data
  - High resolution logs
  - Sonic waveforms
  - Temperature logs

Summary of ODP Core Data:

- Site 998
  - Hole A:
    - grape-1.dat
    - grape-2.dat
    - index.dat
    - magsus.dat
    - natgam.dat
    - pwave.dat
  - Hole B:
    - grape.dat
    - index.dat
    - magsus.dat
    - natgam.dat
- Site 999
  - Hole A:
    - grape-1.dat
    - grape-2.dat
    - index.dat
    - magsus.dat
    - natgam.dat
    - pwave-1.dat
    - pwave-2.dat
  - Hole B:
    - grape.dat
    - magsus.dat
    - natgam.dat
- Site 1000
  - Hole A:
    - grape.dat
    - index.dat
    - magsus.dat
    - natgam.dat
    - pwave.dat
  - Hole B:
    - grape.dat
    - index.dat
    - magsus.dat
    - natgam.dat
- Site 1001
  - Hole A:
    - grape.dat
    - index.dat
    - magsus.dat
    - natgam.dat
    - pwave.dat
  - Hole B:
    - grape.dat
    - index.dat
    - magsus.dat
    - natgam.dat
- Site 1002
  - Hole A:
    - grape.dat
    - magsus.dat
  - Hole B:
    - grape.dat
    - magsus.dat
  - Hole C:
    - grape.dat
    - magsus.dat
  - Hole D:
    - grape.dat
    - magsus.dat
  - Hole E:
    - grape.dat
    - magsus.dat

PROCEEDINGS, INITIAL REPORTS CD MATERIAL

An electronic version of the Leg 165 *Initial Reports* volume in Adobe Acrobat and ASCII tab-delimited versions of the tables listed below are included on the CD-ROM.

Table Directory Structure:

The following text tables from Chapters 3–7 are included on the CD.

Chapter 3, Site 998:

Table 1. Coring summary, Site 998. 3_tbl1.txt

Table 3. Nannofossil datums, absolute ages, and depths at Site 998. 3_tbl3.txt

Table 4. Planktonic foraminifer datums, absolute ages, and depths at Site 998. 3_tbl4.txt

Table 8. Interpolated ages and mass accumulation rate data from Site 998. 3_tbl8.txt

Table 9. Concentrations of inorganic carbon, calcium carbonate, total organic carbon, total nitrogen, and total sulfur, Holes 998A and 998B. 3_tbl9.txt

Table 10. Interstitial water composition, Hole 998A. 3_tbl10.txt

Table 12. Major element chemistry of bulk sediment at Site 998. 3_tbl12.txt

Table 13. Trace element chemistry of bulk sediment at Site 998. 3_tbl13.txt

Table 14. Major element composition of volcanic ash layers in Site 998 sediments. 3_tbl14.txt

Table 15. Trace element composition of Site 998 volcanic ash layers. 3_tbl15.txt

Table 16. Magnetic susceptibility data for Site 998. 3_tbl16a.txt (Hole 998A), 3_tbl16b.txt (Hole 998A), 3_tbl16c.txt (Hole 998B)

Table 17. Gamma-ray attenuation porosity evaluator (GRAPE) data for Site 998. 3_tbl17a.txt (Hole 998A), 3_tbl17b.txt (Hole 998A), 3_tbl17c.txt (Hole 998B)

Table 18. Multisensor track *P*-wave data for Site 998. 3_tbl18.txt

Table 19. Natural gamma-ray (NGR) data for Site 998. 3_tbl19a.txt (Hole 998A), 3_tbl19b.txt (Hole 998A), 3_tbl19c.txt (Hole 998B)

Table 20. Thermal conductivity measured on whole-round core sections for Site 998. 3_tbl20.txt

Table 21. DSV (DSV1 and DSV2) and Hamilton Frame (DSV3) velocities measured at discrete intervals for Site 998. 3_tbl21.txt

Table 22. Index properties measured at discrete intervals for Site 998. 3_tbl22.txt

Table 23. Electrical resistivity measured at discrete intervals for Hole 998A. 3_tbl23.txt

Table 24. Undrained and residual shear strength from miniature vane shear measurements for Site 998. 3_tbl24.txt

Chapter 4, Site 999:

Table 1. Coring summary, Site 999. 4_tbl1.txt

Table 3. Nannofossil datums, absolute ages, and depths at Site 999. 4_tbl3.txt

Table 4. Planktonic foraminifer datums, absolute ages, and depths at Site 999. 4_tbl4.txt

Table 6. Interpolated ages and mass accumulation rate data from Site 999. 4_tbl6.txt

Table 7. Concentrations of inorganic carbon, calcium carbonate, total carbon, total organic carbon, total nitrogen, and total sulfur, Holes 999A and 999B. 4_tbl7.txt

Table 8. Interstitial water composition, Holes 999A and 999B. 4_tbl8.txt

Table 9. Major element chemistry of bulk sediment, Holes 999A and 999B. 4_tbl9.txt

Table 10. Trace element chemistry of bulk sediment, Holes 999A and 999B. 4_tbl10.txt

Table 11. Major oxide composition of volcanic ash layers. 4_tbl11.txt

Table 12. Trace element concentrations of volcanic ash layers. 4_tbl12.txt

Table 13. Gamma-ray attenuation porosity evaluator (GRAPE) data for Site 999. 4_tbl13a.txt (Hole 999A), 4_tbl13b.txt (Hole 999A), 4_tbl13c.txt (Hole 999B)

Table 14. Magnetic susceptibility data for Site 999. 4_tbl14a.txt (Hole 999A), 4_tbl14b.txt (Hole 999B)

Table 15. Multisensor track *P*-wave data for Site 999. 4_tbl15a.txt (Hole 999A), 4_tbl15b.txt (Hole 999b)

Table 16. Natural gamma-ray (NGR) data for Site 999. 4_tbl16.txt

Table 17. Thermal conductivity measured on whole-round core sections for Site 999. 4_tbl17.txt

Table 18. DSV (DSV1 and DSV2) and Hamilton Frame (DSV3) velocities measured at discrete intervals for Site 999. 4_tbl18.txt

Table 19. Index properties measured at discrete intervals for Site 999. 4_tbl19.txt

Table 20. Electrical resistivity measured at discrete intervals for Hole 999A. 4_tbl20.txt

Table 21. Undrained and residual shear strength from miniature vane shear measurements for Site 999. 4_tbl21.txt

Chapter 5, Site 1000:

Table 1. Coring summary, Site 1000. 5_tbl1.txt

Table 3. Nannofossil datums, absolute ages, and depths at Site 1000. 5_tbl3.txt

Table 4. Planktonic foraminifer datums, absolute ages, and depths as Site 1000. 5_tbl4.txt

Table 5. Interpolated ages and mass accumulation rate data from Site 1000. 5_tbl5.txt

Table 6. Concentration of inorganic carbon, calcium carbonate, total carbon, total organic carbon, total nitrogen, and total sulfur, Holes 1000A and 1000B. 5_tbl6.txt

Table 8. Interstitial water composition, Hole 1001A. 5_tbl8.txt

Table 9. Major element chemistry of bulk sediment, Hole 1000A. 5_tbl9.txt

Table 10. Trace element chemistry of bulk sediment, Hole 1000A. 5_tbl10.txt

Table 11. Major oxide composition of volcanic ash layers. 5_tbl11.txt

Table 12. Trace element composition of volcanic ash layers. 5_tbl12.txt

Table 13. Magnetic susceptibility data for Site 1000. 5_tbl13a.txt (Hole 1000A), 5_tbl13b.txt (Hole 1000B)

Table 14. Gamma-ray attenuation porosity evaluator (GRAPE) data for Site 1000. 5_tbl14a.txt (Hole 1000A), 5_tbl14b.txt (Hole 1000B)

Table 15. Multisensor track *P*-wave data for Site 1000. 5_tbl15.txt

Table 16. Natural gamma-ray (NGR) data for Site 1000. 5_tbl16.txt

Table 17. Thermal conductivity measured on whole-round core sections for Site 1000. 5_tbl17.txt

Table 18. DSV (DSV1 and DSV2) and Hamilton Frame (DSV3) velocities measured at discrete intervals for Site 1000. 5_tbl18.txt

Table 19. Index properties measured at discrete intervals for Site 1000. 5_tbl19.txt

Table 20. Electrical resistivity measured at discrete intervals for Site 1000. 5_tbl20.txt

Table 21. Undrained and residual shear strength from miniature vane shear measurements for Site 1000. 5_tbl21.txt

Chapter 6, Site 1001:

Table 1. Coring summary, Site 1001. 6_tbl1.txt

Table 3. Nannofossil datums, absolute ages, and depths at Site 1001. 6_tbl3.txt

Table 4. Planktonic foraminifer datums, absolute ages, and depths at Site 1001. 6_tbl4.txt

Table 6. Interpolated ages and mass accumulation rate data from Site 1001. 6_tbl6.txt

Table 7. Concentrations of inorganic carbon, calcium carbonate, total carbon, total organic carbon, total nitrogen, and total sulfur, Hole 1001A. 6_tbl7.txt

Table 8. Interstitial water composition, Hole 1001A. 6_tbl8.txt

Table 9. Major element chemistry of bulk sediment, Hole 1001A. 6_tbl9.txt

Table 10. Trace element chemistry of bulk sediment, Hole 1001A. 6_tbl10.txt

Table 11. Major and trace element composition of volcanic ash layers from Site 1001. 6_tbl11.txt

Table 12. Major oxide chemical composition of basalts from Site 1001. 6_tbl12.txt

Table 13. Trace element composition of basalts from Site 1001. 6_tbl13.txt

Table 14. Magnetic susceptibility data for Site 1001. 6_tbl14a.txt (Hole 1001A), 6_tbl14b.txt (Hole 1001B)

Table 15. Gamma-ray attenuation porosity evaluator (GRAPE) data for Site 1001. 6_tbl15a.txt (Hole 1001A), 6_tbl15b.txt (Hole 1001B)

Table 16. Multisensor track *P*-wave data for Site 1001. 6_tbl16.txt

Table 17. Natural gamma-ray (NGR) data for Site 1001. 6_tbl17a.txt (Hole 1001A), 6_tbl17b.txt (Hole 1001B)

Table 18. Thermal conductivity measured on whole-round core sections for Site 1001. 6_tbl18.txt

Table 19. DSV (DSV1 and DSV2) and Hamilton Frame (DSV3) velocities measured at discrete intervals for Site 1001. 6_tbl19.txt

Table 20. Index properties measured at discrete intervals for Site 1001. 6_tbl20.txt

Table 21. Electrical resistivity measured at discrete intervals for Site 1001. 6_tbl21.txt

Table 22. Undrained and residual shear strength from miniature vane shear measurements for Site 1001. 6_tbl22.txt

Chapter 7, Site 1002:

Table 1. Coring summary, Site 1002. 7_tbl1.txt

Table 4. Interstitial water composition, Hole 1002C. 7_tbl4.txt

Table 5. Gamma-ray attenuation porosity evaluator (GRAPE) data for Site 1002. 7_tbl5a.txt (Hole 1002A), 7_tbl5b.txt (Hole 1002B), 7_tbl5c.txt (Hole 1002C), 7_tbl5d.txt (Hole 1002D), 7_tbl5e.txt (Hole 1002E)

Table 6. Magnetic susceptibility data for Site 1002. 7_tbl6a.txt (Hole 1002A), 7_tbl6b.txt (Hole 1002B), 7_tbl6c.txt (Hole 1002C), 7_tbl6d.txt (Hole 1002D), 7_tbl6e.txt (Hole1002E)

Appendix Table Structure:

The following Appendix tables are cited in the text but do not appear in the volume.

Ash Layers:

Appendix Table 1. Ash layers for Hole 998A. app_1.txt

Appendix Table 2. Ash layers for Hole 998B. app_2.txt

Appendix Table 3. Ash layers for Site 999. app_3.txt

Appendix Table 4. Ash layers for Site 1000. app_4.txt

Appendix Table 5. Ash layers for Hole 1001A. app_5.txt

Appendix Table 6. Ash layers for Hole 1001B. app_6.txt

Color Reflectance Data:

Appendix Table 7. Color reflectance data for Hole 998A. app_7.txt

Appendix Table 8. Color reflectance data for Hole 998B. app_8.txt

Appendix Table 9. Color reflectance data for Hole 999A. app_9.txt

Appendix Table 10. Color reflectance data for Hole 999B. app_10.txt

Appendix Table 11. Color reflectance data for Hole 1000A. app_11.txt

Appendix Table 12. Color reflectance data for Hole 1000B. app_12.txt
Appendix Table 13. Color reflectance data for Hole 1001A. app_13.txt
Appendix Table 14. Color reflectance data for Hole 1001B. app_14.txt
Appendix Table 15. Color reflectance data for Hole 1002C. app_15.txt
Appendix Table 16. Color reflectance data for Hole 1002D. app_16.txt
Appendix Table 17. Color reflectance data for Hole 1002E. app_17.txt

Paleomagnetic Data:

Appendix Table 18. Paleomagnetic data from discrete samples for Site 998. app_18.txt
Appendix Table 19. Paleomagnetic data from discrete samples for Site 999. app_19.txt
Appendix Table 20. Paleomagnetic data from discrete samples for Site 1000. app_20.txt
Appendix Table 21. Paleomagnetic data from discrete samples for Site 1001. app_21.txt

DEDICATION

This volume is dedicated by the Leg 165 Shipboard Scientific Party to the memory of Dr. Cesare Emiliani, a pioneer in paleoceanography and an early proponent of deep-sea drilling, who passed away suddenly on 20 July 1995. Over the course of a research career that spanned nearly 50 years, Cesare Emiliani produced a legacy of contributions that changed the way we look at the Earth and its climate history.

A native of Bologna, Italy, Cesare Emiliani received a Ph.D. in the Natural Sciences from the University of Bologna after the end of World War II. After a brief stint as an industry micropaleontologist, Cesare moved to the University of Chicago and received a second Ph.D. in Geology in 1950. He then joined the University's Institute for Nuclear Studies where he became an early member of Harold Urey's famed "Geochemical Mafia." At the time, Urey was pursuing studies of Cretaceous paleotemperatures using his newly developed oxygen isotope technique. Emiliani immediately saw the potential application of this approach to deep-sea sediments and turned his attention to piston cores from the Caribbean Sea and tropical Atlantic Ocean.

His isotopic studies of foraminiferal shells, first at Chicago, and later at the University of Miami, revolutionized our understanding of the timing and frequency of glacial cycles in the late Cenozoic and directly led to a revival of interest in the Milankovitch theory of climate change. His simple scheme for subdividing the Pleistocene, based on the new oxygen isotope stratigraphy, has without question stood the test of time; over the past 40 years it has evolved from a means of discussing the climatic record of the Caribbean to one that is universally accepted and used not only in all the ocean basins, but on the continents as well.

In his quest to recover ever longer sediment records, Cesare Emiliani provided much of the impetus for pilot drilling efforts that later led to the creation of JOIDES and to the birth of the Deep Sea Drilling Project (DSDP). In 1963, as an outgrowth of his proposal for a LOCO (LOng COres) project, he acted as chief scientist on the Submarex cruise that drilled the first long core (21.7 m) into Pliocene–Pleistocene sediments on the Nicaraguan Rise in the Caribbean Sea. This cruise helped demonstrate the technical feasibility of scientific drilling at sea, and marked the beginnings of work that continues today with the efforts of the international Ocean Drilling Program (ODP) community.

Appropriately enough, the scientists and crew of Leg 165 celebrated the historic drilling of Site 1000, a major milestone in the history of DSDP/ODP, at a location on the Nicaraguan Rise a mere 250 km southwest of the original LOCO site.

ACKNOWLEDGMENTS

The Scientific Party thanks the many people who played a crucial role in making Leg 165 a success and in producing this volume. In particular, we thank Mike Storms, ODP Operations Manager, for his cheerful spirit in making seemingly endless time estimates of drilling scenarios, observer transfers, and transits; Tim Francis for the multinational logistical legwork and helping us with revised drilling plans; Lorraine Southey for her patience and professionalism during our sampling of "critical boundaries"; Wayne Malone, and all the Sedco drillers and roughnecks; Captain Ed Oonk and the ship's crew for getting us there and back; the Catermar team, headed by Alex Sousa, for delicious meals and clean, comfortable living.

We also thank the nations of Colombia, Honduras, Jamaica, and Venezuela for granting us permission to drill in their territorial waters and for providing pleasant, enthusiastic observers. A very special thank you is extended to Michiko Hitchcox and all the marine technicians for their assistance, hard work, and professionalism.

We are grateful to Chris Mato, John Miller, and the Gulf Coast Repository staff for their assistance with special shore-based sampling of the Cariaco Basin cores and the Cretaceous/Tertiary boundary interval. David Black and Matthew Lynn provided additional science support with shore-based description and color scanning of the Cariaco cores. Walter Hale and Alex Wuelbers of the Bremen Core Repository and Beth Lacey assisted with shore-based sampling not completed on the ship.

Finally, we thank the ODP editorial staff and illustrators for helping us put the *Initial Reports* volume together.