

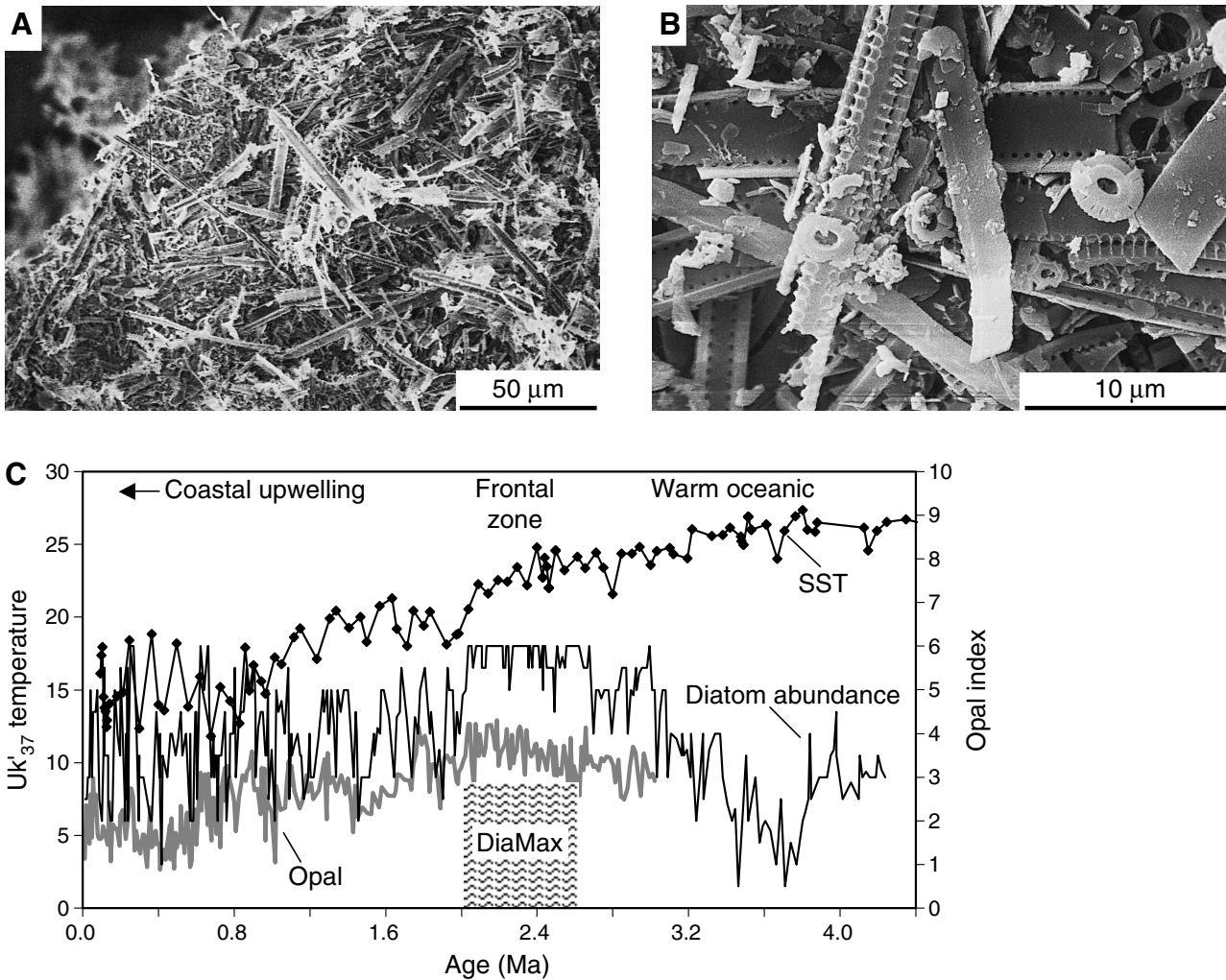
BENGUELA CURRENT SITES 1075-1087



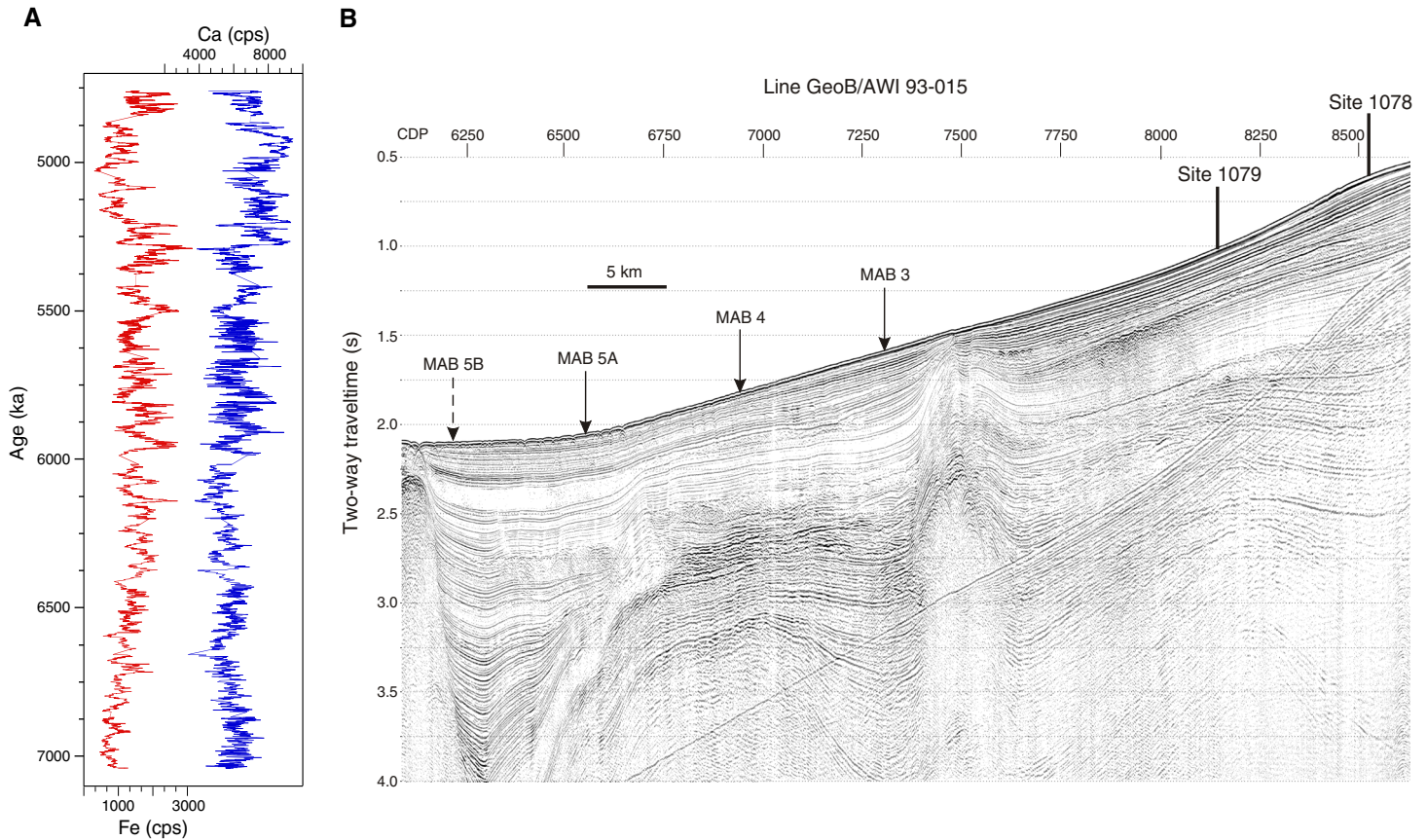
VOLUME 175 SCIENTIFIC RESULTS

PROCEEDINGS OF THE OCEAN DRILLING PROGRAM

Prepared by the
OCEAN DRILLING PROGRAM, TEXAS A&M
UNIVERSITY
in cooperation with the
NATIONAL SCIENCE FOUNDATION and JOINT
OCEANOGRAPHIC INSTITUTIONS, INC.



Frontispiece 1. Scanning electron microscope photographs of a dry piece of sediment from a *Thalassiothrix antarctica*-rich interval (Sample 175-1084A-47X-2W, 70–73 cm). **A.** General aspect. **B.** Close-up view. Note the fragments of *Thalassiothrix* and the presence of coccoliths. **C.** The sea-surface temperature (SST) record derived from the Uk'37 index (alkenones), diatom abundance, and opal index from Site 1084. Note the diatom maximum (DiaMax) in the frontal zone and the decrease in abundance toward the warm oceanic region.



Frontispiece 2. A. A high-resolution graph shows Fe (red line) and Ca (blue line) intensities from Ocean Drilling Program (ODP) Site 1085. The late Miocene–early Pliocene records of Fe and Ca intensities were measured (every 4 cm) by a nondestructive X-ray fluorescence core scanner at the ODP core repository in Bremen, Germany. The astronomically calibrated ages were obtained from the high-resolution benthic $\delta^{18}\text{O}$ record at Site 1085. **B.** Seismic line GeoB/AWI 93-015 at Sites 1078 and 1079. The common depth point (CDP) interval is 25 m for a shotpoint spacing of 25 m. Seismic data are 24-fold stacked and are not migrated. Site 1078 is located at CDP 8550, and Site 1079 is at CDP 8150. Four additional sites (MAB 3, 4, 5A, and 5B) were originally proposed; one (MAB 5B) was withdrawn before the safety review.

PROCEEDINGS OF THE OCEAN DRILLING PROGRAM

Volume 175
Scientific Results
Benguela Current

Covering Leg 175 of the cruises of the Drilling Vessel *JOIDES Resolution*
Las Palmas, Canary Islands, to Cape Town, South Africa
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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.

Current policy requires that all figures published in *Scientific Results* volumes of the *Proceedings of the Ocean Drilling Program* be provided by the authors.

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).

This volume includes 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 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 looking aft toward the bridge of the *JOIDES Resolution* is by ODP Photographer Roy Davis.

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

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

PREFACE

THE VOYAGES OF DISCOVERY

The *Scientific Results* volumes of the *Proceedings of the Ocean Drilling Program* are about Earth and her oceans.

These volumes contain contributions to a better understanding of the history of our planet through time. This exploration of Earth's past is based on scientific analyses of layers of strata sampled by the *JOIDES Resolution* at key locations throughout the global ocean. These volumes are a tribute to the scientific exploration carried out by the men and women who contributed to these voyages of discovery. Like the pioneering exploration and research of Captain Cook aboard the first *Resolution*, these volumes are a credit to the human spirit, which sees no boundaries.

The papers in this volume are published in a new online format that will be archived on CD-ROM. The *Proceedings* contents are available to students, scientists, and the public throughout the world. Volumes, once housed in the libraries of the member nations of ODP, are now published on the Internet for a worldwide audience and are also available in CD-ROM format. This electronic publication enables future investigators to gain easier access to the results of ocean drilling research. I acknowledge and thank the authors for their contributions and willingness to participate in this new venture.

Each *Scientific Results* volume has an Editorial Review Board that is responsible for obtaining peer reviews of papers submitted to the volume. This board usually is made up of the two co-chief scientists for the cruise, the ODP staff scientist for the cruise, and one external specialist who is familiar with the geology of the investigated area. ODP staff coordinate the peer-review process and also edit and produce each paper.

Each *Scientific Results* volume contains one leg synthesis paper and other peer-reviewed papers that present the results of extensive research in various aspects of scientific ocean drilling related to each leg. Each paper submitted to a *Scientific Results* volume undergoes rigorous peer review by at least two specialists in the author's research field. Volumes may also contain short reports of useful data. These Data Reports do not include interpretation of results and are peer-reviewed by at least one specialist. We seek to maintain a peer-review system comparable to those of the most highly regarded journals in the geological sciences.

To acknowledge the contributions made by this volume's Editorial Review Board, the Board members are designated Editors of the volume. Reviewers of manuscripts for this volume, whose efforts are so essential to the success of the publication, are listed without attribution to any particular manuscript.

On behalf of the Ocean Drilling Program, I extend sincere appreciation to the members of the Editorial Review Board and to the reviewers for generously contributing their time and effort. This process ensures that only papers of high scientific quality are published in the *Scientific Results* volumes.

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- 15. Data Report: Petrographic, Cathodoluminescent, and Compositional Characteristics of Organogenic Dolomites from the Southwest African Margin**
Peir K. Pufahl and Gerold Wefer
- 16. Data Report: Evidence of the Dissolution of Fine-Grained Magnetic Minerals from Measurements of Natural and Laboratory-Induced Remanent Magnetizations at Site 1077**
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- 17. Data Report: Carbonate, Organic Carbon, and Opal Concentrations and Organic $\delta^{13}\text{C}$ Values of Sediments from Sites 1075–1082 and 1084, Southwest Africa Margin**
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- 18. Fluctuations in Productivity and Upwelling Intensity at Site 1083 during the Intensification of the Northern Hemisphere Glaciation (2.40–2.65 Ma)**
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- 19. Late Quaternary Productivity Fluctuations off Angola: Evidence from Benthic Foraminifers, Site 1079**
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- 20. Data Report: A Revised Composite Depth Record for Site 1077 Based on Magnetic Susceptibility and XRF Core Scanner (CORTEX) Data**
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- 21. Walvis Paradox Confirmed for the Early Quaternary at the Southern End of the Namibia Upwelling System, ODP Site 1085**
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- 22. An Astronomically Calibrated Age Model for Pliocene Site 1085, ODP Leg 175**
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- 23. Reconstructing the Climatic History of the Western Coast of Africa over the Past 1.5 m.y.: A Comparison of Proxy Records from the Congo Basin and the Walvis Ridge and the Search for Evidence of the Mid-Pleistocene Revolution**
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CD-ROM CONTENTS: ASCII TABLES

This CD-ROM contains **ASCII** versions of selected geochemical and coarse-fraction foraminifer data tables. A complete listing of the ASCII data tables can be found below.

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

PC COMPUTERS

By default, 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 systems: View > Folder Options > File Types.

MAC 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 1

Table T1. Results of coarse fraction analysis, Site 1085.

Table T2. Results of geochemical analysis, Site 1085.

Table T3. Results of organic carbon isotope analyses, Site 1085.

CD-ROM CONTENTS: OVERSIZED TABLE

This oversized table is available in PDF format.

Chapter 14

Table T1. Census counts of radiolarian taxa, Hole 1082A.

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 175 Site Map

ODP Map (Legs 100–175)

DSDP Map (Legs 1–96)

CD-ROM CONTENTS: INDEX TO LEG 175 *INITIAL REPORTS AND SCIENTIFIC RESULTS VOLUMES*

The index covers both the *Initial Reports* and *Scientific Results* portions of Volume 175 of the *Proceedings of the Ocean Drilling Program*. The index contains a subject and taxonomic index.

[Index to Leg 175](#)

CD-ROM CONTENTS: COMPILED ELECTRONIC INDEX

The Compiled Electronic Index of the *Proceedings of the Ocean Drilling Program* contains the indexes of Volumes 101–173 and 174B–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. For information on using the Acrobat search function, see [“Searching a PDF Document”](#) in README.PDF.

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README.PDF

(Information about the volume CD-ROM)

README.TXT

(Information about the volume CD-ROM in ASCII format)

ACROREAD

(Acrobat Reader 4.0.5 installation software and instructions for different platforms)

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README.TXT

MAPS

(Drilling location maps)

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(Leg 175 site map)

ODPMAP.PDF

(ODP map, Legs 100 through 175)

DSDPMAP.PDF

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SR175_01.PDF (Data Report: Sand Fraction, Carbonate, and Organic Carbon Contents)

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SR175_03.PDF (Radiolarians from Northern Cape Basin)

SR175_04.PDF (Pliocene–Pleistocene Opal Records)

SR175_05.PDF (Analysis of Lipid Biomarkers in Sediments)

SR175_06.PDF (Miocene–Pleistocene Record of Carbon Burial)

SR175_07.PDF (Late Quaternary Record of Planktonic Foraminiferal Species Distribution)

SR175_08.PDF (Data Report: Magnetic Properties of Core Sediments)

SR175_09.PDF (Data Report: Sedimentation Rates from Milankovitch Periodicity)

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SR175_11.PDF (Siliceous Phytoplankton Productivity Fluctuations)

SR175_12.PDF (Stable Isotope Record of the Last 500 k.y. at Site 1087)

SR175_13.PDF (Data Report: Magnetic Properties and XRF-Scanner Data)

SR175_14.PDF (Late Cenozoic Radiolarians)

SR175_15.PDF (Data Report: Characteristics of Organogenic Dolomites)

SR175_16.PDF (Data Report: Dissolution of Fine-Grained Magnetic Minerals)

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		SR175_21.PDF (Walvis Paradox Confirmed)
		SR175_22.PDF (Astronomically Calibrated Age Model)
		SR175_23.PDF (Reconstructing Climatic History)
	TABLES (Tables in ASCII format of geochemical and coarse-fraction foraminifer data)	SR175_01 (Chapter 1 files)
		README.TXT
	OVERSIZE (Large-format table)	SR175_14 (Chapter 14 file)
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INDEX.PDX (Acrobat file used to enable Acrobat Search of the 175 <i>Scientific Results</i>)		
ODPINDEX (Compiled Electronic Index of the <i>Proceedings of the Ocean Drilling Program</i>)	101NDX.PDF through 173NDX.PDF, 174BNDX.PDF, and 175NDX.PDF (Index files)	
	NDX.PDX (Acrobat file used to enable Acrobat Search of the Compiled Electronic Index)	