



**Frontispiece.** The seafloor instrumentation that is part of the borehole geophysical observatory NEREID-2 (ODP Site 1151) as photographed by the JAMSTEC remotely operated vehicle (ROV) *Dolphin 3K* in September 1999. The polygonal-shaped object at the bottom of the photograph is the top portion of the reentry cone. The battery frame sits on top of the reentry cone and contains the batteries and storage acquisition module (SAM). The riser assembly, which is the top part of the borehole instrument string, passes through the middle of the battery pack. The borehole instruments are connected via four cables to the multiple-access expandable gateway (MEG), which is a stainless steel canister filled with electrical components that sits on the riser (both the MEG and the riser are visible at the top of the photograph). The bright lever at the top of the battery frame can be used by the ROV to eject the SAM. The slanted protective cover on the SAM is removed by the ROV to allow access to a temporary recording and communication device, referred to as the back from ocean bottom (BOB) module. The handle to the left of the lever is an underwater mateable connector that connects the MEG to the battery and to the SAM unit (yellow cable lying on the gridwork). The ROV makes this connection, thus providing battery power to the borehole instruments. The large circular holes in the gridwork allow access to the battery anodes, which can be replaced by an ROV when consumed.



# PROCEEDINGS OF THE OCEAN DRILLING PROGRAM

Volume 186  
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Western Pacific Geophysical Observatories

Covering Leg 186 of the cruises of the Drilling Vessel *JOIDES Resolution*  
Yokohama, Japan, to Yokohama, Japan  
Sites 1150 and 1151  
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Abbreviations for names of organizations and publications in ODP reference lists follow the style given in *Chemical Abstracts Service Source Index* (published by American Chemical Society).

The bulk of the shipboard-collected data from this leg is available on the World Wide Web and is accessible at [www-odp.tamu.edu/database](http://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](mailto:database@odpemail.tamu.edu).

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 in PDF format.

Beginning with *Initial Reports* Volume 176 and *Scientific Results* Volume 169, all *Proceedings* volumes will be published on CD-ROM and the World Wide Web at [www-odp.tamu.edu/publications](http://www-odp.tamu.edu/publications).

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Cover photograph by Alan T. Linde is of a battery pack for a borehole geophysical observatory being lowered from the *JOIDES Resolution* to the seafloor during Leg 186.

# 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.

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 seven 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 eleven 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 logging services.

JOI, TAMU, and LDEO have worked together successfully for many years to manage the Ocean Drilling Program. We look forward to many exciting discoveries and continued international collaboration as we further our scientific mission, especially the planning for the future of ocean drilling beyond 2003.

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Each cruise on board the *JOIDES Resolution* renders new challenges, and Leg 186 was no exception. The unprecedented installation of permanent borehole geophysical laboratories required a complex operation that demanded the development of new technical instrumentation. The observatory project was mainly supported by the Ocean Hemisphere Network of Japan. The goals of Leg 186 would not have been realized without the invaluable support and help of the members of the ODP/TAMU staff and the Sedco crew; their enthusiasm for solving new problems was a key to the success of the cruise. Finally, the hard work and competence of the ODP Publication Services staff helped to improve the quality and readability of this volume.



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### CORE DESCRIPTIONS

Digital core images, visual core descriptions (VCDs), and smear-slide data tables are included in this section. VCDs and smear-slide data tables are combined into one PDF file for each site. ASCII versions of the smear-slide data tables are also included in the TABLES directory.

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<sup>1</sup>Chapter 1 appears in printed format and on the *Initial Reports* CD-ROM included with this booklet. All other contents are available on the volume CD.

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## ASCII TABLES

The *Initial Reports* CD-ROM contains ASCII versions of selected tables in ASCII format of coring summaries, lithology, biostratigraphy, paleomagnetism, geochemistry, physical properties, and structural geology, and all of the smear-slide data tables presented under "Core Descriptions." For a complete listing, see **186IR.PDF** on the *Initial Reports* CD-ROM.

## DRILLING LOCATIONS 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 on the *Initial Reports* volume CD-ROM in PDF format.

## 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 186 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, color reflectance, and moisture and density). 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](http://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 Lamont-Doherty Earth Observatory, Columbia University, PO Box 1000, Route 9W, Palisades NY 10964, USA; Tel: (914) 365-8672; Fax: (914) 365-3182; E-mail: [borehole@ldeo.columbia.edu](mailto:borehole@ldeo.columbia.edu).

The majority of the core data on the CD are available on the Web at [www-odp.tamu.edu/database](http://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](mailto: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 101–166. 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

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|---|---|--|
| <b>186IR.PDF</b><br>(Preliminary pages and table of contents)   |   |  |
| <b>README.PDF</b><br>(Information about the volume CD-ROM)  |   |  |
| <b>README.TXT</b><br>(Information about the volume CD-ROM in ASCII format)                              |   |  |
| <b>ACROREAD</b><br>(Acrobat Reader 4.0 installation software and instructions for different platforms)  | <b>4.0</b>  | <b>MAC</b>   |
|   |   | <b>WINDOWS</b>                                     |
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|   | <b>README.TXT</b>   |  |
| <b>MAPS</b><br>(Drilling locations maps)  | <b>186_MAP.PDF</b> (Leg 186 site map)   |  |
|   | <b>ODPMAP.PDF</b> (ODP map, Legs 100 through 186)   |  |
|   | <b>DSDPMAP.PDF</b> (DSDP map, Legs 1 through 96)  |  |
| <b>VOLUME</b><br>(Leg 186 <i>Initial Reports</i> volume)  | <b>CHAPTERS</b><br>(Volume chapters)  | <b>Leg 186 Summary: IR186_01.PDF</b>               |
|   |   | <b>Explanatory Notes: IR186_02.PDF</b>             |
|   |   | <b>Borehole Instrument Package: IR186_03.PDF</b>   |
|   |   | <b>Site 1150: IR186_04.PDF</b>                     |
|   |   | <b>Site 1151: IR186_05.PDF</b>                     |
|   | <b>CORES</b><br>(Visual core descriptions, smear-slide data tables, and digital core images)  | <b>Site 1150: COR_1150.PDF</b>                     |
|   |   | <b>Site 1151: COR_1151.PDF</b>                     |
|   |   | <b>IMAGES</b> (PDF files of core images)           |
|   | <b>TABLES</b><br>(Selected tables in ASCII format of coring summaries, lithology, biostratigraphy, paleomagnetism, geochemistry, physical properties, and structural geology, and smear-slide data) | <b>186IR_04</b> (Site 1150 files)                  |
|   |   | <b>186IR_05</b> (Site 1151 files)                  |
|   |   | <b>S_SLIDES</b> (Sites 1150 and 1151 smear slides) |
|   |   | <b>README.TXT</b>                                  |
|   | <b>INDEX.PDX</b><br>(Acrobat file used to enable Acrobat Search of the 186 <i>Initial Reports</i> )   |  |
| <b>ODPINDEX</b><br>(Compiled Electronic Index of the <i>Proceedings of the Ocean Drilling Program</i> ) | <b>101NDX.PDF through 166NDX.PDF</b><br>(Index files)   |  |
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