



PROCEEDINGS OF THE INTEGRATED OCEAN DRILLING PROGRAM

VOLUME 320/321 EXPEDITION REPORTS PACIFIC EQUATORIAL AGE TRANSECT

Expeditions 320 and 321 of the riserless drilling platform
from and to Honolulu, Hawaii (USA)

Sites U1331–U1336

5 March–4 May 2009

and

Honolulu, Hawaii (USA), to San Diego, California (USA)

Sites U1337–U1338

4 May–22 June 2009

Volume authorship

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Published by
Integrated Ocean Drilling Program Management International, Inc.,
for the Integrated Ocean Drilling Program

Prepared by
U.S. Implementing Organization Science Services, Texas A&M University

Publisher's notes

Funding for the program was provided by the following agencies at the time of this expedition:

National Science Foundation (NSF), United States

Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan

European Consortium for Ocean Research Drilling (ECORD)

Ministry of Science and Technology (MOST), People's Republic of China

Korea Institute of Geoscience and Mineral Resources (KIGAM)

Australian Research Council (ARC) and New Zealand Institute for Geological and Nuclear Sciences (GNS), Australian/New Zealand Consortium

Ministry of Earth Sciences (MoES) India

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Examples of how to cite this volume or part of this volume are available at publications.iodp.org/proceedings/320_321/32021bib.htm.

Abbreviations for names of organizations and publications in IODP reference lists follow the style given in *Chemical Abstracts Service Source Index* (published by American Chemical Society).

The bulk of the shipboard-collected core data from this expedition is accessible from Integrated Ocean Drilling Program U.S. Implementing Organization (IODP-USIO) Science Services, Texas A&M University (TAMU), at iodp.tamu.edu/database/index.html. If you cannot access this site or need additional data, please contact:

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Supplemental data were provided by the authors and may not conform to IODP publication formats.

Some close-up core photographs have been tonally enhanced to better illustrate particular features of interest. High-resolution images are available upon request.

Cover photograph shows the *JOIDES Resolution*. Photograph by Bill Crawford.

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ISSN

DVD:1930-1022; World Wide Web: 1930-1014



Foreword

By Integrated Ocean Drilling Program Management International, Inc.

The Integrated Ocean Drilling Program (IODP) is now in the latter half of its decadal program (2003–2013). As envisioned in the Initial Science Plan (ISP), IODP expeditions take advantage of three scientific ocean drilling platforms that enable us to cover unprecedented areas of wide oceans, from ice-covered shallow water to full ocean depths. Drilling miles of depth below seafloor, now part of IODP capabilities, is the major advance from the program predecessors, the Deep Sea Drilling Project and the Ocean Drilling Program. The living Earth is a dynamic system that is continuously evolving. IODP seeks to understand this complex and unique system through scientific ocean drilling, sampling, and experimenting in deep holes, along with advancement of related scientific disciplines. IODP is an international collaboration among scientists and nations with keen aspirations to attain the scientific goals of the ISP. IODP currently includes participating members from 24 nations.

The *Proceedings* present the scientific and engineering results of IODP drilling projects, each designed to better understand the past, present, and future of the Earth system.

IODP expeditions begin with scientists who submit research drilling proposals to test new and innovative ideas, then the proposals progress to international scientific advisors (Science Advisory Structure) who nurture, evaluate, rank, and prioritize proposals. Scientists also schedule the science operations, select science party members from scores of international scientists qualified to participate, plan platform operations, ready the drillship, and choose borehole locations. The science party, collectively and individually, conducts science on board and on shore. The co-chief scientists on each expedition are responsible for synthesizing the scientific results as hallmark of expedition.

Ocean-drilling achievements help us to understand and interpret phenomena in various parts of the Earth system. Achievements in the two legacy drilling programs have validated the scientific concepts behind plate tectonics, contributed to the understanding of ocean circulation changes, and extended our knowledge of long- and short-term climate change. IODP is truly an expansion and extension of the scientific research conducted by the legacy programs, engaging in cutting-edge research concerning topics of global importance.

IODP drilling platform operations are conducted by three Implementing Organizations (IOs). Riserless platform operations are conducted by the United States Implementing Organization (USIO), comprising the Consortium for Ocean Leadership, Inc., Texas A&M University through the Texas A&M Research Foundation, and Lamont-Doherty Earth Observatory of Columbia University. Riser platform operations are conducted by the Japan Agency for Marine-Earth Science and Technology through Japan's Center for Deep Earth Exploration in cooperation with the Center for Advanced Marine Core Research at Kochi University. Mission-specific platform operations are conducted by the European Consortium for Ocean Research Drilling (ECORD) Science Operator, comprising the British Geological Survey, Bremen University, and the European Petrophysics Consortium. The European IO currently represents the ocean-drilling efforts of 16 nations in Europe, plus Canada.

The discoveries presented in this volume build upon layers of knowledge and science developed over roughly the last fifty years. Expedition *Proceedings* are published by IODP Management International for IODP under the sponsorship of the U.S. National Science Foundation (NSF), Japan's Ministry of Education, Culture, Sports, Science and Technology, and other IODP members. The material is based upon research supported under Contract OCE-0432224 from NSF.

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Core descriptions

Visual core descriptions (VCDs), smear slide data tables, thin sections, chert/porcellanite logs, and digital images are included in this section. VCDs, smear slides, and thin sections are combined into a single PDF file for each site. The entire set of core images in PDF are available in the IMAGES directory.

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Expedition research results

Data reports

Titles are available in [HTML](#) pending completion of the volume.

Syntheses

See “[Syntheses](#)” in the Expedition-related bibliography.

Supplementary material

Supplementary material for this volume includes biostratigraphy (age datums in Microsoft Excel and Word formats) and paleomagnetism data in Microsoft Excel. See [README.TXT](#) in the SUPP_MAT directory for a full listing of directories and files, or see the [Directory structure](#) for the names of the main subdirectories.

Drilling location maps

A site map showing the drilling locations for this expedition and maps showing the drilling locations of all Integrated Ocean Drilling Program (IODP), Ocean Drilling Program (ODP), and Deep Sea Drilling Project (DSDP) drilling sites are available in PDF. These maps were produced using Generic Mapping Tools (GMT) of Paul Wessel and Walter H.F. Smith (gmt.soest.hawaii.edu/).

[IODP Expedition 320/321 site map](#)

[IODP map](#) (Expeditions 301–312, 314–316, and 320–321)

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Expedition-related bibliography

IODP publications

Scientific Prospectus

Pälike, H., Lyle, M.W., Ahagon, N., Raffi, I., Gamage, K., and Zarikian, C.A., 2008. Pacific equatorial age transect. *IODP Sci. Prosp.*, 320/321. doi:10.2204/iodp.sp.320321.2008

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*Directory structure reflects the Expedition Reports content and volume material produced on DVD-ROM.

