



**PROCEEDINGS OF THE
INTEGRATED OCEAN
DRILLING PROGRAM
VOLUME 310 EXPEDITION REPORTS
TAHITI SEA LEVEL**

Expedition 310 of the mission-specific drilling platform
from and to Papeete, Tahiti, French Polynesia
Sites M0005–M0026
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Volume Authorship

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and the Expedition 310 Scientists

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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 participating agencies, Integrated Ocean Drilling Program Management International, Inc., or the Integrated Ocean Drilling Program Implementing Organizations.

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 and a complete set of the logging data from this expedition are accessible at iodp.wdc-mare.org. If you cannot access this site or need additional data, please contact

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Some close-up core photographs have been tonally enhanced to better illustrate particular features of interest.

Cover photograph is of a coral reef, a treasure box of Earth's sea level and climatic history. Photograph by Gilbert Camoin.

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Foreword

By Integrated Ocean Drilling Program Management International, Inc.

The Integrated Ocean Drilling Program (IODP) is the most ambitious ocean exploration and drilling program ever undertaken. With multiple platforms and multiple partners, our research spans the globe and truly represents international collaboration and diplomacy among scientists and nations interested in attaining scientific goals.

The *Proceedings* present the scientific and engineering results of IODP drilling projects, each an important component of an international program designed to better understand Earth, its environmental changes and processes, the deep biosphere, and climate change.

The collective effort required to conduct each IODP expedition is colossal. Beginning with scientists who submit ocean drilling research proposals, there are others who 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. There are onboard logistics to manage and critical communications to coordinate among various academic institutions, governments, and national science organizations. And the resulting data must be managed and made accessible to scientists, particularly those who will prepare future proposals. Every aspect of planning an IODP expedition takes a village—or several. There are many participants and many more stakeholders.

Ocean-drilling achievements, however complex, help us understand extraordinary linkages and interpret relationships as they exist in various parts of the Earth system. Achievements in two legacy drilling programs (the Ocean Drilling Program and Deep Sea Drilling Project) 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—scientific information at the foundation of our current drilling program.

IODP drilling platform operations are conducted by three Implementing Organizations (IOs). Riserless platform operations are conducted by the JOI Alliance, comprising the Joint Oceanographic Institutions, 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, 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. At the start of this drilling project, IODP involved 20 nations.

The discoveries discovered 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 Culture, Education, 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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We would like to thank all the people and institutions that helped us to convert an ambitious and challenging project into a very successful expedition that was the first Ocean Drilling Program (ODP)/Integrated Ocean Drilling Program (IODP) program to be conducted in a shallow-water environment.

This project was born in 1998 when the concept of mission-specific platforms for future IODP expeditions was in the early phase of discussion. We want to especially thank John Ludden and Catherine Mével for their encouragement and support at this stage and during the entire scientific planning of the expedition.

The group of proponents of Proposal 519 must be acknowledged for its major contribution in developing the proposed science. Philippe Pézard was involved in the early phase of the proposal and defined an ambitious logging plan. The project has received constant support from the ODP and IODP scientific advisory structure throughout the successive review cycles. We appreciated the constructive exchanges with the various panels and their understanding as the objectives and the operational requirements of our proposal were different from those of the proposals that they usually deal with.

During the planning phase, we have benefited from the unfailing support from various institutions and colleagues who helped us, directly or indirectly. By organizing an International Workshop on Submerged Coral Drilling in September 2000, Terry Quinn and Sandy Tudhope have created the opportunity to provide new insights on the drilling requirements to achieve our objectives. The site survey cruise was supported by the Institut de Recherche pour le Développement (IRD) and the Centre National de la Recherche Scientifique (CNRS). During this cruise, Gilles Lericolais (IFREMER) was able to provide seismic data, although the imaging of recent reefs is a very challenging task. The authorities of French Polynesia have been very supportive; we would like to thank especially Priscille Tea Frogier.

Once Expedition 310 was placed on the drilling schedule, the ECORD Science Operator (ESO) worked tirelessly to make this program happen under the best conditions and to ensure the success of this expedition. There are many to thank in ESO, including their subcontractors, for their role during the planning of the expedition, the offshore phase, and the Science Party: Dan Evans, Colin Brett, Ursula Röhl, Tim Brewer, Jenny Inwood, Holger Kuhlmann, Alex Wuelbers, Hendrik Braaksma, Florence Einaudi, Gilles Henry, Hans Wallrabe-Adams, Davie Baxter, Dave Smith, and Eileen Gillespie. We want to acknowledge especially Dave McNroy, Alister Skinner, and Christian Wilson for their dedication during the offshore phase; it has been a great pleasure to work with them, and our close collaboration was a key of the success of the expedition.

The talented drillers from Seacore Ltd. have done an incredible job by delivering exceptional cores, always with humor and grace. We cannot end without mentioning the crew of the *DP Hunter* and Captain William Roger, who made our life pleasant during the expedition.

This expedition will become a milestone in scientific drilling and will stand as an unforgettable human adventure.

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Core descriptions

Visual core descriptions (VCDs) are included in this section. VCDs are combined into one PDF file for each group of sites.

Maraa western transect: Sites M0005–M0007

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Maraa eastern transect: Sites M0015–M0018

[Visual core descriptions](#)

Tiarei inner ridge: Site M0023

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Tiarei outer ridge: Sites M0009, M0021, and M0024–M0026

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Tiarei marginal sites: Sites M0008, M0010–M0014, and M0022

[Visual core descriptions](#)

Faaa: Sites M0019 and M0020

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Expedition research results

Data reports

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

Syntheses

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

Supplementary material

Supplementary material for this volume includes whole-round core images in JPEG format, wireline logging data in PDF format, interstitial water data in Excel format, and movies in QuickTime format. 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 format. These maps were produced using Generic Mapping Tools (GMT) of Paul Wessel and Walter H.F. Smith (gmt.soest.hawaii.edu).

[IODP Expedition 310 site map](#)

[IODP map](#) (Expeditions 301–312)

[ODP map](#) (Legs 100–210)

[DSDP map](#) (Legs 1–96)

Expedition-related bibliography*

IODP publications

Scientific Prospectus

Camoin, G.F., Iryu, Y., McInroy, D., and the Expedition 310 Project Team, 2005. The last deglacial sea level rise in the South Pacific: offshore drilling in Tahiti (French Polynesia). *IODP Sci. Prosp.*, 310. [doi:10.2204/iodp.sp.310.2005](https://doi.org/10.2204/iodp.sp.310.2005)

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Scientific Drilling journal

Pending

*The [Expedition-related bibliography](#) is continually updated online. Please send updates to PubCrd@iodp.tamu.edu.



Proceedings volume

Camoin, G.F., Iryu, Y., McInroy, D.B., and the Expedition 310 Scientists, 2007. *Proc. IODP*, 310: Washington, DC (Integrated Ocean Drilling Program Management International, Inc.). [doi:10.2204/iodp.proc.310.2007](https://doi.org/10.2204/iodp.proc.310.2007)

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