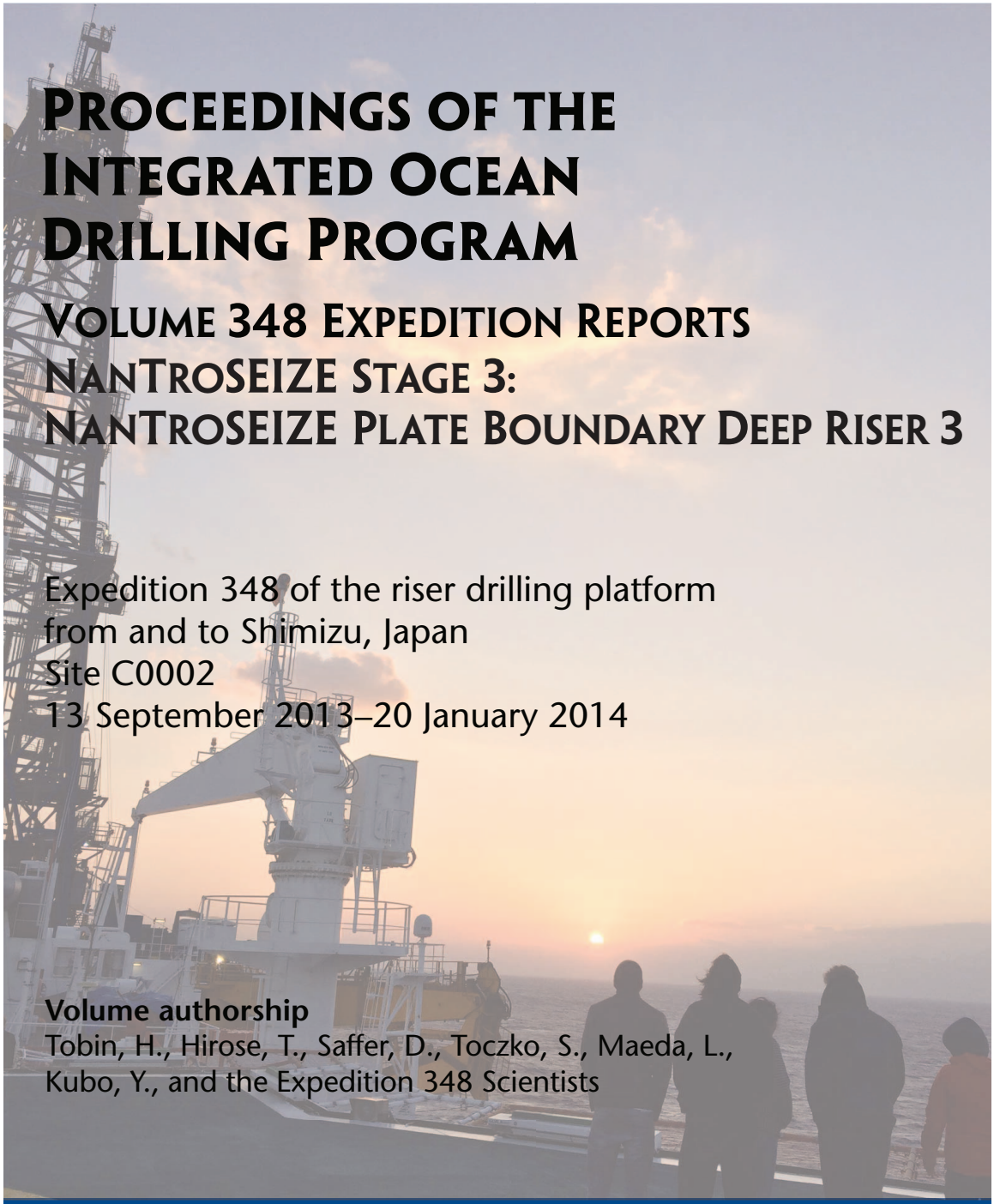

Proceedings of the Integrated Ocean Drilling Program

Volume 348 Expedition Reports
NanTroSEIZE Stage 3:
NanTroSEIZE Plate Boundary Deep Riser 3

Expedition 348 of the riser drilling platform
from and to Shimizu, Japan
Site C0002
13 September 2013–20 January 2014

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JOIDES Resolution Science Operator, Texas A&M University

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Ministry of Earth Sciences (MoES) India

Coordination for Improvement of Higher Education Personnel, Brazil

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, IODP Management International, Inc., or Japan Agency for Marine-Earth Science and Technology.

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 at **sio7.jamstec.go.jp/.**

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

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

Cover photograph shows new year's sunrise 2014 on the D/V *Chikyu*. Photo © JAMSTEC.

Examples of how to cite this volume or part of this volume are available at **publications.iodp.org/proceedings/348/348bib.htm.**

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Foreword

By Integrated Ocean Drilling Program Management International, Inc.

The Integrated Ocean Drilling Program (IODP) concluded its decadal program (2003–2013) in September 2013. As envisioned in the Initial Science Plan (ISP), IODP expeditions utilized three scientific ocean drilling platforms to cover unprecedented areas of wide oceans, from ice-covered shallow water to full ocean depths. The major advance from the program predecessors, the Deep Sea Drilling Project and the Ocean Drilling Program, was the ability to drill miles of depth below seafloor. The living Earth is a dynamic system that is continuously evolving. Among its aims, IODP sought 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 has been an international collaboration among scientists and nations with keen aspirations to attain the scientific goals of the ISP. By the program's end, IODP included participating members from 26 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.

Each IODP expedition started with scientists who submitted research drilling proposals to test new and innovative ideas. These proposals then progressed to international scientific advisors (Science Advisory Structure) who nurtured, evaluated, ranked, and prioritized proposals. Scientists scheduled the science operations, selected science party members from scores of international scientists qualified to participate, planned platform operations, readied the drillship, and chose borehole locations. The science party, collectively and individually, conducted science on board and on shore. The co-chief scientists of each expedition have been responsible for synthesizing the scientific results and will continue in this role as IODP postcruise research results become available.

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 has expanded and extended the scientific research conducted by the legacy programs, engaging in cutting-edge research concerning topics of global importance.

Three Implementing Organizations (IOs) conducted IODP drilling platform operations. Riserless platform operations have been conducted by the U.S. 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 have been 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 have been conducted by the European Consortium for Ocean Research Drilling (ECORD) Science Operator (ESO), comprising the British Geological Survey, the University of Bremen, and the European Petrophysics Consortium. The European IO represented 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. Through September 2013, expedition *Proceedings* were 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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Contents

Expedition reports

Chapters

Expedition 348 summary
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Core descriptions

Visual core descriptions (VCDs), cuttings descriptions, smear slide data, and core images are included in this section. VCDs, cuttings descriptions, and smear slides are combined into PDF files for each site. The entire set of core images in PDF is available in the IMAGES directory.

Site C0002

Visual core descriptions · **Cuttings descriptions** · **Smear slides**

Expedition research results

Data reports

Titles are available in **HTML.**

Syntheses

Titles are available in **HTML.**

Supplementary material

Supplementary material for this volume includes curation data in Microsoft Excel format; drilling mud and daily morning reports in PDF; scanning electron microscope images in TIF, JPG, and PowerPoint formats; smear slide images and descriptions in JPG format and PDF; core and cuttings images in JPG format and cuttings descriptions in PDF; details of unit boundary depths in Microsoft Word format; cuttings images used for visual core description in JPG and TIF formats; and scanned images of visual core description sheets in PDF. See **README.TXT** in the SUPP_MAT directory for a full listing of directories and files.

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 348 site map

IODP map (Expeditions 301–348)

ODP map (Legs 100–210)

DSDP map (Legs 1–96)

Expedition-related bibliography*

IODP publications

Scientific Prospectus

Hirose, T., Saffer, D.M., Tobin, H.J., Toczko, S., Maeda, L., Kubo, Y., Kimura, G., Moore, G.F., Underwood, M.B., and Kanagawa, K., 2013. NanTroSEIZE Stage 3: NanTroSEIZE plate boundary deep riser 3. *IODP Sci. Prosp.,* 348. **doi:10.2204/ iodp.sp.348.2013**

Preliminary Report

Expedition 348 Scientists and Scientific Participants, 2014. NanTroSEIZE Stage 3: NanTroSEIZE plate boundary deep riser 3. *IODP Prel. Rept.,* 348. **doi:10.2204/iodp.pr.348.2014**

Proceedings volume

Tobin, H., Hirose, T., Saffer, D., Toczko, S., Maeda, L., Kubo, Y., and the Expedition 348 Scientists, 2015. *Proc. IODP,* 348: College Station, TX (Integrated Ocean Drilling Program). **doi:10.2204/iodp.proc.348.2015**

Tobin, H., Hirose, T., Saffer, D., Toczko, S., Maeda, L., Kubo, Y., Boston, B., Broderick, A., Brown, K., Crespo-Blanc, A., Even, E., Fuchida, S., Fukuchi, R., Hammerschmidt, S., Henry, P., Josh, M., Jurado, M.J., Kitajima, H., Kitamura, M., Maia, A., Otsubo, M., Sample, J., Schleicher, A., Sone, H., Song, C., Valdez, R., Yamamoto, Y., Yang, K., Sanada, Y., Kido, Y., and Hamada, Y., 2015. Expedition 348 summary. *In* Tobin, H., Hirose, T., Saffer, D., Toczko, S., Maeda, L., Kubo, Y., and the Expedition 348 Scientists, *Proc. IODP,* 348: College Station, TX (Integrated Ocean Drilling Program). **doi:10.2204/iodp.proc.348.101.2015**

Tobin, H., Hirose, T., Saffer, D., Toczko, S., Maeda, L., Kubo, Y., Boston, B., Broderick, A., Brown, K., Crespo-Blanc, A., Even, E., Fuchida, S., Fukuchi, R., Hammerschmidt, S., Henry, P., Josh, M., Jurado, M.J., Kitajima, H., Kitamura, M., Maia, A., Otsubo, M., Sample, J., Schleicher, A., Sone, H., Song, C., Valdez, R., Yamamoto, Y., Yang, K., Sanada, Y., Kido, Y., and Hamada, Y., 2015. Methods. *In* Tobin, H., Hirose, T., Saffer, D., Toczko, S., Maeda, L., Kubo, Y., and the Expedition 348 Scientists, *Proc. IODP,* 348: College Station, TX (Integrated Ocean Drilling Program). **doi:10.2204/iodp.proc.348.102.2015**

Tobin, H., Hirose, T., Saffer, D., Toczko, S., Maeda, L., Kubo, Y., Boston, B., Broderick, A., Brown, K., Crespo-Blanc, A., Even, E., Fuchida, S., Fukuchi, R., Hammerschmidt, S., Henry, P., Josh, M., Jurado, M.J., Kitajima, H., Kitamura, M., Maia, A., Otsubo, M., Sample, J., Schleicher, A., Sone, H., Song, C., Valdez, R., Yamamoto, Y., Yang, K., Sanada, Y., Kido, Y., and Hamada, Y., 2015. Site C0002. *In* Tobin, H., Hirose, T., Saffer, D., Toczko, S., Maeda, L., Kubo, Y., and the Expedition 348 Scientists, *Proc. IODP,* 348: College Station, TX (Integrated Ocean Drilling Program). **doi:10.2204/iodp.proc.348.103.2015**

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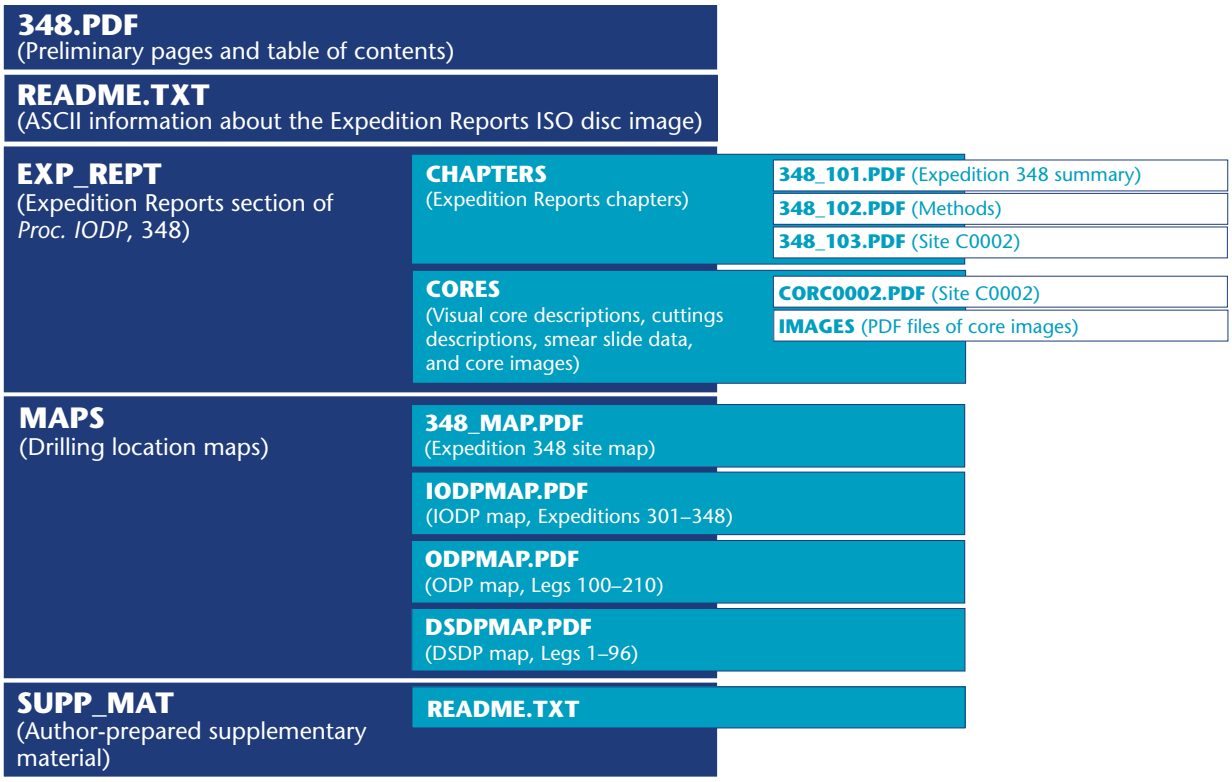

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