

Proceedings of the International Ocean Discovery Program

Volume 359

Maldives Monsoon and Sea Level

Expedition 359 of the riserless drilling platform

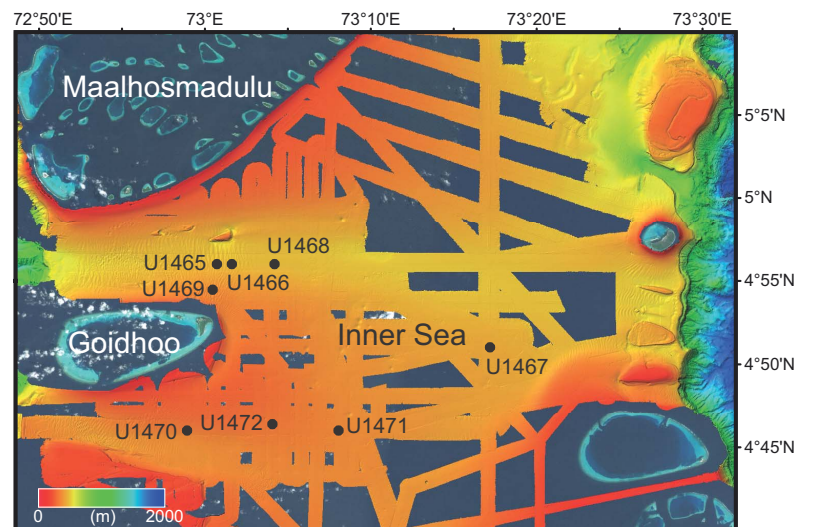
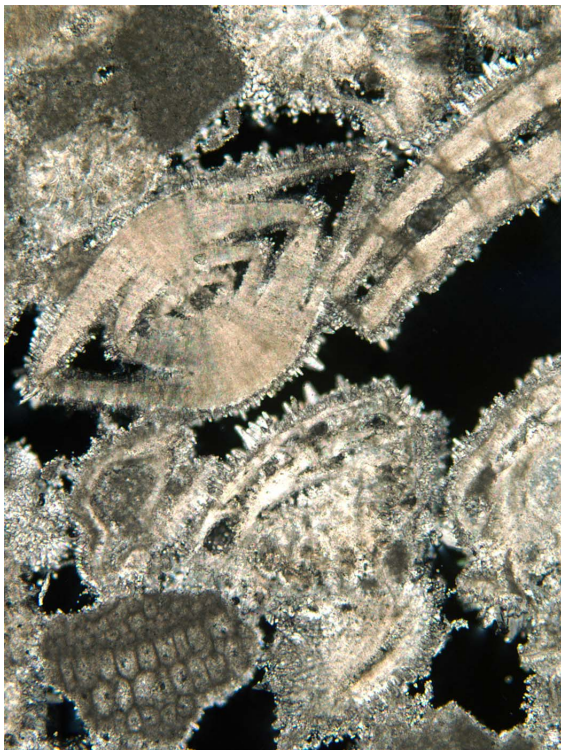
Darwin, Australia, to Colombo, Sri Lanka

Sites U1465–U1472

30 September–30 November 2015

Volume authorship

Betzler, C., Eberli, G.P., Alvarez Zarikian, C.A., and the Expedition 359 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, TAMU, or Texas A&M Research Foundation.

The bulk of the shipboard-collected core data from this expedition is accessible at <http://iodp.tamu.edu/database/index.html>. If you cannot access this site or need additional data, please contact Data Librarian, International Ocean Discovery Program *JOIDES Resolution* Science Operator, Texas A&M University, 1000 Discovery Drive, College Station TX 77845-9547, USA. Tel: (979) 845-8495; Fax: (979) 458-1617; Email: database@iodp.tamu.edu.

A complete set of the logging data collected during the expedition is available at <http://brg.ldeo.columbia.edu/logdb>. If you have problems downloading the data, wish to receive additional logging data, or have questions regarding the data, please contact Database Administrator, Borehole Research Group, Lamont-Doherty Earth Observatory of Columbia University, PO Box 1000, 61 Route 9W, Palisades NY 10964, USA. Tel: (845) 365-8343; Fax: (845) 365-3182; Email: logdb@ldeo.columbia.edu.

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

JRSO expedition photos are the property of IODP and are in the public domain.

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

Cover photograph shows dogtooth cements in *Amphistegina*. Photo credit: IODP JRSO.

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Jeremy R. Young, Santi Pratiwi, Xiang Su, and the Expedition 359 Scientists

Core descriptions

Visual core descriptions (VCDs), smear slides, and thin sections are combined into PDF files for each site. The entire set of core images in PDF is available in the IMAGES directory.

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Supplementary material

Supplementary material for the Volume 359 expedition reports includes DESClogik exports in Microsoft Excel, SHIL log sheets in PDF, and an oversized figure of the transects in AI format with a caption in Microsoft Word. A full list of directories can be found in SUPP_MAT in the volume zip folder or on the [Supplementary material for Volume 359 expedition reports](#) web page.

Expedition research results

Data reports

Titles are available in [HTML](#).

Syntheses

Titles are available in [HTML](#).

Drilling location maps

A site map showing the drilling locations for this expedition and maps showing the drilling locations of all International Ocean Discovery Program (IODP), produced using QGIS (<http://www.qgis.org>), and Integrated Ocean Drilling Program, Ocean Drilling Program (ODP), and Deep Sea Drilling Project (DSDP) expeditions, produced using Generic Mapping Tools (GMT) of Paul Wessel and Walter H.F. Smith (<http://gmt.soest.hawaii.edu>), are available in PDF.

[IODP Expedition 359 site map](#)

[IODP map](#) (Expeditions 349–356 and 359)

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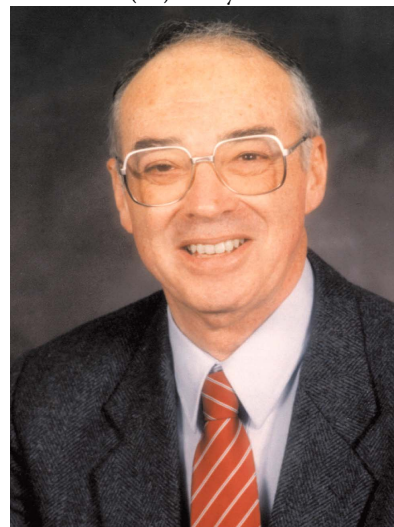
Dedication

We dedicate this volume to Ed Purdy for his seminal work on the Maldives carbonate platform. In addition to his pioneering studies on modern carbonates of the Bahamas and Belize, Ed was a driving force behind seismic and core studies in the Maldives to further the investigation of Neogene platforms and their response to sea level change.

Acknowledgments

This research used samples and data provided by the International Ocean Discovery Program (IODP). We thank all of the personnel aboard the R/V *JOIDES Resolution* during Expedition 359 for their skill and dedication. Particular thanks go to the Technical Support staff for the quality and timeliness of their work. We greatly appreciate the qualified advice from the entire drilling crew and their efforts to core the challenging carbonate sections. The success of the expedition was also enabled by the help of the Environmental Protection and Safety Panel, which allowed us to readjust our drilling strategies even during the expedition. Dr. Mohamed Shainee is thanked for personal support that allowed us to drill in the Maldives. The editorial staff at the IODP *JOIDES Resolution* Science Operator at Texas A&M University is thanked for support with publication of this document. We thank Andre Droxler for initiating the planning for an IODP expedition to the Maldives and the other drilling proposal proponents, as well as the members of the Science Evaluation Panel (Chair: Dick Kroon) for making Expedition 359 possible.

Dr. Edward (Ed) Purdy



Foreword

The International Ocean Discovery Program (IODP) represents the latest incarnation of almost five decades of scientific ocean drilling excellence and is generally accepted as the most successful international collaboration in the history of the Earth sciences. IODP builds seamlessly on the accomplishments of previous phases: the Deep Sea Drilling Project, Ocean Drilling Program, and Integrated Ocean Drilling Program. The 2013–2023 IODP Science Plan (*Illuminating Earth's Past, Present, and Future*) defines four themes and thirteen challenges for this decade of scientific ocean drilling that are both of fundamental importance in understanding how the Earth works and of significant relevance to society as the Earth changes, at least in part in response to anthropogenic forcing. This phase of IODP represents a renewed level of international collaboration in bringing diverse drilling platforms and strategies to increasing our understanding of climate and ocean change, the deep biosphere and evolution of ecosystems, connections between Earth's deep processes and surface manifestations, and geologically induced hazards on human timeframes.

The *Proceedings of the International Ocean Discovery Program* presents the scientific and engineering results of IODP drilling projects, expedition by expedition. As in the preceding Integrated Ocean Drilling Program, expeditions in the new IODP are conducted by three implementing organizations, each providing a different drilling capability. These are the US Implementing Organization (USIO; through September 2014) and the *JOIDES Resolution* Science Operator (JRSO; as of October 2014), providing the leased commercial vessel *JOIDES Resolution* for riserless drilling operations; JAMSTEC's Center for Deep Earth Exploration (CDEX), providing the drillship *Chikyu* for riser and occasional riserless operations; and the European Consortium for Ocean Research Drilling (ECORD) Science Operator (ESO), providing "mission-specific" platforms (MSPs) for expeditions that extend the IODP operational range where neither drillship is suitable, for example, in polar environments and in shallow waters. Scheduling decisions for each capability are made by three independent Facility Boards, each of which includes scientists, operators, and platform funding partners: the *JOIDES Resolution* Facility Board (JRFB), *Chikyu* IODP Board (CIB), and ECORD Facility Board (EFB). At the beginning of the new IODP, the three Facility Boards agreed to utilize Publication Services at the USIO and now the JRSO for production of all expedition *Proceedings* volumes and reports.

The new IODP differs from prior scientific ocean drilling programs in that it has neither a central management organization nor commingled funding for program-wide activities. Yet this phase of IODP retains a fundamental integrative structural element: a "bottom-up" evaluation of all proposals for drilling expeditions by a single advisory structure composed of scientists representing all international program partners. International scientists may submit drilling proposals to the Science Support Office; all submitted proposals are then evaluated by a Science Evaluation Panel in the context of the Science Plan.

The new IODP also has a second internationally integrative level for high-level discussion and consensus-building: the IODP Forum. The Forum is charged with assessing program-wide progress toward achieving the Science Plan. At present, IODP involves 26 international financial partners, including the United States, Japan, an Australia/New Zealand consortium (ANZIC), Brazil, China, India, South Korea, and the eighteen members of ECORD (Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Israel, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and the United Kingdom). This enhanced membership in the new IODP represents a remarkable level of international collaboration that remains one of the greatest ongoing strengths of scientific ocean drilling.

James A. Austin Jr.
Chair, IODP Forum

International Ocean Discovery Program

JOIDES Resolution Science Operator

Website: <http://iodp.tamu.edu>

IODP JRSO

International Ocean Discovery Program
Texas A&M University
1000 Discovery Drive
College Station TX 77845-9547
USA
Tel: (979) 845-2673; Fax: (979) 845-4857
Email: information@iodp.tamu.edu

IODP JRSO Curation and Laboratories

IODP Gulf Coast Repository (GCR)
Texas A&M University
1000 Discovery Drive
College Station TX 77845-9547
USA
Tel: (979) 845-8490; Fax: (979) 845-1303
Email: rumford@iodp.tamu.edu

European Consortium for Ocean Research Drilling, Science Operator (ESO)

Website: <http://www.eso.ecord.org>

IODP ESO Coordinator: Science, Logistics, and Operations

British Geological Survey
The Lyell Centre
Research Avenue South
Edinburgh EH14 4AP
United Kingdom
Tel: (44) 131-667-1000; Fax: (44) 131-668-4140
Email: eso@bgs.ac.uk

IODP ESO Curation and Laboratories

IODP Bremen Core Repository (BCR)
Center for Marine Environmental Sciences (MARUM)
University of Bremen
Leobener Strasse
28359 Bremen
Germany
Tel: (49) 421-218-65560; Fax: (49) 421-218-98-65560
Email: bcr@marum.de

IODP ESO Petrophysics

European Petrophysics Consortium
Department of Geology
University of Leicester
Leicester LE1 7RH
United Kingdom
Tel: (44) 116-252-3611; Fax: (44) 116-252-3918
Email: sjd27@leicester.ac.uk

Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

Website: <http://www.jamstec.go.jp/chikyue>

IODP Japan Science Operator

Center for Deep Earth Exploration (CDEX)
Japan Agency for Marine-Earth Science and Technology
Yokohama Institute for Earth Sciences
3175-25 Showa-machi
Kanazawa-ku, Yokohama
Kanagawa 236-0001
Japan
Tel: (81) 45-778-5643; Fax: (81) 45-778-5704
Email: cdex@jamstec.go.jp

IODP Japan Curation and Laboratories

IODP Kochi Institute for Core Sample Research (KCC)
Japan Agency for Marine-Earth Science and Technology
200 Monobe Otsu
3175-25 Showa-machi
Nankoku City, Kochi 783-8502
Japan
Tel: (81) 88-864-6705; Fax: (81) 88-878-2192
Email: kcc.contact@jamstec.go.jp

Expedition 359 participants*

Expedition 359 scientists

Christian G. Betzler**Co-Chief Scientist**

Institute of Geology
CEN, University of Hamburg
Bundesstrasse 55
Hamburg 20146
Germany

christian.betzler@uni-hamburg.de

Gregor P. Eberli**Co-Chief Scientist**

Department of Marine Geosciences
Rosenstiel School of Marine and Atmospheric Science
University of Miami
Miami FL 33149
USA

geberli@rsmas.miami.edu

Carlos A. Alvarez Zarikian**Expedition Project Manager/Staff Scientist**

International Ocean Discovery Program
Texas A&M University
1000 Discovery Drive
College Station TX 77845
USA

zarikian@iodp.tamu.edu

Montserrat Alonso-García**Paleontologist (foraminifers)**

Instituto Português do Mar e da Atmosfera (IPMA)
Rua Alfredo Magalhães Ramalho, 6
1495-006 Lisboa
Portugal

montserrat.alonso@ipma.pt

Present address:

Centro de Ciências do Mar (CCMAR)
Universidade do Algarve
Campus de Gambelas
8005-139 Faro
Portugal

Or M. Bialik**Sedimentologist**

Dr. Moses Strauss Department of Marine Geosciences
The Leon H. Charney School of Marine Sciences
University of Haifa
Carmel 31905
Israel

obialik@campus.haifa.ac.il

Clara L. Blättler**Inorganic Geochemist**

Department of Geosciences
Princeton University
Guyot Hall
Princeton NJ 08544
USA

blattler@princeton.edu

Junhua Adam Guo**Physical Properties Specialist**

Department of Geological Sciences
California State University Bakersfield
9001 Stockdale Highway
Bakersfield CA 93311
USA

jguo1@csub.edu

Sébastien Haffen**Physical Properties Specialist**

Ecole Nationale Supérieure de Géologie
Université de Lorraine
2 rue du Doyen Marcel Roubault
54501 Vandœuvre-les-Nancy
France

sebastien.haffen@gmail.com

Senay Horozal**Physical Properties Specialist**

Petroleum and Marine Research Division
Korea Institute of Geoscience and Mineral Resources (KIGAM)
Gwahang-no 124, Yuseong-gu
Daejeon 305-350
Republic of Korea

shorozal@kigam.re.kr

Mayuri Inoue**Inorganic Geochemist**

Okayama University
Department of Earth Sciences
3-1-1 Tsushima-naka 700-8530
Japan

inouem@cc.okayama-u.ac.jp

Luigi Jovane**Paleomagnetist**

Instituto Oceanográfico da Universidade de São Paulo
Praça do Oceanográfico 191
São Paulo SP 05508-120
Brazil

jovane@usp.br

*Addresses at time of expedition, except where updated by participants.

Dick Kroon**Paleontologist (foraminifers)**

Department of Geology and Geophysics
University of Edinburgh
Grant Institute, The King's Buildings, James Hutton Road
Edinburgh EH9 3FE
United Kingdom
dick.kroon@ed.ac.uk

Luca Lanci**Paleomagnetist**

Istituto di Scienze della Terra
Università di Urbino
Via S. Chiara 27
61029 Urbino
Italy
luca.lanci@uniurb.it

Juan Carlos Laya**Sedimentologist**

Department of Geology and Geophysics and
Berg-Hughes Center for Petroleum and Sedimentary
Systems
Texas A&M University
Mail Stop 3115
College Station TX 77843-3115
USA
layajc@geos.tamu.edu

Anna Ling Hui Mee**Sedimentologist**

Department of Marine Geosciences
University of Miami
RSMAS MGG N260
Key Biscayne FL 33149
USA
a.ling@rsmas.miami.edu

Thomas Lüdmann**Downhole Measurements**

Institute of Geology
CEN, University of Hamburg
Bundesstrasse 55
20146 Hamburg
Germany
thomas.luedmann@uni-hamburg.de

Masatoshi Nakakuni**Organic Geochemist**

Soka University
Department of Environmental Engineering for Symbiosis
1-236 Tangi-cyo
Hachioji-shi
Tokyo 192-0003
Japan
e13d5702@soka-u.jp

Bejugam N. Nath**Sedimentologist**

Geological Oceanography Division
CSIR—National Institute of Oceanography
Dona Paula
Goa 403004
India
nagender@nio.org

Kaoru Niino**Paleontologist (radiolarians)**

Yamagata University
Graduate School of Science and Engineering
1-4-12 Kojirakawa-machi
Yamagata City 990-8560
Japan
s14e510m@st.yamagata-u.ac.jp

Loren M. Petruny**Paleontologist (benthic foraminifers)**

Environmental Science and Policy Department
David King Hall Room 3005, MSN 5F2
George Mason University
4400 University Drive
Fairfax VA 22030-4444
USA
lpetruny@gmu.edu

Santi D. Pratiwi**Paleontologist (nannofossils)**

Akita University
Faculty of International Resource Science
1-1 Teagata-Gakuencho
Akita 010-8502
Japan
rhabdosphaera@gmail.com

John J.G. Reijmer**Sedimentologist**

Faculty of Earth and Life Sciences
Vrije Universiteit Amsterdam
De Boelelaan 1085
1081 HV Amsterdam
Netherlands
j.j.reijmer@vu.nl

Jesús Reolid**Sedimentologist**

Institute of Geology
CEN, University of Hamburg
Bundesstrasse 55
20146 Hamburg
Germany
jesus.reolid@uni-hamburg.de

Angela L. Slagle**Downhole Measurements**

Lamont-Doherty Earth Observatory
Columbia University
Borehole Building 61 Route 9W
Palisades NY 10964
USA
aslagle@ldeo.columbia.edu

Craig R. Sloss
Sedimentologist

School of Earth, Environment, and Biological Sciences
Queensland University of Technology
R-Block 317, 2 George Street
Brisbane QLD 4001
Australia
c.sloss@qut.edu.au

Xiang Su
Paleontologist (nannofossils)

Key Laboratory of Marginal Sea Geology
South China Sea Institute of Oceanology
Chinese Academy of Sciences
164 West Xingang Road
Guangzhou 510301
China
suxiang@scsio.ac.cn

Peter K. Swart
Inorganic Geochemist

Department of Marine Geosciences
University of Miami
4600 Rickenbacker Causeway
Miami FL 33148
USA
pswart@rsmas.miami.edu

Education and outreach

Juliet M. Crowell
Education/Outreach Officer

1390 Bryant Street Northeast Apartment 304
Washington DC 20018
USA
belize67@aol.com
crowelljuliet@gmail.com

James D. Wright
Stratigraphic Correlator

Department of Earth and Planetary Sciences
Rutgers, The State University of New Jersey
610 Taylor Road
Piscataway NJ 08854-8066
USA
jdwright@rci.rutgers.edu

Zhengquan Yao
Sedimentologist

Department of Marine Geology
First Institute of Oceanography (FIO) State Oceanic
Administration (SOA)
6 Xian Xia Ling Road
Qingdao Shandong 266061
China
yaozq@126.com

Jeremy R. Young
Paleontologist (nannofossils)

Earth Sciences
University College London
Gower Street
London WC1E 6BT
United Kingdom
jeremy.young@ucl.ac.uk

Michelle D. Darrieu
Education/Outreach Officer

Rue de la fauvette, 2
1180 Bruxelles
Belgium
michele_darrieu@hotmail.com

Operational and technical staff

Siem Offshore AS officials

Steve Bradley
Master of the Drilling Vessel

Wayne Malone
Offshore Installation Manager

JRSO shipboard personnel and technical representatives

Robert Aduddell
Engineer

Lisa Crowder
Laboratory Officer

Timothy Blaisdell
Applications Developer

Douglas Cummings
Publications Specialist

Courtney Bouchard
Marine Laboratory Specialist (temporary)

Benjamin Daniel
Thin Section Laboratory

Lisa Brandt
Chemistry Laboratory

William Davidson
Marine Laboratory Specialist (temporary)

Timothy Bronk
Assistant Laboratory Officer

Daniel Fields
Marine Laboratory Specialist (temporary)

Chad Broyles
Curatorial Specialist

Seth Frank
X-Ray/Microbiology Laboratory

Timothy Fulton
Imaging Specialist

Clayton Furman
Logging Engineer

Randy Gjesvold
Marine Instrumentation Specialist

Rachael Gray
Chemistry Laboratory

Margaret Hastedt
Core Laboratory

Sandra Herrmann
Assistant Laboratory Officer

Michael Hodge
Marine Computer Specialist

IODP Publication Services staff*

Douglas Cummings
Graphics Specialist II

Gudelia (“Gigi”) Delgado
Senior Publications Coordinator

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Graphics Specialist II

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Production Specialist IV

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Shana C. Lewis
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Marine Computer Specialist

Mike Meiring
Electronics Specialist

Shawn Miller
Marine Laboratory Specialist (temporary)

Beth Novak
Paleomagnetism Laboratory

Michael Storms
Operations Superintendent

Garrick Van Rensburg
Marine Instrumentation Specialist

Hai (James) Zhao
Applications Developer

Amy McWilliams
Editor IV

Lorri Peters
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Courtney Van Gemert
Production Specialist I

Crystal Wolfe
Production Specialist III

Jean Wulfson
Graphics Specialist III

Ann Yeager
Distribution Specialist

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IODP publications

Scientific Prospectus

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Preliminary Report

Betzler, C.G., Eberli, G.P., Alvarez Zarikian, C.A., and the Expedition 359 Scientists, 2016. *Expedition 359 Preliminary Report: Maldives Monsoon and Sea Level*. International Ocean Discovery Program.

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Expedition reports

Betzler, C., Eberli, G.P., Alvarez Zarikian, C.A., Alonso-García, M., Bialik, O.M., Blättler, C.L., Guo, J.A., Haffen, S., Horozal, S., Inoue, M., Jovane, L., Kroon, D., Lanci, L., Laya, J.C., Ling Hui Mee, A., Lüdmann, T., Nakakuni, M., Nath, B.N., Niino, K., Petruny, L.M., Pratiwi, S.D., Reijmer, J.J.G., Reolid, J., Slagle, A.L., Sloss, C.R., Su, X., Swart, P.K., Wright, J.D., Yao, Z., and Young, J.R., 2017. Expedition 359 summary. *In* Betzler, C., Eberli, G.P., Alvarez Zarikian, C.A., and the Expedition 359 Scientists, *Maldives Monsoon and Sea Level*. Proceedings of the International Ocean Discovery Program, 359: College Station, TX (International Ocean Discovery Program). <http://dx.doi.org/10.14379/iodp.proc.359.101.2017>

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