

Proceedings of the International Ocean Discovery Program

Volume 382

Iceberg Alley and Subantarctic Ice and Ocean Dynamics

Expedition 382 of the R/V *JOIDES Resolution*

from and to Punta Arenas, Chile

Sites U1534–U1538

20 March–20 May 2019

Volume authorship

Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists



Publisher's notes

This publication was prepared by the *JOIDES Resolution* Science Operator (JRSO) at Texas A&M University (TAMU) as an account of work performed under the International Ocean Discovery Program (IODP). Funding for IODP is provided by the following international partners:

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)
Australia-New Zealand IODP Consortium (ANZIC)
Ministry of Earth Sciences (MoES), India
Coordination for Improvement of Higher Education Personnel (CAPES), 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, 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://mlp.ldeo.columbia.edu/logdb/scientific_ocean_drilling. 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 public access.

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

Cover photograph shows an iceberg carrying penguins past Site U1537 in the Scotia Sea on 29 April 2019. Photo credit: Thomas Ronge and IODP JRSO.

Copyright

Except where otherwise noted, this work is licensed under the Creative Commons Attribution 4.0 International (CC BY 4.0) license (<https://creativecommons.org/licenses/by/4.0/>). Unrestricted use, distribution, and reproduction are permitted, provided the original author and source are credited.



Examples of how to cite this volume or part of this volume are available at <http://publications.iodp.org/proceedings/382/382title.html#bib>.

ISSN

World Wide Web: 2377-3189

ISBN

978-1-954252-74-5

Volume DOI

<https://doi.org/10.14379/iodp.proc.382.2021>

Publication date

20 May 2021

Contents

Expedition reports

Chapters

[Expedition 382 summary](#)

M.E. Weber et al.

[Expedition 382 methods](#)

M.E. Weber et al.

[Site U1534](#)

V.L. Peck et al.

[Site U1535](#)

V.L. Peck et al.

[Site U1536](#)

M.E. Weber et al.

[Site U1537](#)

M.E. Weber et al.

[Site U1538](#)

M.E. Weber et al.

Core descriptions

Visual core descriptions (VCDs) are presented in PDF files for each site. Smear slides and/or thin sections are presented in PDF and/or CSV files for each site and/or hole (CSV files are available in the CORES directory). The entire set of core images in PDF is available in the IMAGES directory.

[Site U1534](#)

[Visual core descriptions](#) · Smear slides · [Thin sections](#)

[Site U1535](#)

[Visual core descriptions](#) · [Smear slides](#)

[Site U1536](#)

[Visual core descriptions](#) · Smear slides · [Thin sections](#)

[Site U1537](#)

[Visual core descriptions](#) · Smear slides

[Site U1538](#)

[Visual core descriptions](#) · Smear slides · [Thin sections](#)

Supplementary material

Supplementary material for the Volume 382 expedition reports includes DESClogik workbooks in Microsoft Excel format. A full list of directories can be found in SUPP_MAT in the volume zip folder or on the [Supplementary material for Volume 382 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) expeditions, produced using QGIS (<http://www.qgis.org>), and all 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 (<https://www.generic-mapping-tools.org>), are available in PDF.

[IODP Expedition 382 site map](#)

[IODP map](#) (Expeditions 349–372, 374–376, and 379–382)

[Integrated Ocean Drilling Program map](#) (Expeditions 301–348)

[ODP map](#) (Legs 100–210)

[DSDP map](#) (Legs 1–96)

Acknowledgments

We thank the proponents of Proposals 902-Full and 846-APL for their contributions and continued support to make Expedition 382 happen. In particular, we thank Andres Maldonado and the SCAN project team for providing the majority of the presite survey data. We are indebted to the IODP technical staff and the ship and drilling crews for their tireless support before, during, and after the expedition, especially Captain Terry Skinner and ice observer Diego Mello for navigating us safely through rough weather and iceberg conditions. We also thank the staff at the IODP core repositories in Bremen, Germany, and College Station, Texas (USA), for their assistance and support during X-ray fluorescence (XRF) scanning and the sampling party.

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 an intense 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 current IODP phase 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 Institute for Marine-Earth Exploration and Engineering (MarE3), 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 current 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 current 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 current IODP also has a second internationally integrative level for high-level discussion and consensus-building: the IODP Forum. The Forum is not only charged with assessing program-wide progress toward achieving the current Science Plan, but also with overseeing approaches toward a new bright future of scientific ocean drilling post 2023. 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 current IODP represents a remarkable level of international collaboration that remains one of the greatest ongoing strengths of scientific ocean drilling.

Dick Kroon
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: curator@iodp.tamu.edu

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

Website: <http://www.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/chikyuu/e>

IODP Japan Science Operator

Institute for Marine-Earth Exploration and Engineering
(MarE3)
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: mare3-exp@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 382 participants*

Expedition 382 scientists

Michael E. Weber

Co-Chief Scientist

University of Bonn
Steinmann-Institute
Germany
mike.weber@uni-bonn.de

Maureen E. Raymo

Co-Chief Scientist

Lamont-Doherty Earth Observatory
Columbia University
USA
raymo@ldeo.columbia.edu

Trevor Williams

Expedition Project Manager/Staff Scientist

International Ocean Discovery Program
Texas A&M University
USA
williams@iodp.tamu.edu

Linda H. Armbrecht

Paleontologist (diatoms)

Australian Centre for Ancient DNA (ACAD)
Department of Ecology & Evolutionary Biology
School of Biological Sciences
University of Adelaide
Australia
linda.armbrecht@adelaide.edu.au

Ian Bailey

Stratigraphic Correlator/Petrophysics Specialist

Camorne School of Mines & Environment and Sustainability
Institute
University of Exeter
United Kingdom
I.Bailey@exeter.ac.uk

Stefanie A. Brachfeld

Paleomagnetist

Earth and Environmental Studies
Montclair State University
USA
brachfelds@montclair.edu

Zhiheng Du

Sedimentologist

State Key Laboratory of Cryospheric Sciences
Chinese Academy of Sciences
China
duzhiheng10@163.com

Gerson Fauth

Sedimentologist

Geology Program
University of Vale do Rio dos Sinos (UNISINOS)
Instituto Tecnológico de Micropaleontologia, itt Fossil
Brazil
gersonf@unisinis.br

Marga García

Physical Properties/Downhole Measurements/Petrophysics Specialist

Andalusian Institute of Earth Sciences
CSIC-University of Granada
Spain
marguita.garcia@gmail.com

Anna Glüder

Sedimentologist

College of Earth, Ocean and Atmospheric Sciences
Oregon State University
USA
gluedera@oregonstate.edu

Michelle E. Guitard

Physical Properties/Petrophysics Specialist

College of Marine Science
University of South Florida, St. Petersburg
USA
mguitard@mail.usf.edu

Marcus Gutjahr

Inorganic Geochemist

GEOMAR Helmholtz Centre for Ocean Research Kiel
Germany
mgutjahr@geomar.de

Sidney R. Hemming

Stratigraphic Correlator/Petrophysics Specialist

Lamont-Doherty Earth Observatory
Columbia University
USA
sidney@ldeo.columbia.edu

Iván Hernández-Almeida

Paleontologist (radiolarians)

Department of Earth Sciences
Institute of Geology
ETH Zurich
Switzerland
ivan.hernandez@erdw.ethz.ch

Frida S. Hoem

Palynologist

Marine Palynology and Paleoceanography
Utrecht University
Netherlands
f.s.hoem@uu.nl

Ji-Hwan Hwang

Inorganic Geochemist

Earth & Environmental Sciences
Korea Basic Science Institute
Republic of Korea
hwan628@gmail.com

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

Mutsumi Iizuka**Sedimentologist**

Graduate School of Environmental Science
Hokkaido University
Japan

mutsumi.i@pop.lowtem.hokudai.jp

Yuji Kato**Paleontologist (diatoms)**

Environmental Studies
Nagoya University
Japan

Present affiliation (20 May 2020):
Center for Advanced Marine Core Research
Kochi University
Japan

yujikato2812@gmail.com

Bridget Kenlee**Inorganic Geochemist**

Department of Earth Sciences
University of California, Riverside
USA

bridget.lee@email.ucr.edu

Yasmina M. Martos**Physical Properties/Downhole Measurements/Petrophysics****Specialist**

NASA Goddard Space Flight Center
University of Maryland College Park
USA

yasmartos@gmail.com

Suzanne O'Connell**Sedimentologist**

Department of Earth and Environmental Sciences
Wesleyan University
USA

soconnell@wesleyan.edu

Victoria L. Peck**Sedimentologist**

Geological Sciences
British Antarctic Survey
United Kingdom

vlp@bas.ac.uk

Lara F. Pérez**Physical Properties/Downhole Measurements/Petrophysics****Specialist**

British Antarctic Survey
United Kingdom

larrez@bas.ac.uk

Observers**Fabricio G. Cardillo****Observer/Sedimentologist**

Departamento Oceanografía
Servicio de Hidrografía Naval
Ministerio de Defensa
Argentina

fgcardillo@hidro.gov.ar

Brendan T. Reilly**Paleomagnetist**

College of Earth, Ocean and Atmospheric Sciences
Oregon State University
USA

Present affiliation (May 2020):
Scripps Institution of Oceanography
University of California, San Diego
USA

btreilly@ucsd.edu

Thomas A. Ronge**Sedimentologist**

Marine Geology
Alfred Wegener Institute Helmholtz Center for Polar and
Marine Research

Germany

tronge@awi.de

Osamu Seki**Organic Geochemist**

Institute of Low Temperature Science
Hokkaido University
Japan

seki@lowtem.hokudai.ac.jp

Lisa Tauxe**Paleomagnetist**

Scripps Institution of Oceanography
University of California, San Diego
USA

ltauxe@ucsd.edu

Shubham Tripathi**Sedimentologist**

Marine Stable Isotope Lab
National Centre for Polar and Ocean Research (NCPOR)
India

shubham@ncpor.res.in

Jonathan P. Warnock**Paleontologist (diatoms)**

Department of Geoscience
Indiana University of Pennsylvania
USA

jwarnock@iup.edu

Xufeng Zheng**Physical Properties/Petrophysics Specialist**

Chinese Academy of Sciences
South China Sea Institute of Oceanology
China

zxf@scsio.ac.cn

Anthony D. Mello**Weather/Ice Observer**

USA

melloout@comcast.net

Outreach

Marlo P. Garnsworthy
Outreach Officer
Editor/Author/Illustrator
Wordy Bird Studio
USA
wordybirdie@gmail.com

Lee A. Stevens
Outreach Officer
Communications
American Museum of Natural History
USA
lstevens@amnh.org

Operational and technical staff

Siem Offshore AS officials

Terry Skinner
Master of the Drilling Vessel

Sam McLelland
Drilling Supervisor

JRSO shipboard personnel and technical representatives

Alexis Armstrong
Core Laboratory

Zenon Mateo
Underway Geophysics Laboratory

Heather Barnes
Assistant Laboratory Officer

Graham Messe
Paleomagnetism Laboratory

Michael Cannon
Marine Computer Specialist

Erik Moortgat
Assistant Laboratory Officer

Etienne Claassen
Marine Instrumentation Specialist

Algie Morgan
Applications Developer

Lisa Crowder
Laboratory Officer

Jenna Patten
Marine Laboratory Technician (temporary)

Margaret Hastedt
Core Laboratory

Vincent Percuoco
Chemistry Laboratory

Luan Heywood
Thin Section Laboratory

Doris Pinero Lajas
Physical Properties Laboratory

Minh Huynh
Marine Computer Specialist

Bill Rhinehart
Operations Superintendent

Sarah Kachovich
X-Ray Laboratory

Alyssa Stephens
Publications Specialist

Jan Jurie Kotze
Marine Instrumentation Specialist

Johanna Suhonen
Chemistry Laboratory

Brittany Martinez
Curatorial Specialist

Kerry Swain
Logging Engineer

IODP Publication Services staff*

Emily Britt

Editor II

Douglas Cummings

Graphics Specialist III

Gudelia (“Gigi”) Delgado

Publications Coordinator

Patrick H. Edwards

Supervisor of Production

Willow Grosz

Editor II

Jenni Hesse

Editor IV

Rhonda Kappler

Graphics Specialist IV

Ginny Lowe

Reports Coordinator

Amy McWilliams

Supervisor of Editing

Julie Myers

Production Editor III

Lorri Peters

Manager of Publication Services

Kenneth Sherar

Production Editor III

Alyssa Stephens

Graphics Specialist IV

Jean Wulfson

Supervisor of Graphics

Ann Yeager

Distribution Specialist

*At time of publication.

Expedition-related bibliography*

IODP publications

Scientific Prospectus

Weber, M.E., Raymo, M.E., Peck, V.L., and Williams, T., 2018. *Expedition 382 Scientific Prospectus: Iceberg Alley and South Falkland Slope Ice and Ocean Dynamics*. International Ocean Discovery Program. <https://doi.org/10.14379/iodp.sp.382.2018>

Preliminary Report

Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, 2019. *Expedition 382 Preliminary Report: Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. International Ocean Discovery Program. <https://doi.org/10.14379/iodp.pr.382.2019>

Proceedings volume

Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, 2021. *Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. Proceedings of the International Ocean Discovery Program, 382: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.382.2021>

Expedition reports

Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., Armbrrecht, L.H., Bailey, I., Brachfeld, S.A., Cardillo, F.G., Du, Z., Fauth, G., García, M., Glüder, A., Guitard, M.E., Gutjahr, M., Hemming, S.R., Hernández-Almeida, I., Hoem, F.S., Hwang, J.-H., Iizuka, M., Kato, Y., Kenlee, B., Martos, Y.M., O'Connell, S., Pérez, L.F., Reilly, B.T., Ronge, T.A., Seki, O., Tauxe, L., Tripathi, S., Warnock, J.P., and Zheng, X., 2021. Expedition 382 summary. In Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, *Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. Proceedings of the International Ocean Discovery Program, 382: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.382.101.2021>

Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., Armbrrecht, L.H., Bailey, I., Brachfeld, S.A., Cardillo, F.G., Du, Z., Fauth, G., García, M., Glüder, A., Guitard, M.E., Gutjahr, M., Hemming, S.R., Hernández-Almeida, I., Hoem, F.S., Hwang, J.-H., Iizuka, M., Kato, Y., Kenlee, B., Martos, Y.M., O'Connell, S., Pérez, L.F., Reilly, B.T., Ronge, T.A., Seki, O., Tauxe, L., Tripathi, S., Warnock, J.P., and Zheng, X., 2021. Expedition 382 methods. In Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, *Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. Proceedings of the International Ocean Discovery Program, 382: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.382.102.2021>

Peck, V.L., Weber, M.E., Raymo, M.E., Williams, T., Armbrrecht, L.H., Bailey, I., Brachfeld, S.A., Cardillo, F.G., Du, Z., Fauth, G., García, M., Glüder, A., Guitard, M.E., Gutjahr, M., Hemming, S.R., Hernández-Almeida, I., Hoem, F.S., Hwang, J.-H., Iizuka, M., Kato, Y., Kenlee, B., Martos, Y.M., O'Connell, S., Pérez, L.F., Reilly, B.T., Ronge, T.A., Seki, O., Tauxe, L., Tripathi, S., Warnock, J.P., and Zheng, X., 2021. Site U1534. In Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, *Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. Proceedings of the International Ocean Discovery Program, 382: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.382.103.2021>

Peck, V.L., Weber, M.E., Raymo, M.E., Williams, T., Armbrrecht, L.H., Bailey, I., Brachfeld, S.A., Cardillo, F.G., Du, Z., Fauth, G., García, M., Glüder, A., Guitard, M.E., Gutjahr, M., Hemming, S.R., Hernández-Almeida, I., Hoem, F.S., Hwang, J.-H., Iizuka, M., Kato, Y., Kenlee, B., Martos, Y.M., O'Connell, S., Pérez, L.F., Reilly, B.T., Ronge, T.A., Seki, O., Tauxe, L., Tripathi, S., Warnock, J.P., and Zheng, X., 2021. Site U1535. In Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, *Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. Proceedings of the International Ocean Discovery Program, 382: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.382.104.2021>

Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., Armbrrecht, L.H., Bailey, I., Brachfeld, S.A., Cardillo, F.G., Du, Z., Fauth, G., García, M., Glüder, A., Guitard, M.E., Gutjahr, M., Hemming, S.R., Hernández-Almeida, I., Hoem, F.S., Hwang, J.-H., Iizuka, M., Kato, Y., Kenlee, B., Martos, Y.M., O'Connell, S., Pérez, L.F., Reilly, B.T., Ronge, T.A., Seki, O., Tauxe, L., Tripathi, S., Warnock, J.P., and Zheng, X., 2021. Site U1536. In Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, *Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. Proceedings of the International Ocean Discovery Program, 382: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.382.105.2021>

Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., Armbrrecht, L.H., Bailey, I., Brachfeld, S.A., Cardillo, F.G., Du, Z., Fauth, G., García, M., Glüder, A., Guitard, M.E., Gutjahr, M., Hemming, S.R., Hernández-Almeida, I., Hoem, F.S., Hwang, J.-H., Iizuka, M., Kato, Y., Kenlee, B., Martos, Y.M., O'Connell, S., Pérez, L.F., Reilly, B.T., Ronge, T.A., Seki, O., Tauxe, L., Tripathi, S., Warnock, J.P., and Zheng, X., 2021. Site U1537. In Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, *Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. Proceedings of the International Ocean Discovery Program, 382: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.382.106.2021>

Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., Armbrrecht, L.H., Bailey, I., Brachfeld, S.A., Cardillo, F.G., Du, Z., Fauth, G., García, M., Glüder, A., Guitard, M.E., Gutjahr, M., Hemming, S.R., Hernández-Almeida, I., Hoem, F.S., Hwang, J.-H., Iizuka, M., Kato, Y., Kenlee, B., Martos, Y.M., O'Connell, S., Pérez, L.F., Reilly, B.T., Ronge, T.A., Seki, O., Tauxe, L., Tripathi, S., Warnock, J.P., and Zheng, X., 2021. Site U1538. In Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, *Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. Proceedings of the International Ocean Discovery Program, 382: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.382.107.2021>

Supplementary material

Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, 2021. Supplementary material. <https://doi.org/10.14379/iodp.proc.382supp.2021>. Supplement to Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, *Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. Proceedings of the International Ocean Discovery Program, 382: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.382.2021>

*The Expedition-related bibliography is continually updated online (<http://publications.iodp.org/proceedings/382/382title.html#bib>). Please send updates to PubCrd@iodp.tamu.edu.

Site map

