

Proceedings of the International Ocean Discovery Program

Volume 403

Eastern Fram Strait Paleo-Archive

Expedition 403 of the R/V *JOIDES Resolution*
from and to Amsterdam, Netherlands
Sites U1618–U1624
4 June–2 August 2024

Volume authorship

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The bulk of the shipboard-collected core data from this expedition is accessible at <https://zenodo.org/communities/iodp> (see list of [available data sets](#)). 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 (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 (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 photo shows the *JOIDES Resolution* off Prins Karls Forland, Svalbard. Photo credit: Chris Lyons, Sling-shot Pictures, and IODP.

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Core descriptions

Visual core descriptions (VCDs) are presented in PDF files for each site. Thin sections, smear slides, and/or tabular core description information for each site or hole are presented in tab-separated value (TSV) format or PDF in the CORES directory. 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 403 expedition reports includes core composite photos with X-ray images in Microsoft PowerPoint format and PDF. A full list of directories can be found in SUPP_MAT in the volume zip folder or on the [Supplementary material for Volume 403 expedition reports](#) web page.

Expedition research results

Data reports

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 403 site map](#)

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Dedication

We dedicate this publication to and thank everyone at sea and on shore who made IODP “the most successful and productive global geoscience collaboration” (<https://doi.org/10.1038/d41586-023-00690-1>).

In memoriam

We also dedicate this volume in memoriam of Maria Bianca Cita (Italy, 1924–2024), geologist, micropaleontologist, and stratigrapher. She was the first non-US scientist and one of the first two women to participate in a Deep Sea Drilling Project (DSDP) expedition (Leg 2, 1968). Her contribution to marine geosciences and inspiration for future generations will last forever.



Acknowledgments

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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 an international integrative level for high-level discussion and global 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 22 international funding agencies, including those from the United States, Japan, an Australia/New Zealand consortium (ANZIC), China, India, South Korea, and the 15 members of ECORD (Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom). The IODP membership represents an unparalleled level of international scientific collaboration; one of the greatest and ongoing strengths of scientific ocean drilling.

Henk Brinkhuis
Chair, IODP Forum

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JOIDES Resolution Science Operator

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

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IODP publications

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Preliminary Report

Lucchi, R.G., St. John, K.E.K., Ronge, T.A., and the Expedition 403 Scientists, 2024. Expedition 403 Preliminary Report: Eastern Fram Strait Paleo-Archive. International Ocean Discovery Program. <https://doi.org/10.14379/iodp.pr.403.2024>

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Lucchi, R.G., St. John, K.E.K., Ronge, T.A., and the Expedition 403 Scientists, 2026. Eastern Fram Strait Paleo-Archive. Proceedings of the International Ocean Discovery Program, 403: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.403.2026>

Expedition reports

- St. John, K.E.K., Lucchi, R.G., Ronge, T.A., Barcena, M.A., De Schepper, S., Duxbury, L.C., Gebhardt, A.C., Gonzalez-Lanchas, A., Goss, G., Greco, N.M., Gruetzner, J., Haygood, L., Husum, K., Iizuka, M., Kapuge, A.K.I.U., Lam, A.R., Libman-Roshal, O., Liu, Y., Monito, L.R., Reilly, B.T., Rosenthal, Y., Sakai, Y., Sijinkumar, A.V., Suganuma, Y., and Zhong, Y., 2026. Expedition 403 summary. In Lucchi, R.G., St. John, K.E.K., Ronge, T.A., and the Expedition 403 Scientists, Eastern Fram Strait Paleo-Archive. Proceedings of the International Ocean Discovery Program, 403: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.403.101.2026>
- Lucchi, R.G., St. John, K.E.K., Ronge, T.A., Barcena, M.A., De Schepper, S., Duxbury, L.C., Gebhardt, A.C., Gonzalez-Lanchas, A., Goss, G., Greco, N.M., Gruetzner, J., Haygood, L., Husum, K., Iizuka, M., Kapuge, A.K.I.U., Lam, A.R., Libman-Roshal, O., Liu, Y., Monito, L.R., Reilly, B.T., Rosenthal, Y., Sakai, Y., Sijinkumar, A.V., Suganuma, Y., and Zhong, Y., 2026. Expedition 403 methods. In Lucchi, R.G., St. John, K.E.K., Ronge, T.A., and the Expedition 403 Scientists, Eastern Fram Strait Paleo-Archive. Proceedings of the International Ocean Discovery Program, 403: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.403.102.2026>
- Lucchi, R.G., St. John, K.E.K., Ronge, T.A., Barcena, M.A., De Schepper, S., Duxbury, L.C., Gebhardt, A.C., Gonzalez-Lanchas, A., Goss, G., Greco, N.M., Gruetzner, J., Haygood, L., Husum, K., Iizuka, M., Kapuge, A.K.I.U., Lam, A.R., Libman-Roshal, O., Liu, Y., Monito, L.R., Reilly, B.T., Rosenthal, Y., Sakai, Y., Sijinkumar, A.V., Suganuma, Y., and Zhong, Y., 2026. Site U1618. In Lucchi, R.G., St. John, K.E.K., Ronge, T.A., and the Expedition 403 Scientists, Eastern Fram Strait Paleo-Archive. Proceedings of the International Ocean Discovery Program, 403: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.403.103.2026>
- St. John, K.E.K., Lucchi, R.G., Ronge, T.A., Barcena, M.A., De Schepper, S., Duxbury, L.C., Gebhardt, A.C., Gonzalez-Lanchas, A., Goss, G., Greco, N.M., Gruetzner, J., Haygood, L., Husum, K., Iizuka, M., Kapuge, A.K.I.U., Lam, A.R., Libman-Roshal, O., Liu, Y., Monito, L.R., Reilly, B.T., Rosenthal, Y., Sakai, Y., Sijinkumar, A.V., Suganuma, Y., and Zhong, Y., 2026. Site U1619. In Lucchi, R.G., St. John, K.E.K., Ronge, T.A., and the Expedition 403 Scientists, Eastern Fram Strait Paleo-Archive. Proceedings of the International Ocean Discovery Program, 403: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.403.104.2026>
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- Lucchi, R.G., St. John, K.E.K., Ronge, T.A., Barcena, M.A., De Schepper, S., Duxbury, L.C., Gebhardt, A.C., Gonzalez-Lanchas, A., Goss, G., Greco, N.M., Gruetzner, J., Haygood, L., Husum, K., Iizuka, M., Kapuge, A.K.I.U., Lam, A.R., Libman-Roshal, O., Liu, Y., Monito, L.R., Reilly, B.T., Rosenthal, Y., Sakai, Y., Sijinkumar, A.V., Suganuma, Y., and Zhong, Y., 2026. Sites U1621–U1623. In Lucchi, R.G., St. John, K.E.K., Ronge, T.A., and the Expedition 403 Scientists, Eastern Fram Strait Paleo-Archive. Proceedings of the International Ocean Discovery Program, 403: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.403.106.2026>
- Lucchi, R.G., St. John, K.E.K., Ronge, T.A., Barcena, M.A., De Schepper, S., Duxbury, L.C., Gebhardt, A.C., Gonzalez-Lanchas, A., Goss, G., Greco, N.M., Gruetzner, J., Haygood, L., Husum, K., Iizuka, M., Kapuge, A.K.I.U., Lam, A.R., Libman-Roshal, O., Liu, Y., Monito, L.R., Reilly, B.T., Rosenthal, Y., Sakai, Y., Sijinkumar, A.V., Suganuma, Y., and Zhong, Y., 2026. Site U1624. In Lucchi, R.G., St. John, K.E.K., Ronge, T.A., and the Expedition 403 Scientists, Eastern Fram Strait Paleo-Archive. Proceedings of the International Ocean Discovery Program, 403: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.403.107.2026>

*The Expedition-related bibliography is continually updated online (<http://publications.iodp.org/proceedings/403/403title.html#bib>). Please send updates to PubCrd@iodp.tamu.edu.

Supplementary material

Lucchi, R.G., St. John, K.E.K., Ronge, T.A., and the Expedition 403 Scientists, 2026. Supplementary material, <https://doi.org/10.14379/iodp.proc.403supp.2026>. In Lucchi, R.G., St. John, K.E.K., Ronge, T.A., and the Expedition 403 Scientists, Eastern Fram Strait Paleo-Archive. Proceedings of the International Ocean Discovery Program, 403: College Station, TX (International Ocean Discovery Program).

Site map

