

# Proceedings of the International Ocean Discovery Program

## Volume 391

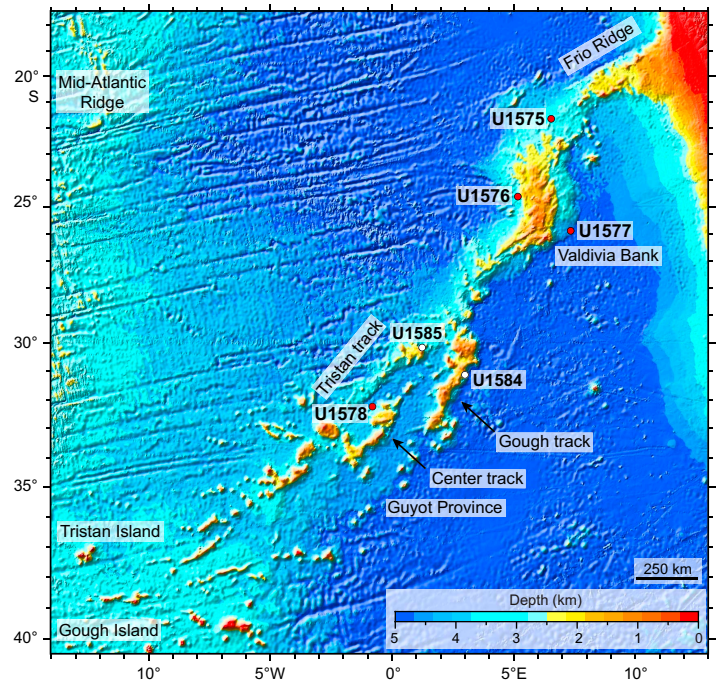
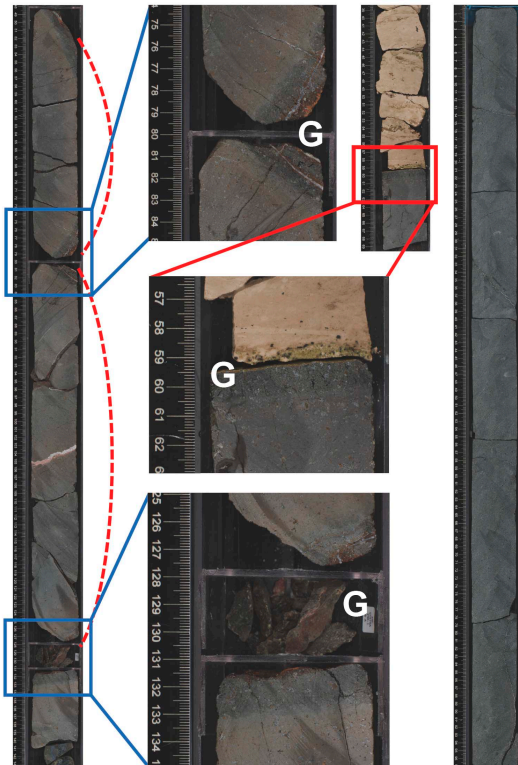
### Walvis Ridge Hotspot

Expedition 391 of the R/V *JOIDES Resolution*  
from and to Cape Town, South Africa  
Sites U1575–U1578  
6 December 2021–5 February 2022

Expedition 397T of the R/V *JOIDES Resolution*  
from Cape Town, South Africa, to Lisbon, Portugal  
Sites U1584 and U1585  
10 September–11 October 2022

#### Volume authorship

Sager, W., Hoernle, K., Höfig, T.W., Blum, P., and the Expedition 391 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). This material is based upon work supported by the JRSO, which is a major facility funded by the National Science Foundation Cooperative Agreement Number OCE1326927. 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  
Australia-New Zealand IODP Consortium (ANZIC)  
Ministry of Earth Sciences (MoES), India

The JRSO is supported by the NSF. Any opinions, findings, and conclusions or recommendations expressed in this material do not necessarily reflect the views of the NSF, the participating agencies, TAMU, or Texas A&M Research Foundation.

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](mailto:database@iodp.tamu.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 pillow lavas and glassy rims, Section 391-U1575A-35R-1 (left), sediment/basement contact, Section 391-U1577A-18R-1 (middle), and massive lava flow, Section 391-U1577A-23R-2 (right). Photo credit: IODP JRSO.

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Examples of how to cite this volume or part of this volume are available at <http://publications.iodp.org/proceedings/391/391title.html#bib>.

## ISSN

World Wide Web: 2377-3189

## ISBN

978-1-954252-84-4

## Volume DOI

<https://doi.org/10.14379/iodp.proc.391.2023>

## Publication date

11 October 2023

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### Core descriptions

Visual core descriptions (VCDs) are presented in PDF files for each site. Thin sections and/or smear slides for each site or hole are presented in CSV or PDF format in the CORES directory and in Excel format in DESC\_WKB in Supplementary material. 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 391 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 391 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 391 site map](#)

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## Acknowledgments

This research used samples and data provided by the International Ocean Discovery Program (IODP). We are grateful to the IODP Technical Support staff and the R/V *JOIDES Resolution* crew for their invaluable assistance and dedication during what was a challenging expedition. The resolve of the Technical Support staff was unmatched. Scientific drilling would be impossible without the efforts of many to collect site survey data. We thank the captain, crews, and science/technical teams of the R/Vs *Thomas G. Thompson* (Cruise TN373), *Polarstern*, *Maria S. Merian* (Cruise ANT23-5), and *Meteor* (Cruise 49-1). The success of the expedition was also enabled by the support of the IODP Science Evaluation Panel and the Environmental Protection and Safety Panel as well as the National Commission on Research, Science and Technology of Namibia and the Namibian Ministry of Environment, Forestry and Tourism. Support for workshops to develop the expedition objectives was provided by the IODP US Science Support Program. Funding for site survey Cruise TN373 was provided by National Science Foundation Grant OCE1832197. For the ANT23-5 cruise, funding was provided by German Research Foundation Grant JO-191/15-1 within the special program “The South Atlantic Margin Processes and Links with Onshore Evolution.” We thank the German Federal Ministry of Education and Research for funding R/V *Sonne* Cruise SO233 to obtain data that helped drill sites. The editorial staff at the IODP *JOIDES Resolution* Science Operator at Texas A&M University is thanked for their help with the publication of this document.

## 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 collaboration; one of the greatest and ongoing strengths of scientific ocean drilling.

Henk Brinkhuis  
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# Expedition-related bibliography\*

Citation data for IODP publications and journal articles in RIS format

## IODP publications

### Scientific Prospectus

- Sager, W., Hoernle, K., and Petronotis, K., 2020. Expedition 391 Scientific Prospectus: Walvis Ridge Hotspot. International Ocean Discovery Program. <https://doi.org/10.14379/iodp.sp.391.2020>
- Sager, W., Hoernle, K., and Petronotis, K., 2021. *Expedition 391 Scientific Prospectus Addendum: Walvis Ridge Hotspot*. International Ocean Discovery Program. <https://doi.org/10.14379/iodp.sp.391add.2021>
- Sager, W.W., Hoernle, K., and Blum, P., 2022. Expedition 397T Scientific Prospectus: Return to Walvis Ridge Hotspot. International Ocean Discovery Program. <https://doi.org/10.14379/iodp.sp.397T.2022>

### Preliminary Report

- Sager, W., Hoernle, K., Höfig, T.W., and the Expedition 391 Scientists, 2022. *Expedition 391 Preliminary Report: Walvis Ridge Hotspot*. International Ocean Discovery Program. <https://doi.org/10.14379/iodp.pr.391.2022>
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### Proceedings volume

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### **Supplementary material**

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