

International Ocean Discovery Program
JOIDES Resolution Science Operator
FY23 Q4 Operations and Management Report

1 July–30 September 2023
Cooperative Agreement OCE-1326927

Submitted by the JRSO
to
The National Science Foundation
and
The *JOIDES Resolution* Facility Board

27 October 2023



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1. Introduction

This quarterly operations and management report reflects activities and deliverables outlined in the International Ocean Discovery Program (IODP) *JOIDES Resolution* Science Operator (JRSO) FY23 Annual Program Plan to the National Science Foundation (NSF), as implemented by Texas A&M University (TAMU), acting as manager and science operator of the research vessel *JOIDES Resolution* as a research facility for IODP. Administrative services in support of JRSO activities are provided by the Texas A&M Research Foundation (TAMRF) through TAMU Sponsored Research Services (SRS).

2. Expedition operations

This section provides information on the following aspects of JRSO expedition support:

- Planning (including logistics and engineering development);
- Staffing (including a staffing table for expeditions implemented during this quarter);
- Clearance, permitting, and environmental assessment activities;
- Expedition operations, including a site map, a coring summary table, and preliminary science results for each expedition completed during this quarter); and
- Postexpedition activities (including postcruise editorial meetings).

Table 2.1. JRSO expedition schedule

Expedition		Port (origin)	Dates ¹	Total days (port/ sea)	Days at sea (transit ² / ops)	Co-Chief Scientists	Expedition Project Manager/ Contact
Reykjanes Mantle Convection and Climate	395	Ponta Delgada, Portugal	12 June–12 August 2023	61 (5/56)	56 (9/47)	R. Parnell-Turner A. Briaies	L. LeVay
NW Greenland Glaciated Margin	400	Reykjavík, Iceland	12 August–13 October 2023	62 (5/57)	57 (15/42)	P. Knutz A. Jennings	L. Childress
Transit/tie up (dry dock) 400T (13 October–10 December 2023; Reykjavík, Iceland, to Amsterdam, The Netherlands) (58 days)							
Mediterranean-Atlantic Gateway Exchange	401	Amsterdam, The Netherlands	10 December 2023–9 February 2024	61 (3/58)	58 (10/48)	R. Flecker E. Ducassou	T. Williams
Tyrrhenian Continent-Ocean Transition	402	Napoli, Italy	9 February–8 April 2024	59 (5/54)	54 (2/52)	N. Zitellini A. Malinverno	E. Estes
Transit/tie up (maintenance) 402T (8 April–4 June 2024; Napoli, Italy, to Reykjavík, Iceland) (57 days)							
Eastern Fram Strait Paleo-archive	403	Reykjavík, Iceland	4 June–2 August 2024	59 (5/54)	54 (12/42)	R.G. Lucchi K. St. John	T. Ronge
Tie up/Demobilization 404D (2 August–30 September 2024; Amsterdam, The Netherlands) (59 days)							

¹The start date reflects the initial port call day. The vessel will sail when ready.

²Preliminary total estimated transit (i.e., to and from the operational area and between sites).

Expedition 398: Hellenic Arc Volcanic Field

Postexpedition activities

A shore-based sampling party was held 24–30 July at the Bremen Core Repository (BCR).

Expedition 399: Building Blocks of Life, Atlantis Massif

Postexpedition activities

The occurrence of asbestos minerals in basement rocks resulted in a modified core flow for safety reasons. Most core description, shipboard sampling, and analyses and all personal sampling was deferred to shore. During the summer, the Gulf Coast Repository (GCR) started preparations for shore-based description and sampling. A doublewide trailer was rented and installed next to the IODP building to accommodate these activities based on recommendations from TAMU Environmental Health and Safety.

Expedition 395: Reykjanes Mantle Convection and Climate

Planning

Replacement severing tools from Schlumberger were shipped to the vessel. A shore-based sampling party is scheduled for 15–21 January 2024 at the BCR.

Table 2.2. Expedition 395 science party staffing breakdown

Member country/consortium	Participants	Co-Chief Scientists
USA: United States Science Support Program (USSSP)	11	1
Japan: Japan Drilling Earth Science Consortium (J-DESC)	2	0
Europe and Canada: European Consortium for Ocean Research Drilling (ECORD) Science Support and Advisory Committee (ESSAC)	9	1
People's Republic of China: IODP-China	2	0
Australia and New Zealand: Australia/New Zealand IODP Consortium (ANZIC)	1	0
India: Ministry of Earth Science (MoES)	1	0

Figure 2.1 Expedition 395 site map. The green symbols are sites that were previously occupied by IODP Expeditions 384 and 395C.

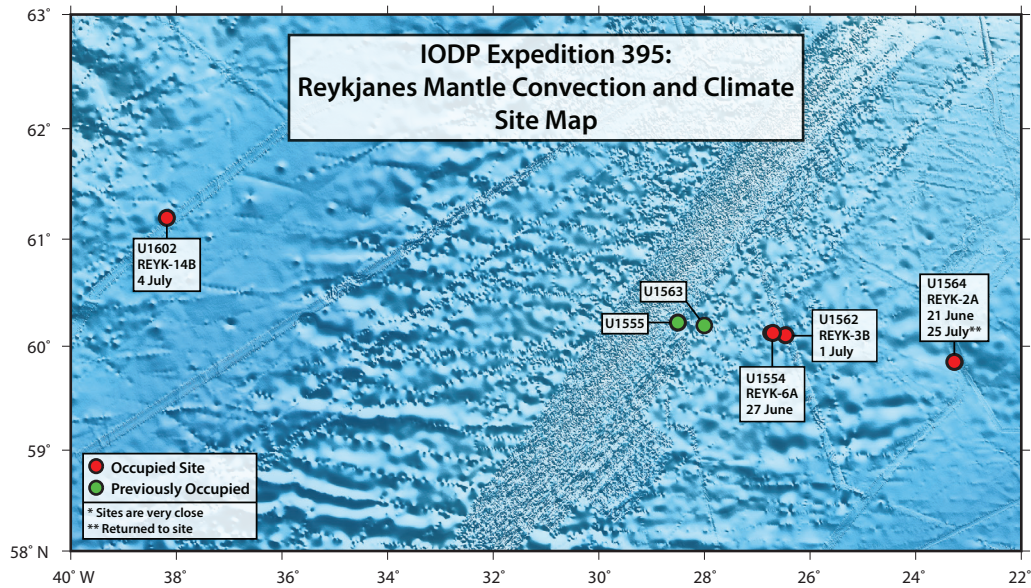


Table 2.3. Expedition 395 coring summary

Site	Hole	Latitude	Longitude	Water depth (mbsl)	Cores (N)	Total penetration (DSF)	Interval cored (m)	Core recovered (m)	Recovery (%)
U1554	U1554G	60°07.50367'N 59°51.0483'N	26°42.1129'W 23°16.0080'W	1868.7	40	355.0	355.0	362.29	102
	U1554H	60°07.4952'N 59°51.0485'N	26°42.1188'W 23°15.9876'W	1866.7	38	354.9	354.9	370.10	104
Site U1554 totals					78	709.9	709.9	731.51	103
U1562	U1562C	60°06.3015'N	26°30.0754'W	2002.8	48	300.4	293.4	307.45	105
Site U1562 totals					48	300.4	293.4	307.45	105
U1564	U1564D	59°51.0483'N	23°16.0080'W	2208.1	73	657.3	655.3	632.42	97
	U1564E	59°51.0485'N	23°15.9876'W	2207.3	28	263.5	263.5	273.7	104
	U1564F	59°51.0363'N	23°15.9840'W	2208.1	75	1169.7	571.7	434.15	76
Site U1564 totals					176	2090.5	1490.5	1340.27	91
U1602	U1602A	61°11.7138'N	38°10.8186'W	2708.6	1	8.8	8.8	8.81	100
	U1602B	61°11.7144'N	38°10.8184'W	2709.2	38	251.1	251.1	262.37	104
	U1602C	61°11.7253'N	38°10.8193'W	2710.0	38	269.3	267.3	272.63	102
	U1602D	61°11.7259'N	38°10.7967'W	2709.1	66	540.7	540.7	450.45	83
	U1602E	61°11.7150'N	38°10.7961'W	2709.2	87	1365.2	835.9	450.39	54
Site U1602 totals					230	2435.1	1903.8	1444.70	76
Expedition 395 totals					532	5535.9	4397.6	3823.93	87

Science summary

The intersection between the Mid-Atlantic Ridge and Iceland hotspot provides a natural laboratory where the composition and dynamics of Earth's upper mantle can be observed. Plume-ridge interaction drives variations in the melting regime, which result in a range of crustal types, including a series of V-shaped ridges (VSRs) and V-shaped troughs (VSTs) located south of Iceland. Mantle upwelling beneath Iceland dynamically supports regional bathymetry and may lead to changes in the height of oceanic gateways, which in turn control the flow of deep water on geologic timescales. Expeditions 395 (12 June–12 August 2023) and 395C (5 June–7 August 2021) recovered basaltic samples from crust that is blanketed by thick sediments that also contain climatic and oceanic records from modern to earliest Oligocene/late Eocene times. Major, trace, and isotope geochemistry of basalts from this expedition provide insight into spatial and temporal variations in mantle melting processes. These samples will enable testing of the hypothesis that the Iceland plume thermally pulses on two timescales (5–10 and ~30 Ma), leading to fundamental changes in crustal architecture. This idea will be tested against alternative hypotheses involving propagating rifts and buoyant mantle upwelling.

Millennial-scale paleoclimate records are contained in the rapidly accumulated sediments of three contourite drifts cored during Expedition 395: the Gardar, Björn, and Eirik drifts. The accumulation rate of these sediments is a proxy for current strength, which is moderated by dynamic support of oceanic gateways such as the Greenland-Scotland Ridge. These sediments also provide constraints for climatic events including Miocene and Pliocene warmth, the intensification of Northern Hemisphere glaciation, and abrupt Late Pleistocene climate change.

The integrated approach of Expedition 395 allows exploration of the relationships between deep Earth processes, ocean circulation, and climate. These objectives were addressed by recovering 3,826 m of sediment and basement cores from four sites during Expedition 395 plus an additional two sites that were completed during Expeditions 384 (Engineering Testing) and 395C. Two sites (U1554 and U1562) are located in the Björn drift above a VSR/VST pair, and another site targeted the Holocene–Eocene sequence of sediments at the Eirik drift, located on the eastern Greenland margin (U1602). The fourth site (U1564) is located on 32.4 My old oceanic crust that is devoid of V-shaped features and was chosen because it intersects the Holocene to Oligocene–Miocene sedimentary sequence of the Gardar drift. Considered together, the sediments, basalts, and vast array of measurements collected during Expedition 395 will provide a major advance in our understanding of mantle dynamics and the linked nature of Earth's interior, oceans, and climate.

Expedition 400: NW Greenland Glaciated Margin

Planning

All port call activities were finalized and completed. The science party boarded the vessel on 13 August. A shore-based sampling party is tentatively scheduled for 18–24 March 2024 at the BCR.

Expedition 401: Mediterranean–Atlantic Gateway Ocean Transition

Planning

Port call logistics are being finalized, preparations for surface and air freight are in progress, and shipments are expected to be dispatched early next quarter. Meetings between the Expedition Project Manager (EPM), Co-Chief Scientists, and technical staff are being held to review laboratory measurements and sampling. An additional Environmental Protection and Safety Panel (EPSP) meeting was held

29 September to evaluate the risk of potential gas at some sites. No changes were made to the drill sites, but JRSO will follow a stricter gas safety protocol by measuring the gas content of the sediment as each core is collected over a ~200 m interval.

Clearance, permitting, and environmental assessment activities

Clearance permits are pending from Portugal and Spain.

Expedition 402: Tyrrhenian Continent–Ocean Transition

Planning

The science party submitted their science plans, and discussions of the research coordination strategies are under way. A deployment plan for the Kuster tool string is being developed, and a sampling plan for the tool is ongoing. Additional meetings between the EPM, Co-Chief Scientists, and technical staff are being held to review laboratory measurements and sampling.

Staffing

One Onboard Outreach Officer had to withdraw and was replaced.

Clearance, permitting, and environmental assessment activities

The clearance permit is pending from Italy.

Expedition 403: Eastern Fram Strait Paleo-archive

Planning

The Co-Chief Scientists and EPM continued discussions regarding the science party research plans. Meetings between the EPM, Co-Chief Scientists, and technical staff are being held to review laboratory measurements and sampling. Additionally, an online meet and greet with the fully staffed science party will be held in October.

Staffing

The final invitations to sail were sent out this quarter, and all scientists have accepted the invitation to sail. The special call for a diatom specialist was filled, and the science party staffing is complete.

Clearance, permitting, and environmental assessment activities

JRSO submitted the completed a Marine Science Research application to the US State Department on 15 September. An Environmental Evaluation will be required due to acoustic activity associated with check shot surveys and will be completed in the next fiscal year.

3. Management and administration

Management and administration (M&A) activities include planning, coordinating (with other IODP-related entities), overseeing, reviewing, monitoring, assuring compliance for, and reporting on IODP activities.

Progress reporting

The JRSO operations and management report for the second quarter of FY23 (April–June) was submitted to NSF on 29 July (http://iodp.tamu.edu/publications/AR/FY23/FY23_Q3.pdf).

Liaison activities

JRSO reports to and liaises with funding agencies and IODP-related agencies (e.g., *JOIDES Resolution* Facility Board [JRFB], JRFB advisory panels, Program Member Offices [PMOs], and other national organizations and facility boards) and participates in facility board, advisory panel, and IODP Forum meetings. Minutes from the facility board meetings are available online (<https://iodp.org/boards-and-panels/facility-boards>).

Project portfolio management

JRSO completed work on the GEODESC project, and work continued on the New Rig Instrumentation System and the Hyperspectral Line Scan Logger projects. The Google Migration project remains on hold.

GEODESC

Scope and deliverables

The purpose of this project is to replace the DESClogik IODP core description interface, with the principal goal of increasing performance and reliability. The GEODESC project proposes to design, build, and deliver a new and improved core description tool set. The project manager is Peter Blum (JRSO EPM).

Status

On 30 September, JRSO deployed the Catalog Manager, which is the final major component of the GEODESC application suite. All of the major components have performed well since their deployment, requiring only very minor maintenance to correct reported bugs.

New Rig Instrumentation System

Scope and deliverables

This project will provide a drilling/coring driller's display system (DDS) that will replace the existing RigWatch/Tru-VU with a modular DDS that meets the performance and end user experience-related requirements as determined during the design and review phases of the project lifecycle. As much as possible, the system will use the sensor, cabling, computing, and data display infrastructure currently installed on the *JOIDES Resolution* rig instrumentation system. The project manager is John Van Hyfte (JRSO Supervisor of Engineering and Logistics Support).

Status

JRSO deployed the backbone of the iRIS software suite during Expedition 399. Work continues on two of the user interfaces, Ops interface and Driller interface, along with the reporting module. The developers and engineers are working with the JRSO Operations Superintendent and the Siem drillers to debug their respective user interfaces. We are also working with operations and science staff to finalize the content and format of the reports. Significant progress was made on the Driller and Ops interfaces during Expedition 400. Four application developers will travel to the ship during the tie-up and dry-dock in

Amsterdam, The Netherlands, to complete the work on the interfaces. We plan to have the iRIS software development completed in time to use it as the primary system during Expedition 401.

Hyperspectral Line Scan Logger

Scope and deliverables

The purpose of this project is to select a suitable hyperspectral camera and integrate it into a logger system to provide noncontact, ultrahigh-resolution spectral data to replace the current Ocean Optics spectrometer and, potentially, the existing image logger. The new hyperspectral camera will provide higher quality color data by removing artifacts caused by the GLAD® ClingWrap and will provide higher spatial resolution color spectral data because each pixel represents the full color spectrum of the base image. The project manager is Lisa Crowder (JRSO Laboratory Officer).

Status

The project manager and team members have completed the project plan and commenced work on the logger and the LabVIEW IMS software package in mid-August. The project team determined that the current hyperspectral camera has unacceptable noise in the 400–430 nm spectral band, so another camera from a different vendor was evaluated and selected. Research and development will resume when the new camera arrives.

4. Subcontract activities

JRSO continued to interact with ODL AS to ensure efficient and compliant operations of *JOIDES Resolution*. JRSO management meets with ODL AS biweekly to discuss operational and logistical issues.

JRSO continued to interact with Schlumberger to ensure that wireline logging operations aboard *JOIDES Resolution* continue in an efficient and compliant manner. JRSO and Schlumberger worked successfully to streamline travel, shipping, and maintenance activities. Replacement severing charges were shipped to the vessel in July, and preparations were made for the November maintenance period.

5. Science operations

The Science Operations (SciOps) department provides scientific, operational, engineering, and logistical planning and implementation for *JOIDES Resolution* drilling expeditions in response to the IODP science planning structure. JRSO is responsible for scoping, planning, managing, and implementing science expeditions (see Expedition operations); conducting long-range operational planning for out-year JRSO expeditions; providing services and materials for the platform and oversight to drilling and logging contractors; and utilizing IODP resources to oversee engineering development projects.

Expedition outreach support

EPMs facilitated outreach activities for Expeditions 395 and 400. Several EPMs and the Curator supported the United States Science Support Program (USSSP) Early Career Workshop that took place at the GCR. In addition, plans are in progress for a School of Rock to be held during the October Expedition 400T transit from Reykjavik, Iceland, to Amsterdam.

Other projects and activities

The Science Operations Manager participated in a meeting of the Site Survey Data Bank Advisory Committee that is reviewing the issues related to archiving or migrating IODP data that support implemented proposals.

6. Technical and analytical services

The Technical and Analytical Services (TAS) department develops, maintains, and operates a diverse array of scientific equipment for analyzing cores and core samples; staffs the shipboard laboratories with skilled technicians; provides support for shipboard scientists; assists with downhole tools and measurements; and facilitates shipboard core curation, handling, and shipping.

Laboratory working groups

The laboratory working groups (LWGs) provide oversight, research direction, and quality assurance for the methods, procedures, and analytical systems both on *JOIDES Resolution* and on shore. The groups meet regularly to review cruise evaluations, expedition technical reports, and any concerns raised by the IODP Issues Management Team to provide advice on corrective actions and potential developments for laboratories.

Curation and Core Handling

The Curation LWG did not meet this quarter.

Geochemistry and Microbiology

The Geochemistry LWG did not meet this quarter because chemistry-related issues continue to be minor and are resolved through the normal operational framework.

Geology

The Geology LWG met this quarter and focused mostly on the GEODESC project closeout. Shipboard issues raised during the recent cruises were almost entirely related to the new description software, and the meeting dealt with those as well as the project closeout plan.

- The major work remaining to be done on GEODESC is to produce the user guide in a way that will be accessible even after the end of JRSO; this required a change in how documentation flows master-to-copy, but a methodology was established.
- Lessons learned were discussed at length. A few examples:
 - Project start was delayed by a search for commercially available software packages that might do the same job, but none were identified.
 - The length of the project, while costly in terms of manpower, allowed many JRSO staff members to participate. This benefited the project and created a large base of staff knowledgeable about the new description package. There were also downsides, however, as turnover slowed the progress of the project at times.
 - As JRSO has discovered with other projects, the testing and regression testing effort was larger than the initial programming effort. This is vital with any software development project, and the most successful of our projects (e.g., LIME and LIVE) were the ones that were given these testing resources. This proved to be the same for GEODESC.

Geophysics

The Geophysics LWG met at the end of last quarter and will meet again next quarter.

7. TAMU Technology Services

TAMU Technology Services oversees JRSO data collection/storage, management, and archiving; maintains IT infrastructure on ship and shore; develops and maintains instrument-specific software for data acquisition; and manages the Program's extensive databases.

Expedition data

LIMS database

Data from Expeditions 399 (Building Blocks of Life, Atlantis Massif) and 395 were added to the Laboratory Information Management System (LIMS) database on shore this quarter. Expedition 392 data were released from moratorium during this quarter.

Expedition data requests

The following tables provide information on JRSO web data requests from the scientific community. Where possible, visits by JRSO employees were filtered out.

Table 7.1. Top 10 countries accessing JRSO web databases

Rank	Janus database		LIMS database	
	Country	Visitor sessions	Country	Visitor sessions
1	United States	712	United States	1,756
2	China	507	China	795
3	United Kingdom	233	United Kingdom	290
4	Germany	177	Germany	222
5	Japan	140	Japan	158
6	Ukraine	85	France	111
7	Taiwan	81	Canada	94
8	Canada	62	New Zealand	84
9	The Netherlands	57	Italy	78
10	Australia	55	India	47
11	Other	413	Other	415
	Total	2,522	Total	4,050

Table 7.2. Top 20 database web queries

Rank	Janus database		LIMS database*	
	Query	Views	Query	Views
1	Paleomag—cryomag	8,957	Samples	1,221
2	Sample	5,627	Hole summary	901
3	Images—prime data	3,555	Section summary	796
4	Paleontology—paleo investigation	3,287	Images—core photo	697
5	Paleomag—Zplot	2,417	Core summary	668

Rank	Janus database		LIMS database*	
	Query	Views	Query	Views
6	Chemistry—carbonates	1,549	Images—section photo	651
7	Chemistry-gas safety	1,368	Chemistry—carbonates	526
8	Images—core photo	1,359	Physical properties—GRA	459
9	Core summary	1,120	Physical properties—MAD	433
10	Site summary	959	X-ray—XRF	323
11	Physical properties—GRA	910	Chemistry—interstitial water	309
12	Depth point calculator	866	Physical properties—MS	296
13	Physical properties—MAD	762	Physical properties—RSC	280
14	Chemistry—ICP	660	Physical properties—NGR	251
15	Chemistry—interstitial water	650	X-ray—XRD	247
16	Operations—APC	464	Chemistry-ICP-AES	209
17	Physical properties—AVS	464	Images—thin section	192
18	Hole trivia	462	Paleomag—SRM section	164
19	Paleontology—sample details	460	Paleomag—MSPOINT	158
20	Hole Summary	437	Chemistry-gas safety	157
	Other	3,052	Other	2,801
	Total	39,385	Total	11,739

Table 7.3. Data requests to the TAMU Data Librarian

Requests	Total	Country	Total
Data	10	USA	6
Images	3	United Kingdom	3
Forwarded	3	China	2
Data not available	1	France	2
How to	1	Japan	2
Seismics	1	Malta	1
Data correction	1	New Zealand	1
		Brazil	1
		Australia	1
		Germany	1
Total	20	Total	20

Network systems operation, maintenance, and security

JRSO conducted routine system maintenance in accordance with the TAMU IT security policy. To increase availability of satellite services to the *JOIDES Resolution* in high latitudes during Expeditions 400 and 403, we signed a joint agreement with Siem to provide additional service using the Starlink system of satellites.

We completed Phase 1 of the annual risk assessment and provided a comprehensive inventory of all IT software, hardware, and services to the risk assessment team. We are currently working to complete Phase 2 of the process, which consists of assessing each item in the Risk Assessment inventory to determine whether there are any security vulnerabilities or deficiencies in complying with directives in the TAMU Security Controls Catalog.

8. Core curation

JRSO provides services in support of Integrated Ocean Drilling Program and IODP core sampling and curation of the core collection archived at the GCR.

Sample and curation strategies

This quarter, JRSO planned sample and curation strategies for Expeditions 395 and 400. The GCR also completed preparing sample lists for the postexpedition sample party for Expedition 398, which was held 24–30 July at the BCR. More than 14,000 samples were collected during this sample party. A doublewide trailer was rented and outfitted to create a laboratory capable of safely mitigating concerns related to asbestiform minerals present in Expedition 399 cores. Work began on recuring and splitting Expedition 399 core sections that could not be processed shipboard, and 75 m of core was split in this laboratory by the end of September.

Sample requests and core sampling

The following table provides a summary of the 3,698 legacy (postmoratorium) samples taken at the GCR during this quarter. Sample requests that show zero samples taken may represent cores that were viewed by visitors during this quarter, used for educational purposes, or requested for X-ray fluorescence (XRF) analysis. For public relations or educational visits/tours, the purpose of the visit is shown in brackets in the “Sample request number, name, country” column, and no number is recorded in the “Number of samples taken” column if no new samples were taken.

Table 8.1. GCR sample requests

Sample request number, name, country	Number of samples taken	Number of visitors
104187IODP, Zhang, China	522	0
104246IODP, Wise, USA	13	0
104263IODP, Agterhuis, Netherlands	15	0
104319IODP, Ning, China	283	0
104327IODP, Marroquin, USA	65	0
104330IODP, Tawil-Morsink, USA	261	2
104168IODP, Wu, China	122	0
104316IODP, McDonald, New Zealand	115	0
104317IODP, McDonald, New Zealand	10	0
104235IODP, Horikawa, Japan	0	0
104347IODP, Zhong, China	471	0
104363IODP, Gonzalez-Lanchas, UK	13	0
104365IODP, Gonzalez-Lanchas, UK	9	0
104375IODP, Yanyan Zhao, China	0	0
104376IODP, Yanyan Zhao, China	24	0
104386IODP, Cottrell, USA	21	0
104387IODP, Ponton, USA	100	2
104395IODP, de Graaf, UK	60	0
104401IODP, Sager, USA	56	1
104402IODP, Usui, Japan	61	2

Sample request number, name, country	Number of samples taken	Number of visitors
104403IODP, Gao, China	45	0
104405IODP, Childress, USA	3	1
104408IODP, Kender, UK	16	0
104416IODP, Dickson, UK	55	0
104418IODP, Smart, UK	25	0
104450IODP, Ai, Germany	41	0
104467IODP, Kegel, Netherlands	253	0
104477IODP, Vogt, Germany	16	0
104481IODP, Chin, USA	0	2
104475IODP, Weldeab, USA	129	0
104490IODP, Weldeab, USA	134	0
104541IODP, Zhang, Switzerland	12	0
104531IODP, Lacerra, USA	73	0
104570IODP, Williams, Australia	114	0
104587IODP, Gonzalez-Lanchas, UK	50	0
104605IODP, Rustic, USA	4	0
104606IODP, Yu, China	269	0
104659IODP, Kimble, USA	81	0
104663IODP, Sweere, USA	22	0
104695IODP, Lee, USA	12	0
104062IODP, Koenig, Spain	31	0
104745IODP, Hoogakker, UK	92	0
104726IODP, Shorrocks, New Zealand	0	2
Tours/demonstrations (4)	4	60
Totals	3,698	72

Use of core collection and education and outreach support

JRSO promotes outreach use of the GCR core collection by conducting tours of the repository and providing materials for display at meetings and museums. The repository and core collection are also used for classroom exercises. This quarter, GCR tours were given to two groups of TAMU students, the Onboard Outreach Officer training participants, and a USSSP-funded Early Career workshop group.

Onshore XRF scanning

During this quarter, 861 core sections and discrete samples were scanned on the XRFs at the GCR. Documentation relating to the operation, advanced configurations, maintenance, and troubleshooting of the XRF is available at <https://sites.google.com/scientific-ocean-drilling.org/xrf-iodp/home>.

Table 8.2. Core sections scanned

Request type	Expedition, name, country	XRF 1	XRF 2	SHIL	WRMSL*
Personal	Non-IODP, Peng, USA	1	0		
Personal	397, Alvarez Zarikian, USA	83	21		
Personal	Non-IODP, Juan Carlos, USA	1	0		

Request type	Expedition, name, country	XRF 1	XRF 2	SHIL	WRMSL*
Personal	Horikawa, Japan	14	0		
Personal	Shorrock, New Zealand	29	27		
Personal	Chin, USA	0	80		
Totals		128	128		

Notes: XRF = X-ray fluorescence, SHIL = Section Half Imaging Logger, WRMSL = Whole-Round Multisensor Logger.

*The WRMSL is currently unavailable because it is serving as the development track for a new X-ray system.

9. Publication services

The Publication Services (Pubs) department provides publication support services for IODP riserless and riser drilling expeditions (see Expedition operations) and editing, production, and graphics services for required Program reports (see Management and administration), technical documentation (see Technical and analytical services), and scientific publications as defined in the JRSO cooperative agreement with NSF. The Pubs department also maintains legacy access and archiving of Integrated Ocean Drilling Program, Ocean Drilling Program (ODP), and Deep Sea Drilling Project (DSDP) publications.

Scientific publications

Table 9.1. Newly published content on the IODP Publications website

Reports and publications	JRSO	Other
<i>Scientific Prospectuses</i>		10.14379/iodp.sp.389.2023 10.14379/iodp.sp.405.2023
<i>Preliminary Reports</i>		10.14379/iodp.pr.386.2023
Expedition Reports	10.14379/iodp.proc.392.2023 10.14379/iodp.proc.392.101.2023 10.14379/iodp.proc.392.102.2023 10.14379/iodp.proc.392.103.2023 10.14379/iodp.proc.392.104.2023 10.14379/iodp.proc.392.105.2023 10.14379/iodp.proc.392.106.2023	
Data Reports		

Notes: Other = European Consortium for Ocean Research Drilling Science Operator (ESO), The Institute for Marine-Earth Exploration and Engineering (MarE3), Integrated Ocean Drilling Program US Implementing Organization (USIO), and Oman expedition publications.

Web services

In addition to internal JRSO web page updates and additions, new content is regularly added to IODP expedition web pages at <http://iodp.tamu.edu/scienceops/expeditions.html>.

During the third quarter of FY23, the IODP TAMU website received 504,943 page views and 43,255 site visits and the IODP Publications website received 481,123 page views and 144,032 site visits. Where possible, visits by JRSO employees and search engine spiders were filtered out of the counts. Visitors to the IODP TAMU website came from more than 218 countries.

The ODP science operator, ODP legacy, and DSDP publications websites are hosted at TAMU. Key data, documents, and publications produced during DSDP and ODP are preserved in these legacy websites that highlight the scientific and technical accomplishments of these ground-breaking precursors to the Integrated Ocean Drilling Program and IODP. These legacy websites contain downloadable documents that cover a wide spectrum of Program information, from laboratory and instrument manuals to Program scientific publications, journals, and educational materials.

Table 9.2. Legacy website statistic

Legacy website	FY23 Q4 page views*	FY23 Q4 site visits*
www-odp.tamu.edu	274,611	50,606
www.odplegacy.org	2,360	1,517
www.deepseadrilling.org	169,885	43,755
Total	446,856	95,878

Note: *Where possible, visits by JRSO employees and search engine spiders were filtered out.

Discovery and accessibility

Digital object identifiers

IODP is a member of CrossRef, the official digital object identifier (DOI) registration agency for scholarly and professional publications. All IODP scientific reports and publications are registered with CrossRef and assigned a unique DOI that facilitates online access. CrossRef tracks the number of times a publication is accessed, or resolved through the CrossRef DOI resolver tool. Program statistics for this quarter are shown in the tables below.

Table 9.3. Number of online DOI resolutions

Reports and publications	DOI prefix	July 2023	August 2023	September 2023	FY23 Q4 total
IODP	10.14379	17,208	14,985	16,900	49,093
Integrated Ocean Drilling Program	10.2204	14,656	13,130	15,110	42,896
ODP/DSDP	10.2973	38,742	32,254	24,203	95,199

Table 9.4. Top 10 IODP DOIs resolved during FY23 Q4

DOI (10.14379)	Resolutions	Title
10.14379/IODP.PROC.396.2023	654	<i>Proceedings</i> Volume 396: Mid-Norwegian Margin Magmatism and Paleoclimate Implications
10.14379/IODP.PROC.385.2021	538	<i>Proceedings</i> Volume 385: Guaymas Basin Tectonics and Biosphere
10.14379/IODP.PROC.367368.2018	535	<i>Proceedings</i> Volume 367/368: South China Sea Rifted Margin
10.14379/IODP.PR.396.2022	529	<i>Preliminary Report</i> : Expedition 396 Mid-Norwegian Margin Magmatism and Paleoclimate Implications
10.14379/IODP.PROC.367368.105.2018	389	<i>Proceedings</i> Volume 367/368: Site U1501
10.14379/IODP.SP.400.2022	355	<i>Scientific Prospectus</i> : Expedition 400 NW Greenland Glaciated Margin
10.14379/IODP.PROC.378.2022	318	<i>Proceedings</i> Volume 378: South Pacific Paleogene Climate
10.14379/IODP.PR.386.2023	214	<i>Preliminary Report</i> : Expedition 386 Japan Trench Paleoseismology

DOI (10.14379)	Resolutions	Title
10.14379/IODP.SP.389.2023	179	<i>Scientific Prospectus</i> : Expedition 389 Hawaiian Drowned Reefs
10.14379/IODP.PR.372.2018	174	<i>Preliminary Report</i> : Expedition 372 Creeping Gas Hydrate Slides and Hikurangi LWD

ScienceOpen

Integrated Ocean Drilling Program and IODP expedition reports and data reports are indexed at ScienceOpen.

Table 9.5. ScienceOpen collection statistics (https://www.scienceopen.com/collection/IODP_Publications and <https://www.scienceopen.com/collection/8b0582f6-47bf-4988-b90a-8533135e6fcc>)

Collection	Number of articles	Article views	Number of authors	Referenced articles
<i>Proceedings of the International Ocean Discovery Program</i> collection	836	25,176	2,045	9,810
<i>Scientific Ocean Drilling Expedition Research Results</i> collection	10,591	63,905	22,077	104,587

Legacy activities

Closeout

Integrated Ocean Drilling Program publications closeout activities continued during the reporting period. Data reports published during this quarter in the *Proceedings of the Integrated Ocean Drilling Program* are listed above in Scientific publications.

Publications archiving

The main IODP publications website (<http://publications.iodp.org/index.html>), which includes the full content from all Integrated Ocean Drilling Program and IODP volumes, and other publications pages are archived at the Internet Archive, a long-term archive specializing in full website backups. Currently, our collection houses 2 TB of data and more than 8.5 million files. We are no longer archiving new publications in this collection. Future archiving will take place at Zenodo.

Citation management

IODP Pubs contracts with the American Geosciences Institute (AGI) to maintain the Scientific Ocean Drilling Citation Database, a subset of the GeoRef database that contains more than 40,800 records for Program-related scientific ocean drilling publications from 1969 to the present.

Table 9.6 Scientific Ocean Drilling Bibliographic Database statistics

Program-related publications	July 2023	August 2023	September 2023	FY23 Q4 total
Searches	303	355	388	1,046
Citation views	172	189	391	752

Downloadable IODP bibliographies

IODP Pubs maintains current Research Information Systems (RIS)–format citation data lists of Program publications and publications and conference presentations/abstracts authored by JRSO staff (<http://iodp.tamu.edu/staffdir/indiv.html>). RIS is a standardized tag format that enables citation programs to exchange data. Users can import the content of the RIS files into most bibliographic software. RIS-format citation data lists are also available for expedition-related bibliographies for Expeditions 301–405. The IODP program publication and JRSO staff-authored publication lists are updated quarterly. Expedition-related bibliography lists are updated monthly.

Abstracts authored by JRSO staff

Abstracts of conference presentations during this quarter authored by JRSO staff include the following. Bold type indicates JRSO staff (<http://iodp.tamu.edu/staffdir/indiv.html>).

Earth Educators' Rendezvous 2023

- Coopers, S., White, L., and **Childress, L.**, 2023. Science and communication at sea: The JR Academy for undergraduate students. Earth Educators' Rendezvous July 2023; https://serc.carleton.edu/earth_rendezvous/2023/program/posters/monday/265167.html

Goldschmidt Conference 2023

- Faz, N.A., Laaker, E.M., Sylvan, J.B., Robinson, R.S., and **Estes, E.R.**, 2023. Microbial activity and response to temporal and chemical gradients in the Gulf of Mexico. Presented at the Goldschmidt Conference, Lyon, France, 9–14 July 2023. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/19953>
- Johnson, M., Solorzano, J.C., Laaker, E.M., Davis, J.E., Sylvan, J.B., Robinson, R.S., and **Estes, E.R.**, 2023. Microbial manganese cycling in seasonal hypoxic zones of the northern Gulf of Mexico. Presented at the Goldschmidt Conference, Lyon, France, 9–14 July 2023. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/19947>
- Kempton, P.D., Ryan, J., Belgrano, T.M., Jonnalagadda, M., Coggon, R.M., Teagle, D.A.H., **Estes, E.R.**, Sylvan, J.B., Reece, J., **Williams, T.**, and South Atlantic Transect Expedition 390 and 393 Scientists, 2023. 61 Ma basalts from IODP Expedition 390 Site U1556: evidence for plume-ridge interaction during opening of the South Atlantic. Presented at the Goldschmidt Conference, Lyon, France, 9–14 July 2023. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/18882>
- Laaker, E.M., Davis, J.E., Bundy, R.M., Sylvan, J.B., Robinson, R.S., and **Estes, E.R.**, 2023. Response of ligand-stabilized manganese by siderophores to seasonal hypoxia in the northern Gulf of Mexico. Presented at the Goldschmidt Conference, Lyon, France, 9–14 July 2023. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/20384>
- Ryan, J.G., Belgrano, T.M., Jonnalagadda, M., Kempton, P.D., Coggon, R.M., Teagle, D.A.H., Reece, J., Sylvan, J.B., **Williams, T.**, **Estes, E.R.**, and South Atlantic Transect Expedition 390 and 393 Scientists, 2023. Evolving MORB compositions between 61 and 7 Ma along the South Atlantic Transect (SAT: IODP Expeditions 390 and 393): shipboard data insights into source and process. Presented at the Goldschmidt Conference, Lyon, France, 9–14 July 2023. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/16206>
- Thibault de Chanvalon, A., Luther, G., **Estes, E.R.**, Necker, J., Tebo, B., Su, J., and Caiu, W.-J., 2023. Influence of manganese cycling on alkalinity in the redox stratified water column of Chesapeake Bay.

Presented at the Goldschmidt Conference, Lyon, France, 9–14 July 2023. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/20197>

International Meeting on Organic Geochemistry 2023

- Zeller, M., Van Dam, B., McKenna, A., Lopes, C., Osburn, C., Fourqrean, J., Kominoski, J., Bottcher, M., Smrzka, D., Smit, N., Orphan, V., Boharmann, G., the South Atlantic Transect IODP Expedition 390 and 393 Scientists (including **E. Estes** and **T. Williams**), Mailland, J., Kucera, M., Zabel, M., and Hinrichs, K.-U., 2023. Biogeochemistry of carbonate-associated organic matter: a story in 3 parts. Presented at the International Meeting on Organic Geochemistry, Montpellier, France, 2023.

IODP/ICDP-Kolloquium 2023

- Brown, A., Kulhanek, D., Bohaty, S.M., Anagnostou, E., Khanolkar, S., Westerhold, T., Dallanave, E., and Expedition 392 Scientists (including **L. Childress**), 2023. Stable isotope analysis of foraminifera from the Mid-Oligocene Glacial Interval (MOGI), IODP Site U1579, Agulhas Plateau, southwestern Indian Ocean. Presented at the German IODP/ICDP Colloquium, Hannover, Germany, 29–21 August 2023.
- Dallanave, E., Sprain, C., Uenzelmann-Neben, G., Bohaty, S.M., **Childress, L.B.**, Kulhanek, D., and Expedition 392 Scientists, 2023. Preliminary magnetic polarity stratigraphy of IODP Exp. 392: Agulhas Plateau Cretaceous Climate, Southwest Indian Ocean. Presented at the German IODP/ICDP Colloquium, Hannover, Germany, 29–21 August 2023.
- Kulhanek, D., Archontikis, O.A., Herrle, J.O., Penman, D.E., Bohaty, S.M., Westerhold, T., Burkett, A.M., Sprain, C.J., Batenburg, S.J., and Expedition 392 Scientists (including **L. Childress**), 2023. Well-preserved calcareous nannofossils across the Paleocene–Eocene Thermal Maximum from International Ocean Discovery Program (IODP) Site U1480, southern Agulhas Plateau, southwestern Indian Ocean. Presented at the German IODP/ICDP Colloquium, Hannover, Germany, 29–21 August 2023.

UK-IODP Annual Meeting 2023

- Aduomahor B., Wagner, T., Herrle, J., Hoffman, P., Dummann, W., Doiron, K., Bijl, P., Uenzelmann-Neben, G., Bohaty, S., **Childress, L.**, and Expedition 392 Scientists. Organic carbon burial in the Cretaceous Transkei Basin: first bulk geochemical results from IODP U1851. UK-IODP Annual Meeting, Southampton, England, 19–20 July 2023.

Articles authored by JRSO staff

- Berndt, C., Planke, S., **Alvarez Zarikian, C.A.**, Frieling, J., Jones, M.T., Millett, J.M., Brinkhuis, H., Bünz, S., Svensen, H.H., Longman, J., Scherer, R.P., Karstens, J., Manton, B., Nelissen, M., Reed, B., Faleide, J.I., Huismans, R.S., Agarwal, A., Andrews, G.D.M., Betlem, P., Bhattacharya, J., Chatterjee, S., Christopoulou, M., Clementi, V.J., Ferré, E.C., Filina, I.Y., Guo, P., Harper, D.T., Lambart, S., Mohn, G., Nakaoka, R., Tegner, C., Varela, N., Wang, M., Xu, W., and Yager, S.L., 2023. Shallow-water hydrothermal venting linked to the Palaeocene–Eocene Thermal Maximum. *Nature Geoscience*. <https://doi.org/10.1038/s41561-023-01246-8>
- Jonas, A.S., **Kars, M.**, Bauersachs, T., Ruebsam, W., and Schwark, L., 2023. Southward displacement of the glacial westerly jet over Asia driven by enhanced Arctic amplification after the Mid-Brunhes Event. *Global and Planetary Change*, 227:104173. <https://doi.org/10.1016/j.gloplacha.2023.104173>

- Thibault de Chanvalon, A., Luther, G.W., **Estes, E.R.**, Necker, J., Tebo, B.M., Su, J., and Cai, W.J., 2023. Influence of manganese cycling on alkalinity in the redox stratified water column of Chesapeake Bay. *Biogeosciences*, 20(14):3053–3071. <https://doi.org/10.5194/bg-20-3053-2023>
- Yakutchik, M., and the IODP Expedition 392 Science Party [including **L. Childress**], 2023. 3.9.3 haiku, Agulhas Plateau Hole U1580A. *Consilience Journal*, Issue 13. <https://www.consilience-journal.com/issue-13-392-haiku>

Appendix: JRSO quarterly report distribution

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