International Ocean Discovery Program

JOIDES Resolution Science Operator

FY24 Q4 Operations and Management Report

1 July–30 September 2024

Cooperative Agreement OCE-1326927

Submitted by the JRSO

to

The National Science Foundation

and

The *JOIDES Resolution* Facility Board

11 November 2024

Contents

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) FY24 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
Eastern Fram Strait Paleo-Archive	403	Amsterdam, Netherlands	4 June–2 August 2024	59 (3/56)	56 (14/42)	R.G. Lucchi K. St. John	T. Ronge
Tie up/Demobilization 404D (2 August–30 September 2024; Amsterdam, Netherlands) (59 days)							
End of JRSO operations							

[1]The start date reflects the initial port call day. The vessel will sail when ready.
[2]Preliminary total estimated transit (i.e., to and from the operational area and between sites).

Expedition 401: Mediterranean-Atlantic Gateway Ocean Transition

Postexpedition activities

A shore-based sampling party for Expedition 401 was held 1–7 July at the Bremen Core Repository (BCR) in Bremen, Germany.

Expedition 402: Tyrrhenian Continent–Ocean Transition

Postexpedition activities

The Expedition 402 postexpedition editorial meeting was held 5–9 August in College Station, Texas. Additional postexpedition sampling of Messinian sections took place 16–20 September at the BCR. This additional sampling by shipboard and shore-based participants will not extend the moratorium period.

Expedition 403: Eastern Fram Strait Paleo-Archive

Table 2.2. Expedition 403 science party staffing breakdown

Member country/consortium	Participants	Co-Chief Scientists
USA: United States Science Support Program (USSSP)	12	1
Japan: Japan Drilling Earth Science Consortium (J-DESC)	3	
Europe and Canada: European Consortium for Ocean Research Drilling (ECORD) Science Support and Advisory Committee (ESSAC)	6	1
People's Republic of China (IODP-China)	2	
Australia and New Zealand: Australia/New Zealand IODP Consortium (ANZIC)	1	
India: Ministry of Earth Science (MoES)	1	

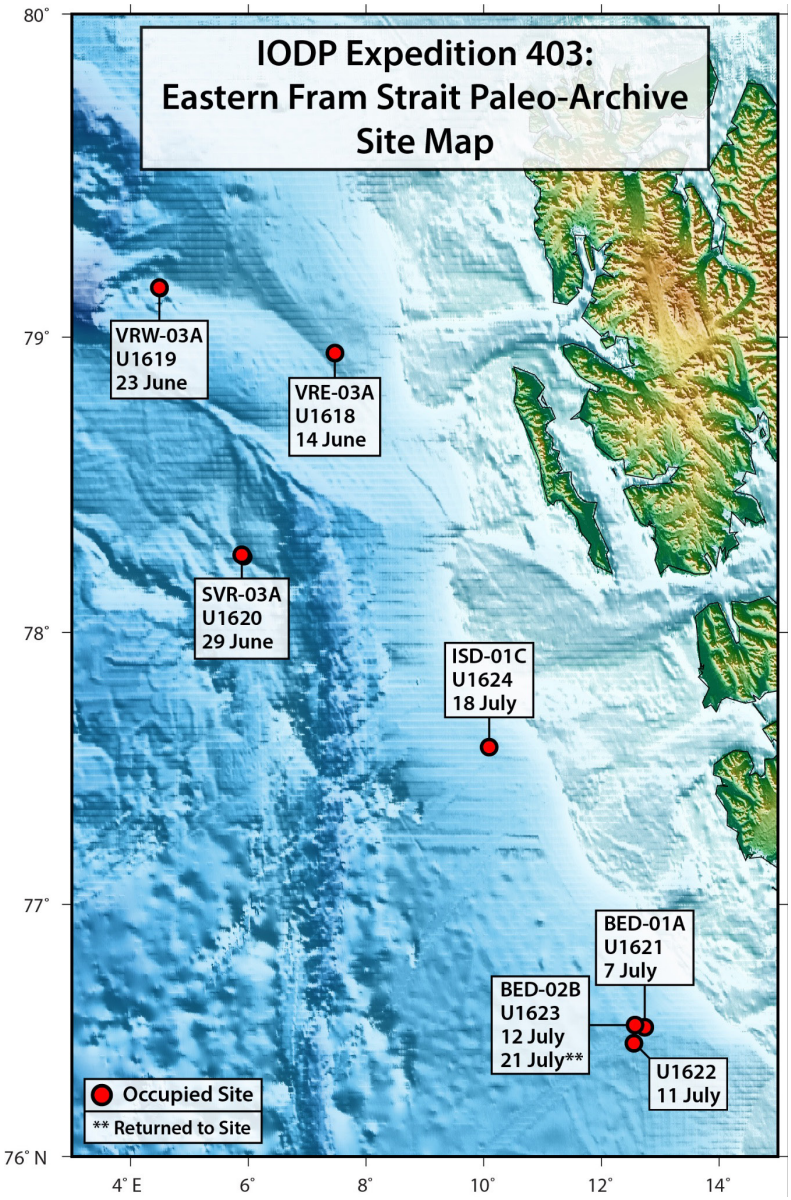
Note: one ESSAC scientist sailed as an unofficial observer from Norway.

Table 2.3. Expedition 403 coring summary

Site	Hole	Latitude	Longitude	Water depth (mbsl)	Cores (*N*)	Total penetration (DSF)	Interval cored (m)	Core recovered (m)	Recovery (%)
U1618	U1618A	78°56.9070′N	7°28.3866′E	1196.0	37	276.9	276.9	252.62	91
	U1618B	78°56.8855′N	7°28.4818′E	1195.2	54	414.3	414.3	375.24	91
	U1618C	78°56.8960′N	7°28.4368′E	1195.8	61	413.1	411.1	450.59	110
Site U1618 total					**152**	**1104.3**	**1102.3**	**1078.45**	**98**
U1619	U1619A	79°09.5894′N	4°29.3227′E	1676.2	85	627.9	627.9	728.35	116
Site U1619 totals					**85**	**627.9**	**627.9**	**728.35**	**116**
U1620	U1620A	78°16.3087′N	5°53.3789′E	1577.7	31	239.9	239.9	277.10	116
	U1620B	78°16.3566′N	5°53.8545′E	1597.1	1	0.4	0.4	0.34	85
	U1620C	78°16.3566′N	5°53.8567′E	1597.1	21	169.9	169.9	186.87	110
	U1620D	78°16.3332′N	5°53.6161′E	1586.0	73	616.0	616.0	667.89	108
Site U1620 totals					**126**	**1026.2**	**1026.2**	**1132.20**	**110**
U1621	U1621A	76°31.2956′N	12°44.3175′	1638.6	28	215.3	215.3	180.40	84
	U1621B	76°31.3053′N	12°44.3358′	1636.51	33	216.1	216.1	203.39	94
	U1621C	76°31.3152′N	12°44.3552′	1635.9	28	207.9	207.9	195.18	94
Site U1621 totals					**89**	**639.3**	**639.3**	**578.97**	**91**
U1622	U1622A	76°27.4495′N	12°33.2859′E	1705.5	7	46.5	46.5	46.26	99
Site U1622 totals					**7**	**46.5**	**46.5**	**46.26**	**99**
U1623	U1623A	76°31.8394′N	12°34.3958′E	1707.7	51	369.3	369.3	330.72	90
	U1623B	76°31.8500′N	12°34.4118′E	1707.7	1	0.1	0.1	0.05	50
	U1623C	76°31.8594′N	12°34.4276′E	1706.4	55	369.0	369.0	322.38	87
	U1623D	76°31.8551′N	12°34.4722′E	1715.6	56	370.0	370.0	351.06	95
	U1623E	76°31.8573′N	12°34.4499′E	1707.2	1	9.6	9.6	9.63	100
	U1623F	76°31.8565′N	12°34.4501′E	1706.7	22	162.3	162.3	147.04	91
	U1623G	76°31.8694′N	12°34.4465′E	1704.8	19	142.1	142.1	153.50	108
Site U1623 totals					**205**	**1422.4**	**1422.4**	**1314.38**	**92**

Site	Hole	Latitude	Longitude	Water depth (mbsl)	Cores (*N*)	Total penetration (DSF)	Interval cored (m)	Core recovered (m)	Recovery (%)
U1624	U1624A	77°35.2627′N	10°05.6277′E	1319.8	1	1.3	1.3	1.33	102
	U1624B	77°35.2625′N	10°05.6399′E	1319.8	45	258.0	258.0	223.05	86
	U1624C	77°35.2543′N	10°05.6072′E	1319.6	43	258.0	258.0	240.24	93
Site U1624 totals					**89**	**517.3**	**517.3**	**464.62**	**90**
Expedition 403 totals					**753**	**5383.9**	**5381.9**	**5343.23**	**99**

Figure 2.1 Expedition 403 site map.



Science summary

The Fram Strait is an important gateway for ocean currents to flow between the North Atlantic and Arctic Oceans. The northward-flowing current system plays critical roles in regional and global climate change because of the heat, salt, and moisture it brings to the Arctic region, which influence the formation and melting of ice sheets and sea ice, as well as the overturning circulation of the ocean itself. Thick deposits of ocean sediments (sediment drifts) have accumulated over millions of years under the effect of the warm current flowing along the seafloor in the eastern Fram Strait.

IODP Expedition 403 conducted operations at seven sites off the western coast of Svalbard. This was a high-recovery expedition, with 5,343 m of total core and a recovery of 99%. The recovered cores are high-resolution continuous expanded sedimentary sequences. Shaped by the bottom current and fed by the input of marine biological activity and sediments delivered by advancing and retreating glaciers on the nearby continental margin, the sediment drifts contain the record of the past (paleo)oceanographic and climatic changes that occurred over millions of years. The dynamic history of ocean-ice interactions during global climate transitions, such as the onset of Northern Hemisphere glaciation, and past periods of rapid warming and higher CO_2 levels than today can be reconstructed from the detailed record contained in these sediment drifts. These paleoclimate data are valuable for ground-truthing climate models of projected future CO_2, temperature, and ice sheet stability.

Postexpedition activities

The Expedition 403 postexpedition editorial meeting is scheduled for 11–15 November in College Station, Texas. Postexpedition sampling is scheduled for January 2025 at the BCR.

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 third quarter of FY24 (April–June) was submitted to NSF on 29 July (**http://iodp.tamu.edu/publications/AR/FY24/FY24_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 (**http://iodp.org/boards-and-panels/facility-boards**).

Project portfolio management

JRSO completed work on the new Rig Instrumentation System (iRIS) and continued work on the Hyperspectral Line Scan Logger and Google Migration projects.

New Rig Instrumentation System

Scope and deliverables

This project aimed to provide a drilling/coring driller's display system (DDS) that would replace the existing RigWatch/Tru-VU, which was no longer supported by the vendor, 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 aimed to 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

Acceptance testing conducted during Expedition 403 determined the application is minimally functional in that it provides all of the essential functionality of the RigWatch application it was scheduled to replace. The software source code and associated documentation were archived in case the *JOIDES Resolution* is brought back into service.

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 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 developers and project team made significant progress in programming and testing new software components and integrating them into the IMS system, including major improvements to camera control and calibration, lighting, and motion control for the hyperspectral track. Modules to enhance the images, extract RGB data from the data cube, and write the large datasets to disk remain under development.

Google Migration

Scope and deliverables

The purpose of this project is to transfer all content (Google sites, Google drives, Google docs, etc.) from the scientific-ocean-drilling workspace to the TAMU workspace. This will transfer primary responsibility for management of these resources from IODP to the TAMU Technology Services department, thus ensuring its availability to the science community beyond the termination of the IODP program. Courtney Landry (IODP Configuration Manager) is the project manager.

Status

Several Google sites and drives were successfully migrated to other locations. Trials to migrate Google sites from the scientific-ocean-drilling workspace to the TAMU tenant revealed several unanticipated

technical hurdles. We are working with TAMU technicians to find solutions to these issues. We are also considering several alternatives to migrating these sites to the TAMU workspace.

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 tool maintenance activities. Schlumberger tools and equipment were removed from the ship during the August–September demobilization 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); 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

JRSO staff worked with the Expedition 403 film crew to facilitate outreach activities during the expedition.

Other projects and activities

Staff assisted with demobilization activities in Amsterdam during August–September. The Manager of Science Operations attended the Forum meeting in Shizuoka, Japan, in early September, where various IODP entities discussed future communication and collaboration mechanisms.

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.

Analytical systems

Hyperspectral Line Scan Logger

Work continues on the Hyperspectral Line Scan Logger (HyperScan) as described above in the “Project portfolio management” section.

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.

No LWGs met this quarter. Final LWG meetings will be scheduled within the two months following the demobilization of *JOIDES Resolution* to resolve any remaining action items and issues, including any new matters from Expedition 403. The LWG leads have started archiving information from past meetings into legacy reports, which will be stored in MerlinOne, Confluence, or another platform, depending on which option offers the best long-term, cost-effective storage solution.

Shipboard Laboratory Demobilization

The successful demobilization of the laboratories on the *JOIDES Resolution* in Amsterdam, Netherlands, involved detailed documentation, disassembly, and careful packing of all scientific equipment along with the furniture, cabinetry, and supplies that will be of use in the shore-based laboratories. These items were loaded into ten 40-foot shipping containers and shipped to the Gulf Coast Repository (GCR), where they will be installed in newly renovated laboratories. The first three containers arrived at the GCR at the end of September and have been unloaded. Initial setup of equipment is under way. The remaining containers are expected to arrive in October.

7. TAMU Technology Services

TAMU Technology Services oversees JRSO data collection/storage, management, and archiving; maintains information technology (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 Expedition 403 were added to the Laboratory Information Management System (LIMS) database on shore this quarter. Expedition 398 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

	Janus database		LIMS database	
Rank	Country	Visitor sessions	Country	Visitor sessions
1	USA	1,486	USA	19,196
2	China	1,066	China	536
3	Germany	334	Poland	371
4	United Kingdom	266	United Kingdom	306
5	Japan	150	Germany	251
6	Canada	110	Japan	171
7	Netherlands	88	Canada	138

Rank	Janus database		LIMS database	
	Country	Visitor sessions	Country	Visitor sessions
8	Belgium	80	India	108
9	France	78	Italy	107
10	Australia	76	Australia	77
11	Other	538	Other	567
	Total	**4,272**	**Total**	**21,828**

Table 7.2. Top 20 database web queries

Rank	Janus database		LIMS database*	
	Query	Views	Query	Views
1	Special holes summary	1,350	Images—core photo	10,022
2	Images—core photo	1,022	Samples	4,475
3	Chemistry—carbonates	1,016	Hole summary	4,284
4	Core summary	813	Images—section photo	4,035
5	Site summary	522	Section summary	3,923
6	Sample	452	Core summary	3,834
7	Hole Summary	404	Physical properties—MS	3,373
8	Paleontology—age model	315	Physical properties—GRA	3,302
9	Images—closeup	255	Paleomag—SRM section	3,302
10	Physical properties—MAD	253	Physical properties—NGR	3,256
11	Physical properties—GRA	249	Paleomag—MSPOINT	3,120
12	Physical properties—MS	230	Physical properties—RSC	3,109
13	Physical properties—RSC	189	Physical properties—MAD	2,796
14	Images—prime data	161	Physical properties—PWL	2,791
15	Hole trivia	131	Chemistry—carbonates	2,602
16	Paleontology—range charts	128	Images—microimage	2,537
17	X-ray—XRF	123	Chemistry—interstitial water	2,483
18	Paleontology—age profile	110	X-ray—XRD	2,469
19	Physical properties—NGR	109	Physical properties—TCON	2,428
20	Depth point calculator	98	Chemistry-gas safety	2,089
	Other	1,319	Other	18,082
	Total	**9,249**	**Total**	**88,312**

Table 7.3. Data requests to the TAMU Data Librarian

Requests	Total
Data	5
Images	3
Data correction	1
Data unavailable	1
Total	**10**

Country	Total
USA	4
United Kingdom	3
Netherlands	2
Japan	1
Total	**10**

Network systems operation, maintenance, and security

JRSO conducted routine system maintenance in accordance with the TAMU IT security policy. The IT staff made significant progress in mitigating security findings from the FY23 risk assessment. They also began Phase I of the FY24 risk assessment.

Other projects and activities

This quarter, the IT staff completed moving all Oracle databases (LIMS, OPS, and Sample and Data Request Management System [SDRM]) from end-of-life, on-premises Oracle Database Appliance (ODA) servers to the TAMU Exadata system. This move will result in considerable cost savings from the lower cost of hardware/software licenses and will remove the need for a contract to retain DBA services. We also moved all Confluence knowledge-base content from on-premises host systems to TAMU enterprise Confluence cloud system, resulting in significant cost savings and increased cybersecurity, and continued our migration from the old tape backup system to a new cloud-based backup system.

To align IT staffing with the needs of the IODP closeout program, we reduced our staff by approximately 35% through attrition and transferring staff to other departments within TAMU.

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 Expedition 403 and GCR staff prepared sample plans for the Expedition 401 postexpedition sample party held 1–7 July at the BCR. The sample party was attended by GCR staff, who assisted with logistics and special sampling. GCR staff also assisted with planning for the additional Expedition 402 postexpedition sample party to be held 16–20 September at the BCR.

Sample requests and core sampling

The following table provides a summary of the 4,709 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
105072IODP, Reid, New Zealand	90	1
105585IODP, Hu, China	131	0
105689IODP, Chen, China	1,350	0
105221IODP, Feng, China	279	0

Sample request number, name, country	Number of samples taken	Number of visitors
105751IODP, Brown, France	48	0
105770IODP, Xiaowen, China	6	0
105552IODP, Scott, New Zealand	200	0
105411IODP, Righi, Italy	256	0
105741IODP, Wang Menqing, China	11	0
105802IODP, Jiang, Australia	544	0
105803IODP, Hoogakker, UK	447	0
105754IODP, Azharuddin, Taiwan	21	0
105826IODP, Wang, China	383	0
105830IODP, Liu, Zhonghui, China	0	0
105832IODP, Hochmuth, Australia	10	1
105839IODP, Miller, New Zealand	10	0
105840IODP, Miller, New Zealand	139	0
105838IODP, Clark, Switzerland	66	0
105842IODP, Kong, USA	23	0
105852IODP, Leckie, USA	1	2
105825IODP, Maria Mejia, Germany	11	0
105853IODP, Liu, China	40	0
105864IODP, van Peer, UK	42	0
105878IODP, Sun, Switzerland	110	0
105880IODP, Gupta, Israel	53	0
105844IODP, McArthur, UK	52	0
105327IODP, Zhang, China	43	0
105922IODP, Zaferani, Canada	1	0
105979IODP, Mershon, USA	15	0
106033IODP, Fernandez, Spain	69	0
105752IODP, Kozik, USA	11	1
106050IODP, Marschalek, UK	90	0
Tours/demonstrations (#)	3	70
Totals	**4,709**	**75**

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, the Glacial Sedimentation Summer School (GLASS) was held 14–19 July at the GCR. More than 30 students from the US and international locations participated in the GLASS workshop and spent the week learning from 10 instructors how ice sheet variability is recorded in the sediment record. Students gained hands-on experience working with glacial cores from DSDP, ODP, and IODP expeditions and ANDRILL cores, culminating in a group presentation at the end of the week. GCR tours were also provided to GLASS participants, Expedition 389 editorial meeting participants, and Mexican undergraduate students taking part in TAMU's Yucatan Initiative.

Onshore XRF scanning

During this quarter, 541 core sections were scanned on the XRFs at the GCR as part of programmatic scanning for Expeditions 402 and 403. 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*
Programmatic	402, Estes, Vadman, Piexoto, Rodriguez Pilco, USA	228	242		
Programmatic	403, Ronge, Rielly, Yeon	30	41		
Totals		**258**	**283**		

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.

Other projects and activities

Substantial completion of the renovation of the GCR laboratory spaces (funded by TAMU) to accommodate instrumentation from the *JOIDES Resolution* following demobilization was reached on 29 August. Preparations were made for renovated GCR laboratory spaces and the loading dock area to be able to receive containers of *JOIDES Resolution* equipment. The first three containers were delivered to the GCR on 28 and 30 September.

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
Scientific Prospectuses		10.14379/iodp.sp.405add.2024
Preliminary Reports	10.14379/iodp.pr.403.2024	
Expedition Reports	10.14379/iodp.proc.398.2024 10.14379/iodp.proc.398.101.2024 10.14379/iodp.proc.398.102.2024 10.14379/iodp.proc.398.103.2024 10.14379/iodp.proc.398.104.2024 10.14379/iodp.proc.398.105.2024 10.14379/iodp.proc.398.106.2024 10.14379/iodp.proc.398.107.2024 10.14379/iodp.proc.398.108.2024	

Reports and publications	JRSO	Other
Expedition Reports	10.14379/iodp.proc.398.109.2024 10.14379/iodp.proc.398.110.2024 10.14379/iodp.proc.398.111.2024 10.14379/iodp.proc.398.112.2024 10.14379/iodp.proc.398.113.2024 10.14379/iodp.proc.398.114.2024	
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 fourth quarter of FY24, the IODP TAMU website received 363,938 page views and 40,764 site visits, and the IODP Publications website received 368,748 page views and 54,540 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 statistics

Legacy website	FY24 Q4 page views*	FY24 Q4 site visits*
www-odp.tamu.edu	507,164	50,977
www.odplegacy.org	3,691	2,228
www.deepseadrilling.org	121,305	18,996
Total	**632,160**	**72,201**

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 2024	August 2024	September 2024	FY24 Q4 total
IODP	10.14379	17,687	16,786	21,888	**56,361**
Integrated Ocean Drilling Program	10.2204	15,155	11,997	17,805	**44,957**
ODP/DSDP	10.2973	32,273	35,628	44,525	**112,426**

Table 9.4. Top 10 IODP DOIs resolved during FY24 Q4

DOI (10.14379)	Resolutions	Title
10.14379/IODP.PROC.356.102.2017	1,042	*Proceedings* Volume 356: Expedition 356 methods
10.14379/IODP.PROC.367368.103.2018	613	*Proceedings* Volume 367/368: Site U1499
10.14379/IODP.PROC.396.2023	593	*Proceedings* Volume 396: Mid-Norwegian Margin Magmatism and Paleoclimate Implications
10.14379/IODP.PROC.390393.2024	559	*Proceedings* Volume 390/393: South Atlantic Transect
10.14379/IODP.PROC.361.108.2017	519	*Proceedings* Volume 361: Site U1479
10.14379/IODP.PR.396.2022	470	*Preliminary Report*: Expedition 396 Mid-Norwegian Margin Magmatism and Paleoclimate Implications
10.14379/IODP.PROC.398.2024	466	*Proceedings* Volume 398: Hellenic Arc Volcanic Field
10.14379/IODP.PROC.367368.105.2018	354	*Proceedings* Volume 367/368: Site U1501
10.14379/IODP.PROC.352.2015	314	*Proceedings* Volume 352: Izu-Bonin-Mariana Fore Arc
10.14379/IODP.PROC.359.101.2017	215	*Proceedings* Volume 359: Expedition 359 summary
10.14379/IODP.PROC.397.2024	215	*Proceedings* Volume 397: Iberian Margin Paleoclimate

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
Proceedings of the International Ocean Discovery Program collection	843	30,257	2,065	9,951
Scientific Ocean Drilling Expedition Research Results collection	11,074	93,148	23,213	113,768

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 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.

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 2024	August 2024	September 2024	FY24 Q4 total
Searches	485	1,243	645	2,373
Citation views	139	125	245	509

Downloadable IODP bibliographies

IODP Pubs also maintains a current PDF list of publications and conference presentations/abstracts authored by JRSO staff and Research Information Systems (RIS)–format citation data lists for IODP program publications and staff-authored journal articles (**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.

ASEE Annual Conference & Exposition

- Stepanova, A., Anwar, S., Laya, J.C., **Alvarez Zarikian, C.A.**, Martinez, N.E., and Hammond, T.A., 2024. Board 379: SedimentSketch, teaching tool for undergraduate sedimentology to provide equitable and inclusive learning for Hispanic students. Paper presented at 2024 ASEE Annual Conference & Exposition, Portland, Oregon, 23–26 June 2024. **https://doi.org/10.18260/1-2--46963**

Articles authored by JRSO staff

Articles published during this quarter authored by JRSO staff include the following. Bold type indicates JRSO staff (**http://iodp.tamu.edu/staffdir/indiv.html**).

- Das, S.K., Mahanta, N., Sahoo, B., Singh, R.K., **Alvarez Zarikian, C.A.**, Tiwari, M., Vats, N., Nihal, Lamy, F., Winckler, G., Middleton, J.L., Arz, H.W., Gottschalk, J., Basak, C., Brombacher, A., Esper, O.M., Farmer, J.R., Herbert, L.C., Iwasaki, S., Lembke-Jene, L., Lawson, V.J., Lo, L., Malinverno, E., Michel, E., Moretti, S., Moy, C.M., Ravelo, A.C., Riesselman, C.R., Saavedra-Pellitero, M., Seo, I., Smith, R.A.,

Souza, A.L., Stoner, J.S., de Oliveira, I.V.M.P., Wan, S., and Zhao, X., 2024. Late Miocene to Early Pliocene paleoceanographic evolution of the Central South Pacific: a deep-sea benthic foraminiferal perspective. Palaeogeography, Palaeoclimatology, Palaeoecology:112252. **https://doi.org/10.1016/j.palaeo.2024.112252**

- Jasper, C.E., Dyer, B., Reilly, B.T., **Williams, T.**, Hemming, S., and Raymo, M.E., 2024. A 3.3-million-year record of Antarctic iceberg rafted debris and ice sheet evolution quantified by machine learning. Paleoceanography and Paleoclimatology, 39(9):e2024PA004897. **https://doi.org/10.1029/2024PA004897**
- Klages, J.P., Hillenbrand, C.-D., Bohaty, S.M., Salzmann, U., Bickert, T., Lohmann, G., Knahl, H.S., Gierz, P., Niu, L., Titschack, J., Kuhn, G., Frederichs, T., Müller, J., Bauersachs, T., Larter, R.D., Hochmuth, K., Ehrmann, W., Nehrke, G., Rodríguez-Tovar, F.J., Schmiedl, G., Spezzaferri, S., Läufer, A., Lisker, F., van de Flierdt, T., Eisenhauer, A., Uenzelmann-Neben, G., Esper, O., Smith, J.A., Pälike, H., Spiegel, C., Dziadek, R., **Ronge, T.A.**, Freudenthal, T., and Gohl, K., 2024. Ice sheet–free West Antarctica during peak early Oligocene glaciation. Science, 385(6706):322–327. **https://doi.org/10.1126/science.adj3931**
- Lissenberg, C.J., McCaig, A.M., Lang, S.Q., **Blum, P.**, Abe, N., Brazelton, W.J., Coltat, R., Deans, J.R., Dickerson, K.L., Godard, M., John, B.E., Klein, F., Kuehn, R., Lin, K.-Y., Liu, H., Lopes, E.L., Nozaka, T., Parsons, A.J., Pathak, V., Reagan, M.K., Robare, J.A., Savov, I.P., Schwarzenbach, E.M., Sissmann, O.J., Southam, G., Wang, F., Wheat, C.G., Anderson, L., and Treadwell, S., 2024. A long section of serpentinized depleted mantle peridotite. Science, 385(6709):623–629. **https://doi.org/10.1126/science.adp1058**
- Morris, A.M., Lambart, S., Stearns, M.A., Bowman, J.R., Jones, M.T., Mohn, G., Andrews, G., Millett, J., Tegner, C., Chatterjee, S., Frieling, J., Guo, P., Jolley, D.W., Cunningham, E.H., Berndt, C., Planke, S., **Alvarez Zarikian, C.A.**, Betlem, P., Brinkhuis, H., Christopoulou, M., Ferré, E., Filina, I.Y., Harper, D.T., Longman, J., Scherer, R.P., Varela, N., Xu, W., Yager, S.L., Agarwal, A., and Clementi, V.J., 2024. Evidence for low-pressure crustal anatexis during the Northeast Atlantic break-up. Geochemistry, Geophysics, Geosystems, 25(7):e2023GC011413. **https://doi.org/10.1029/2023GC011413**
- Reilly, B.T., Tauxe, L., Brachfeld, S.A., Kenlee, B., Gutjahr, M., Dale, A.W., Hernández-Almeida, I., Hemming, S., Bailey, I., Zheng, X., Cheu, D., Taglienti, R., Weber, M.E., Raymo, M.E., and **Williams, T.**, 2024. A geochemical mechanism for >10 m apparent downward offsets of magnetic reversals inferred from comparison of two Scotia Sea drill sites. Geochemistry, Geophysics, Geosystems, 25(7):e2023GC011325. **https://doi.org/10.1029/2023GC011325**
- Shchepetkina, A., Moal-Darrigade, P., Pekar, S., and **Williams, T.**, 2024. Estimating $CaCO_3$ content based on natural gamma ray (NGR) in deep-ocean sediment cores. Stratigraphy, 21(3):225–242. **https://www.micropress.org/microaccess/stratigraphy/issue-405/article-2392**
- Yang, T., **Petronotis, K.E.**, **Acton, G.D.**, Zhao, X., Chemale, F., Jr., and Vasconcelos, P.M., 2024. Remagnetization of pre-fan sediments offshore Sumatra: alteration associated with seismogenic diagenetic strengthening. Journal of Geophysical Research: Solid Earth, 129(8):e2023JB028460. **https://doi.org/10.1029/2023JB028460**
- Zundel, M., Spiegel, C., Mark, C., Millar, I., Chew, D., Klages, J., Gohl, K., Hillenbrand, C.-D., Najman, Y., Salzmann, U., Ehrmann, W., Titschack, J., Bauersachs, T., Uenzelmann-Neben, G., Bickert, T., Müller, J., Larter, R., Lisker, F., Bohaty, S., Kuhn, G., and the Science Team of Expedition PS104 (including **T.A. Ronge**), 2024. A large-scale transcontinental river system crossed West Antarctica during the Eocene. Science Advances, 10(23):eadn6056. **https://doi.org/10.1126/sciadv.adn6056**

Appendix: JRSO quarterly report distribution

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