

International Ocean Discovery Program  
*JOIDES Resolution* Science Operator  
FY23 Q3 Operations and Management Report

1 April – 30 June 2023  
Cooperative Agreement OCE-1326927

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

29 July 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 <sup>1</sup>	Total days (port/ sea)	Days at sea (transit <sup>2</sup> / ops)	Co-Chief Scientists	Expedition Project Manager/ Contact
Transit/tie up (maintenance) 398P (10 February–12 April 2023; Heraklion, Greece to Ponta Delgada, Portugal) (61 days)							
Building Blocks of Life, Atlantis Massif	399	Ponta Delgada, Portugal	12 April–2 June 2023	61 (5/56)	56 (8/48)	A. McCaig S. Lang	P. Blum
Reykjanes Mantle Convection and Climate	395	Ponta Delgada, Portugal	12 June–12 August 2023	61 (5/56)	56 (9/47)	R. Parnell-Turner A. Briais	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, Netherlands) (58 days)							
Mediterranean-Atlantic Gateway Exchange	401	Amsterdam, 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

Expedition	Port (origin)	Dates <sup>1</sup>	Total days (port/ sea)	Days at sea (transit <sup>2</sup> / ops)	Co-Chief Scientists	Expedition Project Manager/ Contact	
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, Netherlands <sup>3</sup> ) (59 days)							

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

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

<sup>3</sup>Amsterdam is the tentative demobilization port.

## Expedition 397: Iberian Margin Paleoclimate

### Postexpedition activities

The shore-based sampling party was held 5–18 June at the Bremen Core Repository (BCR) at the University of Bremen.

## Expedition 398: Hellenic Arc Volcanic Field

### Postexpedition activities

The postcruise editorial meeting was held 22–26 May at the JRSO at TAMU. A shore-based sampling party is scheduled for 24–30 July at the BCR.

## Expedition 399: Building Blocks of Life, Atlantis Massif

### Planning

All port call activities were finalized and completed. The science party boarded the vessel on 13 April.

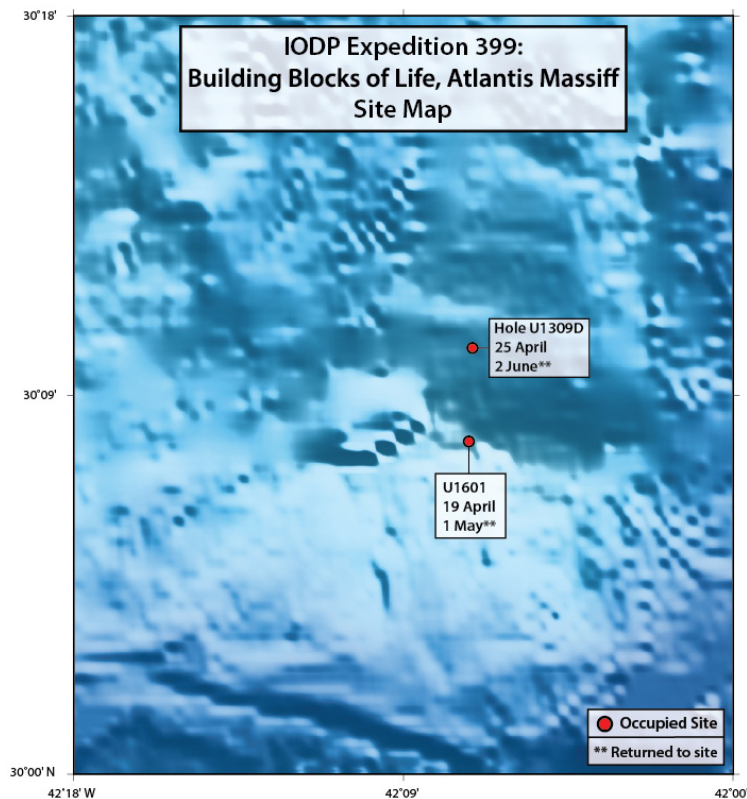
Table 2.2. Expedition 399 science party staffing breakdown

Member country/consortium	Participants	Co-Chief Scientists
USA: United States Science Support Program (USSSP)	12	1
Japan: Japan Drilling Earth Science Consortium (J-DESC)	2	
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	

Table 2.3. Expedition 399 coring summary

Site	Hole	Latitude	Longitude	Water depth (mbsl)	Cores (N)	Total penetration (DSF)	Interval cored (m)	Core recovered (m)	Recovery (%)
U1309	U1309D	30°10.1195'N	42°7.1131'W	1644.9	17	82.5	82.5	48.93	59
Site U1309 totals					17	82.5	82.5	48.93	59
U1601	U1601A	30°7.9260'N	42°7.2255'W	850.0	12	60.6	60.6	14.52	24
	U1601B	30°7.9339'N	42°7.2171'W	850.0	N/A	26	N/A	N/A	N/A
	U1601C	30°7.9417'N	42°7.2072'W	850.0	257	1267.8	1244.8	886.03	71
Site U1601 totals					269	1354.4	1305.4	900.55	69
Expedition 399 totals					286	1436.9	1387.9	949.48	68

Figure 2.2 Expedition 399 site map



## Science summary

Expedition 399 collected new cores from the Atlantis Massif (30°N; Mid-Atlantic Ridge), an oceanic core complex that hosts the Lost City hydrothermal field (LCHF). Studies of the Atlantis Massif and the LCHF have transformed our understanding of tectonic, magmatic, hydrothermal, and microbial processes at slow-spreading ridges. The Atlantis Massif was the site of four previous expeditions (Integrated Ocean Drilling Program Expeditions 304, 305, and 340T and IODP Expedition 357) and numerous dredging and submersible expeditions. The deepest IODP hole in the young (<2 My) oceanic lithosphere, Hole U1309D, was drilled ~5 km north of the LCHF and reached 1415 meters below seafloor (mbsf) through a series of primitive gabbroic rocks. A series of 17 shallow (<16.4 mbsf) holes were also drilled at nine sites across the south wall of the massif during Expedition 357, recovering heterogeneous rock types including

hydrothermally altered peridotites, gabbroic, and basaltic rocks. The hydrologic regime differs between the two locations, with a low permeability conductive regime in Hole U1309D and a high (and possibly deep-reaching) permeability regime along the southern wall.

Expedition 399 targeted Hole U1309D and the southern wall area to collect new data on ancient processes during deformation and alteration of detachment fault rocks. The recovered rocks and fluids are providing new insights into past and ongoing water-rock interactions, processes of mantle partial melting and gabbro emplacement, deformation over a range of temperatures, abiotic organic synthesis reactions, and the extent and diversity of life in the seafloor in an actively serpentinizing system. We sampled fluids and measured the borehole temperature in Hole U1309D before deepening it to 1498 mbsf. The thermal structure was very similar to that measured during Expedition 340T, and lithologies were comparable to those found previously in Hole U1309D. A significant zone of cataclasis and alteration was found at 1451–1474 mbsf.

A new Hole U1601C (proposed Site AMDH-02A) was drilled on the southern ridge close to Expedition 357 Hole M0069A, where both deformed and undeformed serpentinites had previously been recovered. Rapid drilling rates achieved a total depth of 1267.8 mbsf through predominantly ultramafic (68%) and gabbroic (32%) rocks, far surpassing the previous drilling record in a peridotite-dominated system of 201 m. Recovery was excellent overall (71%) but particularly high in heavily peridotite-dominated sections where recovery regularly exceeded 90%. The recovery of sizable sections of largely intact material will provide robust constraints on the architecture and composition of the oceanic mantle lithosphere. The deepest portions of the newly drilled borehole may be beyond the known limits of life, providing the means to assess the role of biological activity across the transition from a biotic to an abiotic regime.

Borehole fluids from both holes were collected using both the Kuster Flow Through Sampler (Kuster FTS) and the new Multi-Temperature Fluid Sampler (MTFS). Wireline logging in Hole U1601C provided information on downhole density and resistivity, imaged structural features, and documented fracture orientations. A reentry system was installed in Hole U1601C, and both it and Hole U1309D were left open for future deep drilling, fluid sampling, and potential borehole observatories.

## Postexpedition activities

The occurrence of asbestiform minerals in the peridotites resulted in a modified core flow for safety reasons, and some shipboard sampling and analyses and all personal sampling was deferred to shore. Once safety procedures are defined, there are plans to do detailed core description (including making thin sections) and some physical properties and geochemical analyses at TAMU and other laboratories, which will be followed by a sample party.

## Expedition 395: Reykjanes Mantle Convection and Climate

### Planning

The addendum to the *Scientific Prospectus* was completed and published in April. All port call and shipping activities were finalized and completed. The science party boarded the vessel on 13 June. The laboratories were professionally cleaned to ensure any potential chrysotile fibers (an asbestiform mineral) from the Expedition 399 cores were removed. No fibers were identified in pre-cleaning air and surface samples or post-cleaning air samples. Replacement severing tools from Schlumberger were planned to be shipped to Iceland for transfer to the vessel during the expedition.

## Staffing

A sedimentologist was unable to sail and dropped out. The position was not restaffed because of time constraints.

## Clearance, permitting, and environmental assessment activities

A genetic resources application required for microbiological work in Greenland was completed and submitted in mid-June. The application was approved by Greenland on 28 June. This requirement had not been included in the permit issued by Denmark.

## Expedition 400: NW Greenland Glaciated Margin

### Planning

The port call logistics are being finalized. Preparations for air freight are in progress, and the 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.

### Staffing

Two scientists have withdrawn from the expedition. The positions were restaffed from the applicant pool. Two ice observers were invited, and both have accepted the invitation to sail. An Outreach Officer has been moved from a shore-based to a shipboard position.

### Clearance, permitting, and environmental assessment activities

The expedition obtained authorization from Denmark (Greenland) to conduct research in the Greenland Exclusive Economic Zone (EEZ) on 9 June. The Environmental Evaluation (EE) required for the Versatile Seismic Imager (VSI) measurements was completed and was approved by NSF on 30 May. A genetic resources application required for microbiological work in Greenland was completed and submitted in mid-June. The application was approved by Greenland on 28 June. This requirement had not been included in the permit issued by Denmark.

## Expedition 401: Mediterranean-Atlantic Gateway Ocean Transition

### Planning

The *Scientific Prospectus* was completed and published in April. A precruise workshop will be held at Bristol University (Bristol, England) in July and will be attended by both expedition scientists and IMMAGE (Land-2-Sea project) investigators. Multiple meetings with the science party have been held to discuss science plans.

### Staffing

The science party staffing is complete. Two Onboard Outreach Officers were invited, and both accepted the invitation to sail.

### Clearance, permitting, and environmental assessment activities

The Marine Scientific Research (MSR) application was completed, and the application was submitted to the US State Department on 4 May. The State Department submitted the Diplomatic Notes to Morocco



and Portugal. Because Spain requested the vessel's flag state to submit the MSR application, the Cyprus Embassy submitted the application on our behalf. The VSI EE was initiated.

## Expedition 402: Tyrrhenian Continent–Ocean Transition

### Planning

Discussions between the Co-Chief Scientists and EPM regarding the curation plan are ongoing. Procedures on handling serpentinized rocks that may contain asbestiform minerals will be refined based on measurements that will occur during handling of Expedition 399 cores at TAMU. Onboard Outreach Officer training was held 27–29 June.

### Staffing

Invitations to sail were sent out this quarter. Special calls for sedimentologists, micropaleontologists, paleomagnetists, inorganic and organic geochemists, microbiologists, and nanofossil specialists were successful. The science party staffing is complete. Two outreach officers have accepted the invitation to sail.

### Clearance, permitting, and environmental assessment activities

The MSR application was completed, and the application was submitted to the US State Department on 22 May. The State Department submitted the Diplomatic Note to Italy.

## Expedition 403: Eastern Fram Strait Paleo-archive

### Planning

The *Scientific Prospectus* was published in May. The Onboard Outreach Officer training was held 27–29 June.

### Staffing

Staffing is currently in progress. The first round of invitations was sent out, and all 13 applicants accepted the invitation to sail. A special call was issued for a diatom specialist.

### Clearance, permitting, and environmental assessment activities

The MSR application will be started next quarter, and a VSI EE will be required.

## 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 (January–March) was submitted to NSF on 5 May ([https://iodp.tamu.edu/publications/AR/FY23/FY23\\_Q2.pdf](https://iodp.tamu.edu/publications/AR/FY23/FY23_Q2.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 X-Ray Linescan Core Imager and Sample and Data Request Replacement projects. Work continued on the GEODESC and the New Rig Instrumentation System projects. Work began on the Hyperspectral Line Scan Logger project. The Google Migration project remains on hold, the Gulf Core Repository (GCR) Core Storage Expansion will be replaced by a new project to accommodate demobilized instrumentation from the ship, and the Core Orientation project was discontinued.

### 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*

JRSO deployed four of the five major components of the GEODESC application suite on 11 October 2022, and they have performed well for two expeditions. JRSO continued working on the Catalog Manager, which is needed to complete the functionality of GEODESC. The estimated project completion date was changed to 30 September 2023.

### X-Ray Linescan Core Imager

#### *Scope and deliverables*

The purpose of this project is to design and fabricate a standalone X-Ray Linescan Imager (XSCAN) to replace the prototype X-Ray Imager that has been in use since Expedition 379 (Amundsen Sea West Antarctic Ice Sheet History). Like the prototype, the XSCAN will provide the fundamental 2-D X-ray images for scientists to observe structures or objects such as dropstones, lamination, shells, burrows, faults, and fractures that might aid in the interpretation of geologic processes, depositional settings, environmental conditions, alteration, and tectonics. Similarly, it will produce images that might aid in core splitting decisions aimed at targeting specific material for sampling or minimizing damaging or disturbing important structures or objects. Unlike the prototype, the XSCAN will be capable of producing linescanned X-ray images of each core section that can be viewed in the LIVE application or used for stratigraphic correlation or other analyses similar to the images produced by the Section Half Imaging Logger (SHIL). Additionally, the XSCAN will be able to rotate the source and detector around the core, which will provide different angular views of structures within the sections and could also be incorporated into volume estimates to be used to improve other datasets. The project manager is Margaret Hastedt (JRSO Research Specialist).

### *Status*

The XSCAN project was successfully completed. Following its installation in late March, XSCAN was used and the software further debugged during Expedition 399. XSCAN is now a fully functional shipboard instrument, and the project is closed.

## 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 the Ops and the Science staff to finalize the content and format of the reports.

## Sample and Data Request Replacement

### *Scope and deliverables*

The scope of this project is to design and implement a replacement program for the current IODP sample and data request (SaDR) application. This project will be used for pre-expedition research planning, along with all postexpedition sample requests, including X-ray fluorescence (XRF) scanning and education and outreach requests. All existing SaDR functions will be carried over to the replacement program. Some additional functions will be added to overcome the shortcomings of SaDR. Work on this project will be conducted in four main phases: creating new requests, administrative functions, integration with the Sample Planning Tool (SPLAT), and data migration from SaDR to the replacement.

### *Status*

JRSO completed work and deployed the Sample and Data Request Replacement application on 15 June.

## 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

This project has been approved by the JRSO management team. The project manager and team members are developing the project plan and expect to commence work building the logger and integrating with the LabVIEW IMS software package by mid-August.

## 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. The new high-temperature cable was installed as the primary wireline in Tarragona, Spain, in preparation for Expedition 399. Expedition 399 sailed with an additional logging engineer so that flaked triple combo tools could be deployed if needed. Arrangements were finalized to ship replacement severing charges to Iceland in July.

## 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, 399, and 400. In addition, plans are in progress for a School of Rock to be held during the Expedition 400T transit from Reykjavik, Iceland, to Amsterdam, Netherlands, in October 2023.

### Other projects and activities

One EPM participated in the JRFB working group on Virtual Expeditions (LEAPs). One current and one past EPM attended the second postexpedition science meetings for Expeditions 379 and 383. The Manager of Science Operations attended the *JOIDES Resolution* and *Chikyu* facility board meetings (JRFB and CIB), and the Science Evaluation Panel meeting in Italy.

## 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

### SPECIM FX10 Hyperspectral Imaging Logger

A charter for a Hyperspectral Scanner (HyperScan) project was written to move from the prior exploratory phase into a development phase, where the focus will be on creating a fully functional automated track system for rapid, systematic collection of hyperspectral data.

### X-ray Core Section Imager

XSCAN was installed on *JOIDES Resolution* and was used during Expedition 399.

### Scanning Electron Microscope—Energy Dispersive Spectrophotometer

The NanoImages scanning electron microscope—energy dispersive spectrophotometer (SEM-EDS) continues to have vibration issues, resulting in distortion to images being taken at magnification >2000x. Vibration isolation measures have been only partially effective, and the system continues to be more sensitive to the ship's motion and vibration than the older SEM. Unfortunately, the plan to purchase a manual stage (analogous to the stage on the Hitachi TM-3000) is not possible because the vendor does not offer a manual stage for this model of SEM. The Hitachi has remained on board providing SEM capability while the Nanoimages system is in use primarily for EDS (which is low magnification and seems to work well).

## 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 no significant chemistry-related issues were reported. It will meet next quarter.

### Geology

The Geology LWG did not meet this quarter because it met at the end of the previous quarter and its chair was subsequently at sea. It will meet next quarter.

### Geophysics

The Geophysics LWG met this quarter to discuss ongoing issues and issues arising from Expeditions 397 and 398.

### *Expedition 397*

- The science party reported ongoing issues with the Correlator workstation (e.g., crashes and slow processing); the computer has since been replaced, and the LWG will monitor the performance.
- Failures of the caliper arms on the centralizer during wireline logging runs were reported in two instances. This was reported to Schlumberger, and a replacement centralizer assembly was used afterward.

### *Expedition 398*

- Issues were reported with moisture and density (MAD) sample size; the science party wanted to measure larger pumice samples intact. JRSO created a workflow to handle standard sample sizes in an efficient manner. Nonetheless, work was done to try to make the MAD process work with the larger samples. Good data were not produced, and the LWG recommended staying within the normal sample size range.
- The software for the Giesa AVS vane shear system was found to be confusing. The LWG recommended additions to the user guide including photographs/screen shots and labels to make this more straightforward.
- The superconducting rock magnetometer (SRM) alternating field (AF) demagnetizer had runaway conditions, and smoke was seen coming from the instrument. This occurred because the abort did not work cleanly and current continued to be supplied to the AF demagnetizer coils. No damage was sustained by the demagnetization unit. The Marine Instrumentation Specialists added a thermal monitor to watch for this condition, but user care in making sure that the system has gone back to starting condition after an abort is always important.

### *Ongoing issues*

- The new X-ray imager (XSCAN) was installed on the ship during the Expedition 398P tie up. Although some of the staff worried it would take up too much space, it fits the area well and was used without notable issue during Expedition 399.
- A report was made on the magnetic susceptibility sonde (MSS). Tests using the copper ring and a tube painted with magnetic paint were run and demonstrated that the channels were distinguishing between conductivity and susceptibility. Use in the field is needed to determine if the MSS will function properly going forward.
- Possible replacements for the formation microscanner (FMS) tool were discussed. Although Schlumberger makes a smaller diameter tool, they do not believe it would work with our coring conditions as the hole diameter will exceed its maximum reach. Schlumberger will try to repair the FMS tool that was damaged during Expedition 393 to get a second tool out to the ship; in the meantime, no spare exists.
- Engineering is creating an equivalent set of advanced piston corer temperature (APCT-3) tools for Peter Flemings (The University of Texas at Austin) for his Gulf of Mexico project.
- The LWG discussed moving forward on the hyperspectral imaging project and potential issues that might arise due to the large data storage requirement. The LWG felt that technology has improved to the point where such large-scale storage (~4 Gb/meter of core) should not be a stumbling block.
- Data issues were found in the SRM code in regard to the background subtraction; this would only affect measurements of samples with very low magnetization, so it did not have a major impact. This

issue was fixed for section half measurements during Expedition 399. Additional experiments and work will be needed to confirm the system works with discrete samples.

## 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

No expedition data were added to the LIMS database on shore this quarter. Expedition 396 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	820	United States	1,848
2	China	396	China	987
3	Germany	293	United Kingdom	792
4	United Kingdom	252	Germany	324
5	Australia	125	Japan	199
6	Netherlands	76	Canada	144
7	Canada	67	France	125
8	Japan	62	Italy	117
9	Brazil	45	India	88
10	Sweden	37	Australia	61
11	Other	252	Other	430
	<b>Total</b>	<b>2,455</b>	<b>Total</b>	<b>5,115</b>

Table 7.2. Top 20 database web queries

Rank	Janus database		LIMS database*	
	Query	Views	Query	Views
1	Images—core photo	2878	Samples	1471
2	Core summary	2356	Section summary	1031
3	Site summary	1823	Paleomag—MSPOINT	1008
4	Sample	1268	Hole summary	1001
5	Chemistry—carbonates	880	Images—core photo	988
6	Hole summary	836	Images—section photo	920
7	Paleontology—age model	801	Core summary	882

Rank	Janus database		LIMS database*	
	Query	Views	Query	Views
8	Special holes summary	730	Physical properties—GRA	619
9	Physical properties—MS	635	Physical properties—MS	591
10	Physical properties—GRA	514	Physical properties—MAD	528
11	Physical properties—MAD	502	Physical properties—NGR	500
12	Paleontology—age profile	481	Chemistry—carbonates	497
13	Physical properties—RSC	426	Physical properties—RSC	483
14	Images-prime data	384	Chemistry—interstitial water	405
15	Images—closeup	376	X-ray—XRF	376
16	Physical properties—NGR	375	X-ray—XRD	332
17	Chemistry-Rock-Eval	327	Chemistry-SRA	307
18	Paleomag—cryomag	301	Images—thin section	272
19	Physical properties—AVS	288	Paleomag—SRM section	259
20	Chemistry-gas safety	278	Physical properties—PWL	244
	Other	2,952	Other	4,676
	<b>Total</b>	<b>19,411</b>	<b>Total</b>	<b>17,390</b>

Table 7.3. Data requests to the TAMU Data Librarian

Requests	Total	Country	Total
Data	4	USA	6
Data not available	3	Denmark	2
How to	1	Netherlands	2
Ages	2	Canada	1
Images	4	Australia	2
		Malta	1
<b>Total</b>	<b>14</b>	<b>Total</b>	<b>14</b>

## Network systems operation, maintenance, and security

JRSO conducted routine system maintenance in accordance with the TAMU IT security policy. In addition, we began work to prepare for the annual risk assessment for 2023.

## 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 399 and began planning for Expedition 400. The GCR also completed preparing sample lists for the postexpedition sample party for Expedition 397, which was held 5–18 June at the BCR. More than 52,000 samples were collected during this sample party, which was the largest one ever held at the BCR. GCR staff traveled to the BCR to assist. This quarter, planning began for the upcoming postexpedition sample party for Expedition 398 to be held 24–30 July at the BCR.



## Sample requests and core sampling

The following table provides a summary of the 5,010 legacy (postmortatorium) 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 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
103261IODP, Nana Yobo, USA	26	1
103258IODP, Peccia, USA	27	0
103364IODP, Hochmuth, Australia	0	1
103377IODP, Karas, Chile	383	0
103351IODP, Smart, United Kingdom	38	0
10344IODP, Kasuya, Japan	56	0
103285IODP, Seo, South Korea	68	0
103463IODP, Mershon, USA	4	0
103493IODP, Bova, USA	152	0
103349IODP, Toyos, Germany	85	0
103525IODP, Alexander, United Kingdom	63	0
103606IODP, Ramirez, USA	131	0
103224IODP, Madrigal, Germany	68	0
103643IODP, Graham, United Kingdom	12	0
103228IODP, Pallone, USA	267	0
103707IODP, Swann, United Kingdom	132	0
103728IODP, Wang, USA	513	0
103734IODP, Lacerra, USA	147	0
103704IODP, Kolomiets, USA	6	0
103855IODP, Siebert, USA	0	2
103861IODP, Yu, China	122	0
103884IODP, Saibro, Brazil	209	0
103897IODP, Abell, USA	22	0
103921IODP, van de Laar, USA	14	1
103964IODP, Liu, China	46	0
104038IODP, Ghosh, India	352	0
104042IODP, Russo, France	0	0
098917IODP, Zheng, China	89	0
104123IODP, Iwasaki, Japan	69	0
104148IODP, Kennett, USA	15	0
104137IODP, Yan, China	400	0
104170IODP, Barron, USA	13	0
104220IODP, Shakun, USA	170	0
104225IODP, Kimble, USA	639	0
104213IODP, O’Connell, USA	21	0

Sample request number, name, country	Number of samples taken	Number of visitors
104189IODP, Bhattacharya, USA	101	0
104187IODP, Zhang, China	522	0
104246IODP, Wise, USA	13	0
104263IODP, Agterhuis, Netherlands	15	0
096694IODP, McCanna, USA	0	1
Tours/demonstrations (#)	5	60
<b>Totals</b>	<b>5,010</b>	<b>66</b>

## 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, tours were given for Dr. Lucien Nana Yobo's Historical Geology class (TAMU) and for local children related to subcontractors that fabricate materials used on the *JOIDES Resolution*. A tour of the GCR was also given to the Outreach Officers of upcoming expeditions as part of the Onboard Outreach Officer training. Additionally, two sections of Dr. Juan Carlos Laya's Sedimentology and Stratigraphy class (TAMU) participated in a laboratory exercise describing IODP core sections in the GCR.

## 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	Peng, Yeon, USA	1	0	0	0
Programmatic	397, Zarikian, Yeon	69	91	0	0
Programmatic	39, Ronge, Woodhouse, Tominaga, Metcalfe, Yeon, Stockmaster, Kutterolf, Perez	369	331	0	0
<b>Totals</b>		<b>439</b>	<b>422</b>	<b>0</b>	<b>0</b>

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.403.2023 10.14379/iodp.sp.401.2023 10.14379/iodp.sp.395add.2023	
<i>Preliminary Reports</i>		
Expedition Reports	10.14379/iodp.proc.396.101.2023 10.14379/iodp.proc.396.102.2023 10.14379/iodp.proc.396.103.2023 10.14379/iodp.proc.396.104.2023 10.14379/iodp.proc.396.105.2023 10.14379/iodp.proc.396.106.2023 10.14379/iodp.proc.396.107.2023 10.14379/iodp.proc.396.108.2023 10.14379/iodp.proc.396.109.2023	
Data Reports	10.14379/iodp.proc.385.203.2023 10.14379/iodp.proc.385.203.2023 10.14379/iodp.proc.383.201.2023 10.14379/iodp. proc.372B375.210.2023 10.14379/iodp.proc.363.206.2023 10.14379/iodp.proc.362.207.2023	

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 <https://iodp.tamu.edu/scienceops/expeditions.html>.

During the third quarter of FY23, the IODP TAMU website received 447,091 page views and 45,883 site visits, and the IODP Publications website received 440,676 page views and 81,944 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	FY23 Q3 page views*	FY23 Q3 site visits*
www-odp.tamu.edu	271,593	52,216
www.odplegacy.org	4,374	2,636
www.deepseadrilling.org	153,796	25,882
<b>Total</b>	<b>429,763</b>	<b>80,734</b>

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	April 2023	May 2023	June 2023	FY23 Q3 total
IODP	10.14379	13,833	12,208	12,287	<b>38,328</b>
Integrated Ocean Drilling Program	10.2204	11,530	10,895	10,106	<b>32,531</b>
ODP/DSDP	10.2973	35,047	23,937	24,433	<b>83,417</b>

Table 9.4. Top 10 IODP DOIs resolved during FY23 Q3

DOI (10.14379)	Resolutions	Title
10.14379/IODP.PROC.396.2023	703	<i>Proceedings</i> Volume 396: Mid-Norwegian Margin Magmatism and Paleoclimate Implications
10.14379/IODP.PROC.385.2021	490	<i>Proceedings</i> Volume 385: Guaymas Basin Tectonics and Biosphere
10.14379/IODP.PROC.367/368.2018	413	<i>Proceedings</i> Volume 367/368: South China Sea Rifted Margin
10.14379/IODP.PR.396.2022	412	<i>Preliminary Report</i> : Expedition 396 Mid-Norwegian Margin Magmatism and Paleoclimate Implications
10.14379/OMANDP.PROC.2020	367	Oman Drilling Project
10.14379/IODP.PROC.363.2018	318	<i>Proceedings</i> Volume 363: Western Pacific Warm Pool
10.14379/IODP.SP.403.2023	306	<i>Scientific Prospectus</i> : Expedition 403 Eastern Fram Strait Paleo-Archive (FRAME)
10.14379/IODP.SP.402.2023	262	<i>Scientific Prospectus</i> : Expedition 402 Tyrrhenian Continent–Ocean Transition
10.14379/IODP.SP.395.2020	251	<i>Scientific Prospectus</i> : Expedition 395 Reykjanes Mantle Convection and Climate
10.14379/IODP.PROC.378.2022	140	<i>Proceedings</i> Volume 378: South Pacific Paleogene Climate

### 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](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	819	24,022	2,004	9,560
<i>Scientific Ocean Drilling Expedition Research Results</i> collection	9,683	57,498	21,036	100,196

## 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. 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	April 2023	May 2023	June 2023	FY23 Q3 total
Searches	254	192	337	<b>783</b>
Citation views	143	123	239	<b>505</b>

## 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 (<https://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 301–399. 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 (<https://iodp.tamu.edu/staffdir/indiv.html>).

### UK-IODP Annual Meeting

- 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. Presented at the UK-IODP Annual Meeting, Southampton, 19 and 20 July 2023.

### Articles authored by JRSO staff

- Carrasqueira, I.G.d.F., Jovane, L., Droxler, A.W., **Alvarez Zarikian, C.A.**, Lanci, L., Alonso-Garcia, M., Laya, J.C., and Kroon, D., 2023. Anomalous widespread arid events in Asia over the past 550,000 years. PNAS Nexus. <https://doi.org/10.1093/pnasnexus/pgad175>

## Appendix: JRSO quarterly report distribution

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