International Ocean Discovery Program

JOIDES Resolution Science Operator

FY20 Q4 Operations and Management Report

1 July–30 September 2020

Cooperative Agreement OCE-1326927

Submitted by the JRSO

to

The National Science Foundation

and

The *JOIDES Resolution* Facility Board

12 November 2020

Contents

4 1. Introduction

4 2. Expedition operations

- Expedition 385: Guaymas Basin Tectonics and Biosphere
- Expedition 378: South Pacific Paleogene Climate
- Expedition 384: Engineering Testing
- Expedition 395: Reykjanes Mantle Convection and Climate
- Expedition 395E: Hole U1309D Remediation and Engineering Testing
- Expedition 396: Mid-Norwegian Continental Margin Magmatism
- Expeditions 390 and 393: South Atlantic Transect 1 and 2
- Expedition 391: Walvis Ridge Hotspot
- Expedition 392: Agulhas Plateau Cretaceous Climate

9 3. Management and administration

- Progress reporting
- Liaison activities
- Project portfolio management

12 4. Subcontract activities

12 5. Science operations

- Expedition outreach support

12 6. Technical and analytical services

- Maintenance period activities
- Analytical systems
- Laboratory working groups

16 7. Development, IT, and Databases

- Expedition data
- Network systems operation, maintenance, and security

17 8. Core curation

Sampling parties and curation policies and procedures

Sample and curation strategies

Sample requests and core sampling

Use of core collection and education and outreach support

Onshore XRF scanning

20 9. Publication services

Scientific publications

Web services

Publications coordination

Discovery and accessibility

Legacy activities

Citation management

26 Appendix: JRSO quarterly report distribution

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) FY20 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 under way during the quarter);
- Clearance, permitting, and environmental assessment activities;
- Expedition operations (including a site map for each expedition under way during the quarter, a coring summary table for each expedition completed during the quarter, and preliminary science results for each expedition completed during the quarter); and
- Postexpedition activities (including postcruise editorial meetings).

Table 2.1. JRSO expedition schedule

Expedition		Port (origin)[1]	Dates[2]	Total days (port/sea)	Days at sea (transit[3]/ ops)	Co-Chief Scientists	Expedition Project Manager
Non-IODP (Dry Dock/Tie-up) (16 May—20 July 2020) (68 days)							M. Malone
Engineering Testing	384	Kristiansand, Norway	20 July–5 September 2020	47 (2/45)	45 (18/27)	N/A	P. Blum
Non-IODP (5 September—5 October 2020) (30 days)							M. Malone
South Atlantic Transect Re-Entry Installations	390C	Kristiansand, Norway	5 October–5 December 2020	61 (3/58)	58 (39/19)	N/A	E. Estes
Non-IODP (Tie-up) (5 December 2020—6 April 2021) (122 days)							M. Malone
Hole U1309D Remediation and Engineering Testing	395E	Las Palmas, Canary Islands	6 April–6 June 2021	61	TBD	N/A	P. Blum
Reykjanes Ridge Mantle Convection and Climate	395	Reykjavík, Iceland	6 June–6 August 2021	61 (5/56)	56 (3/53)	R. Parnell-Turner A. Briais	L. LeVay
Mid-Norwegian Continental Margin Magmatism	396	Reykjavík, Iceland	6 August–6 October 2021	61 (5/56)	56 (7/49)	C. Berndt S. Planke	C. Alvarez Zarikian
Non-IODP (Tie-up/Transit) (6 October–6 December 2021) (61 days)							M. Malone
Walvis Ridge Hotspot	391	Cape Town, South Africa	6 December 2021–5 February 2022	61 (5/56)	56 (11/45)	W. Sager K. Hoernle	K. Petronotis
Agulhas Plateau Cretaceous Climate	392	Cape Town, South Africa	5 February–7 April 2022	61 (5/56)	56 (6/50)	G. Uenzel-mann-Neben S. Bohaty	D. Kulhanek
South Atlantic Transect 1	390	Cape Town, South Africa	7 April–7 June 2022	61 (5/56)	56 (14/42)	R. Coggon J. Sylvan	E. Estes
South Atlantic Transect 2	393	Montevideo, Uruguay	7 June–7 August 2022	61 (5/56)	56 (14/42)	D. Teagle G. Christeson	T. Williams

Notes: TBD = to be determined.
1 Ports subject to change, pending issues related to the COVID-19 virus.
2 The start date reflects the initial port call day. The vessel will sail when ready.
3 Preliminary total estimated transit (i.e., to and from operational area and between sites).

Expedition 385: Guaymas Basin Tectonics and Biosphere

Postexpedition activities

Expedition 385 sampling was completed in July by JRSO staff. The Expedition 385 postcruise editorial meeting, which began on 1 June, is being conducted online using Google Drive collaboration tools and is expected to be completed early next quarter.

Expedition 378: South Pacific Paleogene Climate

Postexpedition activities

X-ray fluorescence (XRF) measurements of the cores were completed by JRSO staff. Because of COVID-19 restrictions, the Expedition 378 postcruise editorial meeting was postponed to early next quarter. The current plan is to conduct the editorial meeting online using Google Drive collaboration tools starting 15 October, with the goal of completing the work by Thanksgiving. In January, we plan to start an in-person sample party, mainly consisting of on-site JRSO staff and maybe, if US travel restrictions and the University restrictions allow, some US scientists. Scientists who are unable to attend will provide a sample list, and samples will be mailed to them in early February.

Expedition 384: Engineering Testing

Planning

The final version of the *Scientific Prospectus* for Expedition 384 was published, and the expedition was rescheduled for 20 July–5 September 2020. Two sites were selected (Sites REYK-13A and U1309) for drill bit testing, and a secondary objective of systematically testing the advanced piston corer (APC) core orientation tools was added at Site REYK-6A. Any core obtained from Sites REYK-13A and REYK-6A, with the exception of a limited amount of basement core for analysis by bit vendors, will be made available to the Expedition 395 science party.

Staffing

Expedition 384 took place with limited JRSO staff. Because COVID-19 travel restrictions were still in place at the end of the quarter, a travel exemption was sought for JRSO staff and crew. Travel reservations were made in June, and staffing was completed.

Figure 2.1 Expedition 384 site map

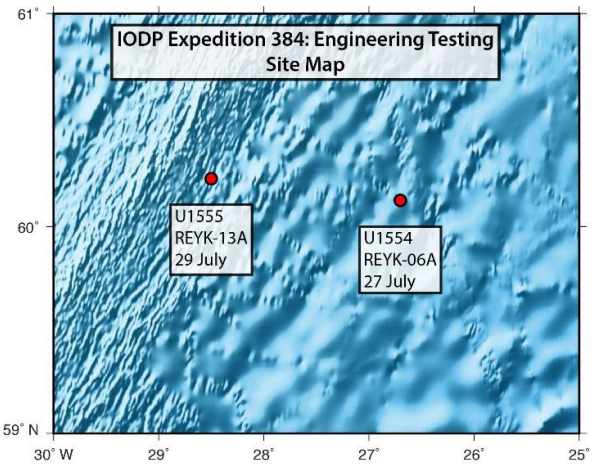


Table 2.2 Expedition 384 coring summary

Site	Hole	Latitude	Longitude	Water depth (mbrf)	Cores (N)	Interval cored (m)	Core recovered (m)	Recovery (%)
U1554	U1554A	60°7.5038′N	26°42.0955′W	1880.8	8	72.2	74.71	103.5
	U1554B	60°7.5058′N	26°42.0748′W	1882.0	8	76.0	76.77	101.0
	U1554C	60°7.4950′N	26°42.0747′W	1880.0	8	75.0	77.03	102.7
	U1554D	60°7.4941′N	26°42.0968′W	1880.0	1	9.5	9.72	102.3
Site U1554 totals					**25**	**232.7**	**238.23**	**102.4**
U1555	U1555A	60°13.6826′N	28°29.9693′W	1527.4	0	0.0	0.0	0.0
	U1555B	60°13.6829′N	28°29.9443′W	1527.4	0	0.0	0.0	0.0
	U1555C	60°13.6816′N	28°29.9318′W	1527.4	0	0.0	0.0	0.0
	U1555D	60°13.6795′N	28°29.9018′W	1527.4	0	0.0	0.0	0.0
	U1555E	60°13.6789′N	28°29.8832′W	1527.4	0	0.0	0.0	0.0
	U1555F	60°13.6861′N	28°30.0207′W	1534.6	8	10.6	8.34	78.7
	U1555G	60°13.6849′N	28°29.9997′W	1534.6	26	140.9	60.30	42.8
Site U1555 totals					**34**	**151.5**	**68.64**	**45.3**
Expedition 384 totals					**59**	**384.2**	**306.87**	**79.9**

Note: mbrf = meters below rig floor

Science summary

The objective of Expedition 384 was to carry out engineering tests with the goal of improving the chances of success in deep (>1 km) drilling and coring in igneous ocean crust. A wide range of tools and technologies for potential testing were laid out by the Deep Crustal Drilling Engineering Working Group in 2017, based on reports from recent crustal drilling expeditions. The *JOIDES Resolution* Facility Board (JRFB) further prioritized the testing opportunities in 2018. The top priority of all recommendations was an evaluation of drilling and coring bits because rate of penetration and bit wear and tear are the prevalent issue in deep crustal drilling attempts and bit failures often require an excessive amount of fishing and hole cleaning time. The test plan included drilling in basalt with three different types of drill bits: a tungsten carbide insert (TCI) tricone bit, a polycrystalline diamond compact (PDC) bit, and a more novel PDC/TCI hybrid bit. In addition, a TCI bit was to be paired with an underreamer with expanding cutting blocks instead of extending arms. Finally, plans were made for a test run of a type of rotary core barrel (RCB) PDC coring bit that was acquired for the *JOIDES Resolution* several years ago but never deployed.

A second objective was added when additional operating time became available for Expedition 384 as a result of the latest schedule changes. This objective included the assessment and potential improvement of current procedures for APC core orientation.

Expedition 384 began in Kristiansand, Norway, on 20 July 2020. The test location was based on various factors, including the *JOIDES Resolution*'s location at the time, our inability to obtain territorial clearance in a short period of time, and a suitable combination of sediment and igneous rock for drilling and coring operations. Expedition 395, which was postponed due to the COVID-19 pandemic, included proposed sites that were suitable for our testing and offered the opportunity to carry out some serendipitous sampling, logging, and casing work for science.

We first triple cored the top 70 m of sediment at Site U1554 (proposed Site REYK-6A) to compare core orientation data with the excellent paleomagnetic signature measured in the cores. Comparison of core orientation measurements taken on the ship and on shore revealed that past problems resulted from a

180° misalignment in the assembly of one of the tools, which occurred randomly over many years. The assembly part was fixed and the problem eliminated for future expeditions.

We then spent 20 days at Site U1555 (proposed Site REYK-13A) to test the three types of drill bits, an underreamer, and a coring bit in six holes. The TCI bits were the best performers, the TCI/PDC hybrid bit did not stand up to the harsh formation, and the PDC bit didn't get sufficient run time due to a mud motor failure. The cutting block underreamer is not considered able to perform major hole opening in basalt but could be useful for knocking out ledges. The PDC coring bit cut good quality basalt cores but did so at an unacceptably low rate.

In Hole U1555G, the seventh and final hole, we used a regular RCB coring bit to recover the entire 130 m basalt section specified in the Expedition 395 *Scientific Prospectus* and provided the project team with shipboard data and samples. The basalt section was successfully wireline logged before the logging winch motor failed, which precluded further operations for safety reasons. Additional operations plans in support of Expedition 395, including coring, logging, and casing at Site U1554, had to be canceled, and Expedition 384 ended prematurely on 24 August in Kristiansand.

Expedition 395: Reykjanes Mantle Convection and Climate

Planning

Expedition 395 was postponed because of COVID-19 travel restrictions that impacted both the science party and the crew. The expedition was rescheduled for 6 June–6 August 2021 with the same starting and ending port (Reykjavík, Iceland). The science party continued to work on research planning and collaborations, and two science meetings were held during the summer. The implementation of Expedition 384 and its connection to Expedition 395 (via Sites REYK-13A and REYK-6A) have yielded cores that will be available for science party use. Additionally, the shipboard thin section samples and inductively coupled plasma spectroscopy (ICP) samples taken during Expedition 384 will be sent to an Expedition 395 petrologist, and the results will be part of the shipboard data.

Staffing

The scientists were asked to confirm their participation by 1 November 2020. The EPM and Co-Chief Scientists created a draft shipboard staffing list that will implement the COVID Mitigation Protocols Established for Safe JR Operations (COPE).

Expedition 395E: Hole U1309D Remediation and Engineering Testing

Planning

At the behest of the JRFB, JRSO was tasked with remediating Hole U1309D (removing the caliper lost from the Versatile Seismic Imager [VSI] tool during Expedition 340T), which is proposed to be deepened in IODP Proposal 937. This will require obtaining borehole fluid samples and a temperature profile before the hole is disturbed during fishing operations. An EPM and an operations superintendent were assigned, and the lead proponent of Proposal 937 was contacted to begin discussions about operations and sampling. JRSO also proposed installing a reentry system, which was included in Proposal 937. The remainder of Expedition 395E will be utilized to conduct engineering testing, including testing the drill bit that was to be tested during Expedition 384 near Site U1309D and completing the testing of the PDC drill bit, which was cut short because of a mud motor failure. JRSO is also in communication with the

Principal Investigators (PIs) who are completing land tests for the probe delivery tool (PDT), which is a replacement for the motion decoupled hydraulic delivery system (MDHDS).

Expedition 396: Mid-Norwegian Continental Margin Magmatism

Planning

Because of COVID-19 restrictions, the South Atlantic expeditions (Expeditions 390/393, 391, and 392) were rescheduled to late 2021–2022. The JRFB reviewed North Atlantic proposals and scheduled Expedition 396 (6 August–6 October 2021) to follow Expedition 395. The current starting point is Reykjavík, Iceland, and the ending port is Kristiansand, Norway. The precruise meeting, which will be conducted as a series of virtual meetings, is planned for early next quarter.

Staffing

Two Co-Chief Scientists were selected and accepted the invitation to sail. A call to apply was issued on 10 September, with an application deadline of 11 October. The Program Member Offices (PMOs) will forward the applications to JRSO by 9 November. The COVID-19 pandemic status will determine whether we need to put the COPE protocol into effect for this expedition, so we will need to plan for both options.

Clearance, permitting, and environmental assessment activities

The Expedition 396 clearance application was started, and discussions with the Co-Chief Scientists will take place in October. We anticipate submitting the clearance application to the US State Department by the end of next quarter or early in the second quarter.

Expeditions 390 and 393: South Atlantic Transect 1 and 2

Planning

Because of COVID-19 restrictions, Expeditions 390 and 393 were rescheduled to 7 April–7 June 2022 and 7 June–7 August 2022, respectively. Expedition 390 will start in Cape Town, South Africa, and end in Montevideo, Uruguay, and Expedition 393 will start and end in Montevideo, Uruguay. Following the postponement of Expeditions 390 and 391 due to COVID-19 pandemic travel restrictions, discussions with the Expedition 390 and 393 Co-Chief Scientists and the JRFB concluded that it would be beneficial to install the planned reentry systems, which could be done without a science party on board, during the engineering testing expedition. A revised operations plan was developed to drill a single APC hole and install casing and reentry systems at five sites in advance of the rescheduled expeditions. This plan saves ~14 days of time from Expeditions 390 and 393, which better ensures that target penetration depths can be achieved at all sites and increases the probability that several sites can be established as legacy holes. Expedition 390C (South Atlantic Transect Reentry Installations) is scheduled to start in Kristiansand, Norway, on 5 October and end at Las Palmas, Canary Islands (Spain), on 5 December. If travel or COVID-19–related issues prevent implementation during this window, this effort could be rolled into the December–February tie up period.

Staffing

The science party was informed of the rescheduled dates and will be asked to officially confirm their participation at a later date.

Expedition 391: Walvis Ridge Hotspot

Planning

Because of COVID-19 restrictions, Expedition 391 was rescheduled to 6 December 2021–5 February 2022.

Staffing

The Science Party was informed of the rescheduled dates and will be asked to officially confirm their participation at a later date.

Clearance, permitting, and environmental assessment activities

Because the expedition was rescheduled, the clearance application will need to be resubmitted with the new dates.

Expedition 392: Agulhas Plateau Cretaceous Climate

Planning

Because of COVID-19 restrictions, Expedition 392 was rescheduled to 5 February–7 April 2022.

Staffing

The Science Party was informed of the rescheduled dates and will be asked to officially confirm their participation at a later date.

Clearance, permitting, and environmental assessment activities

The marine scientific research (MSR) application was submitted to the US State Department. However, because the expedition was rescheduled, the clearance application will need to be resubmitted with the new dates. Additionally, the Environmental Evaluation (EE) required for Expedition 392 acoustic activity associated with check shot surveys was approved by NSF. Because the expedition is scheduled in the same austral summer window, the EE remains valid.

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 FY20 (April–June) was submitted to NSF on 31 July (http://iodp.tamu.edu/publications/AR/FY20/FY20_Q3.pdf).

Liaison activities

JRSO reports to and liaises with funding agencies and IODP-related agencies (e.g., JRFB, JRFB advisory panels, 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 continued work on the New Rig Instrumentation System, Digital Asset Management System, SampleMaster Replacement, GEODESC, QC Data Viewer, X-ray Linescan Core Imager, and Core Orientation projects.

GEODESC

Scope and deliverables

The purpose of the GEODESC 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 GEODESC tool set. The project manager is Peter Blum.

Status

The GEODESC project remains on track for completion in late 2021.

SampleMaster Replacement

Scope and deliverables

The purpose of the SampleMaster Replacement project is to replace the SampleMaster application with a modular program. SampleMaster is an application that provides for all initial IODP data entry into the Laboratory Information Management System (LIMS) database. This interface is used across the organization by a wide range of people who fall into groups of users that perform specific tasks. The project manager for the Catwalk Module is Chieh Peng.

Status

The Catwalk module was tested during Expedition 384 and will be placed into production beginning with Expedition 390C.

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, XSCAN will be capable of producing line-scanned 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, 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.

Status

This project continues to make progress but will not meet the planned October 2020 completion date. The project completion date is unknown and will likely be extended by several months. Additional information is provided in the "Analytical systems" section, below.

Core Orientation

Scope and deliverables

The purpose of this project is to (1) develop a new nonmagnetic orientation tool that will be directly attached to the core barrel and (2) improve methods used in aligning the core liner within the core barrel. Specifically, a new gyroscopic orientation tool (GOT) will be developed in house that will be attached directly to the core barrel, avoiding possible problems with misalignment between the sinker bars and core barrel. Because the GOT does not use the magnetic field for orientation, the large magnetic fields associated with the drill string are irrelevant. To improve the alignment of the core liner, JRSO will investigate whether it is possible to modify the APC core barrels to allow the core liner to be aligned and attached at both ends of the core barrel. Currently, the top of the liner is oriented and attached to the core barrel with a screw but the bottom of the liner is free to twist, which it might do as sediment enters the liner. The project manager is now Bill Rhinehart.

Status

JRSO plans to purchase a fiber-optic model gyro from KVM and conduct further tests to see if this new gyro will overcome the drift issue. During Expedition 384, additional tests with the existing magnetic orientation tools were conducted to identify sources of orientation errors. One tool was found to be misaligned by ~180°, which explains some of the past problems with core orientation. No practical method of attaching the liner to the bottom of the core barrel was apparent, but having the roustabouts ensure the liner was not twisted along the length of the core barrel prior to attaching the cutting shoe resulted in no observed twisting of the recovered cores. The project completion date is unknown and will likely be extended by several months.

QC Data Viewer

Scope and deliverables

The purpose of this project is to design and implement a QC viewer program to visualize QC data acquired during IODP expeditions. The project manager is David Houpt.

Status

The project completion date was extended from late November 2020 to April 2021.

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.

Status

The project management team continues work on the project management plan.

Digital Asset Management System

Scope and deliverables

The scope of this project is to identify a Digital Asset Management system to replace Cumulus 10.2, which will no longer be supported. The project involves investigating both the ship and shore requirements, vendor selection, and purchase of a Digital Asset Management system. The scope involves developing a plan to migrate functions with requirements that cannot be met with a new system to alternative existing JRSO systems. The purchase will include the system software and the installation, which will be executed in another project following the completion of this project. The upfront charge of installation is a standard cost when purchasing software system packages. An initial assessment of the migration from the current system will remain in scope of this project; however, the details and the implementation will be redefined in the next deployment project. The project manager is Michael Berardi.

Status

This project is on track for completion by November 2020.

4. Subcontract activities

JRSO continued to interact with ODL AS to ensure efficient and compliant operations of the *JOIDES Resolution*. JRSO continued to interact with Schlumberger Technology Corporation (Schlumberger) to ensure that wireline logging operations aboard the *JOIDES Resolution* continue in an efficient and compliant manner. JRSO and Schlumberger worked successfully to streamline travel and shipping activities. These efforts continued to be complicated by the effects of the COVID-19 pandemic. JRSO management is meeting biweekly to discuss evolving travel/shipping restrictions as the pandemic progresses.

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 Section 2); 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

No outreach events were conducted on the *JOIDES Resolution* during the review period because of restrictions related to COVID-19.

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.

Maintenance period activities

Maintenance activities included

- Modifying the overhead lighting in the upper tween storage area to increase the space available for storage. Multiple small overhead lights were replaced with four larger LED lights.
- Installing two new large refrigerators, one in the chemistry laboratory and one in the chemical storage area.
- Replacing the –86°C freezer on the foc's'le deck after 20 years of service.
- Adding two new large magnifying lights to the description benches in the core laboratory.
- Replacing the old Haskris water chiller used in the X-ray laboratory for X-ray diffraction (XRD).
- Replacing an older GPS unit with a new Trimble GPS.
- Ensuring sufficient COVID-19 prevention supplies were available on the ship.

Analytical systems

X-ray core section imager (XSCAN project)

The XSCAN system was assembled, with the exception of the external shielding and entry portals. Radiation surveys were conducted to determine the thickness of the external shielding that will be required, and design work commenced for that portion of the project.

Scanning electron microscope—energy dispersive spectrophotometer

The NanoImages SNE-4500M scanning electron microscope (SEM) equipped with a Brüker XFLASH 630 mini energy dispersive spectrophotometer (EDS) was installed, and staff continued the process of defining workflows to allow the uploading of images and data from the device into the LIMS database. This system will replace the Hitachi TM-3000 SEM on the ship, and the older SEM will be transferred to College Station, Texas, where it will be available for use by visiting scientists and staff. As with all onsite work, this has slowed because of limited access to workspaces.

Carbon-hydrogen-nitrogen-sulfur analyzer

JRSO received the new Thermo FlashSmart Elemental Analyzer to replace the aging Flash EA1112 on the ship. The FlashSmart utilizes the same combustion, chromatography, and thermal conductivity detection techniques as the EA1112 and will also allow JRSO to use the same consumables and supplies already on the ship. Installation of the new carbon-hydrogen-nitrogen-sulfur (CHNS) analyzer at headquarters was completed. The system is now functional and is being tested. Shipment to the vessel is targeted for the upcoming maintenance period.

Handheld/portable X-ray fluorescence spectrometer

The Geochemistry laboratory working group (LWG) evaluated new portable X-ray fluorescence spectrometer (pXRF) instruments to seek a replacement for the Olympus DELTA Premium pXRF. Although the DELTA continues to function, it uses a software architecture that is no longer supported by Microsoft Windows, which has caused several problems. The LWG recommended the purchase of a Brüker AXS Tracer-5g pXRF because it offers the ability to quantify sodium (atomic number 11) as well as magnesium

and heavier elements. We have now received the Tracer-5g, and work will commence next quarter to develop its workflow, data upload, and data download procedures.

Epifluorescence microscopes

The microbiology epifluorescence microscope suffered an internal electronics failure, and parts and service are no longer available for the system, purchased in 1985. The decision was made to replace this microscope as well as one of the microscopes in the microscopy laboratory with identical systems capable of fluorescence/darkfield work as well as differential interference contrast (DIC); additional capacity for DIC has been requested several times in cruise evaluations. The new microscopes were ordered and will be delivered sometime next quarter.

Agico MFK2-FA dual-frequency Kappabridge magnetic susceptibility meter

The Geophysics LWG recommended replacement of the aging Agico KLY-4 Kappabridge magnetic susceptibility (MS) system, which runs via a DOS emulator and is no longer supported by the vendor, with an Agico MFK2-FA system capable of low- and high-frequency MS measurements. Based on input from querying the paleomagnetism community via the American Geophysical Union Geomagnetism-Paleomagnetism-Electromagnetism Bulletin Board, the MFK2-FA was the instrument preferred as the replacement for the KLY-4. We received the MFK2-FA instrument and are testing it and making the necessary modifications to the data structure to accommodate new capabilities.

Liquid scintillation counter

A new Perkin Elmer TriCarb 4910 liquid scintillation counter (LSC) and computer were installed in the Radiation Van on the foc's'le deck to replace the aging Wallac LSC.

Microbiology equipment

Several items were purchased based on recommendations from the Expedition 385 microbiologists and the Geochemistry and Microbiology LWG, including a static bar ionizer for the KOACH clean bench and hard- and soft-shell glove bags for the microbiology laboratory. This includes a replacement for the vinyl anaerobic chamber with a right-side airlock and a polymer anaerobic chamber with gloves, an anaerobic monitor, an anaerobic gas infuser, and an atmosphere HEPA filtration system.

Mixer mill

A new automated mixer mill was purchased for the X-ray laboratory to improve throughput and decrease the grinding times for XRD sample preparation.

Conductivity, temperature, and depth sensor

Vertical water column profiles of salinity and temperature at drill sites are often requested, particularly during expeditions with paleoceanographic objectives. JRSO purchased a new Minos-X conductivity-temperature-depth (CTD) sensor capable of measuring to a depth of 6,000 m. For making measurements, the CTD is mounted on the vibration isolated television (VIT) camera frame. Water column information can then be collected whenever the reentry camera is deployed.

Laboratory working groups

The LWGs provide oversight, research direction, and quality assurance for the methods, procedures, and analytical systems both on the *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 and provide advice on corrective actions and potential developments for laboratories. Only one LWG met this quarter because no full science expeditions have occurred that require review by the LWGs.

Curation and Core Handling

The Curation and Core Handling LWG did not meet this quarter because there were no new issues raised on recent expeditions.

Geochemistry and Microbiology

The Geochemistry LWG met this quarter to discuss the results of the microbiology community survey as well as some ongoing issues. The primary goals of the survey were to determine the best ways to optimize the current space and equipment aboard the *JOIDES Resolution* and to determine the most beneficial short- and long-term improvements for the microbiology laboratory. Recommendations from the survey and from previous cruise evaluations include the following:

- Update equipment and instrumentation on the ship, including the anaerobic chambers, epifluorescence microscope, and KOACH clean bench air handling systems. This has been completed.
- Transition microbial contamination tracer usage away from fluorescent microspheres and toward perfluorocarbon tracers; additionally, transition away from using the volatile C7 perfluoromethylcyclohexane (PFMCH) toward the less-volatile C11 perfluoromethyldecalin (PFMD).
- Manufacture two new rock boxes (or flame boxes) to assist microbiologists in avoiding contamination while crushing hard rock samples.
- Develop a more standardized ordering workflow for supplies so that the technicians and EPMs can be confident that they understand scientists' needs and scientists can be confident that their requests are being met.
- Provide at least one automated stage for counting at microscopes. JRSO already had three Swift/Hacker mechanical stages, which were tested during Expedition 384 to confirm that they could be used with the newer microscopes. A user guide was created to convey availability and instruction on use of the mechanical counting stages. The user guide was linked from the Microbiology and Micropaleontology pages of the Laboratory Manuals, Guides, and Resources Wiki.

Requests for a permanent microbiology technician and for a shipboard polymerase chain reaction (PCR) instrument were discussed but not recommended for implementation because neither was practical. A permanent microbiology technician would reduce services elsewhere or require that the science party lose a berth. A PCR instrument does not meet any of the general requirements for adding a new shipboard instrument, which include aiding operational decisions, improving ship safety, or measuring an ephemeral property that would not be possible to measure postcruise.

Geology

The Geology LWG did not meet this quarter because there were no new issues raised on recent expeditions.

Geophysics

The Geophysics LWG did not meet this quarter because there were no new issues raised on recent expeditions.

7. Development, IT, and Databases

The Development, IT, and Databases (DITD) department manages data supporting IODP activities, operates and maintains shipboard and shore-based computer and network systems, and monitors and protects JRSO network and server resources to ensure safe, reliable operations and security for IODP data and information technology (IT) resources. Additional activities include managing expedition and postexpedition data, providing long-term archival access to data, and supporting JRSO IT services.

Expedition data

LIMS database

No new data were added to the LIMS database on shore this quarter. No new 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	777	China	2,291
2	China	365	USA	2,046
3	United Kingdom	197	Canada	309
4	Germany	165	Germany	237
5	Unknown	126	Unknown	234
6	France	89	United Kingdom	199
7	South Korea	73	Japan	163
8	Russia	67	France	135
9	Australia	65	Mexico	126
10	Canada	60	South Korea	88
	Others	375	Others	597
	Total	**2,359**	**Total**	**6,425**

Table 7.2. Top 20 database web queries

	Janus database		LIMS database	
Rank	Query	Views	Query	Views
1	Core summaries	3,776	Images—core photos	4,553
2	Images—core photos	1,234	Physical properties—NGR	1,572
3	Site summaries	1,007	Section summaries	1,546
4	Chemistry—IW	658	Hole summaries	1,398
5	Hole summaries	500	Samples	1,390
6	Samples	477	Images—LSIMG	961

Rank	Janus database		LIMS database	
	Query	Views	Query	Views
7	Chemistry—carbonates	318	Core summaries	903
8	Site details	292	Physical properties—MAD	685
9	Physical properties—MAD	264	Physical properties—GRA	672
10	Physical properties—MSL	235	Physical properties—MS	582
11	XRF	216	Chemistry—IW	568
12	Special holes	211	Mixed samples	467
13	Physical properties—GRA	210	Physical properties—RSC	464
14	Physical properties—Color	194	Physical properties—PWL	488
15	Images—closeups	162	XRD	444
16	Chemistry—ICP	149	Chemistry—carbonates	436
17	Images—prime data	144	SRM-sections	355
18	Hole trivia	143	Chemistry—gas	353
19	Physical properties—PWS	139	Chemistry—ICP-AES	328
20	Physical properties—TCON	133	Physical properties—MSPOINT	327
	Others	1,347	Others	5,990
	Total	**11,809**	**Total**	**24,442**

Table 7.3. Data requests to the TAMU Data Librarian

Requests	Total
Photos	5
How to	4
DSDP data	2
Depth	1
Heat flow	1
Lithology	1
Total	**14**

Country	Total
USA	8
China	3
Australia	1
Ireland	1
Unknown	1
Total	**14**

Network systems operation, maintenance, and security

JRSO began working on a very comprehensive annual TAMU IT risk assessment, which should be completed in October. In June, Jim Rosser (Manager of Development, IT, and Databases) requested that a TAMU Provost IT security expert conduct a thorough practice IT security audit, which began in early August. This audit rehearsal should be completed by November.

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 Gulf Coast Repository (GCR).

Sampling parties and curation policies and procedures

JRSO curation and technical staff collected ~11,000 Expedition 383 samples that were not completed during the January sample party.

Sample and curation strategies

JRSO planned sample and curation strategies this quarter for Expedition 384.

Sample requests and core sampling

The following table provides a summary of the 5,940 samples taken at the GCR during the quarter. Sample requests that show zero samples taken may represent cores that were viewed by visitors during the 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
78384IODP, Whalen, USA	198	0
74740IODP, Carvajal, Mexico	172	0
79229IODP, Rochette, France	85	0
80406IODP, McGunnigle, USA	20	0
80491IODP, Cooper, United Kingdom	33	0
80536IODP, Straub, USA	538	1
80589IODP, Perez, USA	13	11
80748IODP, Izaguirre, USA	59	0
78167IODP, Johnson, USA	43	0
81056IODP, Bhattacharaya, USA	49	0
80984IODP, Alexander, United Kingdom	73	0
81168IODP, King, USA	3	0
80871IODP, Moretti, Germany	530	0
81262IODP, Patarroyo, Brazil	120	0
81245IODP, Storling, Sweden	36	0
81113IODP, Kato, Japan	48	0
81467IODP, Brylka, Sweden	5	0
81518IODP, Chadwick, United Kingdom	1	0
81522IODP, Them, USA	22	0
81619IODP, Kasbohm, USA	285	0
81629IODP, Kendrick, Australia	46	0
81670IODP, Novak, USA	79	0
81507IODP, Varma, Netherlands	39	0
81713IODP, Reershemius, USA	50	0
81697IODP, Blumm, USA	169	0
81703IODP, Kendrick, Australia	0	0
81433IODP, Kim, South Korea	762	0
81796IODP, Hoogakker, United Kingdom	158	0
81834IODP, Bijl, Netherlands	28	0
81909IODP, Green, United Kingdom	21	0
82034IODP, McKay, New Zealand	0	0
81694IODP, Levenstein, USA	2	0
81373IODP, Santa Cruz, New Zealand	28	0
81989IODP, Saitoh, Japan	0	0
82122IODP, Hillenbrand, United Kingdom	16	0
82253IODP, Penman, USA	33	0
82282IODP, Ma, USA	113	0
81360IOD, Wang, USA	40	0
82306IODP, Matzuzaki, Japan	35	0
82351IODP, Vigano, Italy	372	0

Sample request number, name, country	Number of samples taken	Number of visitors
78442IODP, Gubala, Canada	7	0
82432IODP, Brzelinski, Germany	200	0
82500IODP, Zurli, Italy	11	0
82509IODP, Lin, USA	0	0
82556IODP, Herbert, USA	229	0
82564IODP, Herbert, USA	670	0
82544IODP, Standring, USA	151	0
82644IODP, Auderset, Germany	107	0
82657IODP, Kasbohm, USA	6	0
82679IODP, Randle, USA	42	1
82737IODP, Kodama, USA	1	0
82824IODP, Estes, USA	8	0
83035IODP, Rafter, USA	4	0
Totals	**5,940**	**13**

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. One TAMU graduate level class conducted in-person, socially distanced sampling and was given a repository tour in small groups. Additionally, the GCR hosted a few virtual outreach events, including the TAMU virtual GeoX, a live stream event for the American Museum of Natural History hosted by Dr. Jason Sylvan, and a virtual tour for a University of Houston undergraduate class.

Table 8.2. GCR tours/visitors

Type of tour or visitor	Number of visitors
Scientist visitors	4
Educational tours/demonstrations	117
Public relations tours	3
Totals	**18**

Onshore XRF scanning

During this quarter, 496 core sections were scanned on the XRF at the GCR. Documentation relating to the operation, advanced configurations, maintenance, and troubleshooting of the XRF can be found at https://sites.google.com/scientific-ocean-drilling.org/xrf-iodp/home.

Table 8.3. Core sections scanned

Request type	Expedition, name, country	XRF 1	XRF 2	SHIL	WRMSL*
Program	378, Childress, USA	383	64	447	0
Personal	375, Kitajima, USA	0	28	0	0
Personal	145, Straub, USA	0	1	180	0
Personal	379, Robinson, USA	20	0	0	0
Totals		**403**	**93**	**627**	**0**

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 Section 2) and editing, production, and graphics services for required Program reports (see Section 3), technical documentation (see Section 6), 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

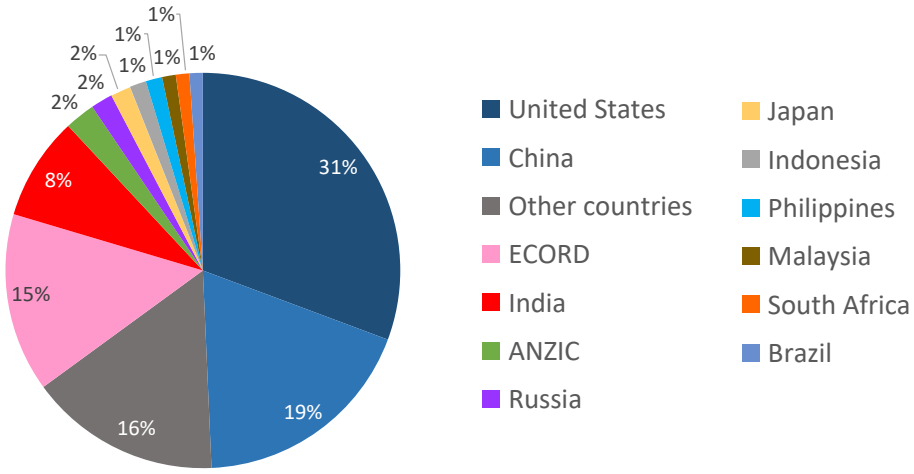
Reports and publications	JRSO	USIO	MarE3	ESO	Oman Drilling Project
Scientific Prospectus	10.14379/iodp.sp.384.2020				
Preliminary Report					
Expedition Reports			10.14379/iodp.proc.358.101.2020 10.14379/iodp.proc.358.102.2020 10.14379/iodp.proc.358.103.2020 10.14379/iodp.proc.358.104.2020 10.14379/iodp.proc.358.105.2020		10.14379/OmanDP.proc.2020: Chapter 7, Site GT2 Chapter 12, Introduction to Science Theme 2 Chapter 13, Site BT1
Data Reports	10.14379/iodp.proc.363.202.2020 10.14379/iodp.proc.361.202.2020 10.14379/ iodp.proc.362.204.2020	10.2204/iodp.proc.346.206.2020			

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 last quarter, the IODP TAMU website received 270,592 page views and 27,231 site visits and the IODP Publications website received 500,678 page views and 17,873 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 200 countries.

Figure 9.1. Top 12 countries/consortia of visitors to the IODP TAMU website



Notes: ECORD = European Consortium for Ocean Research Drilling, ANZIC = Australia/New Zealand IODP Consortium.
ECORD countries include Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

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	FY20 Q4 page views*	FY20 Q4 site visits*
www-odp.tamu.edu	194,394	17,800
www.odplegacy.org	3,504	2,044
www.deepseadrilling.org	42,652	3,928
Total	**240,550**	**23,772**

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

Publications coordination

Data reports related to Expeditions 320/321, 347, 361, 362, and 363 were received, sent to peer review, accepted, and/or published this quarter.

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 the reporting quarter are shown in the table below.

Table 9.3. Number of online DOI resolutions

Reports and publications	DOI prefix	July 2020	August 2020	September 2020	FY20 Q4 total
IODP	10.14379	7,764	6,661	6,972	**21,397**
Integrated Ocean Drilling Program	10.2204	7,715	7,033	7,681	**22,429**
ODP/DSDP	10.2973	44,693	28,915	25,208	**98,816**

Table 9.4. Top 10 Program DOIs resolved during FY20 Q4

DOI	Resolutions	Title
10.2973/ODP.PROC.SR.152.1998	617	ODP Leg 152—Scientific Results, East Greenland Margin
10.14379/IODP.PROC.359.105.2017	417	IODP Expedition 359, Site U1467
10.2973/ODP.PROC.IR.103.107.1987	385	ODP Leg 103—Chapter 7: Mesozoic Evolution of Ortegal Spur, North Galicia Margin: Comparison with Adjacent Margins
10.14379/IODP.SP.384.2020	366	IODP Expedition 384 *Scientific Prospectus*: Engineering Testing
10.2973/ODP.PROC.IR.162.106.1996	257	ODP Leg 162, Site 984
10.14379/IODP.PROC.358.2020	252	IODP Expedition 358, NanTroSEIZE Plate Boundary Deep Riser 4: Nankai Seismogenic/Slow Slip Megathrust
10.14379/IODP.PROC.374.2019	249	IODP Expedition 374, Ross Sea West Antarctic Ice Sheet History
10.14379/IODP.PROC.367368.2018	223	IODP Expedition 367/368, South China Sea Rifted Margin
10.14379/IODP.PROC.372B375.105.2019	200	IODP Expedition 372B/375, Site U1520
10.2973/ODP.PROC.IR.114.104.1988	187	ODP Leg 114, Chapter 4: Underway Geophysics

Table 9.5. Top 10 IODP DOIs resolved during FY20 Q4

DOI (10.14379)	Resolutions	Title
10.14379/IODP.PROC.359.105.2017	417	Expedition 359, Site U1467
10.14379/IODP.SP.384.2020	366	Expedition 384 *Scientific Prospectus*: Engineering Testing
10.14379/IODP.PROC.358.2020	252	Expedition 358, NanTroSEIZE Plate Boundary Deep Riser 4: Nankai Seismogenic/Slow Slip Megathrust
10.14379/IODP.PROC.374.2019	249	Expedition 374, Ross Sea West Antarctic Ice Sheet History
10.14379/IODP.PROC.367368.2018	223	Expedition 367/368, South China Sea Rifted Margin
10.14379/IODP.PROC.372B375.105.2019	200	Expedition 372B/375, Site U1520
10.14379/IODP.SP.395.2020	178	Expedition 395 *Scientific Prospectus*: Reykjanes Mantle Convection and Climate
10.14379/IODP.PR.385T.2019	135	Expedition 385T *Preliminary Report*: Panama Basin Crustal Architecture and Deep Biosphere
10.14379/IODP.PROC.360.2017	114	Expedition 360, Southwest Indian Ridge Lower Crust and Moho
10.14379/IODP.SP.387.2019	84	Expedition 387 *Scientific Prospectus*: Amazon Margin

ScienceOpen

Integrated Ocean Drilling Program and IODP expedition reports and data reports are indexed at ScienceOpen. JRSO deposited data reports from Volumes 320/321, 341, 353, 354, 361, 362, 364, 372B/375 into ScienceOpen this quarter.

Table 9.6. ScienceOpen *Proceedings of the International Ocean Discovery Program* collection statistics (https://www.scienceopen.com/collection/IODP_Publications)

Period	Articles added	Article views	Altmetric score (collection)	Number of authors	Referenced articles
Total FY19	712	8,382	171	1,745	8,377
FY20 Q1	16	658	187	1,793	302
FY20 Q2	3	498	189	1,800	9
FY20 Q3	4	634	214	1,804	28
FY20 Q4	12	789	238	1,827	60
Total to date	**747**	**10,921**	**—**	**—**	**8,776**

Table 9.7. ScienceOpen Scientific Ocean Drilling Expedition Research Results collection statistics (https://www.scienceopen.com/collection/8b0582f6-47bf-4988-b90a-8533135e6fcc)

Period	Articles added	Article views	Altmetric score (collection)	Number of authors	Referenced articles
Total FY19	4,196	13,340	22,630	10,505	40,473
FY20 Q1	181	771	24,698	10,912	2,172
FY20 Q2	0	0	24,912	10,912	9
FY20 Q3	223	2,101	32,047	11,571	2,834
FY20 Q4	132	4,690	40,733	11,895	1,756
Total to date	**4,732**	**18,801**	**—**	**—**	**47,235**

Altmetric.com

JRSO contributes publications metadata to TAMU's Symplectic Elements database, which feeds data to http://altmetric.com, a platform that enables monitoring of the online activity surrounding academic research. This quarter, JRSO uploaded DOIs of Integrated Ocean Drilling Program data reports for Expeditions 320/321, 341, 353, 354, 361–364, and 372B/375.

Legacy activities

Closeout

Integrated Ocean Drilling Program publications closeout activities continued during the reporting period. Data reports published during the quarter in the *Proceedings of the Integrated Ocean Drilling Program* are listed above in "Scientific publications." In addition, peer-reviewed postcruise research result publications related to Expeditions 302, 303/306, 310, 313–318, 320/321, 324, 325, 327, 329, 334, 336, 338–342, 344–347, and 349 were added to the publications database.

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. Quarterly crawls incrementally update the archive with new files. Currently, our collection houses 322.4 GB of data and over 4 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 37,000 records for

Program-related scientific ocean drilling publications from 1969 to the present. This quarter, IODP Pubs sent 143 expedition-related publication citations for consideration for inclusion in the database.

Each year, IODP Pubs produces an annual report that provides information on how Program-related research is disseminated into the scientific community through publications. The 2020 Scientific Ocean Drilling Bibliographic Database and Publication Impact Report looks at publications from highly ranking peer-reviewed journals, publications by authors from current IODP member countries, publications by IODP expedition and Science Plan theme, publication co-author networks, and alternative impact metrics. The 2020 study was published in September and is available online at http://iodp.tamu.edu/publications/AGI_studies/2020_Pub_Impact.pdf

Table 9.8. Scientific Ocean Drilling Bibliographic Database statistics

Program-related publications	July 2020	August 2020	September 2020	FY20 Q4 total
Searches	308	274	340	**922**
Citation views	658	775	176	**1,609**

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 copy the content of the RIS files and import it into most bibliographic software. RIS-format citation data lists are also available for expedition-related bibliographies for Expeditions 349–388. The IODP program publication, JRSO staff-authored, and expedition-related bibliography lists are updated quarterly.

Articles authored by JRSO staff

Program-related science and other articles authored by JRSO staff published during this quarter include the following. Bold type indicates JRSO staff. Other Program-related science articles are available online through the Scientific Ocean Drilling Bibliographic Database (http://iodp.tamu.edu/publications/bibliographic_information/database.html) and the IODP expedition-related bibliographies (http://iodp.tamu.edu/publications/citations.html).

- Barnet, J.S.K., Harper, D.T., **LeVay, L.J.**, Edgar, K.M., Henehan, M.J., Babila, T.L., Ullman, C.V., et al., 2020. Coupled evolution of temperature and carbonate chemistry during the Paleocene–Eocene; new trace element records from the low latitude Indian Ocean. *Earth and Planetary Science Letters*, 545:116414. https://doi.org/10.1016/j.epsl.2020.116414
- Beasley, C., Cotton, L., Al-Suwaidi, A., **LeVay, L.**, Sluijs, A., Ullmann, C.V., Hesselbo, S.P., and Littler, K., 2020. Triumph and tribulation for shallow water fauna during the Paleocene–Eocene transition; insights from the United Arab Emirates. *Newsletters on Stratigraphy*. https://doi.org/10.1127/nos/2020/0573
- Cook, A.E., Paganoni, M., Clennell, M.B., McNamara, D.D., Nole, M., Wang, X., Han, S., et al. (including **L.J. LeVay** and **K.E. Petronotis**), 2020. Physical properties and gas hydrate at a near-seafloor thrust fault, Hikurangi Margin, New Zealand. *Geophysical Research Letters*, 47(16):e2020GL088474. https://doi.org/10.1029/2020GL088474

- Dunlea, A.G., Murray, R.W., Tada, R., **Alvarez-Zarikian, C.A.**, Anderson, C.H., Gilli, A., Giosan, L., et al., 2020. Intercomparison of XRF core scanning results from seven labs and approaches to practical calibration. *Geochemistry, Geophysics, Geosystems*, 21(9):e2020GC009248. https://doi.org/10.1029/2020GC009248
- Gaillot, P., Duchesne, M.J., and **Blum, P.**, 2020. Automatic data reduction and quantification of X-ray computed tomography images of sedimentary cores: method and illustration. *Open Journal of Geology*, 10(8):102219. https://doi.org/10.4236/ojg.2020.108040
- MacLeod, K.G., White, L.T., Wainman, C.C., Martinez, M., Jones, M.M., Batenburg, S.J., Riquier, L., et al. (including **K.A. Bogus**), 2020. Late Cretaceous stratigraphy and paleoceanographic evolution in the Great Australian Bight Basin based on results from IODP Site U1512. *Gondwana Research*, 83:80–95. https://doi.org/10.1016/j.gr.2020.01.009
- Nichols, M.D., Xuan, C., Crowhurst, S., Hodell, D.A., Richter, C., **Acton, G.D.**, and Wilson, P.A., 2020. Climate-induced variability in Mediterranean Outflow to the North Atlantic Ocean during the late Pleistocene. *Paleoceanography and Paleoclimatology*, 35, e2020PA003947. https://doi.org/10.1029/2020PA003947.
- Wainman, C.C., Tagliaro, G., Jones, M.M., Charles, A.J., Hall, T., White, L.T., et al. (including **K.A. Bogus**), 2020. The sedimentological evolution and petroleum potential of a very thick Upper Cretaceous marine mudstone succession from the southern high latitudes—a case study from the Bight Basin, Australia. *Marine and Petroleum Geology*, 118:104441. https://doi.org/10.1016/j.marpetgeo.2020.104441

Published but unreported in previous quarters

- Lee, E.Y., Wolfgring, E., Tejada, M.L.G., Harry, D.L., Wainman, C.C., Chun, S.S., Schnetger, B., et al. (including **K.A. Bogus**), 2020. Early Cretaceous subsidence of the Naturaliste Plateau defined by a new record of volcaniclastic-rich sequence at IODP Site U1513. *Gondwana Research*, 82:1–11. https://doi.org/10.1016/j.gr.2019.12.007
- Sutherland, R., Dickens, G.R., **Blum, P.**, Agnini, C., Alegret, L., Asatryan, G., Bhattacharya, J., et al., 2020. Continental-scale geographic change across Zealandia during Paleogene subduction initiation. *Geology*, 48(5):419–424. https://doi.org/10.1130/G47008.1

Appendix: JRSO quarterly report distribution

J. Allan, NSF, USA, jallan@nsf.gov

T. Kashmer, NSF, USA, tkashmer@nsf.gov

D. Thomas, Texas A&M University, USA, dthomas@ocean.tamu.edu

C. Neal, JRFB Chair, University of Notre Dame, USA, neal.1@nd.edu

L. Armand, JRFB Member, The Australian National University, Australia, ANZIC.programscientist@anu.edu.au

B.K. Bansal, JRFB Member, MoES, India, bansalbk@nic.in

S. Bohaty, JRFB Member, University of Southampton, United Kingdom, S.Bohaty@noc.soton.ac.uk

G. Camoin, JRFB Member, European Management Agency, CEREGE, France, camoin@cerege.fr

M. Godard, JRFB Member, University of Montpellier, France, Marguerite.Godard@umontpellier.fr

B. John, JRFB Member, University of Wyoming, USA, bjohn@uwyo.edu

G.Y. Kim, JRFB Member, KIGAM, Korea, gykim@kigam.re.kr

L. Krissek, JRFB Member, Ohio State University, USA, krissek.1@osu.edu

Y. Sun, JRFB Member, MOST, China, suny@most.cn

R. Tada, JRFB Member, Chiba Institute of Technology, Japan, ryuji.tada@p.chibakoudai.jp

D. Kroon, JRFB Liaison, IODP Forum Chair, University of Edinburgh, dick.kroon@ed.ac.uk

G. Christeson, JRFB Liaison, University of Texas Austin, gail@ig.utexas.edu

S. Davies, JRFB Liaison, University of Leicester, United Kingdom, sjd27@leicester.ac.uk

B. Katz, JRFB Liaison, EPSP Chair, Chevron Corporation, USA, BarryKatz@chevron.com

S. Kuramoto, JRFB Liaison, MarE3/JAMSTEC, Japan, s.kuramoto@jamstec.go.jp

L. McNeill, JRFB Liaison, SEP Co-Chair, University of Southampton, UK, lcmn@noc.soton.ac.uk

C. Meth, JRFB Liaison, IODP Support Office, Scripps Institution of Oceanography, USA, cmeth@ucsd.edu

N. Seama, JRFB Liaison, *Chikyu* IODP Board Chair, Kobe University, Japan, seama@kobe-u.ac.jp

G. Uenzelmann-Neben, JRFB Liaison, ECORD Facility Board Chair, Alfred Wegener Institute, Germany, Gabriele. Uenzelmann-Neben@awi.de