

International Ocean Discovery Program
JOIDES Resolution Science Operator
FY21 Q1 Operations and Management Report

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and
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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) FY21 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 this quarter);
- Clearance, permitting, and environmental assessment activities;
- Expedition operations (including a site map for each expedition under way during this quarter, a coring summary table for each expedition completed during the quarter, 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) ¹	Dates ²	Total days (port/sea)	Days at sea (transit ³ /ops)	Co-Chief Scientists	Expedition Project Manager	
Non-IODP (Tie-up) (5 September—5 October 2020) (30 days)						M. Malone	
South Atlantic Transect Reentry Installations	390C	Kristiansand, Norway	5 October–5 December 2020	61 (3/58)	58 (39/19)	NA	E. Estes
Non-IODP (Tie-up) (5 December 2020—4 February 2021) (61 days)						M. Malone	
Complete SAT Reentry Installations	395P	Cape Town, South Africa	4 February–6 April 2021	61 (10/51)	51 (22/29)	NA	T. Williams
Hole U1309D Remediation and Engineering Testing	395E	Las Palmas, Canary Islands	6 April–6 June 2021	61	TBD	NA	P. Blum
Reykjanes Mantle Convection and Climate	395	Reykjavik, Iceland	6 June–6 August 2021	61 (5/56)	56 (3/53)	R. Parnell-Turner A. Briaes	L. LeVay
Mid-Norwegian Continental Margin Magmatism	396	Reykjavik, 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. Uenzelmann-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, N/A = not applicable, SAT = South Atlantic Transect.

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

The Expedition 385 postcruise editorial meeting was completed, and the *Preliminary Report* was published on 18 December.

Expedition 378: South Pacific Paleogene Climate

Postexpedition activities

Because of COVID-19 travel restrictions, the Expedition 378 postcruise editorial meeting was conducted online using Google Drive collaboration tools. The editorial meeting began 15 October and is ongoing, with the goal of completing the work in January. In preparation for the sample party, scientists submitted sample lists in October that were reviewed by the Sample Allocation Committee (SAC) in November/December. The sample party will begin on 11 January and will consist solely of onsite JRSO staff because of the pandemic. Samples are expected to be shipped to scientists in early February.

Expedition 384: Engineering Testing

Postexpedition activities

The *Preliminary Report* was completed and published in December. This will be the final report for this testing expedition.

Expedition 390C: South Atlantic Transect Reentry Installations

Planning

Following the postponement of Expeditions 390 and 391 and because of COVID-19 pandemic travel restrictions, a revised operations plan was developed to drill a single advanced piston corer (APC) hole and install casing and reentry systems at each site in advance of the rescheduled expeditions, 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. The expedition started in Kristiansand, Norway, on 5 October and was originally to conclude in Las Palmas, Canary Islands (Spain). During the expedition, pandemic conditions in Spain and related restrictions increased. At the same time, South Africa began decreasing restrictions and opening to international travel, so the end port was changed to Cape Town, South Africa, where the expedition concluded on 5 December. Expedition 390C completed coring to basement at four out of six primary sites and installed reentry systems at three primary sites. Planning commenced to complete installation operations on the transit to the North Atlantic during Expedition 395P.

Staffing

Expedition 390C took place with limited JRSO staff and no science party.

Figure 2.1. Expedition 390C site map

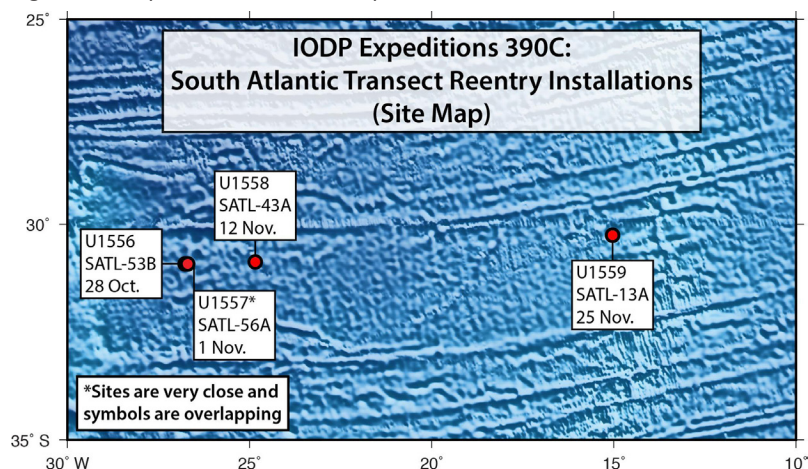


Table 2.2. Expedition 390C coring summary

Site	Hole	Latitude	Longitude	Water depth (mbrf)	Cores (N)	Interval cored (m)	Core recovered (m)	Recovery (%)
U1556	U1556A	30°56.5244'S	26°41.9472'W	5017.5	33	283.8	243.78	85.9
Site U1556 totals					33	232.7	238.23	102.4
U1557	U1557A	30°56.5244'S	26°37.7912'W	5023.4	1	9.5	9.63	101.4
	U1557B	30°56.4547'S	26°37.7775'W	5023.4	66	574.0	414.94	72.3
	U1557C	30°56.4646'S	26°37.7897'W	5023.4	0	0.0	0.00	0.0
	U1557D	30°56.4651'S	26°37.7892'W	5021.9	0	0.0	0.00	0.0
Site U1557 totals					67	583.5	424.57	72.8
U1558	U1558A	30°53.7728'S	24°50.4970'W	4348.1	19	163.9	138.69	84.6%
	U1558B	30°53.7707'S	24°50.4843'W	4348.1	0	0.0	0.00	0.0%
	U1558C	30°53.7761'S	24°50.4942'W	4348.1	0	0.0	0.00	0.0%
	U1558D	30°53.7814'S	24°50.4822'W	4345.7	0	0.0	0.00	0.0%
Site U1558 totals					19	163.9	138.69	84.6
U1559	U1559A	30°15.6335'S	15°02.0942'W	0.0	9	66.2	58.01	87.6
	U1559B	30°15.6336'S	15°02.0941'W	0.0	0	0.0	0.0	0.0
Site U1559 totals					9	66.2	58.01	87.6
Expedition 390C totals					128	1097.4	865.05	78.8

Note: mbrf = meters below rig floor.

Science summary

The primary goal of Expedition 390C was to install reentry systems in advance of Expeditions 390 and 393. During Expedition 390C, coring was completed to basement at four out of six primary sites and reentry systems were installed at three primary sites. A secondary casing string still needs to be installed at Site U1557. No discrete samples were taken. Core description and additional analyses will be conducted during Expeditions 390 and 393 in 2022.

Expedition 395P: Complete SAT Reentry Installations

Planning

Expedition 395P is still in discussion and is dependent on the COVID-19 pandemic. The expedition is currently planned to finish the remaining reentry system and casing installation work, including <300 m

of APC/extended core barrel (XCB) coring at Sites SATL-25A and SATL-33B. Current discussions include (1) which holes to case into basement (using the hydraulic release tool), (2) which holes to case to just above basement (using the Drill-Quip release tool), and (3) whether to use 13.375 or 10.75 inch casing. These depend on the amount of the different diameter casing aboard, site science priority, and time available. More information will be available next quarter.

Staffing

The Expedition 393 Expedition Project Manager (EPM) will be sailing on this expedition.

Expedition 395E: Hole U1309D Remediation and Engineering Testing

Planning

The precruise meeting was planned for early next quarter.

Staffing

Two invitations to Proposal 937 scientists to participate as SAC shore-based members were issued and accepted.

Expedition 395: Reykjanes Mantle Convection and Climate

Planning

The research plans were received from the Science Party late last quarter. Medical exams are due 1 March.

Staffing

All members of the Science Party have reaffirmed their participation. One Onboard Outreach Officer has confirmed their participation, and the other officer response is pending.

Expedition 396: Mid-Norwegian Continental Margin Magmatism

Planning

A virtual precruise meeting was held 13–22 October. The operations plan is being updated and finalized for the Scientific Prospectus. The current goal is to drill single holes at seven sites, drill double holes at two sites, and conduct downhole logging at all sites, including using the Ultrasonic Borehole Imager (UBI) and Versatile Seismic Imager (VSI) tools at some sites.

Staffing

The scientific nominations were received from the US, European Consortium for Ocean Research Drilling (ECORD) Science Support and Advisory Committee (ESSAC), Japan, India, and China. Because of the COVID-19 pandemic, the Australia/New Zealand Consortium (ANZIC) is not participating, and Brazil and Korea may not send nominations. The goal is to have staffing completed by mid-January.

Clearance, permitting, and environmental assessment activities

The additional clearance documentation required by Norway is being completed, and the marine scientific research (MSR) clearance application will be submitted early next quarter. The environmental evaluation was completed and is awaiting NSF review.

Expeditions 390 and 393: South Atlantic Transect 1 and 2

Planning

A revised operations plan will be developed following Expeditions 390C and 395P, dependent on what work is completed. Following completion of Expeditions 390C and 395P, an addendum to the *Scientific Prospectus* will describe the work completed during Exp 390C and present a revised operations plan for Expedition 390.

Staffing

All Science Party members will be asked to reconfirm participation in February.

Expedition 391: Walvis Ridge Hotspot

Staffing

The Expedition 391 scientists, observers, and Onboard Outreach Officer were informed of the new schedule and asked to confirm their availability and IODP member/institutional affiliation by 13 November 2020. One micropaleontologist has withdrawn and will not be replaced.

Expedition 392: Agulhas Plateau Cretaceous Climate

Planning

Expedition 392 research plans and summaries were sent to scientists on 9 November. The scientists were asked to confirm summaries of their proposed research, and several updates were made as a result.

Staffing

Scientists were informed of the new schedule and asked to confirm their availability by 28 February. Graduate students and postdocs who will be changing locations before the expedition will be given an extension until 1 June 2021. One scientist has withdrawn because of the change in schedule, and two scientists have confirmed their participation for 2022.

Clearance, permitting, and environmental assessment activities

The US State Department was informed of the changed dates for the expedition. JRSO was informed that the current MSR clearance application will need to be canceled and resubmitted, which will be done in Summer 2021.

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 fourth quarter of FY20 (July–September) was submitted to NSF on 12 November (http://iodp.tamu.edu/publications/AR/FY20/FY20_Q4.pdf).

Liaison activities

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

Planning meetings

Brad Clement (JRSO Director) and Mitch Malone (JRSO Assistant Director and Manager of Science Operations) attended a special meeting of the JRFB on 23 November, the US Science Support Program (USSSP) leadership meeting held on 8 December, and the American Geophysical Union (AGU) IODP Town Hall meeting held on 15 December. Clement also attended a meeting of a special working group tasked by the JRFB with assessing proposal submission guidelines for implementing the new scientific framework.

Project portfolio management

JRSO completed the Digital Asset Management (DAM) System project and continued work on the New Rig Instrumentation 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 project team added a new requirement to create a non-core samples button at the site/hole level. The “samples” and “group” will be available only for the hole. JRSO estimates the catwalk module will now be completed in January.

X-ray Linescan Core Imager

Scope and deliverables

The purpose of the X-ray Linescan Core Imager 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 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, 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.

Status

The project completion date was extended from October 2020 to March 2021. The instrument is now capable of acquiring linescan X-ray images of core sections. Outer shielding materials were ordered, and the project team began working on a user-friendly software interface. After completion in March, the instrument will be tested thoroughly on shore prior to being sent to the ship for installation in October. Additional information is provided in “Analytical systems.”

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. 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 Bill Rhinehart.

Status

JRSO is designing a power supply for the new gyro, which requires a very specific start-up and shut-down sequence. A power control and supervisory integrated circuit are on order. This is a very complex project with many unknowns. Therefore, the project completion date remains open-ended.

QC Data Viewer

Scope and deliverables

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

Status

The project remains on track for completion in April.

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 JRSO Management Team approved the project management plan in December. The estimated completion date for this project is late fall 2021.

Digital Asset Management System

Scope and deliverables

The scope of this project is to identify a DAM 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 DAM 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 the 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

JRSO completed this project in December and will initiate a follow-on project in early 2021 to install a new DAM system on shore, migrate legacy data, and then shut down the existing Cumulus systems on ship and shore.

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 “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

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.

Analytical systems

X-Ray Linescan Core Imager

The XSCAN project continues to progress, with X-ray images of test objects and core sections acquired. Some of these were Expedition 374 cores previously imaged by the X-ray Imager currently installed on the *JOIDES Resolution*, allowing comparison of the old and new systems. The obvious difference is the lack of image distortion and the continuous section image provided by XSCAN but not the older system. Additional information is provided in “Project portfolio management.”

Scanning Electron Microscope—Energy Dispersive Spectrophotometer

The NanoImages SNE-4500M scanning electron microscope (SEM; equipped with a Bruker XFLASH 630 Mini EDS [energy dispersive spectrophotometer]) continues to be tested on shore to define workflows

for uploading images and data 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, where it will be available for use by visiting scientists and staff. As with all on-site work, this project has slowed because of limited access to workspaces. In addition, a sputter-coater (precious metals mode only) was acquired for sputtering samples on shore.

Carbon-hydrogen-nitrogen-sulfur analyzer

JRSO has postponed shipping the new carbon-hydrogen-nitrogen-sulfur (CHNS) analyzer to allow for additional testing to be done with modified methods and standards. JRSO EPMs have been able to provide samples with different CNS ratios for experimentation on shore. The CHNS is targeted for shipboard installation during the Expedition 395 port call.

Handheld/Portable X-Ray Fluorescence Spectrometer

Work continues with the new Bruker AXS Tracer-5g portable X-ray fluorescence spectrometer (pXRF) to develop the workflow, data upload, and data download procedures before the device is sent to the ship to replace the Olympus DELTA Premium pXRF, which uses a software architecture that is no longer supported by Microsoft Windows.

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 the microscope and another scope 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 received. Assembly and inspection are scheduled for January. Once this is completed, the microscopes will be assessed to ensure that they are functioning properly and then will be sent to the ship.

Agico MFK2-FA dual-frequency Kappabridge magnetic susceptibility meter

The new MFK2-FA Kappabridge replaces an aging Agico KLY-4 Kappabridge magnetic susceptibility (MS) meter, which runs via a DOS emulator and is no longer supported by the vendor. The new meter is being tested, and staff are working with the vendor to customize the software to accommodate the new capabilities of the instrument and provide the output desired by IODP scientists.

Conductivity-temperature-depth sensor

The new Minos-X conductivity-temperature-depth (CTD) sensor purchased in the previous quarter was sent to the ship and deployed successfully multiple times during Expedition 390C. The measurements were made by mounting the CTD on the vibration isolated television (VIT) camera frame and collecting data as the VIT was lowered and raised as part of the operations for the installation of reentry systems.

Laboratory working groups

The laboratory working groups (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. Based on this input, the LWGs provide advice on corrective actions and potential developments for laboratories.

Curation and Core Handling

The Curation LWG met this quarter to introduce the new external members and to discuss ongoing issues.

- The LIMS database contains a number of sample types, tests, and sampling tools, many of which are seldom used or obsolete. The LWG discussed these lists and edited them to match current JRSO usage.
- The LWG discussed terminology for non-cored materials recovered during expeditions (e.g., junk basket samples, scrapings recovered off of CORKs, and borehole fluids). The LWG's intention is to create a consistent system and nomenclature for such materials, whether they came from the borehole, the seabed near the borehole, or the water column.
 - Additional fields were added to the LIMS sample table (e.g., run number and tool used) that will also be added to the appropriate sample reports, which will make it easier to find and understand these types of samples.
 - The Curator will discuss this with the Applications Development group to determine the most feasible path forward.
- The LWG was informed that the Curatorial Cookbook is now complete and available on the JRSO intranet in the Laboratory Manuals, Guides, and Resources Wiki (<https://wiki.iodp.tamu.edu/>).
- Child samples (i.e., subsamples) often have offsets that are from zero to their own length, rather than the interval in the core section from which they were taken. This was addressed years ago for interstitial water (IW) samples by the introduction of an additional "offset in section" field; this will be more widely applied.

Geochemistry and Microbiology

The Geochemistry LWG did not meet this quarter because there have been no new issues raised since the last quarter.

Geology

The Geology LWG met this quarter to discuss ongoing issues.

- The main topic was the calibration of the SHIL and its new LED lighting system. The new SHIL lights create a number of effects (e.g., reddish tinge of the right side of the core section) that were very minor on the old lights.
 - Additional artifacts have been noted (e.g., light and dark stripes up- and downsection).
 - In addition, temperature and intensity of the LED lights will be monitored and the calibration method constrained to the same timeframe as a section scan; hotter-than-normal calibration would lead to shading.
- New SHIL standards will be purchased using several materials, seeking a solution for the color shading and striping, because experimentation on Expedition 390C seemed to indicate many of these issues were calibration method-related rather than a fundamental problem with the lights.

- Experimentation with these standards, using different angles for the lights and so on, will continue until the LWG is satisfied with the results.
- JRSO may also look at different lights with a more diffuse illumination profile.
- The new camera (the next model in the same series from JAI Pulnix) appears to have completely resolved the “green flash” issue reported on several cruises; this issue is now closed.
- The LWG also discussed the creation of the “consumer” or “cropped” images, which are altered to make them look good to the human eye and not by any systematic or scientific method. The LWG concluded that it may be necessary to save unaltered JPGs (direct conversion from TIFF without user input) as well as the altered, cosmetically improved JPGs.
 - The Imaging Specialist also recommended putting a higher-quality, color-calibrated monitor at the SHIL station to remove user bias based on poorly calibrated monitors.

Geophysics

The Geophysics LWG met this quarter to introduce new members and to discuss ongoing issues.

- Testing of the core orientation tool during Expedition 384 appears to have shown the source of the poor declination data, and corrective actions were taken to eliminate its recurrence (see “Project portfolio management”).
 - The LWG also discussed the Engineering section’s development of a GOT. Development was stalled because the original sensor was too vulnerable to noise and drift, but a new sensor has been identified and will be purchased in the coming calendar year for testing and evaluation.
- The LWG discussed the progress of the XSCAN project (see “Project portfolio management”).
- The LWG discussed issues with the Magnetic Susceptibility Sonde (MSS) downhole tool (e.g., apparent signal swapping between resistivity and susceptibility channels and the sensitivity of the MS measurements to temperature). The LWG decided on the next steps to try to ensure the tool is working as intended:
 - Go back through the MSS data archive to find out what tracks with which type of data (this is partially done but needs more research),
 - Decide on an optimal MSS log processing strategy for the future, and
 - Repair and test MSS tool #4, which has been sent to JRSO for evaluation.
- The LWG was informed that the 3.5 kHz precision depth recorder (PDR) ceased functioning on the JOIDES Resolution during Expedition 390C (although the 12 kHz system was unaffected). Since the meeting, troubleshooting efforts have corrected the problem. Both frequencies on the PDR are now working properly.

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

Data from Expedition 384 were added to the LIMS database on shore this quarter. These data are currently under moratorium and available only to the scientists who sailed on the expedition. No 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	USA	587	USA	1,737
2	China	502	China	1,345
3	United Kingdom	204	United Kingdom	388
4	Germany	174	Canada	211
5	France	166	Germany	187
6	Unknown	135	Unknown	178
7	Italy	73	Japan	105
8	Netherlands	55	France	74
9	Japan	60	Italy	62
10	Australia	45	Malaysia	57
	Others	426	Others	319
	Total	2,438	Total	4,663

Table 7.2. Top 20 database web queries

Rank	Janus database		LIMS database*	
	Query	Views	Query	Views
1	XRD	4,848	Images—core photos	2,433
2	Images—photos	1,421	Hole summaries	1,387
3	Samples	758	Samples	1,212
4	Chemistry—IW	749	Images—LSIMG	992
5	Site summaries	739	Section summaries	895
6	Core summaries	652	Core summaries	862
7	XRD Data	623	Physical properties—RSC	623
8	Physical properties—MSL	558	Chemistry—IW	546
9	Hole summaries	413	Physical properties—GRA	531
10	Chemistry—carbonates	392	XRD	529
11	Images—close-ups	350	Physical properties—MS	521
12	Physical properties—MAD	344	Physical properties—NGR	454
13	Images—prime data	293	Physical properties—MAD	443
14	Special holes	283	Chemistry—carbonates	412
15	Paleomag	275	Paleomag—SRM section	401
16	Physical properties—PWL	257	Images—TSimage	394
17	Physical properties—GRA	257	Images—microimages	390

Rank	Janus database		LIMS database*	
	Query	Views	Query	Views
18	Physical properties—smear slides	233	Images—close-ups	356
19	Physical properties—NGR	219	Physical properties—MSPoint	339
20	Paleontology—age models	212	Chemistry—gas	326
	Others	2,719	Others	4,587
	Total	1,6595	Total	18,633

Note: *Information in LIMS from 9–31 December is not available.

Table 7.3. Data requests to the TAMU Data Librarian

Requests	Total	Country	Total
How to	6	China	3
Photo	4	United Kingdom	3
Ages	1	USA	3
Carbonates	1	Germany	2
Drilling data	1	France	1
IR images	1	Ghana	1
NGR	1	Japan	1
		New Zealand	1
Total	15	Total	15

Network systems operation, maintenance, and security

JRSO continues working on its annual TAMU IT risk assessment, which should be completed in early 2021. TAMU Provost IT security expert Paul Wiggins completed JRSO's independent IT assessment in December and provided several recommendations for improvement throughout the process. In response, JRSO made numerous configuration changes to its information resources on ship and shore during the fall and strengthened processes.

Tieup activities

JRSO completed several configuration changes to its shipboard information resources before and during tie-up, including server and workstation upgrades throughout.

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 the final ~4,000 samples that were not completed during the January 2020 Expedition 383 sample party. The GCR also prepared for the Expedition 378 sample party scheduled to begin in early January 2021.

Sample and curation strategies

JRSO planned sample and curation strategies this quarter for Expedition 390C.

Sample requests and core sampling

The following table provides a summary of the 4,745 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
082638IODP, Westerhold, Germany	496	
082596IODP, Sarao, USA	366	
082722IODP, Camoin, France	75	
084428IODP, Clark, USA	424	
082748IODP, Karas, Chile	268	
082814IODP, Archontikis, United Kingdom	92	
082853IODP, Browne, USA	59	
082886IODP, Lamyman, United Kingdom	21	
082919IODP, Bayon, France	16	
082995IODP, Sagawa, Japan	475	
083035IODP, Kender, United Kingdom	6	
083066IODP, St.-John, USA	53	
083127IODP, Desmares, France	34	
083249IODP, Kring, USA	3	
083258IODP, Hoefig, USA	29	
083317IODP, Cowan, USA	78	
078268IODP, Doucet, Australia	4	
083351IODP, Cramwinckel, United Kingdom	69	
083358IODP, Cramwinckel, United Kingdom	17	
083265IODP, Mallery, USA	6	
083389IODP, Li, Canada	12	
083467IODP, Kimble, USA	30	
083492IODP, Kutterolf, Germany	21	
083539IODP, Kasbohm, USA	8	
083065IODP, Fitzgerald, USA	26	
083659IODP, Haobo, China	49	
083759IODP, Kamber, Australia	20	
083896IODP, Finlayson, USA	10	
084037IODP, Cabello, Spain	286	
084037IODP, Turner, USA	33	
084103IODP, Zhong, China	251	
084122IODP, Novak, USA	0	
084122IODP, Liao, USA	21	
084205IODP, Hoefig, USA	110	
084166IODP, Hostettler, USA	7	
084265IODP, Kulhanek, USA	0	
084259IODP, Kulhanek, USA	203	
084430IODP, Zhang, China	675	
084546IODP, Birch, United Kingdom	6	
084603IODP, Algeo, USA	226	
084676IODP, Petronotis, USA	8	

Sample request number, name, country	Number of samples taken	Number of visitors
084744IODP, Wang, USA	146	
084790IODP, Blumm, USA	6	
084837IODP, Hastedt, USA	0	
Totals	4,745	

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. The GCR had no visitors this quarter because of COVID-19.

Onshore XRF scanning

During this quarter, 401 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 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*
Personal	385, Höfig, USA	0	124	124	0
Personal	374, Kulhanek, USA	0	124 [†]	0	0
Personal	363, Kulhanek, USA	240 [†]	0	0	0
Personal	170, Plank, USA	0	13	13	0
Totals		240	261	137	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. † = discrete samples.

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

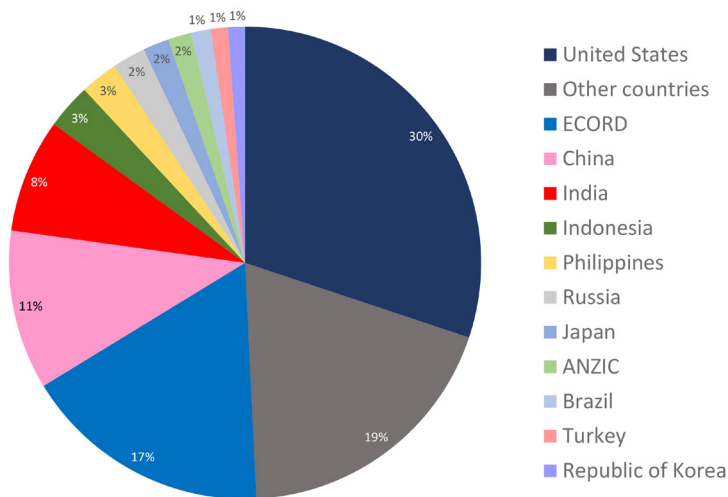
Reports and publications	JRSO	MarE3	ESO	Other
Preliminary Reports	10.14379/iodp.pr.385.2020 10.14379/iodp.pr.384.2020			
Expedition Reports				10.14379/OmanDP.proc.2020: Chapter 17, Site BA3 Chapter 18, Site BA4
Data Reports	10.14379/iodp. proc.363.203.2020		10.2204/iodp.proc.347.202.2020	

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 this quarter, the IODP TAMU website received 283,461 page views and 33,195 site visits and the IODP Publications website received 293,915 page views and 23,353 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 210 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	FY21 Q1 page views*	FY21 Q1 site visits*
www-odp.tamu.edu	223,091	28,849
www.odplegacy.org	4,447	2,164
www.deepseadrilling.org	44,852	5,027
Total	272,390	36,040

Note: *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 this quarter are shown in the table below.

Table 9.3. Number of online DOI resolutions

Reports and publications	DOI prefix	October 2020	November 2020	December 2020	FY21 Q1 total
IODP	10.14379	7,280	6,664	6,572	20,516
Integrated Ocean Drilling Program	10.2204	7,957	7,489	8,523	23,969
ODP/DSDP	10.2973	50,752	62,936	49,726	163,414

Table 9.4. Top 10 IODP DOIs resolved during FY21 Q1

DOI	Resolutions	Title
10.2204/IODP.PROC.302.2006	440	Expedition 302 Contents
10.14379/IODP.PROC.367368.2018	303	Volume 367/368, South China Sea Rifted Margin
10.2204/IODP.PROC.310.2007	272	Tahiti Sea Level
10.14379/IODP.PR.371.2018	267	Expedition 371 Preliminary Report: Tasman Frontier Subduction Initiation and Paleogene Climate
10.2204/IODP.PROC.320321.2010	264	Pacific Equatorial Age Transect
10.14379/IODP.SP.395.2020	258	Expedition 395 Scientific Prospectus: Reykjanes Mantle Convection and Climate
10.14379/IODP.PROC.374.2019	249	Volume 374, Ross Sea West Antarctic Ice Sheet History
10.14379/IODP.PROC.358.2020	230	Volume 358, NanTroSEIZE Plate Boundary Deep Riser 4: Nankai Seismogenic/Slow Slip Megathrust
10.2204/IODP.PROC.303306.2006	230	North Atlantic Climate
10.2204/IODP.PROC.347.2015	221	Baltic Sea Paleoenvironment

Table 9.5. Top 10 Program DOIs resolved during FY21 Q1

DOI (10.14379)	Resolutions	Title
10.2973/ODP.PROC.IR.175.1998	556	Volume 175 Initial Reports
10.2973/ODP.PROC.IR.177.1999	535	Volume 177 Initial Reports
10.2973/ODP.PROC.IR.184.2000	528	Volume 184 Initial Reports
10.2973/ODP.PROC.IR.162.1996	505	Volume 162 Initial Reports
10.2973/ODP.PROC.IR.178.1999	502	Volume 178 Initial Reports
10.2973/ODP.PROC.IR.171B.1998	484	Forward, Initial Reports Volume 171B
10.2973/ODP.PROC.IR.198.2002	464	Volume 198 Initial Reports
10.2204/IODP.PROC.302.2006	440	Expedition 302 contents
10.2973/ODP.PROC.IR.138.1992	338	Volume 138 Initial Reports
10.14379/IODP.PROC.367368.2018	303	Volume 367/368, South China Sea Rifted 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, and 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
FY19–FY20	747	10,921	238	1,827	8,776
FY21 Q1	9	616	261	1,848	97
Total to date	756	11,537	—	—	8,873

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
FY19–FY20	4,732	18,801	40,733	11,895	47,235
FY21 Q1	107	1,603	42,374	12,070	1,294
Total to date	4,839	20,404	—	—	48,529

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 expedition reports for Expedition 358 and data reports for Expeditions 346 and 361–363.

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.” In addition, peer-reviewed postcruise research result publications related to Expeditions 303/306, 311, 314/315/316, 320/321, 323, 325, 331, 339, 341, 343/343T, 346, 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 1.3 TB of data and over 7 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 166 expedition-related publication citations for consideration for inclusion in the database.

Table 9.8. Scientific Ocean Drilling Bibliographic Database statistics

Program-related publications	October 2020	November 2020	December 2020	FY21 Q1 total
Searches	505	509	363	1,377
Citation views	237	249	217	703

IODP Pubs also maintains a current PDF list of publications and conference presentations/abstracts authored by JRSO staff and Research Information Systems (RIS)-format citation data lists for IODP program publications and staff-authored journal articles (<http://iodp.tamu.edu/staffdir/indiv.html>). RIS is a standardized tag format that enables citation programs to exchange data. Users can import the content of the RIS files into most bibliographic software. RIS-format citation data lists are also available for expedition-related bibliographies for Expeditions 301–395. The IODP program publication, JRSO staff-authored, and expedition-related bibliography lists are updated quarterly.

Abstracts authored by JRSO staff

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

AGU Fall Meeting 2020

- Brachfeld, S.A., Reilly, B.T., Tauxe, L., Weber, M., Raymo, M.E., Peck, V.L., **Williams, T.**, et al., 2020. The Scotia Sea magnetic susceptibility record: coupling of the deep ocean and atmosphere? (Abstract GP016-02)
- Brombacher, A., Ezard, T.H.G., Wilson, P.A., and IODP Expedition 383 scientists (including **C.A. Alvarez Zarikian**), 2020. Understanding diachroneity: palaeoenvironmental controls on dispersal of planktonic foraminifera in the Plio-Pleistocene oceans. (Abstract B050-0009).
- Coggon, R.M., Sylvan, J.B., Christeson, G.L., Teagle, D.A.H., **Estes, E.R.**, and **Williams, T.**, 2020. Drilling transects to explore the interconnected Earth. (Abstract OS026-09)
- **Estes, E.R.**, and Sylvan, J., 2020. Evaluating twenty years of microbial contamination tracer usage in ocean drilling. (Abstract OS026-06)
- **Petronotis, K.E.**, Dugan, B., McNeil, L.C., and the IODP Expedition 362 Science Team, 2020. Sedimentary evolution and seismogenic slip at the Sumatra subduction zone. (Abstract OS024-0009)
- Reis, A., Fichtner, V., Erhardt, A., Roehl, U., Thomas, D.J., **Childress, L.B.**, and the Expedition 378 Science Party, 2020. Carbonate recrystallization on the Campbell Plateau: preliminary results from IODP Site 378-U1553. (Abstract PP010-0004)
- Stratford, W., Dickens, G.R., **Blum, P.**, and the Scientific Team of IODP Drilling Leg 371, 2020. IODP borehole constraints on timing of Eocene compressional plate failure during subduction initiation, northern Zealandia, southwestern Pacific. (Abstract V045-06)
- Varela, N., Romans, B., Patterson, M.O., Ash, J.L., **Kulhanek, D.K.**, De Santis, L., McKay, R.M., and the IODP Expedition 374 Scientists, 2020. Sedimentary record of Antarctic Bottom Water (AABW) outflow in the Ross Sea since 3.3 Ma (IODP Sites U1524 and U1525). (Abstract C037-0007)
- Weber, M.E., Raymo, M.E., **Williams, T.**, and the IODP Expedition 382 Scientists, 2020. Dust climate couplings in Iceberg Alley—first results from IODP Expedition 382. (Abstract C037-0002)

Geological Society of America Annual Meeting 2020

- Christoupolou, M., Dodd, J.P., Browne, I., Shevenell, A., McKay, R.M., De Santis, L., **Kulhanek, D.K.**, and the IODP Expedition 374 Scientific Party, 2020. Biogenic silica production in the Ross Sea, Antarctica during the Miocene Climatic Optimum. Geological Society of America Annual Meeting 2020 (online), 26–30 October 2020.
- Nirenberg, J., Romans, B.W., Patterson, M., **Kulhanek, D.**, De Santis, L., McKay, R., Ash, J., and IODP Expedition 374 Scientists, 2020. Glacially-controlled variations in the biological pump of the Ross Sea during the mid-to-late Pliocene. Geological Society of America Annual Meeting 2020 (online), 26–30 October 2020.

Geosciences Conference 2020

- Perez, L., De Santis, L., McKay, R.M., Larter, R.D., Ash, J., Bart, P.J., Böhm, G., et al. (including **D.K. Kulhanek**), 2020. Early and middle Miocene ice sheet dynamics in the Ross Sea: Results from core-log-seismic correlation. Geosciences Conference 2020, Christchurch, New Zealand, 22–25 November 2020.

Appendix: JRSO quarterly report distribution

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