International Ocean Discovery Program
JOIDES Resolution Science Operator
FY18 Q4 Operations and Management Report

1 July–30 September 2018
Cooperative Agreement OCE-1326927

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

13 November 2018

Contents

1. Introduction

This quarterly operations and management report reflects activities and deliverables outlined in the International Ocean Discovery Program (IODP) *JOIDES Resolution* Science Operator (JRSO) FY18 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 that was completed during the quarter); and
- Postexpedition activities (including postcruise editorial meetings).

Table 2.1. JRSO expedition schedule

Expedition		Port (origin)	Dates[1]	Total days (port/ sea)	Days at sea (transit[2]/ ops)	Co-Chief Scientists	Expedition Project Manager
Brothers Arc Flux	376	Auckland, New Zealand	5 May–5 July 2018	61 (5/56)	56 (2/54)	C. de Ronde S. Humphris	T. Höfig
Non-IODP (Maintenance, Subic Bay, Philippines) (5 July–15 November 2018) (133 days)							M. Malone
Return to Hole U1503A (South China Sea)	368X	Hong Kong	15 November–8 December 2018	23 (3/20)	20 (2/18)	N/A	L. Childress
Non-IODP (8 December 2018–18 January 2019) (41 days)							M. Malone
Amundsen Sea West Antarctic Ice Sheet History	379	Punta Arenas, Chile	18 January–20 March 2019	61 (5/56)	56 (14/42)	K. Gohl J. Wellner	A. Klaus
Iceberg Alley and Subantarctic Ice and Ocean Dynamics[3]	382	Punta Arenas, Chile	20 March–20 May 2019	61 (5/56)	56 (9/47)	M. Weber M. Raymo	T. Williams
Dynamics of Pacific Antarctic Circumpolar Current	383	Punta Arenas, Chile	20 May–20 July 2019	61 (5/56)	56 (20/36)	F. Lamy G. Winckler	C. Alvarez Zarikian
Non-IODP (JR100)	379T	Punta Arenas, Chile	20 July–18 August 2019	29 (5/24)	24 (8/16)	TBD	M. Malone
Panama Basin Crustal Architecture (504B) and Restoring Hole 896A	385T	Antofagasta, Chile	18 August–16 September 2019	29 (1/28)	28 (18/10)	TBD	P. Blum
Guaymas Basin Tectonics and Biosphere	385	San Diego, California (USA)	16 September–16 November 2019	61 (5/56)	56 (9/47)	A. Teske D. Lizarralde	T. Höfig
Non-IODP (16 November 2019–3 January 2020) (48 days)							M. Malone
South Pacific Paleogene Climate	378	Fiji[4]	3 January–4 March 2020	61 (3/58)	58 (27/31)	D. Thomas U. Röhl	L. Childress
Engineering Testing	384	Papeete, Tahiti	4 March–26 April 2020	53 (5/48)	58 (25/23)	TBD	P. Blum

Expedition		Port (origin)	Dates[1]	Total days (port/ sea)	Days at sea (transit[2]/ ops)	Co-Chief Scientists	Expedition Project Manager
Amazon Margin	387	Barbados	26 April–26 June 2020	61 (5/56)	56 (8/48)	TBD	L. Childress
Equatorial Atlantic Gateway	388	Recife, Brazil	26 June–26 August 2020	61 (5/56)	56 (2/54)	TBD	L. LeVay
Non-IODP (26 August–5 October 2020) (40 days)							M. Malone
South Atlantic Transect 1	390	Rio de Janeiro, Brazil	5 October–5 December 2020	61 (5/56)	56 (14/42)	TBD	C. Alvarez Zarikian
Walvis Ridge Hotspot	391	Cape Town, South Africa	5 December 2020–4 February 2021	61 (5/56)	56 (11/45)	TBD	K. Petronotis
Agulhas Plateau Cretaceous Climate	392	Cape Town, South Africa	4 February–6 April 2021	61 (5/56)	56 (6/50)	TBD	D. Kulhanek
South Atlantic Transect 2	393	Cape Town, South Africa	6 April–6 June 2021	61 (5/56)	56 (13/43)	TBD	C. Alvarez Zarikian

TBD = to be determined.

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

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

[3] Proposal 902 combined with APL 846.

[4] Port in Fiji TBD.

Expedition 374: Ross Sea West Antarctic Ice Sheet History

Postexpedition activities

A postexpedition editorial meeting and sampling party was held 30 July–10 August in College Station, Texas.

Expedition 375: Hikurangi Subduction Margin

Postexpedition activities

The Expedition 375 *Preliminary Report* was published in July.

Expedition 376: Brothers Arc Flux

Table 2.2. Expedition 376 Science Party staffing breakdown

Member country/consortium	Participants	Co-Chief Scientists
USA: United States Science Support Program (USSSP)	8	1
Japan: Japan Drilling Earth Science Consortium (J-DESC)	3	
Europe and Canada: European Consortium for Ocean Research Drilling (ECORD) Science Support and Advisory Committee (ESSAC)	8	
Republic of Korea: Korea Integrated Ocean Drilling Program (K-IODP)	1	
People's Republic of China: IODP-China	2	
Australia and New Zealand: Australia/New Zealand IODP Consortium (ANZIC)	4	1
India: Ministry of Earth Science (MoES)	0	
Brazil: Coordination for Improvement of Higher Education (CAPES)	1	

Table 2.3. Expedition 376 coring summary

Site	Hole	Latitude	Longitude	Water depth (mbrf)	Cores (*N*)	Interval cored (m)	Core recovered (m)	Recovery (%)
U1527	U1527A	34°51.6528′S	179°03.2397′E	1464.23	15	101.4	1.27	1.25
	U1527B	34°51.6519′S	179°03.2526′E	1464.19	NA	NA	NA	NA
	U1527C	34°51.6625′S	179°03.2534′E	1464.12	19	138.1	25.9	18.75
Site U1527 totals					**34**	**239.5**	**27.17**	**11.34**
U1528	U1528A	34°52.9177′S	179°04.1070′E	1228.36	15	84.4	17.09	20.25
	U1528B	34°52.9222′S	179°04.1077′E	1240.30	NA	NA	NA	NA
	U1528C	34°52.9215′S	179°04.1128′E	1229.01	7	31.5	3.63	11.52
	U1528D	34°52.9219′S	179°04.1164′E	1228.04	62	298.0	87.23	29.27
Site U1528 totals					**84**	**413.9**	**107.95**	**26.08**
U1529	U1529A	34°52.5161′S	179°03.5139′E	1734.99	1	12.0	1.86	15.5
	U1529B	34°52.5217′S	179°03.5207′E	1732.99	4	34.4	0.6	1.74
Site U1529 totals					**5**	**46.4**	**2.46**	**5.30**
U1530	U1530A	34°51.6588′S	179°03.4572′E	1594.86	93	453.1	76.77	16.94
Site U1530 totals					**93**	**453.1**	**76.77**	**16.94**
U1531	U1531A	34°52.7767′S	179°04.2241′E	1354.87	1	15.0	1.0	6.67
	U1531B	34°52.7721′S	179°04.2111′E	1351.87	3	26.0	3.98	15.31
	U1531C	34°52.7239′S	179°04.2586′E	1306.87	3	28.4	2.25	7.92
	U1531D	34°52.7228′S	179°04.2606′E	1306.85	NA	NA	NA	NA
	U1531E	34°52.7591′S	179°04.2344′E	1355.01	8	21.7	0.79	3.64
Site U1531 totals					**15**	**91.1**	**8.02**	**8.80**
Expedition 376 totals					**231**	**1244.0**	**222.37**	**17.88**

Science summary

Volcanic arcs are the surface expression of magmatic systems that result from the subduction of mostly oceanic lithosphere at convergent plate boundaries. Arcs with a submarine component include intraoceanic arcs and island arcs that span almost 22,000 km on Earth's surface. The vast majority of these arcs are located in the Pacific region. Hydrothermal systems hosted by submarine arc volcanoes commonly contain a large component of magmatic fluid. This magmatic-hydrothermal signature, coupled with the shallow water depths of arc volcanoes and their high volatile contents, strongly influences the chemistry of the fluids and resulting mineralization and likely has important consequences for the biota associated with these systems. The high metal contents and very acidic fluids in these hydrothermal systems are thought to be important analogs to numerous porphyry copper and epithermal gold deposits mined today on land.

During Expedition 376 (5 May–5 July 2018), five sites were drilled on Brothers volcano in the Kermadec arc. The expedition was designed to provide the missing link (i.e., the third dimension) in our understanding of hydrothermal activity and mineral deposit formation at submarine arc volcanoes and the relationship between the discharge of magmatic fluids and the deep biosphere. Brothers volcano hosts two active and distinct hydrothermal systems: one seawater influenced and the other affected by magmatic fluids (largely gases). A total of 222.4 m of volcaniclastics and lavas were recovered from the five sites drilled, which include Sites U1527 and U1530 in the Northwest (NW) Caldera seawater-influenced hydrothermal field; Sites U1528 and U1531 in the magmatic fluid–influenced hydrothermal fields of the Upper and Lower Cones, respectively; and Site U1529 in a magnetic low that marks the West (W) Caldera upflow zone on the caldera floor. Downhole logging and borehole fluid sampling were

completed at two sites, and two tests of a prototype turbine-driven coring system (designed by the Center for Deep Earth Exploration [CDEX] at Japan Agency for Marine-Earth Science and Technology [JAMSTEC]) for drilling and coring hard rocks were conducted.

Core recovered from all five sites consists of dacitic volcaniclastics and lava flows with only limited chemical variability relative to the overall range in composition of dacites in the Kermadec arc. Pervasive alteration with complex and variable mineral assemblages attests to a highly dynamic hydrothermal system. The upper parts of several drill holes at the NW Caldera hydrothermal field are characterized by secondary, low-temperature mineral assemblages of goethite + opal + zeolites. At depth, NW Caldera Site U1527 exhibits a higher temperature secondary mineral assemblage dominated by chlorite + quartz + illite + pyrite. A mineral assemblage dominated by diaspore + quartz + pyrophyllite + rutile found in Hole U1530A points to temperatures similar to Site U1527. The alteration assemblage at Site U1528 on the Upper Cone is dominated by paragenesis of illite + natroalunite + pyrophyllite + quartz + opal + pyrite. These intensely altered rocks exhibit extreme depletion of major cation oxides, such as MgO, K2O, CaO, MnO, and Na2O. Furthermore, very acidic (as low as pH ~2), relatively hot (≤247°C) fluids collected at 160, 279, and 313 meters below seafloor (mbsf) in Hole U1528D have chemical compositions indicative of magmatic gas input.

The material and data recovered during Expedition 376 provide new stratigraphic, lithologic, and geochemical constraints on the development and evolution of Brothers volcano and its hydrothermal systems. Insights into the consequences of the different types of fluid-rock reactions for the microbiological ecosystem elucidated by drilling at Brothers await shore-based studies.

Postexpedition activities

An internal Expedition 376 performance review talk was presented to IODP supervisors and managers on 27 August in College Station, Texas. A postcruise editorial meeting and sampling party was planned for 3–7 December in College Station, Texas.

Expedition 368X: Return to Hole U1503A (South China Sea)

Planning

During a routine dry dock, it was discovered that the *JOIDES Resolution* propellers needed to be replaced. Consequently, the expedition schedule was reorganized because of associated delays with making these repairs, which will be completed in Hong Kong. The repairs are expected to be completed about 3 weeks before the ship needs to depart Hong Kong and start the transit to Punta Arenas, Chile, for the next scheduled expedition. IODP Expedition 368X proposes to return to and deepen Hole U1503A, which was cased to 991 m during Expedition 368 but could not be completed because of the failure of one of the drawworks clutches. The two key operational objectives for Hole U1503A are to (1) sample the lowermost ~300 m of sediments on top of the basement and (2) sample the igneous stratigraphy to at least 100 m below the basement. Because of the very short lead time, a minimal science staffing model will be implemented to collect ephemeral, safety, and core and wireline logging data only. Following the expedition, a description and sampling party will be held at the Gulf Coast Repository (GCR) in College Station, Texas.

Staffing

Notification of the proposed return to Hole U1503A was sent to the Expedition 367 and 368 Science Parties to determine interest and availability to fill the key scientific specialist positions required to implement the basic data collection model. Invitations were sent out at the end of September, and the Science Party staffing was completed 2 October. Positions were filled approximating the staffing ratios defined for Expeditions 367 and 368 (i.e., the Complementary Project Proposal [CPP] model).

Clearance, permitting, and environmental assessment activities

The marine scientific research (MSR) application was submitted to the US State Department on 19 September, and the US State Department submitted the application and diplomatic note to China and Taiwan on 26 September and 2 October, respectively. A formal letter of intent was submitted to IODP-China on 21 September.

Expedition 379: Amundsen Sea West Antarctic Ice Sheet History

Planning

In response to last year's extensive sea-ice coverage, the Co-Chief Scientists requested additional sites north of the 2018 sea-ice extent that were approved at the Environmental Protection and Safety Panel (EPSP) meeting held 4–6 September at the JRSO office in College Station, Texas. In addition, a formal request was sent to the *JOIDES Resolution* Facility Board (JRFB) to include sites in the Antarctic Peninsula and the Ross Sea as additional contingency sites. This request was approved. Quotes for weather forecasting and satellite ice imagery support were received. The service for weather forecasting was contracted, and the ice imagery agreement negotiations were in progress at the end of the quarter.

Staffing

Agreements were reached with two sea-ice observers to sail on the expedition.

Clearance, permitting, and environmental assessment activities

An environmental evaluation for Expeditions 379, 382, and 383 was initiated for the sites in Antarctic Waters.

Expedition 382: Iceberg Alley and Subantarctic Ice and Ocean Dynamics

Planning

A videoconference with the Science Party was held on 19 September 2018. A postexpedition sampling party was planned for late November 2019 in Bremen, Germany.

Staffing

Two Onboard Education Officers were invited to sail and have accepted.

Clearance, permitting, and environmental assessment activities

The MSR application was submitted to the US State Department on 31 July, and the US State Department submitted the application and diplomatic note to both Argentina and the United Kingdom on 13 August and 21 August, respectively. Several queries from Argentina were received and answered. An

environmental evaluation for Expeditions 379, 382, and 383 was initiated for the sites in Antarctic Waters. The EPSP granted permission to extend one site to the basement and to deepen the permitted depths for all other expedition sites.

Expedition 383: Dynamics of Pacific Antarctic Circumpolar Current

Planning

The Expedition 383 *Scientific Prospectus* was published in August. An addendum to the *Scientific Prospectus* will be required to document the additional sites approved by the EPSP.

Staffing

A second round of invitations was sent out in September. Two scientists accepted, along with a siliceous micropaleontologist who was selected from a special call. The United States Science Support Program (USSSP) issued a new special call for a petrophysicist on 24 September.

Clearance, permitting, and environmental assessment activities

The MSR application was submitted to the US State Department on 9 October. The EPSP granted permission to occupy nine new sites (one primary and eight alternates), and the operations plan was updated to seven primary sites (three in the Chilean margin and four in the central South Pacific).

Expedition 379T: JR100

Planning

Because of the time required for propeller replacement, Expedition 379T had to be deferred to the tie-up slot following Expedition 383. The start port will be Punta Arenas, Chile, and the end port will be Antofagasta, Chile. The revised dates and ports will decrease the transit and increase the available operational days relative to the previous position in the schedule, albeit in a less desirable weather window. The cruise plan now anticipates being able to visit eleven sites, assuming no weather delays.

Clearance, permitting, and environmental assessment activities

The MSR application was submitted to the US State Department on 25 May. A formal letter of notification regarding the schedule and port changes was submitted on 12 October.

Expedition 385T: Panama Basin Crustal Architecture (504B) and Restoring Hole 896A

Planning

The plan for this transit expedition changed because of the time required for propeller replacement. The Panama Basin 769 Ancillary Project Letter (APL) (Hole 504B), which was previously planned as part of Expedition 384 in FY20, was moved to the FY19 transit from Antofagasta, Chile, to San Diego, California, from 18 August to 16 September. Enough operational time was available on the transit (~10 days) to also add 921 APL, which is designed to restore nearby Ocean Drilling Program (ODP) Hole 896A by removing the wireline-deployed CORK.

Staffing

Co-Chief Scientists will be invited early next quarter. The Science Party will be limited to the minimum number required to conduct operations and collect samples.

Expedition 385: Guaymas Basin Tectonics and Biosphere

Planning

The Expedition 385 pre-expedition meeting was held 3 and 4 September in College Station, Texas. Because of the time required for propeller replacement, the expedition schedule was shifted to 16 September–16 November 2019.

Staffing

First-round invitations were sent out on 30 July, and all were accepted. A special call for a diatom and nannofossil micropaleontologist was sent out, and we anticipate filling that position early next quarter. The current plan is to sail one Onboard Education Officer (USSSP).

Clearance, permitting, and environmental assessment activities

JRSO staff continued to review requirements and discuss with other US vessel operators how they have addressed certain requirements. Three Mexican scientists were invited to sail as scientific observers and members of the Science Party. We anticipate that an additional nonscientist observer will be required.

Expedition 378: South Pacific Paleogene Climate

Planning

Because of the time required for propeller replacement and the operational weather window for the South Pacific operations, Expedition 378 was deferred to 3 January–4 March 2020. The beginning port will now be in Fiji, and the end port remains in Papeete, Tahiti. The site locations and operations plan remain unchanged.

Staffing

The Science Party was notified of the schedule change and asked to consider how these changes may impact their participation.

Clearance, permitting, and environmental assessment activities

Authorization for Expedition 378 was received on 21 August. In accordance with the New Zealand Exclusive Economic Zone (EEZ) Act, a Preactivity Notice was submitted to the New Zealand Environmental Protection Authority (EPA) on 20 July. A notification of the MSR to key Māori groups (Iwi) was issued on 21 August. A report of the Iwi responses and an initial environmental assessment form were submitted to the New Zealand EPA on 11 October. A formal letter of notification regarding the rescheduling was submitted to the US State Department on 20 September and to the New Zealand EPA on 21 September. The EPSP approved deepening Deep Sea Drilling Project (DSDP) Site 277.

Expedition 384: Engineering Testing

Planning

The expedition scope and cruise dates were changed because of the time required for propeller replacement. This expedition will now focus only on engineering testing. The number of operational days was reduced by about seven, and testing will only focus on the JRFB highest priority objectives. As noted above, 769 APL (Panama Basin) was moved to Expedition 385T. The expedition will now begin in Papeete, Tahiti, on 4 March 2020 and end in Barbados on 26 April.

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. JRSO management met with Overseas Drilling Limited (ODL) management, including the new ODL manager, Eelke Hoefstra, at the JRSO office on 26 and 27 September to discuss upcoming operational issues, renewal efforts, and contract issues.

Progress reporting

The JRSO operations and management report for the third quarter of FY18 (April–June 2018) was submitted to NSF on 3 August 2018 (http://iodp.tamu.edu/publications/AR/FY18/FY18_Q3.pdf).

Liaison activities

The 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).

Brad Clement (Director) and Adam Klaus (Supervisor of Science Support) attended the IODP Forum meeting on 19 and 20 September and the IODP PMO meeting on 21 September. Both meetings were held in Goa, India.

Project portfolio management

The JRSO continued work on the SampleMaster Replacement and Data Publishing projects and revived the GEODESC Project, which had been on hold pending recommendations from the DESClogik Replacement project.

GEODESC

Scope and deliverables

The purpose of this project is to replace DESClogik, 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.

Status

Based on recommendations from the DESClogik Replacement project team, the JRSO decided to revive and pursue the GEODESC project. The GEODESC project management team began working to revise the project management plan, which is scheduled for completion in February 2019.

Data Publishing

Scope and deliverables

The purpose of the Data Publishing project is to build a framework, tools, and processes capable of publishing expedition information for long-term repository storage and discovery of referenceable information. This project will also support publication of data files not currently available online. When completed, all published information will be available for science community use via the JRSO publications website, a dynamic search engine (similar to Laboratory Information Management System [LIMS] Online Report Environment [LORE]/OVERVIEW), and web-based searches.

Status

The JRSO management team extended this project until the end of December.

SampleMaster Replacement

Scope and deliverables

The purpose of the SampleMaster Replacement project is to replace SampleMaster with a modular program. SampleMaster is an application that provides for all initial IODP data entry into the LIMS database. This interface is used across the organization by a wide range of people who fall into groups of users, and those users perform specific tasks.

Status

The Sample Party Module remains on track for completion in October 2018. The entire project, comprising multiple modules, remains on track for completion in February 2021.

4. Subcontract activities

The JRSO continued to interact with ODL to ensure efficient and compliant operations of the *JOIDES Resolution*. The JRSO is working with ODL to produce a restatement of the TAMRF/ODL contract, which is intended to simplify the document by removing irrelevant material and condensing amendments into simplified text.

The JRSO continued to interact with Schlumberger Technology Corporation to ensure that wireline logging operations aboard the *JOIDES Resolution* continue in an efficient and compliant manner. The JRSO and Schlumberger worked successfully to streamline travel and shipping activities.

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. The 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, oversight to drilling and logging contractors, and technical advice and assistance for European Consortium for Ocean Research Drilling (ECORD) Science Operator (ESO) and Center for Deep Earth Exploration (CDEX) expeditions; and utilizing IODP resources to oversee engineering development projects.

Expedition outreach support

JRSO staff assisted with planning and implementation of tours for 27 government and universities officials and media at the Expedition 376 port call on 25 July and facilitated the portion of the School of Rock that took place on 5 and 6 July on board the ship.

Engineering support

During the transit to Subic Bay, Philippines, the ship's crew completed connections and final installation of piping and electrical related to implementation of the new hydraulic power units for the vibration-isolated television (VIT) subsea camera system. Initial testing and troubleshooting resolved any issues during the maintenance period. The entire system will be tested at sea during the upcoming transit to Hong Kong.

6. Technical and analytical services

The primary responsibilities of the Technical and Analytical Services (TAS) department are to facilitate core flow and oversee laboratories. TAS activities include staffing the shipboard laboratories; operating scientific measurement equipment and providing support to shipboard scientists; maintaining, repairing, and developing scientific equipment and laboratories; providing support for downhole tools and measurements; and supporting shore-based laboratories.

Maintenance period activities

During the transit, dry dock, and tie-up period this quarter, the following projects were completed:

- Three new air-conditioning units were installed in the science conference room.
- The science conference room and other IODP offices were recarpeted.
- The sonar dome was removed, inspected, refurbished, and then reinstalled.
- The bio van (aka the radiation van) was removed, refurbished, and then reinstalled.
- Insulation was installed under the logging office.
- A leak in the ceiling of the core laboratory was repaired.
- Cracks in the laboratory floors were repaired.

The removal of the fantail crane was planned for next quarter before the ship puts out to sea.

In response to the dry-dock incident in which the ship shifted abruptly, TAS staff inspected laboratory systems for damage and found no obvious problems. More complete testing will be done prior to Expedition 368X.

Analytical systems

Activities, purchases, and repairs during this quarter include the following:

- The manual X-ray system for imaging core sections on upcoming high-latitude expeditions is in the assembly and testing stage. The source is a Teledyne CP120B 120 kV, 1 mA source, and the detector is a Teledyne Go-Scan digital detector with a 75 µm resolution. Both are intended to be mounted on one of the Whole-Round Multisensor Logger (WRMSL) benches to facilitate movement of core through the system. The system will image ~12 cm intervals to ensure overlap between 10 cm imaging regions. TAMU Environmental Health & Safety staff inspected the system with its shielding and determined that the JRSO has met radiation safety requirements for an uncontrolled space. Radiation safety testing will be conducted again on board the ship to ensure the condition of uncontrolled space is met. Test images on a taped-together pair of section halves from Expedition 374 are promising, revealing the ice-rafted debris inside the section.
- Experimentation with a pair of shear wave transducers was initiated to potentially provide constrains on shear moduli and shear strength; this method is only practical for individual experiments and not the WRMSL.
- After the shut-down during dry dock, the power supply for the X-ray diffraction (XRD) system did not come back up. Replacement parts will be sent to the ship, and this component will be repaired by JRSO staff.
- The new freeze dryer was installed to replace a malfunctioning unit.
- A 360° camera was acquired to make 3-D images around and under the ship while in dry dock. These images will be used in Google Tour Creator, and additional movies will be made for laboratory manual web pages.
- To evaluate the quality of the nitrogen generated by the N2 generator, plans were made to install an oxygen sensor on the output line.
- Two additional Ocean Optics QE-Pro spectrophotometers were acquired. One will be used as an additional spare on the *JR*, and the other will be used to develop a color reflectance system for testing and development on shore.

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 and expedition technical reports and issues management communications to provide advice on corrective actions and potential developments for laboratories.

Curation and Core Handling

The Curation and Core Handling LWG did not meet this quarter because there were no curatorial issues arising from recent expeditions.

Geochemistry and Microbiology

The Geochemistry and Microbiology LWG met this quarter to discuss ongoing issues and issues arising from Expeditions 374 and 375.

Ongoing Issues

- The Cahn balance software was rewritten and is much more user friendly.

- The possibility of using various techniques (e.g., microtiter) to try to reduce pore water sample volume used for techniques like ammonia or orthophosphate was investigated; such techniques exist, but they do not use significantly less fluid and in general have worse detection limits and data quality than the existing spectrophotometer methods. The LWG decided to close this line of inquiry.
- A problem with a sulfate blank was corrected, and sulfate blanks are now at an expected level.
- The two Agilent 7890 gas chromatographs will be modified for easier calibration and use.
- The liquid nitrogen generator was repaired and returned to the ship.
- As mentioned in the Geology LWG section below, the LWG discussed possible alternatives to hydrofluoric acid (HF) use in palynology work.

Expedition 374 Issues

- The scientists reported intermittent problems with the conductivity detector on the ion chromatograph. A new replacement detector was purchased, and the old detector was repaired by the vendor, so the *JR* now has a spare detector should problems recur.
- Although the Agilent 5100 inductively coupled plasma–atomic emission spectroscopy (ICP-AES) instrument allows data to be directly uploaded to LIMS, scientists requested a path by which they could review the data first. This has been accommodated.
- The LWG considered a suggestion to have instrumentation for the study of biogenic opal and decided this was beyond the scope of *JR* measurements.
- Poor precision was encountered with ammonium measurements. The method was updated to use a rinse solution containing the color reagents, which will eliminate this problem in the future.
- The scientists experimented with combusted and noncombusted sediment samples for ICP analysis and recommended that sediments not be ignited prior to creating the flux fusion bead. The LWG discussed this recommendation and decided that the user guide will be updated to indicate that the scientists have the option to skip ignition for sediment analysis; however, this is not universally true, so it is still our de facto procedure.

Expedition 375 Issues

- It was determined that sulfate concentrations are not linear on the ion chromatograph over the range of concentrations in the continental margins. The user guide was updated to recommend the use of two separate calibration curves for high- and low-range SO_4^{2-} determinations.
- Lithium and boron data were not optimal in initial runs. A matrix match for lithium and drift correction for boron corrected this.
- A scientist noted that carbon dioxide concentrations on the natural gas analyzer (NGA) would be helpful. The GC is configured to analyze CO_2 and the calibration mixes contain it, so this is possible.

Geology

The Geology LWG met this quarter to discuss ongoing issues and issues arising from Expeditions 374 and 375.

Ongoing Issues

- Alternate illumination sources were tested on the Section Half Imaging Logger (SHIL) and were found to be insufficient to provide high-quality images. Further investigation was tabled.
- An updated copy of DiatomWare was acquired and will be deployed on the *JR*.

- Scientists requested that TimeScaleCreatorPro (TSCPro) be provided on the ship. The JRSO will discuss this more fully with TSCPro's creator and other scientists to determine whether it fits into the *JR* workflow.
- In response to paleontologist criticisms of DESClogik, LWG members will submit a survey to the paleontological community to seek input regarding what would be needed in the upcoming GEODESC project (to replace to DESClogik) to address paleontology needs.
- Requirements and specifications for the GEODESC project continue to be developed, and management approved the work to create a project management plan for the project.
- HF use on the *JR* requires special safety and medical preparation in case of a spill or exposure. The JRSO wishes to reduce the use of HF to the degree possible, so a guide for palynology, including references for non-HF methods, was created.
- A request for a multisieve washing device was considered. The LWG decided that this is not a viable method for the *JOIDES Resolution*, primarily because of space limitations but also because of the potential for cross-contamination.

Expedition 374 and 375 Issues

Only one issue arose from the cruise evaluations for Expeditions 374 and 375 (beyond a continued call for DESClogik improvement or replacement). The behavior of the cursor in the SHIL software is not ideal; the developers will focus on this in the future.

Geophysics

The Geophysics LWG met this quarter to discuss ongoing issues and issues arising from Expedition 376.

Ongoing Issues

- The *P*-wave first-arrival pick method was updated to include the energy ratio method in addition to the zero-crossing method. This should increase data quality for *P*-wave measurements.
- An LWG subcommittee logging team led by Trevor Williams (Expedition Project Manager) was established to assess logging issues in more detail.

Expedition 376 Issues

- Changes to the velocity gantry code were made to allow for (rare) measurement of whole-round sections and/or pieces oriented to either the *X*- or *Y*-axis.
- Revising the KLY-4 KappaBridge software (primarily to allow for treatment comments) will be a future mini-project.
- Expedition 376 scientists had difficulty with the thermal conductivity measurements and attributed them to poor quality of the instrument and its data reduction algorithms. The LWG noted that the materials being measured were highly fractured, and half-space needle measurements of such rock samples are expected to have data quality issues. Furthermore, Dr. Rob Harris (Oregon State University) conducted an in-depth evaluation of the instrument during Expedition 375, including a comparison to a Huskeflex thermal conductivity meter, and found no issues with the performance. The LWG concluded that the problems were primarily related to the sample condition and the relative inexperience of the investigator with the equipment.

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 the JRSO network and server resources to ensure safe, reliable operations and security for IODP data and IT resources. Additional activities include managing expedition and postexpedition data, providing long-term archival access to data, and supporting JRSO Information Technology (IT) services.

Expedition data

LIMS database

Data from Expedition 376 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. Data from Expedition 367/368 (South China Sea Rifted Margin) 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	892	USA	4,259
2	United Kingdom	387	Russia	308
3	China	273	Japan	232
4	Germany	214	China	230
5	Japan	123	Germany	226
6	Unknown	83	United Kingdom	148
7	Canada	65	New Zealand	103
8	France	59	Unknown	62
9	Netherlands	40	Italy	51
10	Norway	39	France	50
	Others	346	Others	268
	Total	**2,521**	Total	**5,937**

Table 7.2. Top 20 database web queries

	Janus database		LIMS database	
Rank	Query	Views	Query	Views
1	Imaging—core photos	1,061	Imaging—core photos	14,177
2	Site summaries	701	Samples	1,410
3	Special holes	605	Section summaries	574
4	Samples	561	Imaging—LS section images	546
5	Core summaries	515	Hole summaries	392
6	Paleontology—age models	495	Core summaries	284
7	Chemistry—IW	391	Chemistry—IW	245
8	Chemistry—carbonates	325	Physical properties—GRA	229
9	Point calculations	311	Chemistry—carbonates	219

Rank	Janus database		LIMS database	
	Query	Views	Query	Views
10	Paleontology—range tables	278	Physical properties—NGR	166
11	Site details	234	Chemistry–ICP-AES	156
12	Physical properties—MAD	198	Physical properties—MAD	156
13	Physical properties—GRA	190	Physical properties—MS	134
14	Hole summaries	187	Physical properties—RSC	134
15	Hole trivia	185	Imaging—core close-up photos	130
16	Physical properties—RSC	185	Imaging—microimages	120
17	Physical properties—MSL	162	XRD	117
18	Paleontology—age models	133	Chemistry–gas	112
19	Physical properties—Adara	124	Physical properties—MS point	104
20	Chemistry—rock eval	114	SRM section	101
	Others	1,722	Others	2,001
	Total	**8,677**	Total	**21,504**

Table 7.3. Data requests to the TAMU Data Librarian

Requests	Total		Country	Total
How to	7		USA	13
Imaging—photos	7		Kazakhstan	2
Hole location	3		United Kingdom	2
Physical properties—GRA	1		Austria	1
Chemistry—IW	1		Canada	1
Seismics	1		Norway	1
Other	1		Spain	1
Total	**21**		Total	**21**

8. Core curation

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

Sampling parties and curation policies and procedures

Approximately 20,000 samples were taken at the Expedition 374 sampling party, which was held 5–10 August at the GCR.

Sample and curation strategies

The JRSO planned sample and curation strategies this quarter for upcoming Expeditions 379, 382, and 383.

Sample requests and core sampling

The following table provides a summary of the 4,688 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 X-ray fluorescence (XRF) analysis. For public relations or educational visits/tours, the purpose of the visit is shown in brackets in the “Sample request number, name, country” column and “No samples” 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
62001IODP, van Peer, United Kingdom	27	
62754IODP, Davidson, USA	3	
61492IODP, Stanislowski, Germany	42	
62629IODP, Clarkson, Switzerland	61	
62822IODP, Norris, USA	61	
62812IODP, Werner, USA	46	
62876IODP, Abrajevitch, Japan	70	
62829IODP, Dickson, United Kingdom	5	
62967IODP, Seki, Japan	111	
61934IODP, Flores, USA	14	
62487IODP, Riedel, Germany	41	
63342IODP, Taylor, United Kingdom	722	
62135IODP, Tibbett, USA	39	1
62745IODP, Abdullajintakam, USA	24	
63565IODP, Hoem, Netherlands	14	
63581IODP, Sexton, United Kingdom	10	
63435IODP, Slowey, USA	0	1
61496IODP, Westerhold, Germany	451	
63738IODP, Westerhold, Germany	0	
63559IODP, Trabucho, Netherlands	450	1
63328IODP, Cheung, USA	381	
63362IODP, Chavagnac, France	22	
63632IODP, Evangelinos, Spain	30	
63898IODP, Tegler, USA	70	
63754IODP, Moretti, Germany	64	
63993IODP, Wittmann, USA	6	
63932IODP, Super, USA	86	
63959IODP, Bralower, USA	22	
64240IODP, Bhattacharya, USA	7	
64599IODP, Hauptvogel, USA	9	
64580IODP, Matioli, Brazil	1	
63984IODP, Whalen, USA	5	
63227IODP, Birch, United Kingdom	343	
63816IODP, Gombiner, USA	59	
57152IODP, Kendrick, Australia	25	
64084IODP, Johnson, USA	1	
64037IODP, Bhatia, United Kingdom	55	
63727IODP, Reilly, USA	496	
64017IODP, Zhang, USA	5	
64312IODP, Naif, USA	13	
64912IODP, Naafs, United Kingdom	7	
64414IODP, Bralower, USA	12	
63766IODP, Horikawa, Japan	38	
60288IODP, Williams, USA	0	
63270IODP, Novak, USA	5	
63620IODP, Koenig, Germany	11	
64254IODP, Bralower, USA	7	
60933IODP, Mimura, Japan	717	2
Tours/demonstrations (7)	0	168
Totals	**4,688**	**173**

Use of core collection and education and outreach support

The 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. Six tours were given this quarter to the Summer Science Safari Camp (a summer camp for children from 12 to 16 years of age).

Table 8.2. GCR tours/visitors

Type of tour or visitor	Number of visitors
Scientist visitors	5
Educational tours/demonstrations (6)	150
Public relations tours (1)	18
Total	**173**

Onshore XRF scanning

During this quarter, 850 core sections were XRF scanned 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	374, Science Party	174	210	0	0
Personal	374, Kulhanek, USA	137	0	0	0
Personal	363, Kulhanek, USA	205	0	0	0
Personal	181, Kulhanek, USA	5	0	0	0
Personal	86, Westerhold, Germany	30	0	0	0
Personal	113, O'Connell, USA	0	4	4	0
Personal	198, Taylor, USA	0	77	77	0
Personal	Non-IODP, Jin, USA	0	8	0	0
Totals		**551**	**299**	**81**	**0**

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, ODP, and DSDP publications.

Postcruise editorial meetings

Postcruise editorial meetings were held in College Station, Texas, for JRSO Expedition 374 (30 July–3 August), ESO Expedition 381 (10–13 July), and CDEX Expedition 380 (11 and 12 September).

Scientific publications

Table 9.1. Newly published content on the IODP Publications website

Reports and publications	JRSO	USIO	CDEX	ESO*
Scientific Prospectus	10.14379/iodp.sp.383.2018		10.14379/iodp.sp.358.2018	
Preliminary Report	10.14379/iodp.pr.375.2018 10.14379/iodp.pr.367.2018 10.14379/iodp.pr.368.2018			
Expedition Report		10.14379/iodp. proc.367368.2018		
Data Report	10.14379/iodp. proc.349.202.2018 10.14379/iodp. proc.354.201.2018 10.14379/iodp. proc.366.201.2018			10.2204/iodp. proc.313.202.2018

*ESO publications are produced under contract with the British Geological Survey.

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 39,862 site visits and 356,845 page views and the IODP Publications website received 21,120 site visits and 346,665 page views. Where possible, visits by JRSO employees and search engine spiders were filtered out of the counts.

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 the legacy websites, which highlight the scientific and technical accomplishments of these ground-breaking precursors to the Integrated Ocean Drilling Program and IODP. The 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	FY18 Q4 page views*	FY18 Q4 site visits*
www-odp.tamu.edu	208,332	26,076
www.odplegacy.org	3,553	1,398
www.deepseadrilling.org	35,462	8,736
Total	**247,347**	**36,210**

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

Publications coordination

Data reports related to Expeditions 353, 354, 355, and 366, 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, as are the Integrated Ocean Drilling Program, ODP, and DSDP scientific reports and publications. 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 2018	August 2018	September 2018	FY18 Q4 total
IODP	10.14379	4,421	3,881	3,974	**12,276**
Integrated Ocean Drilling Program	10.2204	9,775	7,801	9,226	**26,802**
ODP/DSDP	10.2973	11,871	13,301	29,837	**55,009**

Science Open

Integrated Ocean Drilling Program and IODP expedition reports and data reports are indexed at ScienceOpen. IODP deposited data reports from Volumes 302, 342, 346, 352, 355, and 370 into ScienceOpen this quarter.

Table 9.4. 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	Share count	Cited by articles
FY18 Q1	613	1,652			87	
FY18 Q2	19	831	107	1,511	20	
FY18 Q3	4	1,063	116	1,521	8	221
FY18 Q4	19	1,137	130	1,540	4	13
Total	**655**	**4,683**	—	—	**119**	**234**

Table 9.5. 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	Share count	Cited by articles
FY18 Q2	2,086	3,585	11,162	6,198	14	
FY18 Q3	409	1,006	13,221	7,740	2	6,903
FY18 Q4	206	999	15,311	8,197	2	1,685
Total	**2,701**	**5,590**	—	—	**18**	**8,588**

Legacy activities

Closeout

Integrated Ocean Drilling Program publications closeout activities continued during the reporting period. Expedition reports and postexpedition research publications published during the quarter in

the *Proceedings of the Integrated Ocean Drilling Program* are listed above in "Scientific publications." In addition, publication obligation papers and data reports related to Expeditions 313–318, 320–325, 329, 331–334, 336, 339, 341–344, 346, and 347 were submitted to English language peer-reviewed journals or the Program.

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, is archived at Archive-it, a long-term archive specializing in full website backups. Quarterly crawls incrementally update the archive with new files, which, for this quarter, included 10,279 new documents (6.4 GB). In addition, the archive houses legacy publications sites for DSDP and ODP, for a grand total of 1.1 TB of data and almost 6 million documents. The archive can be viewed at https://archive-it.org/collections/9148.

Citation management

IODP Pubs contracts with the American Geosciences Institute to maintain the Scientific Ocean Drilling Citation Database, a subset of the GeoRef database that contains more than 35,000 records for Program-related scientific ocean drilling publications from 1969 to the present. This quarter, IODP Pubs sent 121 expedition-related publication citations for consideration for inclusion in the database.

Table 9.7. Scientific Ocean Drilling Bibliographic Database statistics

Program-related publications	July 2018	August 2018	September 2018	FY18 Q4 total
Searches	1,018	424	920	**2,362**
Citation views	572	410	502	**1,484**

IODP Pubs also maintains a current list of publications and conference presentations/abstracts authored by JRSO staff (http://iodp.tamu.edu/staffdir/indiv.html). This list is updated quarterly.

2018 Scientific Ocean Drilling Bibliographic Database Report

Each year, IODP Publication Services produces an annual report that provides information on how Program-related research is disseminated into the scientific community through publications. The 2018 Scientific Ocean Drilling Bibliographic Database Report looks at publications from highly ranking peer-reviewed journals, publications by authors from current IODP member countries, and publications by IODP expedition and Science Plan theme. Beginning with this year's report, the study also includes the Altmetric score and a link to the Altmetric score details for the top cited expedition-related papers and the expedition-related papers with the highest Altmetric scores. The study was published 18 September and is available online at http://iodp.tamu.edu/publications/AGI_studies/AGI_study_2018.pdf

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).

- Cavaleiro, C., Voelker, A.H.L., Stoll, H., Baumann, K.-H., **Kulhanek, D.K.**, Naafs, B.D.A., Stein, R., Grützner, J., Ventura, C., and Kucera, M., 2018. Insolation forcing of coccolithophore productivity in the North Atlantic during the Middle Pleistocene. *Quaternary Science Reviews*, 191:318–336. https://doi.org/10.1016/j.quascirev.2018.05.027
- De Vleeschouwer, D., Auer, G., Smith, R., **Bogus, K.,** Christensen, B., Groeneveld, J., Petrick, B., et al., 2018. The amplifying effect of Indonesian Throughflow heat transport on late Pliocene Southern Hemisphere climate cooling. *Earth and Planetary Science Letters*, 500:15–27. https://doi.org/10.1016/j.epsl.2018.07.035
- Huang, H.H.M., Yasuhara, M., Iwatani, H., **Alvarez Zarikian, C.A.**, Bassetti, M.A., and Sagawa, T., 2018. Benthic biotic response to climate changes over the last 700,000 years in a deep marginal sea: impacts of deoxygenation and the Mid-Brunhes Event. *Paleoceanography and Paleoclimatology*, 33(7):7866–777. https://doi.org/10.1029/2018PA003343
- Larsen, H.C., Mohn, G., Nirrengarten, M., Sun, Z., Stock, J., Jian, Z., **Klaus, A.,** et al. [including **C.A. Alvarez-Zarikian** and **T.W. Höfig**], 2018. Rapid transition from continental breakup to igneous oceanic crust in the South China Sea. *Nature Geoscience, 11:782–789.* https://doi.org/10.1038/s41561-018-0198-1
- Li, Y.-X., Zhao, X., Xie, S., Jovane, L., and **Petronotis, K.**, 2018. Paleomagnetism of IODP Site U1380: implications for the forearc deformation in the Costa Rican Erosive Convergent Margin. *Scientific Reports*, 8:11430. https://doi.org/10.1038/s41598-018-29243-7
- Lüdmann, T., Betzler, C., Eberli, G.P., Reolid, J., Reijmer, J.J.G., Sloss, C.R., Bialik, O.M., et al. [including **C.A. Alvarez-Zarikian**], 2018. Carbonate delta drift: a new sediment drift type. *Marine Geology*, 401:98–111. https://doi.org/10.1016/j.margeo.2018.04.011
- Tangunan, D.N., Baumann, K.-H., Just, J., **LeVay, L.J.**, Barker, S., Brentegani, L., De Vleeschouwer, D., et al., 2018. The last 1 million years of the extinct genus Discoaster: Plio–Pleistocene environment and productivity at Site U1476 (Mozambique Channel). *Palaeogeography, Palaeoclimatology, Palaeoecology*, 505:187–197.

Appendix: JRSO quarterly report distribution

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