International Ocean Discovery Program

JOIDES Resolution Science Operator

FY18 Q2 Operations and Management Report

1 January–31 March 2018

Cooperative Agreement OCE-1326927

Submitted by the JRSO

to

The National Science Foundation

and

The *JOIDES Resolution* Facility Board

11 May 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 meetings).

Table 2.1. JRSO expedition schedule

Expedition		Port (origin)	Dates [1]	Total days (port/ sea)	Days at sea (transit/ ops)	Co-Chief Scientists	Expedition Project Manager
Creeping Gas Hydrate Slides and Hikurangi LWD[2]	372	Fremantle, Australia	26 November 2017–4 January 2018	39 (5/34)	34 (15/19)	I. Pecher P. Barnes	L. LeVay
Ross Sea West Antarctic Ice Sheet History	374	Lyttelton, New Zealand	4 January–8 March 2018	63 (5/58)	58 (16/42)	R. McKay L. De Santis	D. Kulhanek
Hikurangi Subduction Margin	375	Lyttelton, New Zealand	8 March–5 May 2018	58 (5/53)	53 (2/51)	L. Wallace D. Saffer	K. Petronotis
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 (5 July–14 October 2018) (101 days)							M. Malone
South Pacific Paleo-gene	378	Lyttelton, New Zealand	14 October–14 December 2018	61 (4/57)	57 (11/46)	D. Thomas U. Röhl	L. Childress
Non-IODP (14 December 2018–18 January 2019) (35 days)							M. Malone
Amundsen Sea West Antarctic Ice Sheet History	379	Punta Arenas, Chile	18 January–20 March 2019	61 (3/58)	58 (12/46)	K. Gohl J. Wellner	A. Klaus
Iceberg Alley and South Falkland Slope[3]	382	Punta Arenas, Chile	20 March–20 May 2019	61 (5/56)	56 (9/47)	M. Weber M. Raymo	T. Williams

Expedition		Port (origin)	Dates [1]	Total days (port/ sea)	Days at sea (transit/ ops)	Co-Chief Scientists	Expedition Project Manager
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
Panama Basin Crustal Architecture and Engineering Testing	384	Valparaíso, Chile	20 July–19 September 2019	61 (5/56)	56 (TBD)	TBD	P. Blum
Guaymas Basin Tectonics and Biosphere	385	San Diego, California (USA)	19 September–19 November 2019	61 (5/56)	56 (9/47)	TBD	T. Höfig
Non-IODP (19 November 2019–21 January 2020) (63 days)							M. Malone
Gulf of Mexico Methane Hydrates[4]	386	Galveston, Texas (USA)	21 January–22 March 2020	61 (3/58)	58 (2/56)	TBD	L. LeVay

Notes: TBD = to be determined.
[1] The start date reflects the initial port call day. The vessel will sail when ready.
[2] Combined expedition with Ancillary Project Letter (APL) 841 and logging while drilling (LWD) from Proposal 781A (Expedition 375).
[3] Proposal 902 combined with APL 846.
[4] Complimentary Project Proposal (CPP) is contingent on substantial financial contribution outside of normal IODP funding.

Expedition 371: Tasman Frontier Subduction

Postexpedition activities

The Expedition 371 postcruise editorial meeting and sampling party were held 23 January–2 February in College Station, Texas.

Expedition 372: Creeping Gas Hydrate Slides and Hikurangi LWD

Table 2.2. Expedition 372 Science Party staffing breakdown

Member country/consortium	Participants	Co-Chief Scientists
USA: United States Science Support Program (USSSP)	9	
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)	2	2
India: Ministry of Earth Science (MoES)	1	
Brazil: Coordination for Improvement of Higher Education (CAPES)	1	

Clearance, permitting, and environmental assessment activities

In accordance with the New Zealand Exclusive Economic Zone (EEZ) Act, the Post-Activity Report was submitted to the New Zealand Environmental Protection Authority (EPA) on 27 February.

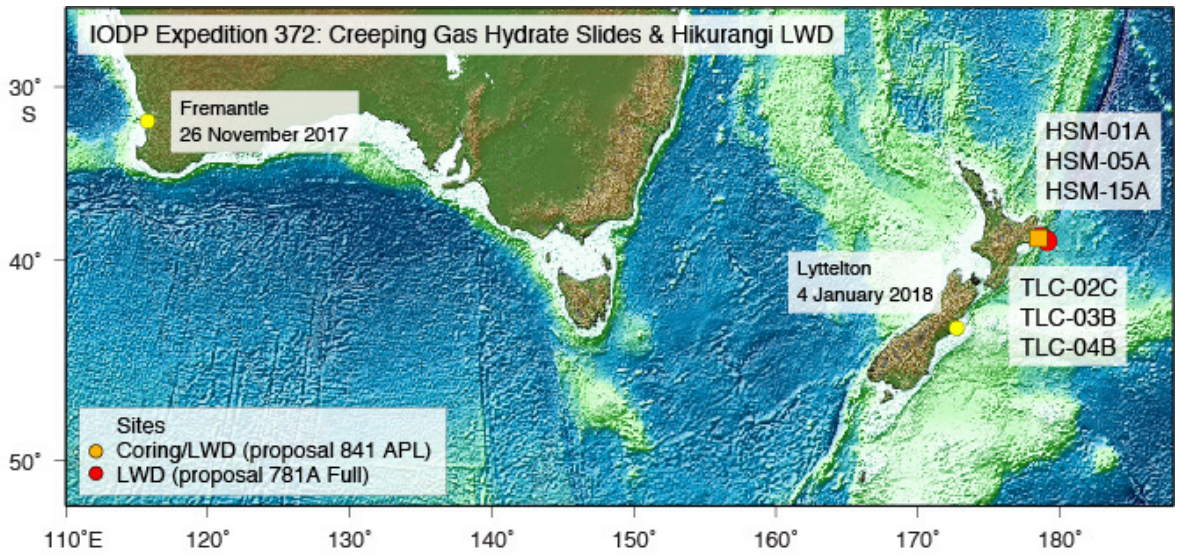


Table 2.3. Expedition 372 coring summary

Site	Hole	Latitude	Longitude	Water depth (mbrf)	Cores (*N*)	Interval cored (m)	Core re-covered (m)	Recovery (%)
U1517	U1517A	38°49.7722′S	178°28.5574′E	736.2	0	0.00	0.00	0.0
	U1517B	38°49.7820′S	178°28.5633′E	731.1	1	9.40	9.40	100.0
	U1517C	38°49.7820′S	178°28.5633′E	731.8	36	188.50	177.44	94.1
	U1517D	38°49.7765′S	178°28.5604′E	731.8	0	0.00	0.00	0.0
Site U1517 totals					**37**	**197.90**	**186.84**	**94.4**
U1518	U1518A	38°51.5368′S	178°53.7606′E	2647.3	0	0.00	0.00	0.0
	U1518B	38°51.5476′S	178°53.7621′E	2647.3	0	0.00	0.00	0.0
Site U1518 totals					**0**	**0.00**	**0.00**	**0.0**
U1519	U1509A	38°43.6372′S	178°36.8537′E	1011.6	0	0.00	0.00	0.0
Site U1519 totals					**0**	**0.00**	**0.00**	**0.0**
U1520	U1520A	38°58.1641′S	179°07.9357′E	3532.2	0	0.00	0.00	0.0
	U1520B	38°58.1587′S	179°07.9233′E	3531.0	0	0.00	0.00	0.0
Site U1520 totals					**0**	**0.00**	**0.00**	**0.0**
Expedition 372 totals					**37**	**197.90**	**186.84**	**94.4**

Science summary

Expedition 372 combined two research topics: slow-slip events (SSEs) on subduction faults (Proposal 781A-Full) and actively deforming gas hydrate–bearing landslides (Proposal 841-APL). The area on the Hikurangi margin east of the coast of New Zealand provided unique locations for addressing both research topics. The principal goals of Expedition 372 were as follows:

- Document the in situ conditions, material properties, and composition of the subduction inputs and the shallow plate boundary near the trench.

- Characterize the stress regime, temperatures, rock physical properties, lithologies, fluid pressures, fluid geochemistry, flow pathways, and structure of the upper plate above the SSE source.
- Further advance understanding of the mechanisms by which gas hydrates may cause creeping landslides.

SSEs at subduction zones are an enigmatic form of creeping fault behavior. They typically occur on subduction zones at depths beyond the capabilities of ocean floor drilling. However, at the northern Hikurangi subduction margin they are among the best-documented and shallowest on Earth. Here, SSEs may extend close to the trench, where clastic and pelagic sediments ~1.0–1.5 km thick overlie the subducting, seamount-studded Hikurangi Plateau. Geodetic data show that these SSEs recur about every 2 years and are associated with measurable seafloor displacement. The northern Hikurangi subduction margin thus provides an excellent setting in which to use IODP capabilities to discern the mechanisms behind slow-slip fault behavior.

Expedition 372 acquired logging-while-drilling (LWD) data at three subduction-focused sites to 600, 650, and 750 meters below seafloor (mbsf), respectively. Two sites (U1518 and U1519) lie above the plate interface fault that experiences SSEs, and one site (U1520) lies in the subducting "inputs" sequence in the Hikurangi Trough 15 km east of the plate boundary. Overall, we acquired excellent logging data and reached our target depths at two of these sites. Drilling and logging at Site U1520 did not reach the planned depth due to operational time constraints. These logging data will be augmented by coring and borehole observatories planned for Expedition 375.

Gas hydrates have long been suspected of being involved in seafloor failure; not much evidence, however, has been found to date for gas hydrate–related submarine landslides. Solid, ice-like gas hydrate in sediment pores is generally thought to increase seafloor strength, as confirmed by a number of laboratory measurements. Dissociation of gas hydrate to water and overpressured gas, on the other hand, may weaken and destabilize sediments, potentially causing submarine landslides.

The Tuaheni Landslide Complex (TLC) on the Hikurangi margin shows evidence for active creeping deformation. Intriguingly, the landward edge of creeping coincides with the pinch-out of the base of gas hydrate stability on the seafloor. We therefore hypothesized that gas hydrate may be linked to creep-like deformation and presented several hypotheses that may link gas hydrates to slow deformation. Alternatively, creeping may not be related to gas hydrates but instead may be caused by repeated pressure pulses or linked to earthquake-related liquefaction.

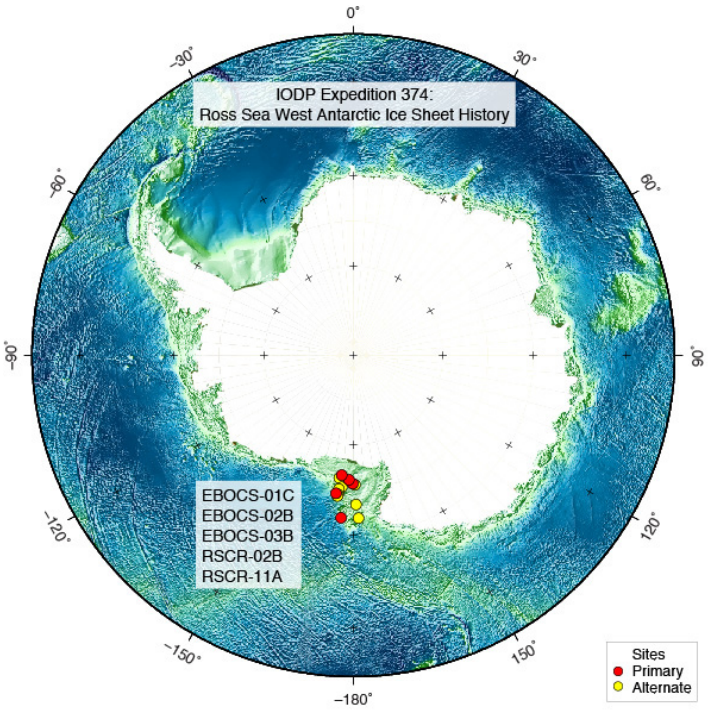
Expedition 372 operations included a coring and LWD program to test our landslide hypotheses. Due to weather-related downtime, the gas hydrate–related program was reduced and we focused on a set of experiments at Site U1517 in the creeping part of the TLC. We conducted a successful LWD and coring

program to 205 mbsf, the latter with almost complete recovery, through the TLC and gas hydrate stability zone, followed by temperature and pressure tool deployments.

Expedition 374: Ross Sea West Antarctic Ice Sheet History

Table 2.4. Expedition 374 Science Party staffing breakdown

Member country/consortium	Participants	Co-Chief Scientists
USA: United States Science Support Program (USSSP)	9	
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)	9	1
Republic of Korea: Korea Integrated Ocean Drilling Program (K-IODP)	2	
People's Republic of China: IODP-China	2	
Australia and New Zealand: Australia/New Zealand IODP Consortium (ANZIC)	1	1
India: Ministry of Earth Science (MoES)	1	
Brazil: Coordination for Improvement of Higher Education (CAPES)	1	



Clearance, permitting, and environmental assessment activities

The Annual Antarctica Waste Report was submitted to NSF on 30 March.

Table 2.5. Expedition 374 coring summary

Site	Hole	Latitude	Longitude	Water depth (mbrf)	Cores (*N*)	Interval cored (m)	Core recovered (m)	Recovery (%)
U1521	U1521A	75°41.0351’S	179°40.3108’W	562.2	71	650.10	411.50	63.3
Site U1521 totals					**71**	**650.10**	**411.50**	**63.3**
U1522	U1509A	76°33.2262’S	174°45.4652’W	557.6	76	701.80	279.57	39.8
Site U1522 totals					**76**	**701.80**	**279.57**	**39.8**
U1523	U1523A	74°9.0172’S	176°47.7067’W	828.0	7	46.30	33.51	0.0
	U1523B	74°9.0179’S	176°47.6660’W	828.0	22	121.20	45.13	37.2
	U1523C	74°9.0288’S	176°47.6680’W	828.0	0	0.00	0.00	0.0
	U1523D	74°9.0288’S	176°47.7087’W	828.0	18	172.80	0.90	0.5
	U1523E	74°9.0290’S	176°47.7491’W	827.9	17	84.70	54.08	63.8
Site U1523 totals					**64**	**425.00**	**133.62**	**31.4**
U1524	U1524A	74°13.0427’S	173°38.0185’W	2394.4	34	299.50	282.35	94.3
	U1524B	74°13.0440’S	173°37.9834’W	2394.2	1	7.70	7.76	100.8
	U1524C	74°13.0537’S	173°37.9338’W	2394.3	19	181.40	19.20	10.6
Site U1524 totals					**54**	**488.60**	**309.31**	**63.3**
U1525	U1525A	75°0.0603’S	173°55.2028’W	1775.7	33	213.20	158.70	74.4
Site U1525 totals					**33**	**213.20**	**158.70**	**74.4**
Expedition 374 totals					**298**	**2478.70**	**1292.70**	**52.2**

Science summary

The marine-based West Antarctic Ice Sheet (WAIS) is currently retreating due to shifting wind-driven oceanic currents that transport warm waters toward the ice margin, resulting in ice-shelf thinning and accelerated mass loss of the WAIS. Previous results from geologic drilling on Antarctica’s continental margins show significant variability in marine-based ice sheet extent during the late Neogene and Quaternary. Numerical models indicate a fundamental role for oceanic heat in controlling this variability over at least the past 20 My. Although evidence for past ice sheet variability has been collected in marginal settings, sedimentological sequences from the outer continental shelf are required to evaluate the extent of past ice sheet variability and the associated oceanic forcings and feedbacks. The principal goals of Expedition 374 were as follows:

- Evaluate the contribution of West Antarctica to far-field ice volume and sea level estimates.
- Reconstruct ice-proximal atmospheric and oceanic temperatures to identify past polar amplification and assess its forcings and feedbacks.
- Assess the role of oceanic forcing (e.g., sea level and temperature) on Antarctic Ice Sheet (AIS) stability/instability.

- Identify the sensitivity of the AIS to Earth's orbital configuration under a variety of climate boundary conditions.
- Reconstruct eastern Ross Sea paleobathymetry to examine relationships between seafloor geometry, ice sheet stability/instability, and global climate.

Expedition 374 recovered 1,292.70 m of high-quality records from five sites spanning the early Miocene to late Quaternary. Three sites were cored on the continental shelf (Sites U1521, U1522, and U1523). At Site U1521, we cored a 650 m thick sequence of interbedded diamictite, mudstone, and diatomite, penetrating the Ross Sea seismic Unconformity RSU4. The depositional reconstructions of past glacial and open-marine conditions at this site will provide unprecedented insight into environmental change on the Antarctic continental shelf during the early and middle Miocene. At Site U1522, we cored an upper Miocene to Pleistocene sequence of glacial and glaciomarine strata from the outer shelf, with the primary objective to penetrate and date seismic Unconformity RSU3, which is interpreted to represent the first major continental shelf–wide expansion and coalescing of marine-based ice streams from both East and West Antarctica. At Site U1523, we cored a sediment drift located beneath the easterly flowing Antarctic Slope Current (ASC). Cores from this site will provide a record of the changing vigor of the ASC through time. Such a reconstruction will enable testing of the hypothesis that changes in the vigor of the ASC represent a key control on regulating heat flux onto the continental shelf, resulting in the ASC playing a fundamental role in ice sheet mass balance.

We also cored two sites on the continental slope and rise. At Site U1524, we cored a Pliocene–Pleistocene sedimentary sequence on the continental rise on the levee of the Hillary Canyon, which is one of the largest conduits of Antarctic Bottom Water delivery from the Antarctic continental shelf into the abyssal ocean. Drilling at Site U1524 was intended to penetrate into middle Miocene and older strata but was initially interrupted by drifting sea ice that forced us to abandon coring in Hole U1524A at 399.5 m drilling depth below seafloor (DSF). We moved to a nearby alternate site (U1525) to core a single hole with a record complementary to the upper part of the section recovered at Site U1524. We returned to Site U1524 3 days later after the sea ice cleared. We then cored Hole U1525C with the rotary core barrel system with the intention of reaching the target depth of 1000 m DSF. However, we were forced to terminate Hole U1524C at 441.9 m DSF due to a mechanical failure with the vessel that resulted in termination of all drilling operations and a return to port in Lyttelton 16 days earlier than scheduled. The loss of 39% of our operational days significantly impacted our ability to achieve all Expedition 374 objectives as originally planned. In particular, we were not able to obtain the deeper time record of the middle Miocene on the continental rise or abyssal sequences that would have provided a continuous and contemporaneous archive with the high-quality (but discontinuous) record from Site U1521 on the continental shelf. The mechanical failure also meant we could not recover sediment cores from proposed Site RSCR-19A, which was targeted to obtain a high-fidelity, continuous record of upper Neogene and

Quaternary pelagic/hemipelagic sedimentation. Despite our failure to recover a shelf-to-rise transect for the Miocene, a continental shelf-to-rise transect for the Pliocene to Pleistocene interval is possible through comparison of the high-quality records from Site U1522 with those from Site U1525 and legacy cores from the Antarctic Geological Drilling Project.

Expedition 375: Hikurangi Subduction Margin

Planning

Preparations for surface and air freight were completed, and the shipments were dispatched. A final crew and science party list was submitted to New Zealand immigration. The expedition starting port was changed from Lyttelton, New Zealand, to Timaru, New Zealand, due to a dock worker strike. Plans were made for a joint interview of Expedition 375 and 376 Co-Chief Scientists with Radio NZ to be held on 5 May.

Clearance, permitting, and environmental assessment activities

In accordance with the New Zealand EEZ Act, a Pre-Activity Notice was submitted to the New Zealand EPA on 5 January. A notification of marine scientific research (MSR) to key Māori groups was issued on 23 January. A report of the notifications and an initial environmental assessment form were submitted to the New Zealand EPA on 24 February, and a Post-Activity Report will be submitted to the New Zealand EPA following the expedition.

Expedition 376: Brothers Arc Flux

Planning

All essential engineering questions were positively addressed. Our logistics staff worked with the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) to facilitate shipping of the Turbine Driven Coring System (TDCS), which will be tested during the expedition. Flasks and related supplies for high-temperature operations of some of the Schlumberger wireline logging tools (Hostile Environment Litho-Density Sonde [HLDS]/Hostile Environment Natural Gamma Ray Sonde [HNGS]/logging equipment head–mud temperature [LEH-MT]) were prepared for shipment. Plans were made for a joint interview of Expeditions 375 and 376 Co-Chief Scientists with Radio NZ to be held on 5 May, and four ship tours were scheduled for the afternoon of 6 May.

Staffing

Two Center for Deep Earth Exploration (CDEX) engineers were invited and accepted the invitation to sail to oversee operation of the TDCS. The second Schlumberger engineer was confirmed to sail to support

high-temperature logging operations. A representative of a documentary team has been invited to sail, but they are in negotiation regarding approval of funding.

Clearance, permitting, and environmental assessment activities

Authorization for the expedition was received on 2 March. In accordance with the New Zealand EEZ Act, a Pre-Activity Notice was submitted to the New Zealand EPA on 27 February. A notification of MSR to key Māori groups was issued on 23 March. A report of the notifications and initial environmental assessment form will be submitted to the New Zealand EPA before the expedition.

Expedition 378: South Pacific Paleogene

Planning

The *Scientific Prospectus* was published in January 2018.

Staffing

First- and second-round invitations were sent in January. Science Party staffing was completed on 11 February. The US Science Support Program (USSSP) outreach officer candidate was invited and accepted the invitation to sail.

Clearance, permitting, and environmental assessment activities

The MSR application was submitted to the US State Department on 16 February. The US State Department submitted the application and diplomatic note to the New Zealand government on 28 February.

Expedition 379: Amundsen Sea West Antarctic Ice Sheet History

Staffing

The JRSO received applications in mid-December 2017, and initial invitations were sent out at the end of January. Science staffing was completed, except for a special call for a Radiolarian Specialist, which we anticipate filling early next quarter. The USSSP outreach position was filled, and a call for applications for an outreach officer from the European Consortium for Ocean Research Drilling (ECORD) Science Support & Advisory Committee (ESSAC) was issued with a deadline of 25 March.

Clearance, permitting, and environmental assessment activities

On 2 January, NSF approved the waste permit application for Antarctic activities for all expeditions with operations in polar waters in FY18 and FY19, including Expedition 379.

Expedition 382: Iceberg Alley Paleoceanography & South Falkland Slope Drift

Planning

The Expedition 382 pre-expedition meeting was held in College Station, Texas, on 8 and 9 February. The meeting was attended by both Co-Chief Scientists and the 846-APL lead proponent. The draft *Scientific Prospectus* was made available in March for scientific invitees to review prior to accepting invitations to sail.

Staffing

The JRSO received applications from the Program Member Offices (PMOs) in mid-January, and an initial round of invitations was issued at the beginning of March.

Clearance, permitting, and environmental assessment activities

Due to the sovereignty dispute of the Falkland Islands/Isla Malvinas, one berth space will be reserved for the United Kingdom and one berth space will be reserved for Argentina (a total of two observer berths). On 2 January, NSF approved the waste permit application for Antarctic activities for all expeditions with operations in polar waters in FY18 and FY19, including Expedition 382.

Expedition 383: Dynamics of Pacific Antarctic Circumpolar Current

Planning

The pre-expedition meeting was planned for 26 and 27 April in College Station, Texas. A Webinar was held on 15 February.

Staffing

A call for applications was issued on 1 December 2017 with a deadline of 1 March. Applications are due to the JRSO on 1 May.

Clearance, permitting, and environmental assessment activities

One site was found to be in the vicinity of a submarine cable. Although the distance of the primary site from the cable is sufficient for the JRSO to operate, it is closer than the typical preference of cable companies. The Co-Chief Scientists located a new potential alternate site farther away from the cable that will be discussed at the pre-expedition meeting. The alternate site will need to be reviewed by the Environmental Protection and Safety Panel (EPSP). On 2 January, NSF approved the waste permit application for Antarctic activities for all expeditions with operations in polar waters in FY18 and FY19, including Expedition 383, which has one site that is south of 60°S.

Expedition 384: Panama Basin Crustal Architecture and Engineering Testing

Planning

The JRSO held several internal meetings to discuss the recommendations of the Deep Crustal Engineering Workshop and began communicating with vendors on the availability and cost of various recommended products. Communications have continued with one of the Proposal 769-APL proponents concerning requirements to remove the wireline-deployed CORK in Holes 504B and 896A. Currently, we are awaiting the *JOIDES Resolution* Facility board (JRFB) decision regarding restoration and sampling of Ocean Drilling Program (ODP) Hole 896A (Proposal 921-APL).

Expedition 385: Guaymas Basin Tectonics and Biosphere

Planning

The JRSO discussed increasing the temperature range of the advanced piston corer temperature tool (APCT-3) with the vendor. A USSSP expedition webinar was scheduled for 4 April.

Staffing

A call for applications was issued on 15 January with a deadline of 15 April. Applications are due to the JRSO on 15 June. A Co-Chief Scientist accepted the invitation to sail on the expedition.

Expedition 386: Gulf of Mexico Methane Hydrate

Planning

Monthly conference calls with the proponents continued. Two additional conference calls were made to discuss issues surrounding permitting with participants from the proponent group, the JRSO, NSF, and the US Department of Energy.

Clearance, permitting, and environmental assessment activities

JRSO, Overseas Drilling Limited (ODL), and proponents continued efforts to define permitting requirements. We are awaiting official letters advising on what standards the *JOIDES Resolution* will have to meet to be able to conduct gas hydrate research in the Gulf of Mexico.

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.

Program planning

Planning began this quarter for preparation of the FY19 Annual Program Plan.

Progress reporting

The JRSO operations and management report for the first quarter of FY18 (October–December 2017) was submitted to NSF on 5 February 2018 (http://iodp.tamu.edu/publications/AR/FY17/FY17_Q4.pdf).

Liaison activities

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

Four JRSO staff attended the Science Evaluation Panel meeting held 9–11 January at Scripps Institute for Oceanography. The JRSO hosted an EPSP meeting on 20 February 2018 in College Station, Texas.

Project portfolio management

The JRSO management team approved the following projects for project execution: SampleMaster Replacement, Data Publishing, and DESClogik Replacement (a branch of the geological description [GEODESC] Project, which remains on hold).

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

Because GEODESC would require a very significant investment of resources, the JRSO decided to keep the GEODESC project on hold while exploring additional options for a core description tool, including the use of commercial software. This action spawned the new DESClogik Replacement project.

DESClogik Replacement

Scope and deliverables

The purpose of the DESClogik Replacement project is to review commercially available core description software capable of replacing DESClogik. This project explores options for delivering a new and improved GEODESC tool set using commercial, off-the-shelf software.

Status

This project was approved for execution with an estimated completion date of 1 July 2018.

Data Publication

Scope and deliverables

The purpose of the Data Publication 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 LIMS Online Report Environment [LORE]/ OVERVIEW), and web-based searches.

Status

This project was approved for execution with an estimated completion date of 1 November 2018.

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 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, and those users perform specific tasks.

Status

This project as approved for execution with an estimated completion date of 1 February 2021.

Facility performance assessment

The JRSO hosted two meetings this quarter to assess the JRSO's performance. The first meeting, held 26 and 27 February, was a Co-Chief Scientist review attended by seven of the ten Co-Chief Scientists of FY17 expeditions. Attendees assessed the JRSO's performance in implementing FY17 Expeditions 363, 366–368, and 371 and compiled their findings in a report that was submitted to NSF and presented at

a subsequent NSF-convened panel held 28 February–2 March to assess the JRSO's performance as a facility in meeting the needs of IODP in fulfilling its Science Plan. NSF's response to the panel report was still pending at the end of this reporting period.

4. Subcontract activities

The JRSO continued to interact with ODL to ensure efficient and compliant operations of the *JOIDES Resolution*.

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 ECORD Science Operator (ESO) and CDEX expeditions; and utilizing IODP resources to oversee engineering development projects.

Expedition outreach support

JRSO staff assisted with planning port call public relations and outreach activities for Expeditions 375 and 376. Port call outreach on March was disrupted because the ship had to change ports to Timaru to avoid the strike in Lyttelton. Some planned tours were dropped or deferred, but the JRSO provided tours to local officials, university groups, and the high school students who won the borehole observatory naming contest while the vessel was in Lyttelton, as well as a tour for a media representative while the vessel was in Timaru.

Engineering support

No major engineering acquisitions occurred during this quarter.

6. Technical and analytical services

The Technical and Analytical Services (TAS) Department's primary responsibilities 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; maintenance, repair, and development of scientific equipment and laboratories; providing support for downhole tools and measurements; and support of shore-based laboratories.

Analytical systems

No major analytical acquisitions occurred during this quarter. The Olympus DELTA Premium portable X-ray fluorescence (XRF) scanner was repaired by the manufacturer and returned to the vessel.

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 met this quarter to discuss ongoing issues and evaluations from several recent expeditions.

- Participants whose first language was not English had difficulty with curatorial/sampling procedures on several expeditions. To address this, curation will ensure procedures are clear and include written instructions. For example: (1) orientation documents given to shipboard participants will thoroughly outline sampling flow, and (2) a document explaining how core catchers are typically subsampled for paleontology (PAL samples) will be provided to minimize confusion.
- The project manager for the SampleMaster Replacement project gave a status report of the first new module development (a tool to assist with sample party planning and execution). SampleMaster's various functions (e.g., drill shack entry, core catwalk entry) will be replaced one by one.
- The LORE report for samples shows PAL subsamples as having offsets of 0–5 cm (for a 5 cm whole round). This offset is correct relative to the parent but is confusing to the end user because it does not represent the offset relative to the entire core catcher section. The LORE report will be modified to add columns to show "offset in section" to the existing fields.
- Based on several requests to improve the sample and data request system (SaDR), the Curator will collect comments and change requests and evaluate the need for revision.

- The LWG discussed difficult core types (e.g., "ghost" cores) and how they are handled; the Curator will create a document listing and defining each type so they are handled consistently between expeditions.
- The LWG discussed the core liner quality issue and the differences between the two vendors' products.

Geochemistry and Microbiology

The Geochemistry and Microbiology LWG met this quarter to discuss ongoing issues and issues from Expeditions 371, 369, and 372.

Ongoing issues

- Revisions to ODP Technical Note 28 (microbial contamination) are in process following the microbiological tracer workshop; a draft is anticipated in April 2018, and the goal is to have guidelines in place before Expedition 376.
- Tobias Höfig (JRSO Expedition Project Manager [EPM]) gave a presentation on Energy Dispersive Spectrometer (EDS) technology; three systems were evaluated: two that mount on the Hitachi SEM currently in use and one that is an integrated scanning electron microscope (SEM)-EDS. One system was selected as preferred if management decides to implement this technology on the drillship.
- The LWG discussed making Igpet Rockware plotting software available on the ship and whether a trial period could be offered during Expedition 376 for generating plots of different hard rock descriptive and/or chemical information.

Expedition 371 issues

- Comment about usability of Cahn weighing software: the LWG was informed that the old "Java Balance" program would be replaced in the near future.
- Complaint about the calibration of the new Agilent 5110 inductively coupled plasma–atomic emission spectrometer (ICP-AES): this was addressed on subsequent expeditions and the scientists have been pleased with the results.
- Request to adopt a different pH scale than the current NBS pH scale: we will continue using the existing pH scale for now and will reconsider if we get repeated requests.

Expedition 369 issues

- Request to investigate alkalinity and/or pH measurement techniques that require less sample volume (currently 3 mL of sample): an LWG member will research other techniques and report at the next LWG meeting.
- Request to look into alternate methods for ammonia and silica because the photometric method uses a significant amount of sample: an LWG member will research micro-titer plate techniques for consideration at the next LWG meeting.

Expedition 372 issues

- Complaint about the ~0.85 mM blank in the sulfate result on the ion chromatograph: this is a known issue with Metrohm ion chromatographs and the configuration we use; the chemistry technicians will try to solve this problem during Expedition 375 and will report back at the next LWG meeting.
- Comment that tables that show only the database TEXT_ID identifiers can make it difficult to evaluate data; one group of technicians was placing the data in a table with human-readable sample information and depth before giving them to the scientists; both crews will do so henceforth.
- Problems with gas chromatograph calibrations for fixed gases (e.g., N_2, O_2) on the natural gas analyzer; this is being investigated and will be resolved as soon as possible.

Geology

The Geology LWG met this quarter to discuss ongoing issues and issues from Expeditions 369 and 372.

Ongoing issues

- Update on the DESClogik replacement project: software from three external vendors will be evaluated in April 2018 to determine whether their products can be used for part or all of the DESClogik replacement; after this evaluation, management will determine the path forward for core description.
- The LWG is still waiting for final results on alternate lighting technology for the Section Half Imaging Logger (SHIL); initial tests with an axial illuminator were inconclusive.
- An EPM is continuing to investigate subscriptions for DiatomWare and TimeScaleCreator Pro for the ship; there is no update at this time.
- The LWG received a presentation from the Geochemistry LWG on EDS technology and concurred with the other LWGs' findings.

Expedition 369/372 issues

- Complaints from biostratigraphers in regard to DESClogik, listing a number of well-known issues, some of which gave rise to the DESClogik replacement project itself: the LWG will include biostratigraphers in discussions of how paleontological information is captured in the new description product (or revisions/updates of the existing one).

Geophysics

The Geophysics LWG met this quarter to discuss ongoing issues and issues arising from Expeditions 369 and 372.

Ongoing issues

- Additional quality control practices for the Whole-Round Multisensor Logger (WRMSL) measurements (magnetic susceptibility, gamma ray attenuation [GRA] bulk density, and *P*-wave velocity) were defined and provided to the developer for implementation.
- Superconducting rock magnetometer (SRM) flux jumps have been connected not only to cell phones but also to wireless and Bluetooth devices; scientists will be discouraged from using these devices in proximity to the SRM.

Expedition 369 issues

- Comment on samples from Sites U1512 and U1513 (shale/highly laminated units) for which *P*-wave caliper measurements were challenging (and demonstrated as much as 13% *P*-wave anisotropy) because the samples were too fragile to make discrete samples and measure them on multiple axes: the LWG took note, but little can be done on these sorts of samples.
- Comment that thermal conductivity results were confusing and the vendor's "SAM" method is a black box: the LWG is taking steps to make the results in the database clearer and more straightforward; additionally, an Expedition 375 scientist will bring another vendor's thermal conductivity tool to compare to the TeKa Berlin TK-04 results and give his advice and recommendations to IODP at the conclusion of the expedition.
- Comment that the *P*-wave code on both the WRMSL and the gantry is a bit opaque: the LWG is revisiting the *P*-wave logger code on the WRMSL to make the data and reduction clearer and more straightforward.

Expedition 372 issues

- Comments about broken components on a few systems: these were repaired/replaced during the expedition (e.g., NaI[Tl] detector on GRA).

- Additional comments about reproducibility of *P*-wave data: again, the instruments and methods are being revised to be clearer to the end user.
- Comments about downhole logging (especially logging while drilling [LWD]): IODP management is already looking at these issues and will create a "lessons learned" document for future projects.
- Requests for additional PETREL/TECHLOG workstations: IODP has four licenses for these tools, two on the vessel and two on shore; if another similar expedition requests it, we can ship one or both workstations to the vessel for such needs.
- Request for PETREL/TECHLOG manuals to be provided on the ship: Schlumberger doesn't produce a manual per se, but instead provides method notes for specific (mostly oilfield) situations; whatever documentation we could get from the company is available on the ship.
- Complaints on the performance of the temperature-dual pressure tool (T2P)/motion decoupled hydraulic delivery system (MDHDS)/Electrical Release System (ERS) system: Engineering is already evaluating these comments, and additional T2P testing may be done on the upcoming engineering test expedition (to be determined).
- Request for an X-ray computed tomography (CT) scanner: we have received many of these requests, and although a CT scanner presents difficulties given our space and workflow constraints, the JRSO is looking into two-dimensional X-ray imaging possibilities for use during Expeditions 379 and 382.

Several requests for a standardized pre-generated Methods chapter were received; the LWG will ask EPMs to encourage scientists tasked with writing a given volume's Methods chapter to have the technical staff review what they have written and ensure they are using up-to-date information about systems and procedures in place.

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 postcruise data, providing long-term archival access to data, and supporting JRSO Information Technology (IT) services

Expedition data

LIMS database

Data from Expeditions 372 and 374 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 expeditions. Data from Expedition 366 (Mariana Convergent Margin & South Chamorro Seamount) were released from moratorium during this quarter.

Expedition data requests

The following tables provide information on JRSO web data requests from the scientific community. Where possible, visits by JRSO employees were filtered out.

Table 7.1. Top 10 countries accessing JRSO web databases

	Janus database		LIMS database	
Rank	Country	Visitor sessions	Country	Visitor sessions
1	USA	1,299	USA	774
2	UK	591	China	292
3	China	247	Japan	198
4	Germany	183	United Kingdom	175
5	Japan	171	Germany	173
6	Australia	110	France	103
7	France	100	Unknown	96
8	Italy	94	Russia	56
9	Unknown	76	Italy	51
10	Russia	50	South Korea	50
	Others	373	Others	286
	Total	**3,294**	**Total**	**2,254**

Table 7.2. Top 20 database web queries

	Janus database		LIMS database	
Rank	Query	Views	Query	Views
1	Imaging—photos	2,578	Samples	1,097
2	Site summaries	844	Section summaries	959
3	Samples	833	Imaging—core photos	699
4	Core summaries	713	Imaging—line scans	671
5	Hole trivia	608	Hole summaries	510
6	Special holes	558	Core summaries	439
7	Paleontology—age models	528	Physical properties—RSC	304
8	Hole summaries	359	Physical properties—MAD	294
9	Physical properties—GRA	358	Physical properties—GRA	234
10	Chemistry—carbonates	336	Physical properties—MS	231

Rank	Janus database		LIMS database	
	Query	Views	Query	Views
11	Imaging—prime data images	271	Physical properties—NGR	204
12	Paleontology—age profiles	271	Chemistry—carbonates	165
13	Physical properties—MSL	267	Imaging—core close-up photos	160
14	Imaging—core close-up photos	252	Physical properties—TCON	158
15	Point calculations	232	Physical properties—MS point	139
16	Physical properties—color	195	XRD	138
17	Physical properties—NGR	182	Physical properties—PWL	137
18	Chemistry—IW	177	Imaging—thin sections	131
19	Physical properties—MAD	156	Imaging—microimages	117
20	Paleomag	145	Physical properties—PWC	108
	Others	2,003	Others	2,325
	Total	**14,626**	**Total**	**9,220**

Table 7.3. Data requests to the TAMU Data Librarian

Requests	Total	Country	Total
Imaging—core scans	11	USA	12
How to	4	Germany	4
Seismics	3	Spain	3
Paleontology—age depth	2	Australia	1
Paleontology—age models	1	Japan	1
Paleontology—range table	1	New Zealand	1
Sader	1	United Kingdom	1
Sample depths	1	Unknown	1
Total	**24**	**Total**	**24**

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 Gulf Core Repository (GCR).

Sampling parties and curation policies and procedures

The Expedition 371 sampling party was held at the GCR from 29 January to 2 February, during which time more than 12,000 samples were taken. Preparations began for the Expedition 369 sampling party to be held in May.

Sample and curation strategies

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

Sample requests and core sampling

The following table provides a summary of the 6,222 samples taken at the GCR during the quarter. Sample requests that show zero samples taken may represent cores that were viewed by visitors during the quarter, used for educational purposes, or requested for XRF analysis. For public relations or educational visits/tours, the purpose of the visit is shown in brackets in the "Sample request number, name, country" column and "No 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
57232IODP, Bralower, USA	8	
54948IODP, Hansen, USA	46	
56874IODP, Haynes, USA	137	
57101IODP, Fraas, USA	5	
57480IODP, Groeneveld, Germany	6	
57619IODP, Suh, USA	6	
57911IODP, Chalk, United Kingdom	145	
57960IODP, Witkowski, Poland	35	
58109IODP, Anderson, USA	0	
56606IODP, Galazzo, United Kingdom	12	
57588IODP, Woodhouse, United Kingdom	60	
57547IODP, Alexander, United Kingdom	20	
59284IODP, Griffith, USA	24	
58050IODP, Yano, Japan	53	
58315IODP, Menini, France	36	
56282IODP, Kuroyanagi, Japan	700	
58339IODP, Garcia, Germany	48	
59087IODP, Pasquier, Israel	0	
57851IODP, Hoem, Netherlands	0	1
58121IODP, Hoem, Netherlands	51	
58607IODP, Caballero-Gill, USA	86	
55417IODP, Etourneau, Spain	41	
58792IODP, Hoem, Netherlands	76	
58469IODP, Mateo, USA	26	
58702IODP, Evangelinos, Spain	21	
58892IODP, John, United Kingdom	22	
59205IODP, Bralower, USA	19	
59486IODP, Griffith, USA	11	
59625IODP, Wade, United Kingdom	32	
58745IODP, Herbert, USA	42	
59275IODP, Kast, USA	25	
58817IODP, Dukingdome, New Zealand	59	

Sample request number, name, country	Number of samples taken	Number of visitors
58359IODP, McIntyre, United Kingdom	106	
58516IODP, Diz, Spain	43	
59862IODP, Passchier, USA	13	
53614IODP, Jeong, China	400	
58919IODP, Gombosi, USA	19	3
59514IODP, Murphy, USA	145	
58104IODP, Chen, USA	23	
60242IODP, Hessler, USA	38	
58644IODP, Schmidt, United Kingdom	2	
59684IODP, Westerhold, Germany	137	
59579IODP, Poirier, USA	32	
56475IODP, McKay, New Zealand	1,100	
57406IODP, Hessler, USA	7	1
60199IODP, Wade, United Kingdom	5	
59883IODP, Tzanova, USA	62	
58663IODP, van der Weijst, Netherlands	265	
60132IODP, Gomez, USA	25	
60213IODP, Rizzo, USA	67	1
58020IODP, Turner, USA	16	
59681IODP, Pettinga, USA	131	
54038IODP, Barno, USA	48	
59851IODP, Paris, France	273	
59143IODP, Esegbue, United Kingdom	77	
60368IODP, Bhattacharya, USA	39	1
60454IODP, Mueller, Germany	16	
58867IODP, Zill, USA	0	1
60545IODP, Bitonti, USA	5	
60604IODP, Zill, USA	87	
60761IODP, Zill, USA	0	
60770IODP, Zill, USA	198	
60774IODP, Jacobel, USA	26	
58913IODP, Lam, USA	380	
60026IODP, Hesemann, Germany	8	
60759IODP, Ford, USA	38	
55554IODP, Pandey, India	480	
60613IODP, Belanger, USA	39	
59045IODP, Jacobel, USA	2	
60738IODP, Reznikoff, USA	18	
Tours/demonstration (6)		96
Totals	**6,222**	**104**

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.

Table 8.2. GCR tours/visitors

Type of tour or visitor	Number of visitors
Scientist visitors	8
Educational tours/demonstrations (4)	71
Public relations tours (2)	25
Totals	**104**

Other GCR activities

The new GCR HVAC system is now complete and operational. The old equipment has been removed.

Onshore XRF scanning

During this quarter, 1,040 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
Personal	28, Hoehm, Netherlands	0	0	4	0
Educational	62, Williams, USA	8	0	8	0
Personal	113, Bohaty, United Kingdom	0	6	6	0
Personal	113, Bogus, United Kingdom	0	34	34	0
Personal	113, Batenburg, United Kingdom	64	0	72	0
Personal	130, Feng, China	0	0	1	0
Personal	165, Student, USA	0	0	9	0
Personal	188, Hoem, Netherlands	0	0	36	0
Educational	198, Williams, USA	4	0	4	0
Personal	198, Student, USA	0	0	3	0
Program	369, Science Party, Multiple	498	11	9	0
Program	371, Science Party, Multiple	205	210	0	0
Totals		**779**	**261**	**186**	**0**

Notes: SHIL = Section Half Imaging Logger, WRMSL = Whole-Round Multisensor Logger.

9. Publication services

IODP Publication Services (Pubs) 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. IODP Pubs also maintains legacy access and archiving of Integrated Ocean Drilling Program, ODP, and Deep Sea Drilling Program (DSDP) publications.

Shipboard publications support

The Pubs department provided onboard publication specialists for Expeditions 374 and 375 and, under subcontract, for the ESO Expedition 381 onshore science party.

Postcruise editorial meetings

JRSO Pubs hosted the Expedition 371 postcruise editorial meeting on 23–27 January 2018.

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.378.2018			
Preliminary Report	10.14379/iodp.pr.371.2018 10.14379/iodp.pr.369.2018 10.14379/iodp.pr.372.2018			
Data Report	10.14379/iodp.proc.349.204.2018	10.2204/iodp.proc.320321.220.2018 10.2204/iodp.proc.342.206.2018	10.2204/iodp.proc.337.204.2018	
Expedition Report	10.14379/iodp.proc.366.2018			

*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 48,303 site visits and 380,940 page views and the IODP Publications website received 21,461 site visits and 182,041 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 Q2 page views*	FY18 Q2 site visits*
www-odp.tamu.edu	225,693	31,315
www.odplegacy.org	4,446	1,966
www.deepseadrilling.org	55,921	8,474
Total	**286,060**	**41,755**

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

Publications coordination

Data reports related to Expeditions 349–352, 354, 357, 361–364, and 366 were received, sent to peer review, accepted, or published this quarter, and expedition reports from Expeditions 372, 374, 380, and 381 were received.

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	January 2018	February 2018	March 2018	FY18 Q2 total
IODP	10.14379	1,982	2,308	2,949	**7,239**
Integrated Ocean Drilling Program	10.2204	3,243	4694	6,487	**14,424**
ODP/DSDP	10.2973	9,020	6,416	10,970	**26,406**

Science Open

Integrated Ocean Drilling Program and IODP expedition reports and data reports are indexed at ScienceOpen (https://www.scienceopen.com/collection/IODP_Publications). IODP deposited chapters from Expeditions 362, 364–366, and 370 and data reports from Volumes 337, 346, 349, and 351 into ScienceOpen this quarter. In addition, IODP Pubs created a companion collection (https://www.scienceopen.com/collection/8b0582f6-47bf-4988-b90a-8533135e6fcc) containing 2,086 records from expedition-related research published in outside literature this quarter.

Table 9.4. ScienceOpen Proceedings of the International Ocean Discovery Program collection statistics

Period	Article count	Article views	Altmetric score (collection)	Number of Authors	Share count
FY18 Q1	613	1,652			87
FY18 Q2	632	831	107	1,511	20
Total	———	**2,482**	———		**107**

Table 9.5. ScienceOpen Scientific Ocean Drilling Expedition Research Results collection statistics

Period	Article count	Article views	Altmetric score (collection)	Number of Authors	Share count
FY18 Q2	2,086	3,585	11, 162	6,198	14

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, 320/321, 323, 324, 327, 329–331, 334–344, and 346–349 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. The archive can be viewed publicly at https://archive-it.org/collections/9148.

Table 9.6. Archive-it crawl statistics

Period	Total data	New data	Total docs	New docs
FY18 Q1	183.2 GB	13.1 GB	176,563	23,339
FY18 Q2	138.9 GB	4.3 GB	178,626	8,925
Total	**322.1 GB**	**17.4 GB**	**355,189**	**32,264**

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 records for Program-related scientific ocean drilling publications from 1969 to the present. This quarter, IODP Pubs sent 96 expedition-related publication citations for consideration for inclusion in the database.

IODP Pubs also maintains a current list of conference presentations/abstracts and publications authored by JRSO staff.

Abstracts authored by JRSO staff

Abstracts of conference presentations during this quarter authored by JRSO staff include the following. Bold type indicates JRSO staff.

TAMU Annual Geology & Geophysics Student Research Symposium, 11th

- McCreary, M., **Höfig, T.W., LeVay, B.,** Stock, J., Sun, Z., **Klaus, A.,** Jian, Z., Larsen, H.C., **Alvarez-Zarikian, C.,** and the IODP Expedition 367/368 Scientists, 2018. Applying XRF core scanning to basaltic lavas from the South China Sea [presented at the TAMU 11th Annual Geology & Geophysics Student Symposium, College Station, Texas, 31 March 2018].

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).

- Betzler, C., Eberli, G.P., Lüdmann, T., Reolid, J., Kroon, D., Reijmer, J.J.G., Swart, P.K., Wright, J., Young, J.R., **Alvarez-Zarikian, C.,** et al., 2018. Refinement of Miocene sea level and monsoon events from the sedimentary archive of the Maldives (Indian Ocean). *Progress in Earth and Planetary Science,* 5:5. https://doi.org/10.1186/s40645-018-0165-x

- Kutterolf, S., Schindlbeck, J.C., Robertson, A., Avery, A., Baxter, A., **Petronotis, K.E.,** and Wang, K.-L., 2018. Tephrostratigraphy and provenance from IODP Expedition 352, Izu-Bonin Arc: tracing

tephra sources and volumes from the Oligocene to Recent. *Geochemistry, Geophysics, Geosystems,* 19(1):150–174. https://doi.org/10.1002/2017GC007100

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