International Ocean Discovery Program

JOIDES Resolution Science Operator

FY16 Q3 Operations and Management Report

1 April–30 June 2016

Cooperative Agreement OCE-1326927

Submitted by the JRSO

to

The National Science Foundation

and

The *JOIDES Resolution* Facility Board

5 August 2016

Contents

Introduction

The organization of this quarterly operations and management report reflects activities and deliverables outlined in the International Ocean Discovery Program (IODP) *JOIDES Resolution* Science Operator (JRSO) FY16 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).

Management and administration

Management and administration functions of the JRSO include planning, coordinating (with other IODP-related entities), overseeing, reviewing, and reporting on IODP activities.

Subcontract activities

Overseas Drilling Limited

The JRSO continued to interact with Overseas Drilling Limited (ODL) to ensure efficient and compliant operations of the *JOIDES Resolution*.

Schlumberger Technology Corporation Inc.

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 have worked successfully to streamline travel and shipping activities.

Progress reporting

JRSO reports

JRSO FY16 Q2 Quarterly Operations and Management Report

The JRSO operations and management report for the second quarter of FY16 (January–March 2015) was submitted to NSF on 10 May (http://iodp.tamu.edu/publications/AR/FY16/FY16_Q2.pdf).

JRSO FY16 Annual Program Plan Addendum

On 10 June 2016, the JRSO submitted a FY16 Annual Program Plan Addendum to NSF that proposed acquiring a second X-ray fluorescence (XRF) scanner in FY16 and developing the implementation plan for making scanning services available as an IODP programmatic measurement. No additional funds were requested for the purchase of the scanner.

JRSO FY17 Annual Program Plan

The first draft of the JRSO FY17 Annual Program Plan was submitted to the *JOIDES Resolution* Facility Board (JRFB) for review on 4 May 2016. The FY17 Annual Program Plan included four expeditions and addressed NSF guidance resulting from the JRSO Site Visit Panel Report. After JRFB review and subsequent revised guidance from NSF, an updated FY17 Annual Program Plan was submitted to NSF on 10 June 2016 that included five expeditions using JRSO carryforward funds to cover the cost of implementing the fifth expedition.

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/facility-boards).

Keynote presentation

On 27 June 2016, JRSO Director of Science Services Brad Clement presented a keynote presentation at the Australian Earth Science Convention in Adelaide, Australia. The talk presented the initial results of the *JOIDES Resolution*'s expeditions in the Indian Ocean to date and was part of a special session organized by the Australian and New Zealand International Ocean Discovery Program Consortium (ANZIC) to highlight ANZIC's role in the International Ocean Discovery Program.

Project portfolio management

The JRSO completed two projects (Extending IMS to WRMSL and STMSL and Thin Section Form Report Follow-up), initiated one project (LIMSpeak II), and continued work on two existing projects (Liquid Helium–Free Superconducting Rock Magnetometer Installation and Software Update and Improve Web Services) (see "Software development" in "Development, IT, and databases").

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.

Program website statistics

During the last quarter, the IODP JRSO website received 33,400 site visits and 374,070 page views. Where possible, visits by JRSO employees and search engine spiders were filtered out of the count.

Legacy web services

The Ocean Drilling Program (ODP) science operator, ODP legacy, and Deep Sea Drilling Project (DSDP) publications websites are hosted at TAMU. Key data, documents, and publications produced during the 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.

Legacy website statistics

Legacy website	FY16 Q3 page views*	FY16 Q3 site visits*
www-odp.tamu.edu	235,624	27,201
www.odplegacy.org	4,352	1,658
www.deepseadrilling.org	49,069	7,179
Totals	**284,693**	**34,380**

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

Science operations

The JRSO is responsible for planning, managing, coordinating, and performing activities and providing services, materials, platforms, and ship- and shore-based laboratories for JRSO expeditions; long-range operational planning for out-year JRSO expeditions; and technical advice and assistance for European Consortium for Ocean Research Drilling (ECORD) Science Operator (ESO) and Center for Deep Earth Exploration (CDEX) expeditions.

JRSO expedition schedule

Expedition		Port (origin)	Dates [1, 2]	Total days (port/ sea)	Days at sea (transit[3]/ ops)	Co-Chief Scientists	Expedition Project Manager
Non-IODP [31 March–4 July 2016] [96 days]							M. Malone
Transit/Hole U1473A Remediation	362T	Cape Town, South Africa	4 July–6 August 2016	33	33 (24/9)	N/A	P. Blum
Sumatra Seismogenic Zone	362	Colombo, Sri Lanka	6 August–6 October 2016	61 (5/56)	56 (7/49)	L. McNeill B. Dugan	K. Petronotis
Western Pacific Warm Pool	363	Singapore	6 October–8 December 2016	63 (5/58)	58 (8/50)	Y. Rosenthal A. Holbourn	D. Kulhanek
Mariana Convergent Margin[4]	366	Guam	8 December 2016–7 February 2017	61 (5/56)	56 (8/48)	P. Fryer G. Wheat	T. Williams
South China Sea Rifted Martin[5]	367	Hong Kong	7 February–9 April 2017	61 (5/56)	56 (2/54)	Z. Sun J. Stock	A. Klaus
South China Sea Rifted Martin[5]	368	Hong Kong	9 April–11 June 2017	61 (5/56)	56 (2/54)	Z. Jian H.-C. Larsen	C. Alvarez Zarikian
Non-IODP [9 June–27 July 2017] [48 days]							M. Malone

Expedition		Port (origin)	Dates [1, 2]	Total days (port/ sea)	Days at sea (transit[3]/ ops)	Co-Chief Scientists	Expedition Project Manager
Tasman Frontier Subduction	371	Townsville, Australia	27 July–26 September 2017	61 (3/58)	58 (7/51)	R. Sutherland G. Dickens	P. Blum
Australia Cretaceous Climate and Tectonics	369	Hobart, Tasmania (Australia)	26 September–26 November 2017	61 (5/56)	56 (7/49)	R. Hobbs B. Huber	K. Bogus
Creeping Gas Hydrate Slides and Hikurangi LWD[6]	372	Fremantle, Australia	26 November 2017–4 January 2018	39 (5/34)	34 (15/19)	TBD	L. LeVay
Ross Sea West Antarctic Ice Sheet History	374	Wellington, New Zealand	4 January–8 March 2018	63 (5/58)	58 (16/42)	TBD	D. Kulhanek
Hikurangi Subduction Margin[6]	375	Wellington, New Zealand	8 March–5 May 2018	58 (5/53)	53 (2/51)	TBD	K. Petronotis
Brothers Arc Flux	376	Auckland, New Zealand	5 May–5 July 2018	61 (5/56)	56 (2/54)	TBD	A. Klaus
Non-IODP [5 July–14 October 2018] [101 days]							M. Malone
South Pacific Paleogene	378	Wellington, New Zealand	14 October–14 December 2018	61 (4/57)	57 (11/46)	TBD	C. Alvarez Zarikian
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)	TBD	A. Klaus

Notes: TBD = to be determined.
[1] Dates for expeditions may be adjusted pending non-IODP activities.
[2] The start date reflects the initial port call day. The vessel will sail when ready.
[3] Transit total is the estimated transit to and from port call and does not include transit between sites.
[4] Also includes Proposal 693 Ancillary Project Letter (APL), South Chamorro Seamount CORK.
[5] Complementary Project Proposal (CPP) is contingent on substantial financial contribution outside of normal IODP funding.
[6] Combined expedition with 841 APL and LWD from Proposal 781A (Expedition 375).

JRSO expeditions

Expedition 356: Indonesian Throughflow

Postexpedition activities

Two of the three attempted high-profile publications are currently in revision, and the temporary publication embargo on the Expedition 356 *Preliminary Report* is still ongoing.

Expedition 360: Southwest Indian Ridge Lower Crust and Moho

Postexpedition activities

The Expedition 360 *Preliminary Report* was completed and published in April. See "Expedition 362T: Hole U1473A remediation," below.

Expedition 361: South African Climates

Postexpedition activities

The Expedition 361 *Preliminary Report* was completed and published in May. Planning is under way for the postexpedition sample party. Some archive-half cores from the splice interval were shipped to Scripps and Lamont-Doherty Earth Observatory (LDEO) for XRF scanning.

Expedition 362T: Hole U1473A remediation

Planning

The plan to remediate Hole U1473A to remove the metal in the hole and cement unstable horizons was finalized.

Expedition 362: Sumatra Seismogenic Zone

Planning

To provide additional back-up options with the loss of sites in Indonesian waters, two additional alternate sites were developed from a data set collected in 2015 located south of the current primary and alternate sites. Final planning and acquisition for supplies required during the expedition were completed. The surface and airfreight to Cape Town, South Africa, were dispatched, as well as the limited surface freight to Colombo, Sri Lanka.

Staffing

Two science party invitations were accepted to replace scientists that withdrew. One of the two Indonesian scientists withdrew and was not replaced. One US Science Support Program (USSSP) and one ECORD Science Support & Advisory Committee (ESSAC) education officer invitations were accepted.

Clearance, permitting, and environmental assessment activities

The new alternate sites will be reviewed by Environmental Protection and Safety Panel (EPSP) and the TAMU Safety Panel in July.

Expedition 363: Western Pacific Warm Pool

Planning

Review of sample, data, and research plans commenced among the Sample Allocation Committee (SAC). Planning for heavy interstitial water sampling and other laboratory requirements was initiated. Visa requirements and preliminary travel information was distributed to the science party.

Clearance, permitting, and environmental assessment activities

The JRSO transmitted ANZIC's desire to use the observer berth for education and outreach to the State Department to communicate to the Australian government.

Expedition 366: Mariana Convergent Margin

Planning

Scientist research plans were received during the quarter. Based on initial review, the SAC initiated communication with the science party to begin coordinating research plans within specific groups.

Receipt of the research plans initiated discussion of technical support requirements, including possible integration of third-party instrumentation.

Expedition 367 and 368: South China Sea Rifted Margin

Planning

The *Scientific Prospectus* was finalized and was published in April. Initial communications with the science parties were drafted and will be circulated after the Expedition 368 Co-Chief Scientist position has been filled.

Staffing

Initial invitations were issued in mid-April, and a special call for applications was issued to fill key positions where there was inadequate response in the initial applicant pool. Scientific staffing was completed in early June. One of the Expedition 368 Co-Chief Scientists had to withdraw from the expedition. An invitation was issued at the end of the quarter to fill the position.

Clearance, permitting, and environmental assessment activities

The marine scientific research (MSR) application will be submitted to the State Department after the EPSP meeting in July when site locations are finalized.

Expedition 371: Tasman Frontier Subduction

Planning

Communication was initiated with the Co-Chief Scientists, and the pre-expedition meeting was scheduled (13–14 October 2017).

Staffing

Two lead proponents accepted invitations to sail as Co-Chief Scientists. The call for applications was issued in June with a deadline for applications of 15 August.

Clearance, permitting, and environmental assessment activities

The expedition will require clearance from Australia and New Zealand. New Zealand IODP scientists provided details regarding new research requirements for New Zealand clearance.

Expedition 369: Australia Cretaceous Climate and Tectonics

Planning

With finalization of ports, a revised operations time estimate was prepared to initiate discussion with the Co-Chief Scientists in preparation for the pre-expedition meeting scheduled in July.

Staffing

The call for applications was issued in June with a deadline for applications of 15 August.

Clearance, permitting, and environmental assessment activities

The expedition will require clearance from Australia.

Expedition 372: Creeping Gas Hydrate Slides and Hikurangi LWD

Staffing

Review of candidates for Co-Chief Scientist was initiated.

Clearance, permitting, and environmental assessment activities

The expedition will require clearance from New Zealand.

Expedition 374: Ross Sea West Antarctic Ice Sheet History

Planning

Initial discussions were initiated with proponents, ODL management, and the captain on requirements for an ice breaker and strategies for locating available ice breaker operators.

Staffing

The Science Evaluation Panel (SEP) will provide Co-Chief Scientist nominations following the June meeting. The call for applications was issued in June with a deadline for applications of 15 August.

Expedition 375: Hikurangi Subduction Margin

Planning

The shift of logging-while-drilling (LWD) to Expedition 372 will require a reassessment of the operations plan once Co-Chief Scientists have been selected.

Expedition 376: Brothers Arc Flux

Planning

Discussions were initiated concerning a method to measure borehole temperature to assess whether temperatures are low enough to wireline log the holes. Keir Becker (Rosenstiel School of Marine and Atmospheric Science, University of Miami) provided the high-temperature tool constructed for similar use during ODP Leg 193 to the JRSO, and it will be tested and assessed for potential use and/or upgrades.

Clearance, permitting, and environmental assessment activities

The expedition will require clearance from New Zealand.

Expedition 378: South Pacific Paleogene

Staffing

The SEP will provide Co-Chief Scientist nominations following the June meeting.

Clearance, permitting, and environmental assessment activities

All sites are in international waters.

Expedition 379: Amundsen Sea West Antarctic Ice Sheet History

Planning

Initial discussions were initiated with proponents on ice requirements.

Technical and analytical services

Maintenance period activities

The 2016 maintenance period began on 31 March and continued through the departure of the *JOIDES Resolution* from Cape Town on 4 July 2016 on transit to Colombo. Activities in the laboratories during the maintenance period focused on cross-training technical staff, refurbishing worn equipment, and completing programmatic projects. All technicians on board were involved in cross-training personnel among laboratories to improve coverage of laboratory facilities within our current staffing model. Among many tasks performed during the maintenance period, highlights include removing and replacing damaged floors in the splitting room, replacing the A/C unit on the radioisotope van, dismantling and refurbishing all rock saws, fabricating new rock saw enclosures, and refinishing countertops. Three major programmatic projects were undertaken: (1) migration of the Integrated Measurement System (IMS) software architecture to the Whole-Round Multisensor Logger (WRMSL) along with replacing the drive system, (2) testing the new IMS-based superconducting rock magnetometer (SRM) software on the existing cryogenic magnetometer, and (3) implementing a complete web services upgrade. With completion of the SRM software and the new WRMSL, all core loggers on the *JOIDES Resolution* except the natural gamma ray logger will have the same fundamental software architecture. Migration of IMS to WRMSL was completed, and SRM software is expected to complete testing during Expedition 362. The web services upgrade will continue during the transit to Colombo and will include systematic function testing of every instrument on the vessel.

Analytical systems

Analytical systems acquisitions and updates

As reported last quarter, the Thermo Niton XLt3 handheld energy-dispersive XRF (ED-XRF) spectrometer suffered a failure, and the JRSO decided to replace it rather than repair it. The JRSO evaluated handheld laser-induced breakdown spectrometers (LIBS) and a variety of handheld energy-dispersive XRF systems as potential replacements. The JRSO concluded that although LIBS is an exciting technique with a great potential for qualitative determination of elemental composition in geological samples, the technology is not developed sufficiently to be the "workhorse" that is needed aboard ship. The JRSO will finalize selection and acquisition of a handheld ED-XRF system next quarter.

The JRSO took delivery of the 2G Enterprises liquid helium-free SRM, and it is being set up at the Gulf Coast Repository Laboratory for testing and marriage to IODP motion and data control systems. In parallel, the JRSO is rebuilding the SRM software in order to respond to community input and paleomagnetist scientist comments during IODP expeditions, and that software should be available for use during Expedition 362 (Sumatra Seismogenic Zone). The completed hardware system is intended to be shipped to the Guam port call prior to Expedition 366.

Three Icefield MI-5 orientation tools were repaired and returned to the JRSO by the manufacturer; these will be returned to the ship and be available by Expedition 362.

Refitting of the Agilent 7890 gas chromatographs is still in process.

During the Avaatech field engineers' visit to the Gulf Coast Repository to replace the Avaatech XRF Core Scanner's detector assembly (see below for an explanation), the JRSO discussed the design of an additional XRF Core Scanner to support IODP operations. Size and efficiency issues (e.g., door opening/closing) were discussed with the Avaatech field engineers with an eye toward building the smallest and most efficient XRF cabinet possible to facilitate operations on the *JOIDES Resolution*, should that ever be desired, while not compromising operations 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.

Geology

The Geology LWG met this quarter to discuss issues arising from Expedition 359 (Maldives Monsoon and Sea Level), Expedition 360, and Expedition 361, as well as ongoing action items. External participants were Chris Charles (Scripps Institution of Oceanography), Benoit Ildefonse (Center National de la Recherche Scientifique, Universités de Montpellier), and Steffen Kutterolf (GEOMAR Helmholtz Centre for Ocean Research, Kiel).

- Scientists complained of insufficient room in the core laboratory and an inability to get behind the forward description table (no action).
- Microscopes/software
    - An additional petrographic microscope would be useful on hard rock expeditions when many petrologists are competing for microscope time; the JRSO will consider leaving an older scope on board when it next replaces one of the older Zeiss scopes.
    - Additional phase contrast capability would be useful for nannofossil work; the JRSO already plans to purchase additional phase objectives in FY17.
    - There was a complaint of polarizer orientation being out of alignment, and the JRSO requested the microscope service vendor investigate this issue during the Expedition 362T maintenance period; this will be reported on in the next quarter.
    - Software needs to be consistently installed on microscope workstations; the JRSO Information Technology (IT) section will ensure that KaleidaGraph, Microsoft Office, and the Adobe Creative Suite (if possible; possibly pending a technical issue on Mac Minis) are all installed on the microscopy computers.
    - The image capture scale bar was incorrect in a number of images; the JRSO has investigated this issue and instituted calibration procedures against a micrometer to ensure that each objective (and objective + optivar setting combination) has the appropriate scale bar. The JRSO cannot prevent human error in this process, which can arise not only from a failure to select the right objective (or objective + optivar) but also from reducing the area of the SPOT camera picture. Users will be instructed to take care (and not to use the reduced-area option on the SPOT) to collect accurate scale information.
    - The scanning electron microscope (SEM) uploader software is too cumbersome and slow; the JRSO will investigate the performance of this tool.

    - Paleontology supplies (additional 63, 150, and 250 µm sieves; slide trays for nannofossils; and metal weighing trays for foraminifers) will be purchased and included in inventory.
    - The Dinolite USB scope was available during Expedition 360 but the scientists described it as not very useful in igneous rock examination. The JRSO will leave it on board to be a potential tool for sediment describers and/or outreach officers.
- Core description
    - Scientists complained about the speed of DESClogik; the JRSO is aware of this, and we hope that the Web services and ORACLE server upgrades will address much of this issue.
    - BugWin has not been used by the scientists to date and therefore has yet to have a good tryout and evaluation; the Expedition 363 Expedition Project Manager (EPM) plans to encourage its use on that expedition.
    - Cleanup of description value lists (and adherence to the Paleontology Coordination Group Taxa Name Lists) is ongoing work that has not yet been completed.
    - Requirements and specifications of a potential DESClogik replacement are being developed for consideration for future JRSO projects.
    - The Expedition 360 scientists hoped to settle on a single structural description schema and recommend it to the JRSO; more work is needed before consensus can be reached.
    - DESClogik value list management is going to be revisited, and a system that does not rely upon Google docs (and satellite connectivity) will be developed.
    - Flashes from the close-up station in the microscope laboratory were a subject of complaint; a screen has been installed to improve the situation, and the JRSO has received no new complaints.
    - The scientists found the tool chain and especially the operation of the Correlator software to be difficult to master and want support from the technicians; the JRSO is training technicians on both crews in the tool chain and developing a detailed training manual for new correlators. Because the JRSO now contracts with the software group that writes Correlator, it now has additional control over new releases and feature changes as well.
    - The XRF Core Scanner on the *JOIDES Resolution* is tabled at the current time until the new generation of detector can be evaluated.

Geophysics

The Geophysics LWG met this quarter to discuss issues arising from Expedition 361 and ongoing action items. External participants were Donna Blackman (Institute of Geophysics and Planetary Physics, Scripps Institution of Oceanography) and Tony Morris (School of Geography, Earth and Environmental Sciences, Plymouth University).

- Superconducting rock magnetometer
    - Our plan is to evaluate the section-half module during the Expedition 362T transit and Hole U1473A remediation and to use it during Expedition 362 on the existing magnetometer if all goes well.
    - Discrete sample code is still in development, but it will be ready along with the hardware for Expedition 366 and the Guam port call.
    - The new magnetometer was received at IODP Headquarters on 9 June (6 months late); delivery for Guam port call could potentially slide into the June–July 2017 tie-up.
    - During Expedition 361, a strong overprint signal was observed on the top two sections of many Site U1476 and U1477 cores. For samples with a strong overprint, the inclination would not reverse, and this raised concern that something was wrong with the *z*-axis superconducting quantum interference device (SQUID) or that the trapped field had been lost. Fluxgate measurements showed proper function, and the root cause of the behavior was not found. The JRSO believes this was sample and overprint behavior on very weak carbonate cores but will watch for further examples.
- Spinner magnetometer
    - Scientists complained that the JR-6A spinner uploader uses the TEXT_ID, a concatenation of sample type and sample number (e.g., CUBE2434481), rather than a human-readable label (e.g., U1478A-2H-4 24/26), making it more difficult to track what sample they're working on; the JRSO will investigate if a more user-friendly approach can be used without increasing the risk of data being uploaded to the wrong sample.
    - The LWG discussed the user request that when values are very low, some warning that the error is high be given; the JR-6A software is third-party and can't be changed.
- Color reflectance

    - The new Ocean Optics Blu Loop was installed in tandem with the existing halogen light source to improve performance at the blue end of the spectrum (successful to the limit of the USB4000 model spectrometer).
    - A color reflectance workshop is scheduled for the fall to discuss the path forward for improving color measurements on the *JOIDES Resolution*. An upgrade to a Peltier-cooled detector is the current JRSO recommendation, pending endorsement or change by the workshop attendees.
- Whole-Round Multisensor Logger (WRMSL)
    - The interface board for MDrive stepper motors was updated to ensure proper emergency stop behavior.
    - A large number of improvements to the WRMSL code to make it compliant with the current IMS requirements are scheduled for the South Africa tie-up, to be tested on the Expedition 362T transit.
    - Magnetic susceptibility correction factor was discussed, and the default data uploaded to LIMS will use the Bartington-provided correction factor for the frequency-adjusted loop on an instrument unit (non-volume-corrected) basis. An additional component will be created for user-applied empirical correction factors, should they so choose.
        - The LWG briefly discussed the possibility of the frequency-adjusted loop responding differently to certain materials, but the frequency change is 20% and unlikely to cause a measurable difference.
- Underway Geophysics
    - The LWG discussed the status of repairs to the towed magnetometer level wind; parts will not reach the ship until Expedition 363 (Western Pacific Warm Pool) port call, and it is not planned to be run during Expedition 362.
- Icefield MI-5 core orientation tool
    - This tool was discussed by the LWG (summarized above).

Geochemistry

The Geochemistry LWG did not meet this quarter but did convene by email to discuss a few ongoing issues:

- As mentioned above, the LWG decided not to pursue LIBS technology at this time.

- The LWG endorsed the purchase of a new portable XRF spectrometer to replace the failed Thermo Niton XL3t device.
- The LWG recommended that the aged liquid scintillation counter in the radiation van be replaced with a modern system.
- Members of the LWG were asked to assist the EPM to respond to Expedition 361 chemistry laboratory comments:
    - Coulometer workflow issues were identified and will be addressed in the next version to make it more user-friendly and organized.
    - Phosphorous precision issues were traced to a clogged flow cell, which was replaced and the analyses run, and in future the CARY 100 will have an autosampler which should assist in reproducibility. (The autosampler was installed at the beginning of Expedition 362T in Cape Town.)
        - Additionally, a non-flow "standard" cuvette is available if scientists wish to use it, but the JRSO doesn't recommend its use because it is more tedious.
    - Complaints about chlorinity precision will be investigated; the instrument has been deemed more than adequate up to now.
    - Data reduction software for the inductively-coupled plasma—atomic emission spectrometer (ICP-AES) is being rewritten completely with guidance from the community, so complaints about that workflow will hopefully be reduced.
    - Expedition scientists want the JRSO to stock additional combustion catalyst columns for CHNS (in their case to enhance CN while sacrificing S), but the number of possible configurations is large. Assistant Lab Officers will try to determine during precruise planning whether alternate columns are needed, and they can be stocked on an as-needed basis.

Curation and Core Handling

The Curation and Core Handling LWG did not meet this quarter due to scheduling conflicts. It will meet next quarter.

Other projects and activities

Geosciences Laboratory

Subsequent to the failure of the X-ray source, the XRF Core Scanner's detector became saturated with helium and lost energy resolution to the point that Al could not be separated from Si and K could not be

separated from Ca. This helium saturation is ongoing due to the thinness of the beryllium window and the presence of He as a purge gas. It slowly degrades performance until a critical point, at which time the detector no longer functions properly.

Avaatech's next generation of detector was made available by the company, along with the existing software modified to use it. The software was installed during the quarter. Those scientists whose data were affected by the poor energy resolution will be permitted time to rescan those sections with the new detector wherever possible. The new detector is roughly three times faster than the old detector and has higher spectral resolution.

The XRF Core Scanner facility is booked through December 2016, almost entirely with postcruise, recent-expedition-related requests. Only 2 weeks out of the remaining calendar year will be scheduled to analyze legacy cores. Expeditions 356 and 359 have both original and rescanning work planned, and Expedition 361 has a number of cores that will be scanned (although they have divided their XRF scanning between Scripps and LDEO as well).

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 Coast Repository (GCR).

JRSO expedition core sampling

The JRSO planned sample and curation strategies this quarter for upcoming JRSO Expeditions 362, 363, and 366.

Gulf Coast Repository activity

Sample requests

The following table provides a summary of the 2,859 samples that were 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.

Sample request number, name, country	Number of samples taken	Number of cores XRF scanned	Number of cores imaged	Number of core sections sent	Number of core kits sent	Number of visitors
39887IODP, Liang, USA	38					
38586IODP, Zorzi, Canada	150					
39501IODP, Voigt, Germany	28					
40402IODP, Carpenter, Australia	15					
39911IODP, Remmelzwaal, UK	24					
39098IODP, Voigt, Germany	276					
40281IODP, Wycech, USA	36					

Sample request number, name, country	Number of samples taken	Number of cores XRF scanned	Number of cores imaged	Number of core sections sent	Number of core kits sent	Number of visitors
39088IODP, Grimmer, Germany	60					
41382IODP, St. John, USA	0				1	
40960IODP, Gill, USA	0				1	
40239IODP, Damste, USA	48					
39936IODP, Herbert, USA	179					
41493IODP, Petronotis, USA	46					
41847IODP, Huck, UK	81					3
41695IODP, Hatfield, USA	2					2
42051IODP, Penkrot, USA	16					1
41565IODP, Bertram, UK	120					1
41684IODP, Thomas, USA	87					
26977IODP, Yamaguchi, Japan	149					
39570IODP, Menicucci, USA	3					
41430IODP, Friedrich, Germany	146					
42618IODP, Purvis, UK	2					
42259IODP, Bohaty, UK	18					
41610IODP, Smik, UK	53					
42970IODP, Hoogakker, UK	5					
43110IODP, Bhattacharya, USA	88					
41332IODP, Liang, USA	38					
41366IODP, Ishino, Japan	12					
42499IODP, Tremblin, France	78					
42217IODP, Leandro, Brazil	158					
41951IODP, Riedel, Canada	38					
41828IODP, Kwiatkowski, USA	146					
41830IODP, Kwiatkowski, USA	218					
39906IODP, Leuthold, Switzerland	32		25			
41976IODP, Belanger, USA	194					
41724IODP, Passchier, USA	178					
41716IODP, Matsuzaki, Japan	92					
40532IODP, McKay, New Zealand	0					1
41000IODP, Cowan, USA	0					2
43338IODP, Foerster, Australia	5					
30567IODP, Kroon, UK		332				
25817IODP, Petrick, Germany		224				
23383IODP, McHugh, USA		182				
41493IODP, Petronotis, USA				56		
Tours/demonstrations	8					
Totals	**2,859**	**738**	**25**	**56**	**3**	**10**

GCR tours/visitors

Public relations tours and educational visits to the repository are shown in the following table.

Type of tour or visitor	Number of Visitors
Scientist visitors	0
Educational tours/demonstrations (8)	120
Totals	**120**

Use of core collection

The JRSO promotes outreach use of the GCR core collection by conducting tours of the repository (see the table above) and providing materials for display at meetings and museums. The repository and core collection are also used for classroom exercises.

Expedition 361 archive sections were packed and shipped to Lamont-Doherty Earth Observatory (454 sections) and Scripps Institution of Oceanography (657 sections) for XRF scanning.

Other GCR activities

The GCR hosted the Expedition 359 Sample Party from 25 April to 4 May 2016, during which 29,618 samples were taken by 22 expedition scientists. The GCR also hosted the USSSP Antarctic Workshop from 9 to 11 May with ~80 scientists. For the month of June, the GCR gave tours for 120 middle school students from the Summer Science Safari Program from Houston.

Sample uploading into LIMS of JRSO cores taken at the Kochi Core Center (KCC; Japan) continued, with 7,415 moratorium samples uploaded from Expedition 353 scientists' visit in April.

The second GCR Core Kit was improved for use by Request #041989IODP by providing a clean Micropaleontological Reference Center (MRC) diatom slide from the same core as the diatom ooze core catcher and by providing a better example of volcanic sand with a smear slide from ODP Leg 200, Site 1223.

Development, IT, and databases

The JRSO manages data supporting IODP activities, including expedition and postexpedition data, provides long-term archival access to data, and supports JRSO IT services. Daily activities include operating and maintaining shipboard and shore-based computer and network systems and monitoring and protecting JRSO network and server resources to ensure safe, reliable operations and security for IODP data and IT resources.

Expedition data

LIMS database

Data from Expedition 361 were added to the Laboratory Information Management System (LIMS) database on shore this quarter. These data are currently under moratorium and available only to the scientists who sailed on this expedition. No new data were released from moratorium during this quarter.

Expedition data requests

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

Top 10 countries accessing JRSO web databases

	Janus database		LIMS database	
Rank	Country	Visitor sessions	Country	Visitor sessions
1	USA	1,201	USA	428
2	UK	695	Japan	217
3	China	575	UK	143
4	Australia	209	Germany	134
5	Germany	207	Unknown	79
6	France	120	China	60
7	Japan	69	France	55
8	Italy	63	Australia	38
9	Netherlands	47	South Korea	36
10	Canada	43	Netherlands	35
	Others	251	Others	178
	Total	**3,480**	**Total**	**1,403**

Top 20 database web queries

	Janus database		LIMS database	
Rank	Query	Downloads	Query	Downloads
1	Images – core photos	1,755	Samples	1,295
2	Site summaries	753	Images – section images	561
3	Core summaries	581	Section summaries	513
4	Special holes	504	Images – core photos	392
5	Sample	401	Core summaries	248
6	Chemistry – IW	381	Hole summaries	247
7	XRD	271	Images – thin sections	213
8	Physical properties – GRA	266	Physical properties – MAD	196
9	Hole summaries	246	Carbonates	187
10	Chemistry – carbonates	235	Physical properties – GRA	174
11	Physical properties – MAD	181	Physical properties – MS	144

Top 20 database web queries				
12	Hole trivia	178	Chemistry – IW	135
13	Paleontology – range tables	176	Physical properties – RSC	133
14	Paleontology – age models	174	Images – close-ups	103
15	Physical properties – MSL	163	SRM sections	99
16	Site details	133	Physical properties – PWL	92
17	Paleontology – age profile	125	Physical properties – NGR	83
18	Images – prime data images	124	Images – expanded core photos	81
19	Physical properties – thermal conductivity	122	Chemistry – ICP-AES	70
20	Physical properties – PWL	116	Piece log	70
	Others	2,074	Others	1,381
	Total	**8,959**	**Total**	**6,417**

Data requests submitted to the JRSO Data Librarian			Countries submitting data requests to the JRSO Data Librarian	
Requests	**Totals**		**Country**	**Totals**
How to access or find data	13		USA	16
DESC	3		UK	8
Drilling data	3		Canada	2
Images – core photos	3		Germany	2
Images – thin sections	2		Brazil	1
XRD	2		China	1
Paleomagnetism	1		Italy	1
Physical properties	1			
Seismic	1			
Thermal conductivity	1			
XRF	1			
Total	**31**		**Total**	**31**

Network systems operation, maintenance, and security

Satellite services

The JRSO added 1 Mbps of additional downlink bandwidth, satisfying one of the 2016 JRSO Site Visit Panel recommendations. *JOIDES Resolution*'s total bandwidth is currently 1.6 Mbps down (to the ship) and 616 Kbps up (out from the ship).

Software development

Liquid Helium–Free Superconducting Rock Magnetometer Installation and Software Upgrade

Project scope and deliverables

In FY14, the JRFB and NSF approved replacement of the current shipboard liquid helium cryogenic magnetometer with a new liquid helium–free magnetometer. The magnetometer currently in use aboard

the *JOIDES Resolution* is almost 20 years old. Although it is still functioning well, the age of the system, the increasing costs of obtaining liquid helium, and the importance of magnetic measurements to IODP science were key factors in the decision to replace the current system. During this project, the JRSO will install the new helium-free magnetometer aboard the *JOIDES Resolution*, complete testing of the new system prior to Expedition 362, send the old liquid helium magnetometer to shore, and replace the software running the system.

Project status

Work continued on this project. JRSO took delivery of the new SRM on 9 June 2016, several months beyond the vendor's promised delivery date. This caused the management team to review and approve a project extension with a new completion date of 28 February 2017.

Improve Web Services

Project scope and deliverables

The goal of this project is to improve functionality and maintainability of web services for data input and output to LIMS by fixing and replacing existing web services with newer versions while implementing secure authentication for all services that use accounts and passwords (part of meeting a TAMU security requirement).

Project status

Work continued on this project, which is slightly behind schedule to complete all deliverables by July 2016.

Extending IMS to WRMSL and STMSL

Project scope and deliverables

This project replaces the current applications used on the WRMSL and Special Task Multisensor Logger (STMSL) with the current version of IMS framework application.

From the user's perspective, this application will have the look and feel of the other IMS-supported logging systems. From the developer's perspective, a large percentage of the code will be reused from the other IMS-supported logger libraries and new code will be developed in the IMS framework.

Project status

JRSO successfully completed this project on 17 June 2016.

Thin Section Form Report Follow-up

Project scope and deliverables

The goal of this project is to improve the appearance of reports generated by the Report Writer application, particularly relating to pagination, in response to repeated user requests, and improves user friendliness of the Report Builder, which should improve task efficiency and report quality for personnel defining reports and shorten the learning curve for new personnel assigned to that role.

Project status

JRSO successfully completed this project on 12 May 2016.

Other projects and activities

Tie-up activities

JRSO IT completed several activities during the first 3 months of tie-up. Some of the most significant items include replacing color printers, supporting the Improve Web Services project, expanding network storage, migrating several system services to new servers, and completing installation of the Oracle Database Appliance.

Publication services

IODP Publication Services provides publication support services for Integrated Ocean Drilling Program and IODP riserless and riser drilling expeditions; editing, production, and graphics services for required Program reports (see “Progress reporting” in “Management and administration”), technical documentation, and scientific publications as defined in the JRSO cooperative agreement with NSF; and distribution of Integrated Ocean Drilling Program, ODP, and DSDP publications.

Publications support

IODP Publication Services hosted three postcruise editorial meetings during the quarter: JRSO Expedition 359 (25–29 April), JRSO Expedition 360 (10–13 May), and ESO Expedition 357 (7–10 June). The Expedition 357 meeting was supported by the British Geological Survey.

Scientific publications

The table below lists IODP Program publications published during the quarter by digital object identifier (DOI). DOIs can be resolved at http://dx.doi.org.

Reports and publications	JRSO	USIO	CDEX	ESO
Scientific Prospectus	10.14379/iodp.sp.362.2016 10.14379/iodp.sp.366.2016 10.14379/iodp.sp.367368.2016		10.14379/iodp.sp.370.2016	
Preliminary Report	10.14379/iodp.pr.360.2016 10.14379/iodp.pr.361.2016			10.14379/iodp.pr.357.2016
Data Report		10.2204/iodp.proc.323.203.2016 10.2204/iodp.proc.344.203.2016 10.2204/iodp.proc.344.204.2016	10.2204/iodp.proc.331.201.2016 10.2204/iodp.proc.338.205.2016	

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

Citation management

Scientific publication digital object identifiers

JRSO deposits digital object identifiers for every Program publication into the CrossRef database. The following table lists the number of queries to the CrossRef database to resolve Program publications during the quarter.

		Number of online DOI resolutions			
Reports and publications	DOI prefix	April 2016	May 2016	June 2016	FY16 Q3 total
IODP	10.14379	813	740	711	2,264
Integrated Ocean Drilling Program	10.2204	6,019	5,551	7,006	18,576
ODP/DSDP	10.2973	9,271	10,018	18,674	37,963

Publications management

Integrated Ocean Drilling Program closeout activities

Publications 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, data reports, and postcruise research results related to Expeditions 322, 323, 329, 331, 333, 336, 337, 338, 339, 340, 341, 342, 344, 345, 347, 348, 349, 350, 352, and 359 were submitted to English language peer-reviewed journals or the Program.

Publications website

The IODP Publications website is hosted at TAMU. During the last quarter, the IODP Publications website received 23,755 site visits and 205,780 page views.

Other projects and activities

Ocean Drilling Citation Database interface

A redesigned web interface for the Ocean Drilling Citation Database was demonstrated 23 June 2016 during a meeting at the JRSO with Sharon Tahirkheli, Director of Information Services at the American Geosciences Institute (AGI). The database is a subset of AGI's GeoRef database and includes more than 31,000 citations related to IODP and the preceding scientific ocean drilling programs. The new interface will utilize VuFind software and will replace the Inmagic interface developed 15 years ago for the Ocean Drilling Program. Programming was about 95 percent complete at the end of the quarter. Cost of the redesign will be approximately $5,000.

Abstracts authored by JRSO staff

Program-related abstracts authored by JRSO staff published during this quarter include the following. Bold type indicates JRSO staff.

- Andò, S., Garzanti, E., and **Kulhanek, D.K.**, 2016. Raman spectroscopy: an essential tool for future IODP expeditions. *EGU General Assembly 2016*, Vienna, Austria. *Geophysical Research Abstracts*, 18:EGU2016-9628.
- Bratenkov, S., **Kulhanek, D.K.**, Clift, P.D., and George, S.C., 2016. Arabian night and sea story—biomarkers from a giant mass transport deposit. *EGU General Assembly 2016*, Vienna, Austria. *Geophysical Research Abstracts*, 18:EGU2016-3754.
- Bratenkov, S., George, S.C., Bendle, J., Liddy, H., Clift, P.D., Pandey, D.K., **Kulhanek, D.K.**, Andò, S., Tiwari, M., Khim, B.-K., Griffith, E., Steinke, S., Suzuki, K., Lee, J., Newton, K., Tripathi, S., and Expedition 355 Scientific Party, 2016. Multi-proxy geochemical analyses of Indus Submarine Fan sediments sampled by IODP Expedition 355: implications for sediment provenance and palaeoclimate reconstructions. *EGU General Assembly 2016*, Vienna, Austria. *Geophysical Research Abstracts*, 18:EGU2016-3735.
- Clift, P., Pandey, D., **Kulhanek, D.**, Andò, S., Zhou, P., and Expedition 355 Scientists, 2016. Cenozoic climate-tectonic interactions in the Western Himalaya recorded in the Indus Submarine Fan: initial results from IODP Expedition 355. *EGU General Assembly 2016*, Vienna, Austria. *Geophysical Research Abstracts*, 18:EGU2016-2421.
- Ferré, E.C., Carvallo, C., Sager, W.W., Michibayashi, K., Morgan, S., Christeson, G., **Petronotis, K.**, and Godard, M., 2016. Contrasted shallow magnetic sources in the Izu-Bonin forearc. Abstract presented at Expedition 352 Science Meeting, 10–12 May 2016, Agros, Cyprus.

- Hahn, A., Lyle, M., **Kulhanek, D.**, Andò, S., and Clift, P., 2016. High resolution variability in the Quaternary Indian monsoon inferred from records of clastic input and paleo-production recovered during IODP Expedition 355. *EGU General Assembly 2016*, Vienna, Austria. *Geophysical Research Abstracts*, 18:EGU2016-17580.

- Iwai, M., Suzuki, K., Pandey, D., Clift, P., **Kulhanek, D.**, and Expedition 355 Scientists, 2016. Initial results of IODP Expedition 355, Cenozoic Arabian Sea monsoon. Japan Geoscience Union Meeting 2016, Chiba, Japan, MIS16-P03.

- **Kulhanek, D.K.**, Su, X., Li, Q., Gregory, M., Warny, M., and Clift, P.D., 2016. Did opening of the South China Sea impact development of the Asian monsoon? Results from Oligocene microfossils, IODP Site U1435, northern South China Sea. *EGU General Assembly 2016*, Vienna, Austria. *Geophysical Research Abstracts*, 18:EGU2016-11065.

- Li, Y.-X., Zhao, X., Jovane, L., **Petronotis, K.**, Gong, Z., and Xie, S., 2016. Paleomagnetic results from IODP Expedition 344 Site U1381 and implications for the initial subduction of the Cocos Ridge. Abstract presented at EGU General Assembly, Vienna, 19 April 2016.

- **Petronotis, K.**, and Acton, G.D., 2016. Magnetic properties of sediments from IBM forearc Sites U1439 and U1440. Abstract presented at Expedition 352 Science Meeting, 10–12 May 2016, Agros, Cyprus.

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 ocean drilling citation database (http://iodp.tamu.edu/publications/citations/database.html) and the IODP Expedition-related bibliography (http://iodp.tamu.edu/publications/citations.html).

- Arculus, R.J., Ishizuka, O., **Bogus, K.**, Gurnis, M., Hickey-Vargas, R., et al., 2016. Reply to Unclear causes for subduction. *Nature Geoscience*, 9:338–339 http://dx.doi.org.10.1038/ngeo2704

- Shepherd, C.L., and **Kulhanek, D.K.**, 2016. Eocene nannofossil biostratigraphy of the mid-Waipara River section, Canterbury Basin, New Zealand. *Journal of Nannoplankton Research*, 36(1): 33–59.

Appendix: JRSO quarterly report distribution

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