International Ocean Discovery Program

JOIDES Resolution Science Operator

Texas A&M University

FY18 Annual Program Plan to NSF

for the time period

1 October 2017–30 September 2018

Amount proposed FY18: $66,772,544

Respectively submitted to:
National Science Foundation

JOIDES Resolution
Science Operator

_____

Brad Clement
Director, *JOIDES Resolution* Science Operator
College Station, TX

30 June 2017

Contents

1. Executive summary

1.1. Introduction

Texas A&M University (TAMU) acts as manager and science operator of the research vessel (R/V) *JOIDES Resolution* as a research facility for the International Ocean Discovery Program (IODP). Administrative services in support of *JOIDES Resolution* Science Operator (JRSO) activities are provided by the Texas A&M Research Foundation (TAMRF) through TAMU Sponsored Research Services (SRS).

1.2. Annual Program Plan overview

The complex nature of IODP operations requires Annual Program Plans spanning operational years to establish priorities and allow the procurement of long–lead time equipment and services. The IODP JRSO FY18 Annual Program Plan to the National Science Foundation (NSF) defines the JRSO scope of work for FY18 IODP activities and deliverables that are specifically covered under NSF Cooperative Agreement OCE-1326927. This Annual Program Plan is based on (1) the current mission forecast provided for the JRSO by NSF and (2) the JRSO operations schedule approved by the *JOIDES Resolution* Facility Board (JRFB) in May 2017. The scope and budget justification of the activities described in the Annual Program Plan were derived from NSF guidance to the JRSO.

The IODP JRSO FY18 Annual Program Plan includes a discussion of the goals of the JRSO, responsibilities and deliverables, the operational schedule, descriptions of expeditions, and the JRSO organizational structure for science operations and platform operations activities. This section (Section 1) provides budget definitions, assumptions, and directives used to construct the Annual Program Plans. Section 2 describes scheduled FY18 expedition operations; Section 3 describes the organizational structure, provides a personnel summary, and addresses Management and Administration tasks; Section 4 provides an overview of subcontracts; and Sections 5 through 9 address JRSO tasks and budgets by department. Section 10 provides a summary of costs by expense category, a cumulative budget request detail by department, a detailed budget justification, and a table showing cost savings should any of the planned expeditions be canceled.

“Appendix I: JRSO IT security summary” provides information requested by NSF regarding information technology (IT) security policies, procedures, and practices employed by the JRSO to protect contractual research and education activities. “Appendix II: recommended IODP JRSO program of insurance” provides information on risk management services provided to the JRSO, including insurance policy monitoring, ongoing risk assessments, marine insurance negotiations, and claims settlement.

1.3. Summary of FY18 scope of work

As science operator of the *JOIDES Resolution* research facility, the JRSO will provide wireline coring and logging services, as well as technical, science, engineering, and IT support; curate core materials; develop data applications and manage digital databases; and publish pre-expedition and postexpedition reports and results. All of these Program activities will be conducted in accordance with direction provided by the Program's advisory panels and the JRFB and as outlined in approved Annual Program Plans.

The scope of activities associated with initial planning and preparation of IODP expeditions is similar to early Integrated Ocean Drilling Program activities in terms of deliverables, challenges, and risks. The JRSO will carry out postexpedition activities related to IODP expeditions and ongoing operational tasks (e.g., complete reports and technical documentation), complete legacy work (e.g., produce scientific publications), conduct long–lead time planning in preparation for expeditions scheduled for future fiscal years, and provide all necessary environmental assessments for IODP expeditions conducted by the JRSO.

On behalf of the JRSO and as outlined in this Annual Program Plan, TAMRF has contracted with Overseas Drilling Limited (ODL) for the services of the *JOIDES Resolution* and with Schlumberger Technology Corporation (Schlumberger) for the provision of downhole logging equipment and engineering support.

1.4. FY18 budget development

1.4.1. NSF guidance

NSF provided guidance to the JRSO that outlined the FY18 mission forecast for the JRSO. The original mission forecast from NSF included guidance to conduct five expeditions in FY18 and a budget upper limit of $64,000,000. This Annual Program Plan reflects the NSF guidance to conduct five expeditions and their associated costs.

1.4.2. FY18 budget assumptions

The total budget request of $66,772,544 includes costs to support JRSO facility operations; science operations at sea and all costs in support of these operations such as planning, logistics, engineering science support, and so forth; core curation tasks at the Gulf Coast Repository (GCR); publications tasks; shore-based data management tasks; and other costs in support of maintaining US capability for continued scientific ocean drilling by IODP.

Assumptions about the operations schedule are outlined in the "Expedition operations" section (Section 2). The JRSO has provided a best-effort estimate of FY18 costs in this plan. If additional funds are identified or expected costs can be avoided during the fiscal year, the JRSO may, upon consultation with

NSF, use them to purchase data management system equipment, drilling or science supplies, or high-priority capital replacement items in support of JRSO deliverables.

Fuel price volatility is a major risk factor for completion of the scheduled operations. Assumptions were made using the best available data to determine a prudent estimate for FY18 fuel costs; however, market conditions are subject to fluctuations that may result in a need for supplemental funding during the period of operations.

1.4.3. FY18 budget request

The FY18 JRSO budget summary below shows the overall budget request by department. The line-item total requested for each department includes only direct costs. Subcontracts to ODL and Schlumberger are budgeted in Management and Administration. Cumulative JRSO costs are separated into total direct costs and indirect costs that add up to the "grand total" budget.

Department	Cost
Management and Administration	45,405,697
Science Operations	8,502,111
Technical and Analytical Services	4,625,940
Development, IT, and Databases	1,754,617
Publication Services	1,475,225
JRSO total direct costs	**$61,763,590**
JRSO modified total direct costs	19,265,202
JRSO indirect costs	5,008,954
Grand total JRSO FY18 budget request	**$66,772,544**

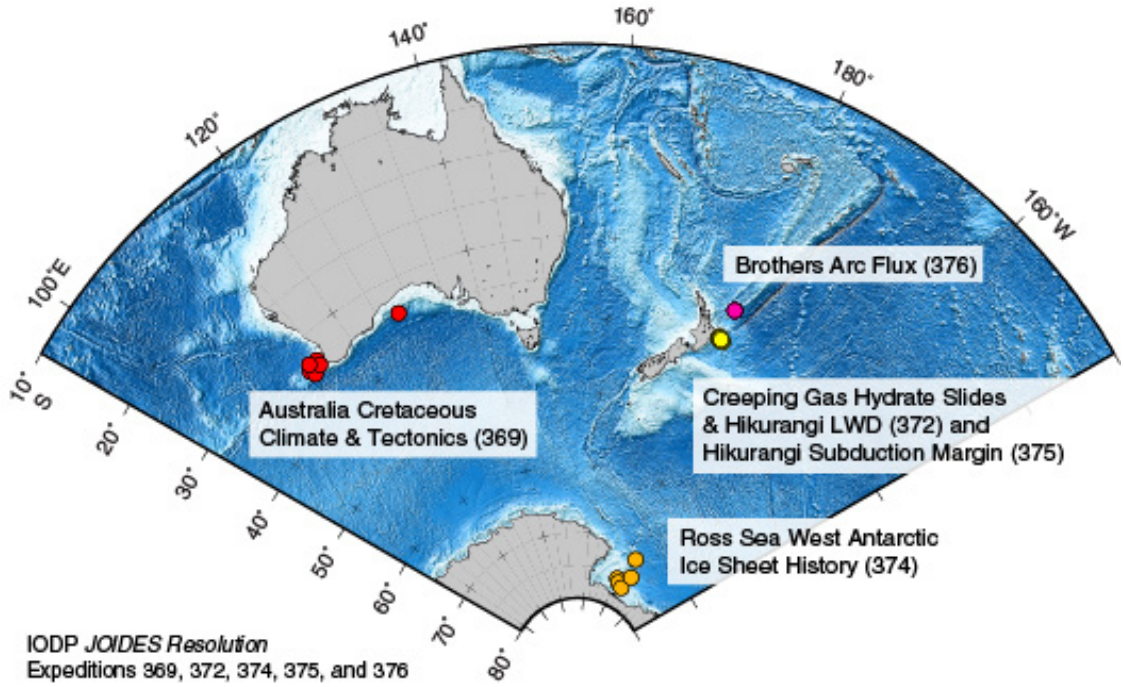
2. Expedition operations

2.1. FY18 operations schedule

This Annual Program Plan is based on the following operations schedule published 1 August 2016, including a tie-up period.

26 September–26 November 2017	Expedition 369: Australia Cretaceous Climate and Tectonics
26 November 2017–4 January 2018	Expedition 372: Creeping Gas Hydrate Slides and Hikurangi LWD
4 January–8 March 2018	Expedition 374: Ross Sea West Antarctic Ice Sheet History
8 March–5 May 2018	Expedition 375: Hikurangi Subduction Margin
5 May–5 July 2018	Expedition 376: Brothers Arc Flux
5 July–14 October 2018	Tie-up period

2.2. FY18 site map



2.3. Expedition overview

2.3.1. Expedition 369: Australia Cretaceous Climate and Tectonics

Proposed operations

The Australia Cretaceous Climate and Tectonics Expedition (based on IODP Proposal 760 Full and 897 Ancillary Project Letter [APL]) aims to understand the paleoceanography and tectonics of the Naturaliste Plateau (NP) and Mentelle Basin (MB) off southwest Australia. Core and log data from a series of sites in water depths between 850 and 3900 m will investigate (1) the rise and collapse of the Cretaceous hothouse; (2) controls on oceanic anoxic events during major carbon cycle perturbations; (3) Cretaceous paleoceanography including deep and intermediate water circulation; (4) Cenozoic to recent paleoceanography, including the influence of the Tasman gateway opening and Indonesian gateway restriction; and (5) the tectonic, volcanic, and depositional history of the NP and MB prior to the Gondwana breakup, as well as after separation from India and subsequently Antarctica.

Logistics

Operations for Expedition 369 are budgeted based on an estimated 61 days (5 in port, 7 in transit, and 49 in operations).

2.3.2. Expedition 372: Creeping Gas Hydrate Slides and Hikurangi LWD

Proposed operations

Expedition 372 has two primary objectives: (1) to investigate the relationship between gas hydrate and underwater landslides (IODP proposals 841-APL2 and 841-Add) and (2) to characterize sediment and fault zone structures and physical properties associated with recurring shallow slow slip events (SSEs) along the Hikurangi subduction interface (IODP proposals 781A-Full and 781A-Add).

Submarine slides are thought to occur as catastrophic events, and as such pose a significant geohazard, potentially causing tsunamis and damaging seafloor installations. Dissociation of gas hydrate has been proposed as a driver of seafloor destabilization but there is evidence that gas hydrate itself may lead to seafloor weakening through creeping seafloor deformation. We will test the hypothesis that interstitial gas hydrate may exhibit viscous behavior leading to slow deformation as observed in terrestrial rock glaciers. Alternatively, permeability reduction from gas hydrates may lead to overpressure, hydrofracturing, and seafloor weakening. To elucidate how gas hydrates promote creeping behavior, we will collect logging-while-drilling (LWD) data at three sites, as well as advanced piston corer (APC) cores, pressurized cores, and penetrometer data at one of the LWD sites.

SSEs along the Hikurangi margin provide the opportunity to investigate the physical processes and in situ conditions that govern the spectrum of fault slip modes through a combination of LWD, coring, and continuous monitoring. During Expedition 372, we will acquire LWD data at a series of sites that will be cored and instrumented during the subsequent Expedition 375: IODP Hikurangi Subduction Margin.

Logistics

Operations for Expedition 372 are budgeted based on an estimated 39 days (5 in port, 15 in transit, and 19 in operations).

2.3.3. Expedition 374: Ross Sea West Antarctic Ice Sheet History

Proposed operations

The Ross Sea West Antarctic Ice Sheet (WAIS) History expedition (based on IODP Proposals 751 Full2, 751 Add, and 751 Add2) will investigate the relationship between climatic/oceanic change and WAIS evolution through the Neogene and Quaternary. Numerical models indicate that this region is highly sensitive to changes in ocean heat flux and sea level, making it a key target to understand past ice sheet variability under a range of climatic forcings. The proposed drilling program is designed to optimize data-model integration for improved understanding of Antarctic Ice Sheet mass balance during climates warmer than the present. Core and log data from a transect of six sites from the outer continental shelf to rise in the eastern Ross Sea will be used to (1) evaluate WAIS contribution to far-field ice volume and sea level estimates, (2) reconstruct ice proximal atmospheric and oceanic temperatures to

identify periods of past polar amplification and assess forcings/feedbacks, (3) assess the role of oceanic forcing (e.g., sea level and temperature) on WAIS instability, (4) document WAIS sensitivity to Earth's orbital configuration under varying climate boundary conditions, and (5) reconstruct eastern Ross Sea bathymetry to examine relationships among seafloor geometry, ice sheet instability, and global climate.

Logistics

Operations for Expedition 374 are each budgeted based on an estimated 63 days (5 in port, 16 in transit, and 42 in operations).

2.3.4. Expedition 375: Tasman Frontier Subduction Initiation and Paleogene Climate

Proposed operations

Expedition 375 will investigate SSE along the northern Hikurangi subduction margin (IODP proposals 781A-Full and 781A-Add). Hikurangi SSEs recur approximately every 2 years, so we can monitor changes in deformation rate and associated chemical and physical properties surrounding the SSE source area throughout an entire slow slip cycle. Sampling material from the sedimentary section and oceanic basement of the subducting plate and from primary active thrusts in the outer accretionary wedge, in combination with LWD data, will reveal the rock properties, composition, and lithologic and structural character of the active faults involved in the SSE, as well as material that is transported downdip to the SSE source region. Coring and downhole measurements from four sites will be integrated with the LWD data collected during Expedition 372. In addition, borehole observatories will be installed at the thrust fault site and a site in the upper plate to monitor hydrologic, chemical, and physical processes during the SSE cycle.

Logistics

Operations for Expedition 375 are budgeted based on an estimated 58 days (3 in port, 2 in transit, and 51 in operations).

2.3.5. Expedition 376: Brothers Arc Flux

Proposed operations

Expedition 376 will investigate the fundamental interrelated processes governing subseafloor hydrothermal activity at Brothers Volcano, southern Kermadec arc (IODP proposal 818-Full2). The primary objectives are to (1) characterize the subsurface, magma-derived volatile phase for testing models predicting the existence of either a single-phase gas or a two-phase brine-vapor; (2) explore the distribution of base and precious metals and metalloids at depth, as well as the reactions that took place during their precipitation along fluid migration pathways to the seafloor; (3) quantify the mechanisms and extent of fluid-rock interaction and what this implies for the mass flux of metals and metalloids to

the ocean, as well as the role of magma-derived carbon and sulfur species in acting as agents for those fluxes; and (4) assess the diversity, extent, and metabolic pathways of microbial life in an extreme, acidic, and metal-toxic (sub)volcanic environment.

The ultimate scientific goal of Expedition 376 is to discover the key processes that distinguish submarine arc-hosted hydrothermal systems from those linked to spreading centers, which result from the flux of magmatic fluid commonly being much higher in volcanic arcs. As a consequence of their shallow water depths and high volatile contents, the magmatic-hydrothermal arc signature gives rise to different fluid compositions, and thus mineralization, compared to submarine extensional settings. This process likely also has consequences for the associated biota. Additionally, given the very acidic fluids and high metal concentrations, submarine arc hydrothermal systems are thought to be important analogs to porphyry copper, epithermal gold, and various volcanic rock–hosted massive sulfide deposits mined on land. Drilling Brothers Volcano will provide essential information for understanding the formation of those mineral deposits and will also reconstruct the volcanic stratigraphy of this arc volcano.

Operations will focus on discharge zones of geochemically distinct fluids in and around the caldera of Brothers Volcano by drilling and logging hundreds of meters. The drill sites show variable impact of magmatic volatiles, which will enable the expedition to directly study the implications of magma degassing for the transport of metals to the seafloor and how this affects the functioning of microbial life.

Logistics

Operations for Expedition 376 are budgeted based on an estimated 61 days (5 in port, 2 in transit, and 54 in operations).

2.4. Expedition outreach

Berths will be made available for Onboard Education Officers during each expedition, and JRSO personnel will facilitate the activities of teachers at sea, give port call tours, and work with the US Science Support Program, the IODP Science Office, the IODP Forum, and the TAMU College of Geosciences on diversity and education issues and to further advance the Program through outreach.

3. Management and administration

3.1. Organizational structure

The JRSO's existing organizational structure directly reflects the responsibilities specified by NSF for the technical and scientific management, administration, and operation of the *JOIDES Resolution,* including planning, coordinating, overseeing, reviewing, and reporting activities. The TAMU portion of the

organization consists of four departments: Science Operations (SciOps); Technical and Analytical Services (TAS); Development, Information Technology, and Databases (DITD); and Publication Services (Pubs). Managers of these departments report to the JRSO Director, who is responsible for the Program's overall management and performance. The Human Resources group resides within the Director's Office.

On-site administrative staff members dedicated to JRSO support are overseen by a General Manager who reports to the Executive Director of TAMU SRS. This separate reporting chain ensures that the administrative unit retains the independence to ensure regulatory compliance while working directly with the JRSO staff to efficiently implement the Program. The Director's Office and the Administrative Services group combined comprise the Management and Administration portion of this Annual Program Plan.

On behalf of the JRSO, and as outlined in this Annual Program Plan, TAMRF has contracted with ODL for the services of the *JOIDES Resolution* for use as the JRSO riserless drilling vessel and with Schlumberger for the provision of wireline logging equipment and engineering support.

3.2. Personnel summary

The personnel summary table below presents an accounting of the cumulative estimated effort within the departments to which positions are assigned. The table reflects actual senior personnel and departmental staffing as of 18 April 2017 plus projected staffing for FY18. Staffing levels may change annually due to unanticipated changes in the operations schedule and/or scope of work. The table does not show student workers or the dedicated Administrative Services, IT, and application developer positions that are supported through indirect costs.

3.2.1. FY18 personnel summary

Department/ senior personnel	Position titles	Personnel (#)
Management and Administration		**9**
Brad Clement	Director of Science Services	1
	Administrative Assistant	1
	Curator	1
	Superintendent of Gulf Coast Repository	1
	Curatorial Specialists	3
	XRF Technician	1
Michele Lacey	General Manager, JSRO Administrative Services	1
Science Operations		**27**
Mitch Malone	Manager of Science Operations and Assistant Director of Science Services	1
	Business Coordinator	1
	Supervisor of Engineering and Logistics Support	1
	Staff Engineers	2

Department/ senior personnel	Position titles	Personnel (#)
	Designers	3
	Staff Researcher	1
	Marine Logistics Coordinator	2
	Shipping and Receiving Coordinator	1
	Materials Technician	1
	Supervisor of Operations	1
	Operations Superintendent	1
	Operations Engineer	1
	Materials Specialist	1
	Supervisor of Science Support	1
	Staff Scientists	9
Technical and Analytical Services		**34**
Jay Miller	Manager of Technical and Analytical Services	1
	Business Coordinator	1
	Supervisor of Analytical Systems	1
	Imaging Specialists	2
	Supervisor of Technical Support	1
	Laboratory Officers	2
	Assistant Laboratory Officers	4
	Marine Laboratory Specialists (Research Assistant/Research Specialist)	18
	Marine Instrumentation Specialists	4
Development, IT, and Databases		**4**
Jim Rosser	Manager of Development, IT, and Databases	1
	Supervisor of Databases/Archives	1
	Senior Software Applications Developer	1
	Data Analysts	1
Publication Services		**18**
Lorri Peters	Manager of Publication Services	1
	Publications Coordinator	1
	Supervisor of Editing	1
	Editors	4
	Supervisor of Production and Graphics	1
	Production Editors	4
	Distribution Specialist	1
	Graphics Specialists	5
Total FY18 JRSO personnel		**92**

3.3. Management and Administration goals

Management and Administration goals include planning, coordinating with other IODP-related entities, overseeing, reviewing, and reporting on IODP activities.

3.4. Management and Administration deliverables in FY18

- Program planning: develop and ensure implementation of Annual Program Plans.
- Progress reporting: provide content for and submit quarterly and annual reporting deliverables, including financial reports.
- Reporting and liaison activities: report to and liaise with funding agencies and with IODP-related agencies (e.g., the JRFB, JRFB advisory panels, Program Member Offices [PMOs], and other national organizations and facility boards). Act as a liaison to IODP advisory and other panels, task forces, and workshops as appropriate.
- Project portfolio management: manage large cross-departmental tasks and projects through teams using a formal project portfolio management approach to identify, categorize, review, evaluate, select, and prioritize proposed projects.
- Compliance support: ensure compliance with university, state, and US federal statutes and rules governing research, including US export control regulations for all materials shipped to the *JOIDES Resolution*, including third-party instruments, and all scientific personnel sailing during a JRSO expedition.
- Contract services: provide contract services for IODP-related activities, including negotiation, management, and contractual oversight of subcontracts.
- Other administrative services: manage payroll, travel, invoicing, financial and subcontract reporting, equipment inventory, and risk management services for the Program.
- Human resources management: assist with management and supervision of JRSO staff to ensure adherence to TAMU's policies and procedures for maintaining a well-trained and productive workforce and safe work environment.
- Legacy documentation: routinely archive electronic copies of documents and reports produced by the JRSO on behalf of IODP.

3.5. Facility assessment and NSF guidance

On 3 April 2017, NSF provided the following guidance (items A–H) to the JRSO resulting from the JRSO Site Visit Panel Report. The JRSO's response follows each item.

A. Take steps to capitalize on engineering advances and the regional emphasis of operations to publicize globally the ambition and scale of *JOIDES Resolution* activities and the scientific missions they underpin.

- The JRSO will work with NSF and the JRFB to determine the best mechanisms to publicize better recent engineering advances and the significant impacts of regional planning on addressing key science plan questions.

B. Implement additional steps during expedition planning to ensure that key stakeholders (e.g., proposal proponents and Co-Chief Scientists) are made aware of the limitations, risks, and contingencies that impact all aspects of the facility, including logging and specialty tools.

- Co-Chief Scientists are confronted with an immense amount of information during the expedition planning process. Based on feedback from this year's assessment, the JRSO will re-examine how we provide key information and work to communicate more effectively the risks, limitations, and contingencies in the operational planning for all aspects of the expedition.

C. Implement, in conjunction with the JRFB, mechanisms for assessing the readiness of tools and other engineering innovations and, when proven ready, schedule their testing at sea with minimal impact on science.

- The JRSO will work with the JRFB to schedule at-sea testing of tools under development to determine their readiness for routine deployment.

D. Continue to pursue long-term archiving to include digital documents and other types of relevant products for the geosciences community, ensuring that figures and illustrations are preserved in the highest definition possible. Advertise Publication Services efforts widely and inform researchers of the new tools available and of their capabilities to facilitate research and increase its impact.

- The JRSO is actively pursuing long-term archiving options for digital program materials. We will also work to publicize our new tools for authors and researchers.

E. Develop a long-term plan for continuing to accommodate core in the GCR within the existing building footprint. These plans should include adequate space in the GCR for use during sampling parties and effective mechanisms for consistent training and supervision of student workers.

- The JRSO is committed to making the most efficient use of the GCR storage space and will work to use the available space in the most efficient way possible.

F. Assess the need for additional laboratory core instrumentation in the GCR in order to limit potentially damaging shipment of cores for whole-core analyses.

- The JRSO has initiated the X-ray fluorescence (XRF) scanning facility as an effort to minimize risks associated with core shipment and will examine other possible instrumentation as feasible.

G. Hold regular meetings of the PMOs to address ongoing concerns related to *JOIDES Resolution* Science Party staffing.

- The JRSO will assist with this effort and plans to have the Supervisor of Science Support (who oversees the staffing process) attend the annual PMO meeting.

H. Establish a structure that allows the JRSO to effectively facilitate an Education and Outreach (E&O) program.

- The JRSO will work with the "appropriate body" (as referred to by NSF) to facilitate an effective E&O program for IODP.

4. Subcontractors

4.1. Introduction

The Administrative Services department manages subcontracts by implementing established policies and procedures that ensure compliance with the applicable laws, regulations, provisions, and obligations of the NSF cooperative agreement with the JRSO. Establishment of subcontracts involves development of a detailed scope of work that outlines the operational responsibilities of the subcontractor, a review of the subcontractors' policies and agreements to ensure that applicable flow-down regulations are incorporated into any subagreements (e.g., shipboard catering), and monitoring of the subcontractors' adherence to the established scope of work through direct supervision, periodic meetings, and review of progress reports. Administrative Services staff review subcontractor invoices prior to payment and conduct periodic audits of the subcontractors' financial records to ensure financial compliance with cost allowability and other contractual requirements.

4.2. Overseas Drilling Limited

ODL is responsible for safely conducting drilling and coring operations to meet the scientific goals outlined in the Annual Program Plan. This responsibility includes providing the marine crew, the drilling crew, and complete logistical requirements (i.e., ship supplies, drilling supplies, spare parts, and port call–related activities) in accordance with the approved Operations Plan. The JRSO Operations Superintendent monitors ODL adherence to their scope of work on board the *JOIDES Resolution*. In addition, JRSO Science Operations staff review the required daily operations report that details logistical, scientific, and operational data. Expedition planning and crossover meetings held with ODL also ensure that the subcontractor adheres to the scope of work and scientific objectives. Review of ODL policies and agreements related to catering, travel, and purchasing ensure that applicable flow-down regulations are incorporated. Thorough review of invoices submitted prior to payment and periodic audit of ODL financial records ensure financial compliance with cost allowability and other contractual requirements.

4.3. Schlumberger Technology Corporation

Schlumberger provides services associated with the design, installation, and operation of logging infrastructure on board the *JOIDES Resolution* to meet the scientific goals outlined in the Annual Program Plan. Two logging technicians sail on a rotating basis, interfacing directly with JRSO staff throughout the expedition and assisting with logging projects on shore. This integration embeds the logging operations into the Science Operations department's approach to planning, ensuring the Program's goals are met in accordance with the approved operations plan and subcontract agreement. Detailed review of invoices submitted prior to payment ensures financial compliance.

5. Science Operations

5.1. Science Operations goals

The SciOps department provides scientific, operational, engineering, and logistical planning and implementation for *JOIDES Resolution* drilling expeditions in response to the IODP science planning structure. SciOps goals include leading the scoping, planning, and implementation of science expeditions; interacting with and providing oversight to the drilling and logging subcontractors; conducting long-range operational planning for out-year JRSO expeditions; and utilizing IODP resources to oversee engineering development projects.

5.2. SciOps deliverables in FY18

- Drilling proposal evaluation: scope proposals and conduct risk assessment for proposed expeditions.
- Risk management: engage a panel of experts (the TAMU Safety Panel) to participate in site reviews with the Environmental Protection and Safety Panel (EPSP) to provide independent recommendations to the JRSO on drilling safety and environmental protection.
- Expedition planning and implementation: provide scientific, engineering, operational, and logistical planning and execution for each scheduled expedition; interact with and provide oversight to the drilling subcontractor (ODL) and wireline logging subcontractor (Schlumberger); manage rig instrumentation; perform/oversee drilling, logging, and coring operations; plan and implement large projects; and conduct long-range operational, engineering, and science planning for out-year expeditions.
- Expedition staffing: provide selection and support for scientific staffing and Co-Chief Scientist selection for each scheduled JRSO expedition.
- Logistics support: provide for expedition and shore-based activities, including procurement, shipping, and inventory of equipment and supplies.

- Clearance/Environmental assessment: obtain permits and clearances to drill in US waters and the Exclusive Economic Zones (EEZs), Extended Continental Shelves (ECSs), and territorial waters of potentially any coastal country; provide for environmental assessment services for protected species permitting associated with seismic operations; and ensure environmental protection and safety.
- Engineering support: provide engineering support for maintaining and developing shipboard and shore-based drilling, coring, logging, and downhole systems, including third-party developments and long–lead time borehole installation projects, for each scheduled JRSO expedition.
- Scientific leadership: provide scientific leadership within the JRSO for expeditions, projects, and Laboratory Working Groups and provide scientific leadership on board the *JOIDES Resolution* during expeditions.
- Progress reporting: provide expedition-related reports and content for expedition publications (e.g., *Scientific Prospectus, Preliminary Report,* etc.). Provide content for shipboard and shore-based reporting deliverables (e.g., daily and weekly ship reports, site summaries, and JRSO quarterly and annual reports).
- Liaison activities: act as a liaison to IODP advisory and other panels, task forces, and workshops as appropriate.
- Education/Outreach support: facilitate activities of teachers at sea, give port call tours, and participate in efforts to further advance the Program through outreach.
- Legacy documentation: routinely archive electronic copies of documents and reports produced by the JRSO on behalf of IODP, including expedition science and operations reports.

6. Technical and Analytical Services

6.1. Technical and Analytical Services goals

The TAS department's major responsibilities are to facilitate core flow and oversee laboratories. TAS stocks, maintains, upgrades, and staffs the shipboard and shore-based laboratories and instrumentation. TAS goals include managing the complex supply chain for stocking the shipboard laboratories; operating scientific measurement equipment and providing support to shipboard scientists in fulfilling their responsibilities and expectations; providing a supervisory and reporting structure for seagoing JRSO personnel; educating customers regarding laboratory-specific and general shipboard safety requirements; maintenance, repair, and development of scientific equipment and laboratories while at sea to enable expedition staff to meet scientific objectives; providing support for downhole tools and

measurements; working to ensure proper quality assurance/quality control (QA/QC) of measurements made in the shipboard laboratories; and support of shore-based laboratories.

6.2. TAS deliverables in FY18

- Analytical systems: support and maintain shipboard and shore-based analytical facilities, tools, instruments, and associated QA/QC protocols.
- Laboratory working groups: provide oversight, research direction, and advice on corrective actions and potential developments for laboratories and QA for the methods, procedures, and analytical systems both on the *JOIDES Resolution* and on shore through regular review of expedition evaluations, expedition technical reports, issues management communications, and interactions with members of the science community.
- Shipboard laboratory support: ensure shipboard laboratory safety, handle core, oversee and assist in shipboard analytical measurements, manage and troubleshoot issues in the shipboard laboratories, ensure effective capture and transfer of expedition to database systems, manage supply chain for shipboard consumables, and support Science Parties in achieving scientific objectives.
- Scientific leadership: provide scientific leadership within the JRSO for project management and in LWGs.
- Progress reporting: provide content for reporting deliverables (e.g., JRSO quarterly and annual reports).
- Liaison activities: act as a liaison to IODP advisory and other panels, task forces, and workshops as appropriate. Participate in annual IODP curatorial staff meeting.
- Education/outreach support: facilitate activities of teachers at sea, give port call tours, and participate in efforts to further advance the Program through outreach.
- Legacy documentation: routinely archive electronic copies of documents and reports produced by the JRSO on behalf of IODP.

7. Development, IT, and Databases

7.1. Development, IT, and Databases goals

The DITD department oversees JRSO data collection/storage, management, and archiving; maintains IT infrastructure on ship and shore; develops and maintains instrument-specific software for data acquisition; and manages the Programs' extensive databases.

DITD goals include managing data supporting IODP activities, managing expedition and postexpedition data, providing long-term archival access to data, and supporting IT services.

7.2. DITD deliverables in FY18

- Expedition data services: maintain and manage databases supporting expedition planning and data collected during expeditions, operate and maintain data management and harvesting systems (including QA/QC for storage and archival of expedition and postexpedition data, including core and sample tracking), ensure data integrity, respond to data requests from the scientific community, and plan data handling for special/third-party science equipment.
- Program-wide data query services: provide JRSO customers with access to expedition databases and data using web-based application services.
- Operation and maintenance: operate and maintain computer and network systems both on ship and shore; maintain IT infrastructure, including satellite communications, personal computers, and network instrumentation hosts; and maintain congruency between ship and shore system architectures.
- IT service support: provide help desk services and support IT needs of visiting scientists.
- Security services: monitor and protect JRSO network and server resources to ensure safe, reliable operation and security for IODP data and IT resources.
- Software development: provide software development services as needed, maintain software, and provide training support for shipboard scientists as necessary.
- Project Portfolio Management: administer the JRSO project portfolio management program.
- Reporting: provide content for reporting deliverables (e.g., JRSO quarterly and annual reports). Act as a liaison to IODP advisory and other panels, task forces, and workshops as appropriate.
- Expedition outreach: facilitate activities of teachers at sea and enable ship-to-shore videoconferencing with classrooms, museums, and meetings.
- Legacy documentation: routinely archive electronic copies of documents and reports produced by the JRSO on behalf of IODP, including documentation of all IT architecture and corresponding services configurations.

8. Core Curation

8.1. Core Curation

The Core Curation unit's major responsibilities are to curate, archive, and manage cores and samples collected by the Program. Core curation goals include providing services in support of IODP core sampling and curation of the core collection archived at the GCR. Curation will also provide support of the XRF core scanning facility at the GCR to provide scanning as Program measurements.

8.2. Core Curation deliverables in FY18

- Sampling and curation policy and procedures: work with other IODP facilities and the IODP advisory panel to review and revise the IODP Sample, Data, and Obligations Policy, as needed, and implement a policy for IODP core curation. Work closely with staff to coordinate, standardize, and document curatorial procedures for IODP cores and samples.
- Sample and curation strategies: plan sample and curation strategies for upcoming JRSO expeditions and review all shipboard and moratorium-related requests in coordination with the other members of the Sample Allocation Committee for each expedition.
- Core sampling: provide curator specialist on board the *JOIDES Resolution* to supervise core sampling during ship operations.
- Core curation and sample requests: conduct all responsibilities associated with curation of core collections at the GCR and provide services in support of core sampling, analysis, and education; fulfill postmoratorium sample requests from the scientific community; analyze geological core in shore-based laboratories; and provide technical expertise in interactions with the Kochi Core Center (KCC) and Bremen Core Repository (BCR) in support of sampling and curation of core material obtained from NSF-funded scientific ocean drilling and housed at the KCC and BCR.
- Use of core collection: promote outreach use of the core collection in collaboration with implementing organization (IO) education/outreach personnel and other science partners by providing materials for display at meetings or museums, conducting tours, and supporting other JRSO outreach activities.
- Onshore XRF scanning: install the new XRF scanner and develop procedures/methods for conducting XRF scanning as an expedition measurement.
- Progress reporting: provide content for reporting deliverables (e.g., JRSO quarterly and annual reports).

- Legacy documentation: routinely archive electronic copies of documents and reports produced by the JRSO on behalf of IODP.

9. Publication Services

9.1. Publication Services goals

The Pubs department is responsible for producing IODP scientific publications, from pre-expedition planning documents (i.e., *Scientific Prospectuses*) to postexpedition *Proceedings* volumes and scientific results, along with technical documentation and Program reporting deliverables. Integrated presentation of IODP Program publications are managed through a combination of NSF funding and IO contracts for expeditions taking place from FY15 forward.

Pubs goals include providing publications support services for JRSO drilling expeditions and editing, production, and graphics services for all required reports and scientific publications as defined in the JRSO cooperative agreement with NSF. IODP publications for FY18 will include quarterly and annual reports for the JRSO; a *Scientific Prospectus, Preliminary Report,* and *Proceedings of the International Ocean Discovery Program* volume for each JRSO and Center for Deep Earth Exploration (CDEX) expedition; and *Proceedings of the Integrated Ocean Drilling Program* volumes for USIO, CDEX, and European Consortium for Ocean Research Drilling (ECORD) Science Operator (ESO) expeditions that concluded by the end of FY14.

9.2. Publications deliverables in FY18

- Shipboard publications support: provide a Publications Specialist for publications support and report coordination during each FY18 JRSO expedition.
- Postexpedition editorial meetings: provide editorial, graphics, and production support during 4 JRSO and 1 CDEX postexpedition editorial meetings.
- IODP scientific publishing: produce scientific and expedition reports, including approximately 10 JRSO and 2 CDEX scientific reports (*Scientific Prospectuses* and *Preliminary Reports*) and expedition reports from 9 JRSO and 2 CDEX expeditions that will either be published or in production during FY18 and postexpedition data reports and synthesis papers from 10 Integrated Ocean Drilling Program expeditions and 14 IODP expeditions.
- Publications management: manage peer-review process for Integrated Ocean Drilling Program and JRSO *Proceedings* volumes (~40 data reports or synthesis papers) and provide centralized recordkeeping of IODP postexpedition research submissions.

- Bibliography and citation management: manage postexpedition publication citations, maintain cumulative Program and expedition-related bibliographies, prepare annual report of Program-related citation statistics, and respond to special requests for Program-related citation data.
- Progress reporting: edit and produce the JRSO FY17 fourth quarterly report, 3 JRSO FY18 quarterly reports, the JRSO FY17 Annual Report, and the JRSO FY19 Annual Program Plan, including original versions and all revisions required by NSF.
- Expedition outreach: facilitate activities of teachers at sea during JRSO expeditions.
- Legacy and technical documentation: routinely archive electronic copies of all documents, reports, technical documentation, and scientific publications produced by the JRSO on behalf of IODP.
- Integrated Ocean Drilling Program closeout activities: complete and archive expedition publications (e.g., publish data reports and synthesis papers in the *Proceedings of the Integrated Ocean Drilling Program* and update expedition-related citation lists associated with legacy program expeditions).

10. JRSO FY18 budget

10.1. Overview

The budget summary and detailed departmental budgets in this section describe the overall JRSO FY18 budget requests to provide a framework for interpreting fiscal data in quarterly reports delivered to NSF by the JRSO.

Section 10.2 provides the cumulative total for each major expense category in the JRSO FY18 budget, Section 10.3 shows the detailed budget request for each department, and Section 10.4 outlines the potential cost savings by expedition that would result from elimination of a scheduled expedition. The budget explanation for each expense category is provided in Section 10.5.

10.2. FY18 expense category summary

FY18 JRSO budget by expense category	
Expense category	**Cost**
Salaries and fringes	9,518,438
Equipment	608,000
Travel	1,343,602
Materials and supplies	3,573,696
Consultant/professional services	638,726
Computer services	65,000
Subcontracts	41,886,388
Other direct costs	4,129,740
Shipping	1,153,655

Communication	725,926
Business conferences	47,975
Training	188,275
Insurance	1,115,679
Maintenance and repair	472,750
Other	425,480
JRSO total direct costs	**$61,763,590**
JRSO total modified direct costs	19,265,202
JRSO indirect costs	5,008,954
Grand total JRSO FY18 budget request	**$66,772,544**

10.3. FY18 JRSO budget detail

FY18 JRSO budget by department	
Department/expense category	**Cost**
Management and Administration	
Salaries and fringes	1,106,224
Equipment	0
Travel	155,600
Materials and supplies	93,700
Consultant/professional services	93,150
Computer Services	65,000
Subcontracts	41,886,388
Overseas Drilling Limited	36,825,421
Day rate	27,385,419
Fuel and lubricants	4,712,500
Per diem	681,695
Port calls	1,580,000
Travel—ODL	922,125
Insurance—JOIDES Resolution	650,682
Other	893,000
Schlumberger Technology Corporation	3,789,746
Day rate	3,312,163
Supplies	142,000
Shipping	10,000
Consultant/professional services	0
Travel	44,500
Equipment rental	105,083
Maintenance and repair	176,000
Schlumberger LWD tool rental	1,271,221
Equipment rental	1,251,421
Shipping	10,000
Maintenance and repair	9,800
Other direct costs	2,005,635
Shipping	38,800
Communication	713,626

FY18 JRSO budget by department	
Department/expense category	**Cost**
Business conferences	47,975
Training	23,775
Insurance	1,105,679
Maintenance and repair	19,700
Other	56,080
Total Management and Administration direct costs	**$45,405,697**
Science Operations	
Salaries and fringes	3,328,738
Equipment	210,000
Travel	369,152
Materials and supplies	2,661,406
Consultant/professional services	406,500
Computer Services	0
Subcontracts	0
Other direct costs	1,526,315
Shipping	1,102,455
Communication	2,000
Training	36,900
Insurance	10,000
Maintenance and repair	10,500
Other	364,460
Total Science Operations direct costs	**$8,502,111**
Technical and Analytical Services	
Salaries and fringes	3,238,460
Equipment	128,000
Travel	518,000
Materials and supplies	557,000
Consultant/professional services	43,500
Computer Services	0
Subcontracts	0
Other direct costs	140,980
Shipping	12,000
Communication	2,000
Training	39,800
Maintenance and repair	85,800
Other	1,380
Total Technical and Analytical Services direct costs	**$4,625,940**
Development, IT, and Databases	
Salaries and fringes	477,881
Equipment	270,000
Travel	181,000
Materials and supplies	247,600
Consultant/professional services	164,676
Computer Services	0

FY18 JRSO budget by department	
Department/expense category	**Cost**
Subcontracts	0
Other direct costs	413,460
Shipping	400
Communication	8,300
Training	76,200
Maintenance and repair	325,700
Other	2,860
Total Development, IT, and Databases direct costs	**$1,754,617**
Publication Services	
Salaries and fringes	1,367,135
Equipment	0
Travel	50,750
Materials and supplies	13,990
Consultant/professional services	0
Computer Services	0
Subcontracts	0
Other direct costs	43,350
Shipping	0
Communication	0
Training	11,600
Maintenance and repair	31,050
Other	700
Total Publication Services direct costs	**$1,475,225**
JRSO total direct costs	**61,763,590**
JRSO total modified total direct costs	19,265,202
JRSO indirect costs	5,008,954
Grand total JRSO FY18 budget request	**$66,772,544**

10.4. Expense category definitions

Salaries and fringe benefits. Salaries, fringe benefits, and sea pay, including an anticipated cost-of-living allowance for staff supporting the Program (see Section 3.2). Fringe rates are calculated based on a University-established percentage of 17.5% plus insurance premiums.

Equipment. Procurement, upgrading, or fabrication of operational equipment with an acquisition cost of more than $5,000, including tools and equipment in support of logging operations and computer and network equipment to replace aged network models, workstations, and plotters, as well as new workstations for new staff. Costs associated directly with equipment (computer, scientific, and drilling) intended solely for use on the ship over a period of time greater than one expedition, equipment purchased for a specific expedition, and the pro-rata cost of shore-based equipment used partially to support expedition activities. Operational equipment replacement and acquisition of parts and spare units for downhole tools. Acquisition of new analytical systems and capital replacement or upgrades of

failed or obsolete laboratory equipment. Estimated equipment costs are projected based on potential for loss during operations and the need for replacement and are calculated using current quotes on file.

Travel. Transportation, per diem, lodging, and other associated costs.

Domestic. Travel to IODP meetings and workshops, pre- and postexpedition planning meetings; subcontractor, insurance, and vendor meetings; and professional conferences. Travel costs to bring off-site JRSO staff to participate in on-site meetings. Costs are estimated at $2,000 per domestic trip based on the current published government per diem rates.

International. Travel for personnel attending international Program meetings and workshops and for personnel who will work at port calls, sail during expeditions, and/or work on the ship during transits or tie-up periods. Costs are estimated at $5,500 for regular meetings and $4,500 for port calls/expeditions based on the expedition schedule, the current published government per diem rates, and estimated air travel costs specific to the port call location.

Materials and supplies. Operational, laboratory, logistical, and shipping supplies for shipboard and shore-based analytical and engineering laboratory and test facilities and expeditions, including long–lead time hardware for FY19 expeditions. Cost estimates for drill and core bits, core liner, hardware, bulk materials, and coring supplies are calculated based on expedition-specific requirements such as estimated penetration, core recovery, lithology, and potential hole instability. Standard reference material; shipboard laboratory consumables and safety supplies; specialized supplies for core sampling and curation tasks; expendables and small hardware for continued operation and maintenance of IT resources; digital photographic supplies (e.g., drum scanner supplies, CDs, DVDs, and tapes) for processing images on shore; general operational and office supplies including printer and copier supplies and paper; noninventory equipment costing less than $5,000; software purchases and upgrades, software subscriptions, volume licensing agreements, concurrent usage software agreements, electronic media, and other computer supplies; costs of office furniture, including replacing broken or aging office furniture; and general safety and cleaning supplies.

Consultant/professional services. Costs for expert assistance, including annual physical examinations for seagoing personnel, external printing and copier services, vehicle and warehouse equipment repair, testing and calibration of laboratory instruments and equipment, machine shop services, inspection and refurbishment of tubulars (drill pipe, knobbies, and other outer core barrel components), environmental evaluations, facilities repair, lease of off-premises records storage facility, visitor parking permits, back-up services, IT expert assistance services, TAMU Physical Plant services, temporary labor, tuition for graduate assistant non-teaching (GANT) positions, transfer fees, and weather reports. Consultant and contract services, including services in support of network and videoconferencing equipment, engineering evaluation services as needed, and liaisons to selected panels as needed.

American Geosciences Institute (AGI) Scientific Ocean Drilling Bibliographic Database fee for inclusion of new citations, CrossRef annual membership and administrative costs, digital object identifier (DOI) registration charges, and CrossMark registration charges.

Computing services. Use of TAMU's financial and management information system (FAMIS), including the Program's share of costs based on the number of entry lines.

Subcontracts. Consultant and contract services.

ODL. Subcontract for operations of the *JOIDES Resolution*. Costs related to this subcontract include the following:

Day rate. Vessel staffing for the subcontractor's sailing crew and drilling personnel, not including the cost of the USIO personnel or scientists aboard the ship. The day rate varies according to the mode of the ship, which is operating (drilling or cruising) or standing by (in port). Although it is a fixed rate per day, the day rate is adjusted for changes in the Consumer Price Index-Urban (CPI-U) and Employment Cost Index (ECI). The amount is based on 365 days, which includes all or part of the tie-up period, and the budget allows for one CPI-U adjustment of 2.32% and two ECI adjustments of 2.32%, each based on an average of the last seven actual percentage increases. The anticipated operations/cruising and standby day rates, respectively, are $75,023.19 and $72,561.44 through 30 April 2018, adjusted to $76,137.14 and $73,638.83 through 30 June 2018, and then adjusted to $76,505.08 and $73,997.60 for the remainder of the fiscal year.

Fuel and lubricants. Fuel to be purchased for the riserless vessel estimated at a total of 7,400 metric tons: 900 metric tons in Freemantle, Australia; 1,400, 1,100, and 1,400 metric tons in Wellington, New Zealand (3 refuelings); 1,100 and 800 metric tons in Auckland, New Zealand (2 refuelings); and 700 metric tons in Subic Bay, Philippines. Price per metric ton is based on prices quoted by Ship and Bunker for those locations as of 13 February 2017.

Per diem. Shipboard catering costs associated with meals and berthing on the vessel and cleaning of the laboratory stack. The estimate is based on a shipboard party of 60 participants at $34.02/day/person for all nontransit and nonmaintenance periods. The number of personnel on board for transit and non-IODP periods was estimated based on previous staffing schedules in like circumstances. This category does not include per diem for the ship subcontractor's sailing crew and drilling personnel because they are accounted for in the day rate unless charged as a reimbursable (see "Day rate," above).

Port call costs. Vessel agent's expenses, subcontractor freight, and meals and lodging costs incurred during subcontractor's crew rotations for port calls scheduled for Fremantle, Australia (5 days); Wellington, New Zealand (3 port calls at 5 days each and 1 port call at 43 days); Auckland, New Zealand (1 port call at 5 days and 1 port call at 4 days); and Subic Bay, Philippines (57 day tie-up period).

Insurance—JOIDES Resolution. Annual insurance premiums for subcontractor and TAMRF, including subcontractor's premium costs for All Risks Marine Hull and Machinery (H&M) and Removal of Wreck (ROW) insurance and TAMRF premium costs for General and Automobile Liability, Workers Compensation, Cargo, Third Party Property (Equipment), Excess Liability, Control of Well and Seepage and Pollution Liability, Charterers Legal Liability, Logging-while-drilling Liability, and Contractor's Pollution Liability—Gradual coverage for the vessel. All premium amounts are based on 365 days of coverage, and the premiums for Sections 1 and 2 of the H&M coverage are discounted 50% during non-IODP periods, which total 88 days in FY18.

Travel—ODL. Subcontractor transportation, including airfare for ship subcontractor's crews to/from 7 scheduled crew changes—Freemantle, Australia (Expedition 372); Wellington, New Zealand (Expeditions 374, 375, and 378); Auckland, New Zealand (Expeditions 376 and 376T); and Subic Bay, Philippines (Tie-up). The estimate is based on a crew of 60 personnel with various domestic and international origin fly points arriving and departing each port call.

Schlumberger. Subcontract for the provision of a standard suite of tools, engineer services, software support, mobilization services, and specialty tools as needed; support for a dedicated engineer on the ship for each expedition and support from the base of operations; and the services of a district engineer, staff engineer, electronics technician, and special services engineer as needed. Costs (including shipping charges) related to leasing equipment needed for wireline fishing, back-off and severing services, day rate and travel expenses for the Schlumberger engineer, and day rate for tool insurance for the deployment of downhole logging tools.

Schlumberger LWD tool rental. Subcontract for the provision of logging-while-drilling tools and personnel as needed.

Other direct costs. Costs not covered in other categories.

Shipping. Postage, express mail, and freight, including general postage and express mail/courier services for regular correspondence, scientific reports, small packages, and data and photo requests; shipping of materials, equipment, and supplies to and from expeditions; regular-sized sample shipments to scientists; and costs for special shipments of deep-frozen microbiological samples, U-channels, and so on. Estimated costs are based on historical averages of similar shipments for standard items sent to the ship for each expedition as well as expedition-specific items.

Communication. Standard telephone line, long distance, and fax charges; cellular phone charges; satellite; and cost of web and video conferencing as needed. Cost for very small aperture terminal (VSAT) communication and inmarsat communication to and from the *JOIDES Resolution*.

Business conferences. Catering, supply, and incidental costs associated with hosting pre- and postexpedition meetings, core sampling events, educational workshops, on-site training events, and visits to the GCR. The cost per meeting is based on the past 3 years' expense data for these meetings. IODP-TAMU hosts approximately 21 meetings per year.

Training. Registration, transportation, per diem, and lodging expenses related to professional courses and meetings and online training courses.

Insurance. Annual insurance premiums for JRSO vehicles.

Maintenance and repair. Equipment service agreements and noncontracted maintenance and repair of equipment in warehouse, forklift, overhead cranes and other loading dock equipment, deep freezers, shrink-wrap and bagging machinery, office equipment, copiers, postage meter, imaging equipment such as cameras, vehicle fleet, IT computer hardware and software. Drilling, coring, logging, laboratory, repository, and safety equipment.

Equipment rental. Rental of equipment when it is more economical to rent than purchase, including conference equipment, mud motors, and water coolers.

Recruiting and relocation. Employee recruitment costs, including local, internet, and science and trade journal advertisements, and other costs related to filling/replacing positions and recruiting professional staff. Relocation costs for new employees.

Library. Technical books, journals, and other resources, including subscriptions to professional publications and documentation materials required for reference.

Indirect costs. The TAMU off-campus indirect cost rate of 26% modified total direct cost (MTDC) is applied to this cooperative agreement. MTDC is calculated as total direct costs minus costs in exempt categories (e.g., equipment and subcontract costs over $25,000).

Appendix I: IT security summary

Policies and procedures

Extensive Standard Administrative Procedures provided by Texas A&M University are available at http://rules-saps.tamu.edu/TAMURulesAndSAPs.aspx. Texas A&M University's Security Controls Catalog is available at https://goo.gl/4hpMfW.

The JRSO policy for shipboard communications is available at https://goo.gl/SrILWS.

All employees must take yearly security awareness training as required by Texas A&M University. As part of this training, all users are required to acknowledge that they have read, understand, and will comply with university requirements regarding computer security policies and procedures.

Risk assessment

The JRSO completes an annual information security risk assessment report as required by TAMU using the Texas Department of Information Resources (DIR) tool, SPECTRUM. The results are electronically reviewed by the Supervisor of Information Technology & Support, department manager, Director of Science Services, and College of Geosciences Dean and then filed with the Texas A&M University Risk Management Office for further assessment and follow-up.

Roles and responsibilities

System Administrator, Marine Computer Specialist, and Service Desk Specialist (departmental IT personnel) responsibilities include

- Applying platform technical safeguards,
- Supplying the first-level response (i.e., restoration services) to any security breach, and
- Immediately reporting any security breach to the Supervisor of Information Technology & Support.

Supervisor of Information Technology & Support responsibilities include

- Assuring that best practices are followed in the administration of systems;
- Reporting criminal activity under applicable state code concerning computer or telecommunications crimes to the department manager, Director, College of Geosciences Dean, and Texas A&M University's Chief Information Security Officer or designee;
- Determining if a violation rises to the standard of fraud or fraudulent action and reporting it to the department manager, Director, and College of Geosciences Dean; and

- Determining the physical and electronic evidence to be gathered as part of incident investigation such as initiating, completing, and documenting the incident investigation.

Technical safeguards

- Departmental IT personnel shall test security patches prior to implementation where practical. Departmental IT personnel are encouraged to have hardware resources available for testing security patches in the case of special applications.
- Departmental IT personnel shall ensure that vendor-supplied patches are routinely acquired, systematically tested, and installed promptly based on risk-management decisions.
- Departmental IT personnel shall enable security features included in vendor-supplied systems in accordance with best practices, including but not limited to firewalls, virus scanning and malicious code protections, multi-factor authentication, and other file protections, where possible. Audit logging shall also be enabled. User privileges shall be set utilizing the “least privileges” concept of providing the minimum amount of access required to perform job functions. Privileges may be added as need is demonstrated by the user. The use of passwords shall be enabled in accordance with Texas A&M University policies referenced below.
- Departmental IT personnel shall disable or change the password of default accounts.
- Departmental IT personnel or their designee shall test servers, especially for known vulnerabilities, periodically or when new vulnerabilities are announced.
- Departmental IT personnel shall seek and implement best practices for securing their particular system platform(s).

Physical safeguards

After business hours, JRSO building entry is allowed via identification (ID)/keycard. Information is logged and available for retrieval at a later date. An access list is maintained by the Building Proctor. Entry into the main computer room is granted only to authorized personnel whose job responsibilities require access to the facility and to vendors when necessary. Doors are secured using centrally controlled electronic locks with swipe card access capability

Power to the computer room is provided via 50 kVA uninterruptible power supply (UPS) and matching power distribution unit (PDU). In case of power outage, power is supplied to UPS and backup heating, ventilation, and air-conditioning (HVAC) by a diesel generator. The computer room is protected from fire by a halon fire suppression system.

Incremental backups are completed on a daily basis, and full backups are completed weekly. One full backup copy is kept locally, and another is removed to off-site storage.

Cybersecurity breach notification procedures

In the event of a cybersecurity breach:

1. Departmental IT personnel have information security roles and responsibilities that take priority over normal duties.
2. Departmental IT personnel are responsible for notifying the Supervisor of Information Technology & Support and department manager and initiating the appropriate action, including restoration. The department manager will notify the Director and Texas A&M University's Chief Information Security Officer or designee.
3. Departmental IT personnel are responsible for determining the physical and electronic evidence to be gathered as part of the incident investigation, such as initiating, completing, and documenting the incident investigation.
4. Departmental IT personnel shall report security incidents that may involve criminal activity under their respective state's penal code concerning computer or telecommunications crimes to the Director or department manager and Texas A&M University's Chief Information Security Officer or designee.
5. If fraud or theft is suspected as part of security incident detection, the person detecting the incident shall follow their respective system policies concerning the control of fraud and fraudulent actions.
6. If there is a substantial likelihood that security incidents could be propagated to other systems beyond departmental control, Departmental IT shall report/escalate such incidents as soon as an incident is identified.
7. The Supervisor of Information Technology & Support shall file an after-action report to the Texas A&M University Information Technology Risk Management (ITRM) office by e-mail to security@tamu.edu.

Security measures for nonemployees

All subcontractors, researchers, and others who have access to the systems employed in support of this contract are required to follow all Texas A&M University and JRSO security policies.

Appendix II: recommended program of insurance

TAMRF will utilize the risk management services of TAMU. These services will include insurance policy monitoring, ongoing risk assessments, marine insurance negotiations, and claims settlement. TAMRF's established relationship with the London insurance market coupled with the Program's safety history have enabled TAMU staff to obtain cost-effective premiums. TAMU staff have used market relationships, attention to detail, and clear communication to educate insurance brokers and underwriters to the specific risks involved in deep-ocean coring and foster an understanding of risk mitigation along with differentiation from the common risks incurred during energy-related drilling.

Premium negotiations include documentation and explanation of specific exposures, estimated payroll costs, estimated operational time, confirmation of valuation, and operational history. As a result of proactive risk management, communication, and education, the Program's premiums have historically averaged less than the energy market, and terms and conditions for insurance coverage have been more favorable than the norm in the energy sector. The premiums in the table below are preliminary estimates subject to underwriter confirmation in FY17.

The FY18 proposed program of insurance for mitigation of drilling risks and marine/employer's liability is depicted in the following table. In addition, TAMU, on behalf of the JRSO, will assess specialty risks and procure insurance if warranted.

JRSO FY18 program of insurance details			
Program of insurance with government indemnification	**Coverage limits**	**Deductible**	**Estimated annual premiums**
Hull & Machinery and Removal of Wreck[1]	190,000,000	250,000	687,817
Control of Well	25,000,000	50,000	84,702
Seepage & Pollution Liability[2]	1,000,000	50,000	0
Cargo	5,000,000	25,000	23,293
Third Party Property/Equipment	10,000,000	25,000	30,104
Charterer's Legal Liability	1,000,000	10,000	17,365
Logging-while-drilling (LWD) Liability	4,000,000	Determined based on usage	500,000
Contractor's Pollution Liability—Gradual	10,000,000	1,000,000	27,920
Umbrella	200,000,000	Per underlying limits	270,000
Worker's Compensation & Maritime Employer's Liability	1,000,000	None	93,708
Comprehensive General & Automobile Liability	1,000,000	None	31,452
Total estimated annual premiums			$1,766,361

[1] Carried by ship subcontractor (ODL) and reimbursed by TAMRF.
[2] Included in Control of Well Policy and covered under the Umbrella.