International Ocean Discovery Program

JOIDES Resolution Science Operator

FY16 Q2 Operations and Management Report

1 January–31 March 2016

Cooperative Agreement OCE-1326927

Submitted by the JRSO

to

The National Science Foundation

and

The *JOIDES Resolution* Facility Board

10 May 2016

Table of 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 FY16 Q1 Quarterly Operations and Management Report

The JRSO operations and management report for the first quarter of FY16 (October–December 2015) was submitted to NSF on 17 February 2016 (http://iodp.tamu.edu/publications/AR/FY16/FY16_Q1.pdf).

JRSO FY17 Annual Program Plan

Budget planning began for the JRSO FY17 Annual Program Plan this quarter, and a text template was prepared for review and revision.

Liaison activities

The JRSO reports to and liaises with funding agencies and IODP-related agencies (e.g., *JOIDES Resolution* Facility Board [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 (iodp.org/facility-boards).

Planning meetings

The JRSO Assistant Director of Science Services attended the US Advisory Committee for Scientific Ocean Drilling (USAC) meeting held February 8 and 9 in St. Petersburg, Florida.

Facility performance assessment

The JRSO hosted two meetings this quarter to assess the JRSO's performance. The first meeting, held February 22 and 23, was a Co-Chief Scientist review chaired by Craig Fulthorpe and attended by seven of the eight Co-Chief Scientists of FY15 expeditions. Attendees assessed the JRSO's performance in implementing FY15 Expeditions 353–356 and compiled their findings in a report that was submitted to NSF and presented at a subsequent NSF-convened panel held 24–26 February to assess the JRSO's performance as a facility in meeting the needs of the International Ocean Discovery Program in fulfilling its Science Plan. The international review panel found that "the facility is being managed exceptionally well by the JRSO, and that it is also being overseen effectively by the JRFB and NSF to meet the IODP Science Plan." The review panel provided a set of recommendations to NSF, and NSF passed the recommendations on to the JRSO with guidance for implementation. Plans were made to address several of those recommendations in the JRSO FY17 Annual Program Plan.

Project portfolio management

The JRSO continued work on four projects, including Liquid Helium–Free Superconducting Rock Magnetometer Installation and Software Update, Improve Web Services, Extending IMS to WRMSL and STMSL, and Thin Section Form Report Follow-up (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 iodp.tamu.edu/scienceops/expeditions.html.

Program website statistics

During the last quarter, the IODP TAMU website received 41,172 site visits and 458,571 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 Q2 page views*	FY16 Q2 site visits*
www-odp.tamu.edu	437,553	32,443
www.odplegacy.org	4,084	1,606
www.deepseadrilling.org	172,736	8,381
Total	**614,373**	**42,430**

*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 the European Consortium for Ocean Research Drilling (ECORD) Science Operator (ESO) and Center for Deep Earth Exploration (CDEX) expeditions.

JRSO expedition schedule

Expedition[1]		Port (Origin)	Dates[2, 3]	Total Days (Port/ Sea)	Days at Sea (Transit[4]/ Ops)	Co-Chief Scientists	Expedition Project Manager
Southwest Indian Ridge Lower Crust and Moho	360	Colombo, Sri Lanka	30 November 2015–30 January 2016	61 (5/56)	56 (14/42)	H. Dick C. MacLeod	P. Blum
South African Climates[5]	361	Port Louis, Mauritius	30 January– 31 March 2016	61 (5/56)	56 (6/50)	I. Hall S. Hemming	L. LeVay
Non-IODP [31 March–6 August 2016] [128 days]							M. Malone
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[6]	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[7]	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[7]	368	Hong Kong	9 April– 9 June 2017	61 (5/56)	56 (2/54)	Z. Jian K. McIntosh	C. Alvarez Zarikian
Non-IODP [9 June–28 September 2017] [111 days]							M. Malone
Australia Cretaceous Climate and Tectonics	369	Fremantle, Australia	28 September – 28 November 2017	61 (5/56)	TBD	R. Hobbs B. Huber	K. Bogus
TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Hikurangi Subduction Margin[8]	TBD	TBDF	TBD	TBD	TBD	TBD	K. Petronotis

Notes: TBD = to be determined.
[1] Further expedition information can be obtained at iodp.tamu.edu/scienceops/expeditions.html.
[2] Dates for expeditions may be adjusted pending non-IODP activities.
[3] The start date reflects the initial port call day. The vessel will sail when ready.
[4] Transit total is the estimated transit to and from port call and does not include transit between sites.

[5] Also includes Proposal 845-APL, Agulhas Current LGM Density.
[6] Also includes Proposal 693-APL, South Chamorro Seamount CORK.
[7] Complementary Project Proposal (CPP) is contingent on substantial financial contribution outside of normal IODP funding.
[8] Will be implemented in FY18 but will not be placed in the expedition sequence until the 2016 JRFB meeting.

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 359: Maldives Monsoon and Sea Level

Postexpedition activities

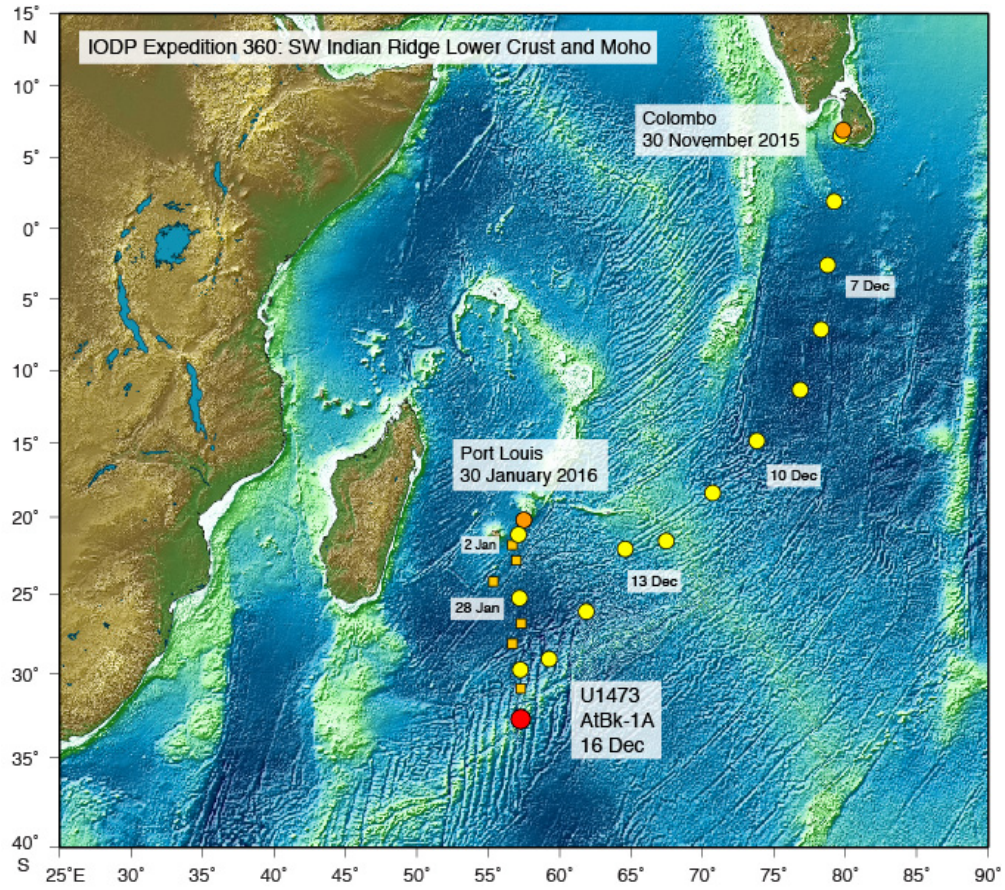
The attempted high-profile publication was not accepted, so the temporary publication embargo was lifted and the Expedition 359 *Preliminary Report* was published in March 2016.

Expedition 360: Southwest Indian Ridge Lower Crust and Moho

Staffing

Expedition 360 Science Party staffing breakdown		
Member country/consortium	**Participants**	**Co-Chief Scientists**
USA: United States Science Support Program (USSSP)	9	1
Japan: Japan Drilling Earth Science Consortium (J-DESC)	4	
Europe and Canada: European Consortium for Ocean Research Drilling (ECORD) Science Support and Advisory Committee (ESSAC)	8	1
Republic of Korea: Korea Integrated Ocean Drilling Program (K-IODP)	1	
People's Republic of China: IODP-China	2	
Australia and New Zealand: Australia/New Zealand IODP Consortium (ANZIC)	1	
India: Ministry of Earth Science (MoES)	1	
Brazil: Coordination for Improvement of Higher Education	1	

Site Map



Coring summary

Site	Hole	Latitude	Longitude	Water depth (mbrf)	Cores (N)	Interval cored (m)	Core recovered (m)	Recovery (%)
U1473	U1473A	32°42.3622'S	57°16.6880'E	710.2	88	789.7	469.15	63.2
Expedition 360 totals					**88**	**789.7**	**469.15**	**63.2**

Science summary

Expedition 360 was the first leg of Phase I of the SloMo (shorthand for "The nature of the lower crust and Moho at slower spreading ridges") Project, a multiphase drilling program that proposes to drill through the outermost of the global seismic velocity discontinuities, the Mohorovičić seismic discontinuity (Moho). The Moho corresponds to a compressional wave velocity increase, typically at ~7 km beneath the oceans, and has generally been regarded as the boundary between crust and mantle. An alternative model, that the Moho is a hydration front in the mantle, recently gained credence upon the discovery of abundant partially serpentinized peridotite on the seafloor and on the walls of fracture zones, such as at Atlantis Bank, an 11–13 My old elevated oceanic core complex massif adjacent to the Atlantis II Transform on the Southwest Indian Ridge.

Expedition 360 Hole U1473A was drilled on the summit of Atlantis Bank, 1–2 km away from two previous ODP holes: Hole 735B (drilled during ODP Leg 118 in 1987 and ODP Leg 176 in 1997) and Hole

1105A (drilled during ODP Leg 179 in 1998). A mantle peridotite/gabbro contact has been traced by dredging and diving along the transform wall for 40 km. The contact is located at ~4,200 m depth at the drill sites but shoals considerably 20 km to the south, where it was observed in outcrop at 2,563 m depth. Moho reflections have, however, been found at ~5–6 km beneath Atlantis Bank and less than 4 km beneath the transform wall, leading to the suggestion that the seismic discontinuity may not represent the crust/mantle boundary but rather an alteration (serpentinization) front. This then raises the interesting possibility that a whole new planetary biosphere may thrive due to methanogenesis associated with serpentinization. The SloMo Project seeks to test these two hypotheses at Atlantis Bank and evaluate carbon sequestration in the lower crust and uppermost mantle.

A primary objective of SloMo Leg 1 was to explore the lateral variability of the stratigraphy established in Hole 735B. Comparison of Hole U1473A with Holes 735B and 1105A allows us to demonstrate a continuity of process and complex interplay of magmatic accretion and steady-state detachment faulting over a time period of ~128 ky. Preliminary assessment indicates that these sections of lower crust are constructed by repeated cycles of intrusion, represented in Hole U1473A by approximately three upwardly differentiated hundreds of meter–scale bodies of olivine gabbro broadly similar to those encountered in the deeper parts of Hole 735B.

Specific aims of Expedition 360 focused on gaining an understanding of how magmatism and tectonism interact in accommodating seafloor spreading, how magnetic reversal boundaries are expressed in the lower crust, assessing the role of the lower crust and shallow mantle in the global carbon cycle, and constraining the extent and nature of life at deep levels within the ocean lithosphere.

Expedition 361: South African Climates

Planning

The air freight to Mauritius was finalized and sent and planning and preparation for the port call were completed.

Staffing

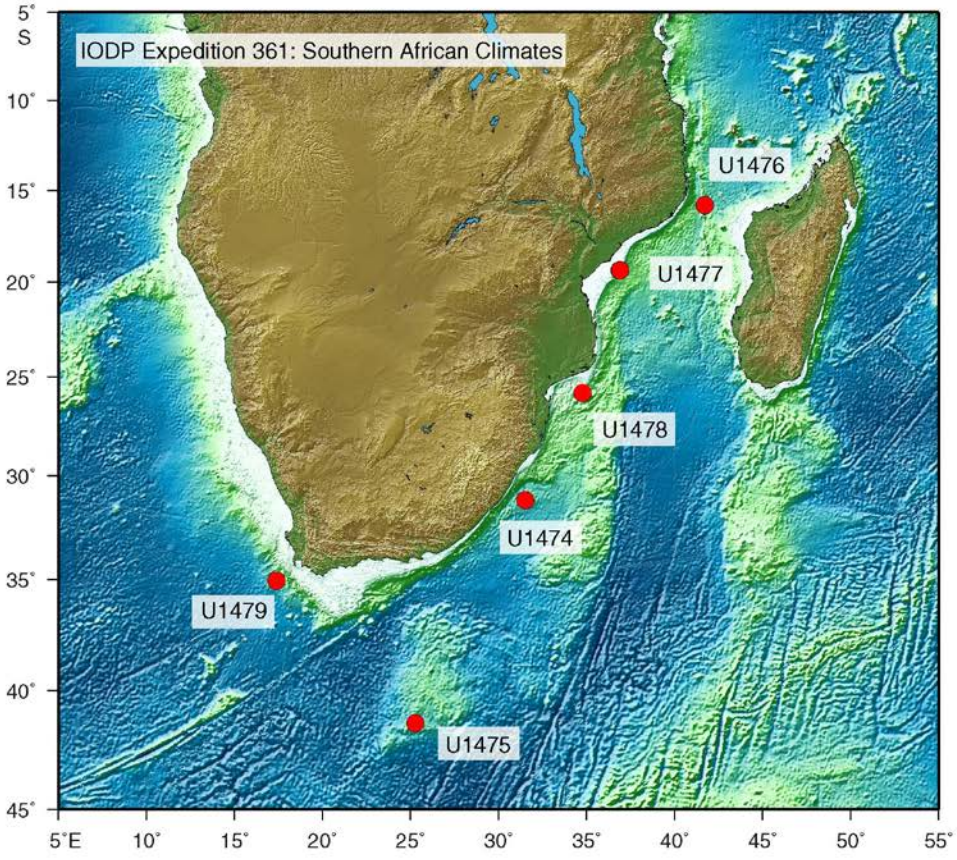
Expedition 361 Science Party staffing breakdown		
Member country/consortium	**Participants**	**Co-Chief Scientists**
USA: United States Science Support Program (USSSP)	8	1
Japan: Japan Drilling Earth Science Consortium (J-DESC)	3	
Europe and Canada: European Consortium for Ocean Research Drilling (ECORD) Science Support and Advisory Committee (ESSAC)	9	1
Republic of Korea: Korea Integrated Ocean Drilling Program (K-IODP)	0	
People's Republic of China: IODP-China	2	
Australia and New Zealand: Australia/New Zealand IODP Consortium (ANZIC)	2	
India: Ministry of Earth Science (MoES)	1	
Brazil: Coordination for Improvement of Higher Education	1	

Clearance, permitting, and environmental assessment activities

On 5 January 2016, the South African government granted consent for the proposed research. The Mozambique government indicated they had no objection to the research and sent stipulations and

conditions in the form of an agreement for conducting research, which the JRSO signed and returned on 4 January 2016. However, the ship departed port without clearance because of internal issues processing paperwork in Mozambique that ultimately required resubmission of the clearance agreement. This required the ship to divert and start work in South African and international waters on a much less efficient ship track. Persistence by the US State Department eventually resulted in the Mozambique government verbally granting permission for the *JOIDES Resolution* to start operations in Mozambique waters on 7 March 2016. Two new sites in international waters were reviewed and approved as contingency for the delays in Mozambique clearance.

Site Map



Coring summary

Site	Hole	Latitude	Longitude	Water depth (mbrf)	Cores (N)	Interval cored (m)	Core recovered (m)	Recovery (%)
U1474	U1474A	31°12.9995'S	31°32.7080'E	3,044.6	29	254.10	264.83	104.0
	U1474B	31°12.9882'S	31°32.7083'E	3,045.2	16	147.30	142.09	96.0
	U1474C	31°12.9999'S	31°32.7215'E	3,050.0	1	3.10	3.07	99.0
	U1474D	31°12.9999'S	31°32.7213'E	3,045.2	14	124.50	126.04	101.0
	U1474E	31°12.9995'S	31°32.7208'E	3,045.2	17	112.00	114.44	102.0
	U1474F	31°13.0105'S	31°32.7078'E	3,046.8	32	236.40	240.49	102.0
	U1474G	31°12.9995'S	31°32.7080'E	3,044.6	1	9.50	9.97	105.0
	U1474H	31°12.9995'S	31°32.7080'E	3,044.6	1	9.50	9.82	103.0
Site U1474 totals					**111**	**896.40**	**910.75**	**101.6**
U1475	U1475A	41°25.6052'S	25°15.6440'E	2,681.4	1	1.50	1.48	99.0
	U1475B	41°25.6052'S	25°15.6441'E	2,680.5	26	243.90	250.31	103.0
	U1475C	41°25.5941'S	25°15.6439'E	2,680.4	29	272.00	280.70	103.0
	U1475D	41°25.6055'S	25°15.6586'E	2,679.3	16	143.00	150.86	105.0
	U1475E	41°25.6162'S	25°15.6439'E	2,682.9	29	270.50	277.20	102.0
	U1475F	41°25.6054'S	25°15.6299'E	2,680.4	6	57.00	55.37	97.0
Site U1475 totals					**107**	**987.90**	**1,015.92**	**102.8**
U1476	U1476A	15°49.2535'S	41°46.1242'E	2,176.8	24	224.20	232.90	104.0
	U1476B	15°49.2421'S	41°46.1234'E	2,177.6	16	148.40	154.42	104.0
	U1476C	15°49.2526'S	41°46.1355'E	2,176.6	1	5.70	5.72	100.0
	U1476D	15°49.2525'S	41°46.1358'E	2,176.6	24	228.00	237.02	104.0
	U1476E	15°49.2635'S	41°46.1236'E	2,176.3	25	234.80	243.77	104.0
Site U1476 totals					**90**	**841.10**	**873.83**	**103.9**
U1477	U1477A	19°21.2930'S	36°54.8962'E	440.4	27	181.20	182.53	101.0
	U1477B	19°21.2822'S	36°54.8958'E	440.8	26	174.40	185.73	106.0
	U1477C	19°21.2928'S	36°54.9066'E	440.4	16	118.40	121.75	103.0
Site U1477 totals					**69**	**474.00**	**490.01**	**103.4**
U1478	U1478A	25°49.2600'S	34°46.1593'E	499.2	32	248.40	256.96	103.0
	U1478B	25°49.2500'S	34°46.1589'E	499.2	33	246.30	246.85	100.0
	U1478C	25°49.2604'S	34°46.1705'E	501.2	33	238.30	242.32	102.0
	U1478D	25°49.2706'S	34°46.1592'E	502.0	21	172.70	175.97	102.0
Site U1478 totals					**119**	**905.70**	**922.10**	**101.8**
U1479	U1479A	35°03.5290'S	17°24.0620'E	2,629.9	1	1.00	1.01	101.0
	U1479B	35°03.5289'S	17°24.0621'E	2,629.7	32	300.70	296.73	99.0
	U1479C	35°03.5183'S	17°24.0621'E	2,629.7	31	294.50	303.69	103.0
	U1479D	35°03.5286'S	17°24.0754'E	2,626.5	11	101.40	102.15	101.0
	U1479E	35°03.5402'S	17°24.0623'E	2,626.5	15	142.50	148.17	104.0
	U1479F	35°03.5290'S	17°24.0493'E	2,626.7	1	9.50	9.50	100.0
	U1479G	35°03.5290'S	17°24.0493'E	2,623.9	1	9.30	9.29	100.0
	U1479H	35°03.5289'S	17°24.0489'E	2,624.6	9	81.60	70.75	87.0
	U1479I	35°03.5286'S	17°24.0493'E	2,624.8	4	34.80	21.79	63.0
Site U1479 totals					**105**	**975.30**	**963.08**	**98.7**
Expedition 361 totals					**601**	**5,080.40**	**5,175.69**	**101.9**

Science summary

Expedition 361 cored six sites on the southeast African margin and in the Indian-Atlantic ocean gateway, southwest Indian Ocean. The sites, situated in the Mozambique Channel at locations directly influenced by discharge from the Zambezi and Limpopo River catchments, the Natal Valley, the Agulhas Plateau, and the Cape Basin, were targeted to reconstruct the history of the Greater Agulhas Current System over the past ~5 My. The Agulhas Current is the strongest western boundary current in the Southern Hemisphere, transporting some 70 Sv of warm and saline surface waters from the tropical Indian Ocean along the East African margin to the tip of Africa. Exchanges of heat and moisture with the atmosphere influence southern African climates, including individual weather systems such as extra-tropical cyclone formation in the region and rainfall patterns. Recent ocean model and paleoceanographic data further point at a potential role of the Agulhas Current in controlling the strength and mode of the Atlantic Meridional Overturning Circulation (AMOC) during the Late Pleistocene. Spillage of saline Agulhas water into the South Atlantic stimulates buoyancy anomalies that act as a control mechanism on the basin-wide AMOC, with implications for convective activity in the North Atlantic and global climate change.

The main objectives of Expedition 361 were to establish the sensitivity of the Agulhas Current to climatic changes during the Pliocene–Pleistocene, determine the dynamics of the Indian-Atlantic gateway circulation during this time, examine the connection of the Agulhas leakage and AMOC, and address the influence of the Agulhas Current on African terrestrial climates and coincidences with Human evolution. Additionally, the expedition set out to fulfill the needs of the Agulhas Current Density Profile Ancillary Project Letter (APL), consisting of high-resolution interstitial water samples that will constrain the temperature and salinity profiles of the ocean during the Last Glacial Maximum. The expedition made major strides toward fulfilling each of these objectives. The recovered sequences allowed complete spliced stratigraphic sections to be generated that span the interval of 0 to between ~0.13 and 7 Ma. These sediments will provide decadal- to millennial-scale climatic records that will help answer the paleoceanographic and paleoclimatic questions set out in the drilling proposal.

Expedition 362: Sumatra Seismogenic Zone

Planning

The draft *Scientific Prospectus* was updated with the latest information on site status. Sample, data, and research plans were submitted for review by the expedition Sample Allocation Committee (SAC) and for determination of laboratory support requirements. Preparations also began for use of the temperature dual-pressure tool (T2P), including discussions with the tool owner, who will be transferring the tool to IODP. The JRSO will take possession of the tool in the next quarter.

Staffing

Two Indonesian scientists accepted invitations to sail in January; however, the status of one of these scientists to participate is uncertain and may result in replacement.

Clearance, permitting, and environmental assessment activities

The US State Department confirmed sites available in international waters, including the presence of an Indonesian Extended Continental Shelf (ECS) claim. Work was initiated on development of the environmental evaluation for use of the acoustic source for the planned vertical seismic profile (VSP).

Expedition 363: Western Pacific Warm Pool

Planning

The Expedition 363 *Scientific Prospectus* was published in February 2016. Discussions of education and outreach were initiated with the US Science Support Program (USSSP), JRSO, and Expedition 363 Co-Chief Scientists.

Staffing

Scientific staffing was finalized in early February 2016.

Clearance, permitting, and environmental assessment activities

The US State Department confirmed that two sites that were believed to be in international waters are located in an ECS claim of the Federated States of Micronesia. The clearance application was submitted to the State Department on 16 February 2016. The Environmental Protection and Safety Panel (EPSP) and TAMU Safety Panel reviewed and recommended approval of two new sites.

Expedition 366: Mariana Convergent Margin

Planning

The Expedition 366 *Scientific Prospectus* was finalized and will be published early next quarter pending EPSP review of a depth extension request. Communication with the Science Party was initiated, and preparations began for the sample, data, and research plans that will be submitted and begin review next quarter. Initial work was begun to identify third-party tools and special requirements for the expedition.

Staffing

Scientific staffing was finalized in early February 2016.

Expedition 367 and 368: South China Sea Rifted Margin

Planning

The Expedition 367 and 368 pre-expedition meeting was held 29 February–1 March 2016 in College Station, Texas. Work was ongoing to finalize a single *Scientific Prospectus.* Other discussions focused on efforts that will be required to coordinate the two Science Parties. Based on a request from IODP-China, efforts will continue to determine if it is possible to use Shanghai as the port call at the end of Expedition 368.

Staffing

Nominations from the PMOs were received at the end of the quarter, and review and discussion of the applicants were initiated.

Expedition 369: Australia Cretaceous Climate and Tectonics

Planning

Initial communication with the Co-Chief Scientists was initiated.

Staffing

Two proponents accepted invitations to sail as Co-Chief Scientists.

Expedition TBD: Hikurangi Subduction Margin

Planning

A CORK design meeting was held 7 and 8 March 2016 in College Station to finalize the major engineering design for the observatories. Scientists and JRSO engineering staff continue to work various action items from the meeting.

Technical and analytical services

Analytical systems

Analytical systems acquisitions and updates

The Thermo Niton XLT3 handheld X-Ray Fluorescence (XRF) spectrometer suffered a complete failure of its onboard processor and had to be sent to shore for repair. The JRSO is continuing to evaluate options for repair or replacement of the instrument to continue to provide handheld elemental analysis capability.

The JRSO was informed by 2G Enterprises that the delivery of the new liquid helium-free super-conducting rock magnetometer (SRM) was further delayed until approximately mid-May 2016. This delay has required the project team to reevaluate the delivery schedule for the new instrument to the *JOIDES Resolution*. The software being developed by the JRSO in parallel will function on the older SRM and is on track to be ready for use during Expedition 362.

All three Icefield MI-5 orientation tools failed during Expedition 361 as a result of heavy sea current–induced vibration in the drill string. They have been sent to shore to be evaluated and repaired. The JRSO retained the two older (but still functioning) Minex FlexIT tools on board, so core orientation measurements were continued throughout the expedition and without interruption.

After discussion with the Agilent field engineer, a slight redesign of the new 7890 gas safety gas chromatographs (GCs) was done to facilitate manual injections without having to pierce the septum. One 7890 GC was sent to shore to be modified, and when it is returned to the vessel the other will be shipped to shore for modification. Once these modifications are complete and both 7890s are on board, the older 6890 “GC3” will be retired.

Laboratory working groups

The laboratory working groups (LWGs) provide oversight, research direction, and quality assurance for the methods, procedures, and analytical systems both on the *JOIDES Resolution* and on shore. The

groups meet regularly to review cruise evaluations, expedition technical reports, and issues management communications to provide advice on corrective actions and potential developments for laboratories.

Geology

The Geology LWG did not meet this quarter and will discuss issues arising from Expeditions 359, 360, and 361 in the next quarter.

Geophysics

The Geophysics LWG met this quarter to discuss current action items as well as issues arising from Expeditions 359 and 360. External LWG participants were Donna Blackman and Tony Morris.

Expedition 359 cruise-related issues

- The JR-6A spinner data were found to be missing individual measurements for the magnetic moment of *x* and *y* (displayed as zeros) even though the data were collected. AGICO was contacted and the bug was corrected during the expedition. An uploader for JR-6A data was created to store spinner data in the Laboratory Information Management System (LIMS) database.
- The SRM data quality was found to be poor in the upper 1–5 m of each core, presumably due to iron contamination from the drilling equipment; this has not recurred since Expedition 359, but technical staff is keeping an eye out for it.
- The expedition scientists requested that file sharing and data workflow be more open and consistent for wireline logging; the JRSO has implemented standard procedures to ensure this.
- Core splitting was found to be uneven and the technical staff is working to ensure better techniques are applied so the archive and working halves are as close to the same size as possible.

Expedition 360 cruise-related issues

- Code changes to the *P*-wave caliper were made to facilitate repeat measurements on a single discrete sample. The *P*-wave caliper software has a number of repetitive tasks; an action item was created to define detailed specifications for changes to the user interface workflow.
- One scientist wished to use the laser profile data from the Section Half Multisensor Logger (SHMSL) at high resolution and without smoothing. The data are smoothed in order to do the job for which the laser is intended (determining valid measurement positions for the color reflectance and the MS2K point magnetic susceptibility sensors), although they are stored at 0.1 mm resolution. If scientists want to access the unsmoothed data as well, they will have to be stored separately under a different component; this requires further discussion.
- The uploader for the JR-6A did not satisfy the scientists because the sample identification using the TEXT_ID (e.g., CUBE2945881) was not human-readable. The scientists therefore used their own naming scheme and the JR-6A data were not uploaded to LIMS until the end of the cruise. The LWG will look into alternate workflows to satisfy both requirements, but the AGICO software does not allow enough characters to do both.
- The natural gamma radiation (NGR) software will pass a null string for the TEXT_ID if the experiment is started without first scanning the barcode from the section. The LWG would like

the workflow locked so that non-scanned samples cannot be run; however, this could have an impact on troubleshooting efforts during an expedition and needs further discussion.

- The scientists requested that the logging database be restored to the ship's servers, as it is impractical to try to download DSDP/ODP/IODP logging data from shore.

Geochemistry

The Geochemistry LWG met this quarter to discuss ongoing issues; however, since both external participants were unavailable (at sea), the LWG will meet next quarter to review any issues arising from Expeditions 359, 360, and/or 361. During this quarter's meeting, the LWG

- Discussed the laser-induced breakdown spectrometer (LIBS) and a recommendation to also look at XRF for replacement; this mirrors an NSF panel member recommendation and is being done.
- Discussed the modifications to the 7890 GCs to make manual injection easier and more consistent.
- Discussed results of the argon-free microwave inductively-coupled plasma spectrometer (MICP) testing at the University of Houston. Although there are significant logistical advantages to the MICP (no argon, for one), the system does not perform well when compared to inductively coupled plasma–atomic emission spectroscopy (ICP-AES) systems such as the one currently on the *JOIDES Resolution*. It's more analogous to graphite furnace atomic absorption spectrometers (GF-AAS), and the technology needs to improve before it is considered viable for the JRSO.
- Recommended that the total organic carbon (TOC) analyzer be tested and checked out each port call; the TOC analyzer is rarely requested, but it also sits idle for many months and should be part of the technicians' normal testing and duties.
- Discussed the Technical Note 15 reference for Sr in seawater; the reference is out of date and the value traditionally used for the IAPSO standard is low. Sr was estimated by ratio at the time of Technical Note 15 and more recent references measured it by direct methods. EPMs and technicians will mention this during the beginning of expeditions to help ensure that methods are written correctly for the cruise reports.
- Explored the possibility of adding ultraviolet-visible (UV-VIS) capability to the Metrohm ion chromatograph (IC) to avoid the need for third-party IC for NH_4^+ and NO_2^-/NO_3^- analysis. This will be considered in the future pending community input.

Curation and Core Handling

The Curation and Core Handling LWG did not meet this quarter and will discuss issues arising from Expeditions 359, 360, and 361 in the next quarter.

Other projects and activities

Geosciences laboratory

The TAMU Geoscience XRF Core Scanner facility hosted four groups of scientists during this period for XRF scanning projects (mostly for large-scale postexpedition analysis). The facility was used approximately 80% of available days. Expedition 356 and 359 scientists were able to reschedule after last quarter's failure of the X-ray source and their work is largely caught up. IODP expedition scientists continue to request postexpedition XRF time: Expedition 356 scientists did a significant amount of work,

Expedition 359 work will begin early in next quarter, and Expedition 361 requests for XRF time were received during the quarter.

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. A JRSO Curatorial Specialist supervised shipboard core sampling during Expeditions 360 and 361 and reviewed all shipboard and moratorium-related requests in coordination with the other members of the expedition SAC.

Gulf Coast Repository activity

Sample requests

The following "Sample requests" table provides a summary of the 3,287 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. Public relations tours and educational visits to the repository are shown in the "GCR tours/visitors" table.

Sample request number, name, country	Number of samples taken	Number of cores XRF scanned	Number of cores Imaged	Number of visitors
37855IODP Ramos USA	36		19	
40243IODP Jean USA	1			
39851IODP Miller USA	12			
39306IODP Lee USA	59			
38838IODP Seyler Canada	14			
39072IODP Sucheras-Marx France	105			
39608IODP Marcott USA	10			
40114IODP Bradford USA	25			1
39087IODP Schwartz USA	13			
39136IODP Duggan USA	59			
37968IODP Marcott USA	15			
40523IODP Sibert USA	19			
38955IODP Peterson USA	147			
38475IODP Zellers USA	118			
40314IODP Bijl Netherlands	98			1
39877IODP Evangelinos Spain	1,220			6
38689IODP Waite USA	41			1
39077IODP Haynes USA	11			
40040IODP Noble Australia	43			

Sample request number, name, country	Number of samples taken	Number of cores XRF scanned	Number of cores Imaged	Number of visitors
38471IODP Huck United Kingdom	78			
38974IODP Straub USA	14			
39202IODP Noble Australia	43			
38760IODP Ford USA	26			
38364IODP Varkouhi United Kingdom	9			
38216IODP Suh USA	27			
39233IODP Dickson United Kingdom	24			
38354IODP Lewis USA	98			
38069IODP de Bar Netherlands	144			
38294IODP Lupi Italy	443			
36831IODP Lin USA	3			
38780IODP Fildani USA	3			
38727IODP Covoult USA	9			2
38227IODP Suh USA	94			
38529IODP Penkrot USA	5			1
38458IODP Penkrot USA	0	24		
37959IODP Gusarevich United Kingdom	126			1
38308IODP Cowan USA	60			
38427IODP Auerbach USA	5			
38138IODP Zellers USA	4			
37689IODP Vannucchi United Kingdom	26			
Tours/demonstrations				81
Totals	**3,287**	**24**	**19**	**94**

GCR tours/visitors

Type of tour or visitor	Number of Visitors
Scientist visitors	13
Educational tours/demonstrations (5)	81
Totals	**94**

Use of core collection

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

Other GCR activities

The GCR hosted the Expedition 356 Sample Party from 19 to 26 February 2016, during which 15,726 samples were taken by 26 expedition scientists.

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 Information Technology (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 360 (SW Indian Ridge Lower Crust and Moho) were added to the LIMS database on shore this quarter. These data are currently under moratorium and available only to the scientists who sailed on these expeditions. 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	854	USA	499
2	United Kingdom	672	Germany	247
3	Germany	198	Japan	194
4	France	100	United Kingdom	163
5	Canada	86	Unknown	116
6	Australia	73	China	73
7	China	73	France	47
8	Russia	71	Australia	46
9	Japan	50	India	32
10	Taiwan	45	Netherlands	28
	Others	298	Others	197
	Total	**2,520**	**Total**	**1,642**

Top 20 database web queries				
Rank	Janus database		LIMS database	
	Query	Downloads	Query	Downloads
1	Images—photo	1,826	Samples	1,064
2	Site summaries	902	Images—LSIMG	534
3	Samples	381	Section summaries	481
4	Core summaries	334	Images—core composites	428
5	Point calculations	318	Physical properties—GRA	291
6	Special holes	307	Hole summaries	232
7	Hole trivia	262	Core summaries	215
8	Chemistry—IW	243	Physical properties—RSC	200
9	Physical properties—MSL	230	Physical properties—NGR	197
10	Physical properties—GRA	229	DESC reports	191
11	Images—prime data images	179	Expanded NGR	178
12	Chemistry—rock eval	167	Physical properties—MS	146
13	Smear slides	160	Hole summary lists	123
14	Hole summaries	144	Chemistry—IW	103
15	Paleontology—range charts	133	Chemistry—carbonates	102
16	Chemistry—carbonates	125	Physical properties—MAD	94
17	Physical properties—color	114	Images—close-ups	83
18	Physical properties—MAD	111	Physical properties—RGB	79
19	Leg summaries	95	Images—TSImage	79
20	Paleontology—age models	93	Splice detail	70
	Others	1,495	Others	1,288
	Total	**7,848**	**Total**	**6,178**

Data requests submitted to the TAMU Data Librarian	
Requests	**Total**
How to	7
Samples	3
Images	2
Seismic	2
VCD	2
Datum	1
Drilling data	1
Chemistry—IW	1
Logging	1
MAD data	1
Magnetic susceptibility	1
Sections	1
Special cores	1
XRF	1
Total	**25**

Countries submitting data requests to the TAMU Data Librarian	
Country	**Total**
USA	16
United Kingdom	4
Netherlands	2
Canada	1
China	1
France	1
Total	**25**

Network systems operation, maintenance, and security

Satellite services

The JRSO is working with RigNet to add additional downlink bandwidth within the next year, which will satisfy one of the 2016 JRSO Site Visit Panel recommendations later endorsed by NSF. The JRSO also successfully implemented and tested wide area network (WAN) acceleration during Expedition 361, which significantly improved network throughput. The new WAN accelerator will be used for all future expeditions.

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, which has been extended because 2G Enterprises recently delayed the delivery date of the new magnetometer to mid-May at the earliest. Installation will likely occur during the Guam port call beginning 8 December 2016.

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 remains on track 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 Whole-Round Multisensor Logger (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

All work on this project was completed during FY15 Q4; however, the management team has approved a second change request to complete all documentation by 6 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

Testing determined that additional work is required to complete all project deliverables. The management team has approved a second change request to complete all deliverables by 16 May 2016.

Other projects and activities

CoreWall Correlator

Correlator developers and the JRSO released a fully functioning version of Correlator in time for use during Expedition 361, fixing a problem with incorrect generation of splice intervals.

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.

Scientific publications

JRSO publications

Scientific Prospectus

10.14379/iodp.sp.363.2016

Preliminary Report

10.14379/iodp.pr.359.2016

USIO publications

Data reports

10.2204/iodp.proc.318.202.2016

10.2204/iodp.proc.320321.219.2016

10.2204/iodp.proc.335.203.2016

10.2204/iodp.proc.341.201.2016

10.2204/iodp.proc.344.205.2016

CDEX publications

Data reports

10.2204/iodp.proc.338.204.2016

10.2204/iodp.proc.343343T.204.2016

ESO publications

Scientific Prospectus

10.14379/iodp.sp.364.2016

Citation management

Scientific publication digital object identifiers

Reports and publications	Digital object identifier (DOI) prefix	Number of online DOI resolutions			
		January 2016	February 2016	March 2016	FY16 Q2 total
IODP	10.14379	337	669	631	**1,637**
Integrated Ocean Drilling Program	10.2204	2,375	6,804	5,281	**14,460**
ODP/DSDP	10.2973	17,082	12,310	8,391	**37,783**

ANZIC citation report

IODP Publication Services prepared citation data for the Australia-New Zealand IODP Consortium (ANZIC) this quarter for use in their annual report. The data were derived from the Ocean Drilling Citation subset of the American Geosciences Institute (AGI) GeoRef database.

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 and data reports related to Expeditions 317, 318, 323, 331, 338–344, and 347–349 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 21,895 site visits and 230,130 page views.

JRSO expedition science outreach support

JRSO staff provided support to the onboard Education Officers during Expedition 360 and 361 and also assisted with planning for Expeditions 360/361 and 363 port call public relations and outreach activities in Mauritius and Cape Town, South Africa, respectively.

Staff Scientist science engagement activities

Students who are doing projects with JRSO Staff Scientists presented their work at the TAMU Student Research Week on 30 March 2016. One of these students also won first place at the TAMU Geology & Geophysics Student Research Symposium on 31 March.

Abstracts authored by JRSO staff

The following abstract from FY16 Q1 was missing from the first quarterly report.

Geosciences Conference 2015

- Shepherd, C.L., **Kulhanek, D.K.**, and Hollis, C.J., 2015. Termination of the early Eocene climatic optimum in the Southwest Pacific: calcareous nannofossil paleobiogeography and paleoclimatic implications [presented at the Geosciences 2015 Meeting, Wellington, New Zealand, 24–27 November 2015].

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 (iodp.tamu.edu/publications/citations/database.html) and the IODP Expedition-related bibliography (iodp.tamu.edu/publications/citations.html).

- **Alvarez Zarikian, C.A.,** 2016. Pleistocene deep sea ostracods from the Bering Sea (IODP Expedition 323. *Deep Sea Research, Part II: Topical Studies in Oceanography,* 125–126:96–106. http://dx.doi.org/ /10.1016/j.dsr2.2014.05.010
- Asahi, H., Kender, S., Ikehara, M., Sakamoto, T., Takahashi, K., Ravelo, A.C., **Alvarez Zarikian, C.A.,** Khim, B.K., and Leng, M.J., 2016. Orbital-scale benthic foraminiferal oxygen isotope stratigraphy at the northern Bering Sea Slope Site U1343 (IODP Expedition 323) and its Pleistocene paleoceanographic significance. *Deep-Sea Research, Part II: Topical Studies in Oceanography,* 125–126:66–83.. http://dx.doi.org/10.1016/j.dsr2.2014.01.004
- Engel, M., Jacobson, K., Boldt, K., Frenzel, P., Katsonopoulou, D., Soter, S., **Alvarez Zarikian, C.A.,** and Brückner, H., 2016. New sediment cores reveal environmental changes driven by tectonic processes at ancient Helike, Greece. *Geoarchaeology,* 31(2):140–155. http://dx.doi.org/10.1002/gea.21540

The following article from FY16 Q1 was missing from the first quarterly report.

- **Kulhanek, D.K.,** Crouch, E.M., Taylor, M.J.S., and Hollis, C.J., 2015. Paleocene calcareous nannofossils from East Coast, New Zealand: biostratigraphy and paleoecology. *Journal of Nannoplankton Research,* 35(2):155–176.

Appendix: JRSO quarterly report distribution

J. Allan, NSF, USA, jallan@nsf.gov

T. Janecek, NSF, USA, tjanecek@nsf.gov

T. Kashmer, NSF, USA, tkashmer@nsf.gov

K. Miller, Texas A&M University, USA, kcmiller@tamu.edu

A. Koppers, JRFB Chair, Oregon State University, USA, akoppers@coas.oregonstate.edu

G. Camoin, JRFB Member, European Management Agency, CEREGE, France, camoin@cerege.fr

Á. Pentado Crósta, JRFB Member, CAPES, Brazil, alvaro@ige.unicamp.br

B.K. Bansal, JRFB Member, MoES, India, bansalbk@nic.in

Q. Sun, JRFB Member, MOST, China, sunqing@acca21.org.cn

M. Coffin, JRFB Member, ANZIC, University of Tasmania, Australia, Mike.Coffin@utas.edu.au

G.Y. Kim, JRGB Member, KIGAM, Korea, gykim@kigam.re.kr

R. Anma, JRFB Member, University of Tsukuba, Japan, ranma@sakura.cc.tsukuba.ac.jp

C. Neal, JRFB Member, University of Notre Dame, USA, neal.1@nd.edu

C. Ravelo, JRFB Member, University of California Santa Cruz, USA, acr@ucsc.edu

A. Roberts, JRFB Member, Australian National University, Australia, andrew.roberts@anu.edu.au

P. Wilson, JRFB Member, University of Southampton, United Kingdom, paul.wilson@noc.soton.ac.uk

J. Austin, JRFB Liaison, IODP Forum, University of Texas at Austin, USA, jamie@utig.ig.utexas.edu

R. Gatliff, JRFB Liaison, ESO, British Geological Survey, United Kingdom, rwga@bgs.ac.uk

H. Given, JRFB Liaison, IODP Support Office, Scripps Institution of Oceanography, USA, hgiven@ucsd.edu

B. Katz, JRFB Liaison, EPSP Chair, Chevron Corporation, USA, BarryKatz@chevron.com

S. Kuramoto, JRFB Liaison, CDEX, JAMSTEC, Japan, s.kuramoto@jamstec.go.jp

G. Lericolais, JRFB Liaison, ECORD Facility Board Chair, IFREMER, France, Gilles.lericolais@ifremer.fr

D. Mallinson, JRFB Liaison, SEP Co-Chair, East Carolina University, USA, MALLINSOND@ecu.edu

K. Miller, JRFB Liaison, SEP Chair, Rutgers University, USA, kgm@rci.rutgers.edu

Y. Tatsumi, JRFB Liaison, CIB Chair, Kobe University, Japan, tatsumi@diamond.kobe-u.ac.jp