Nov 30, 2011

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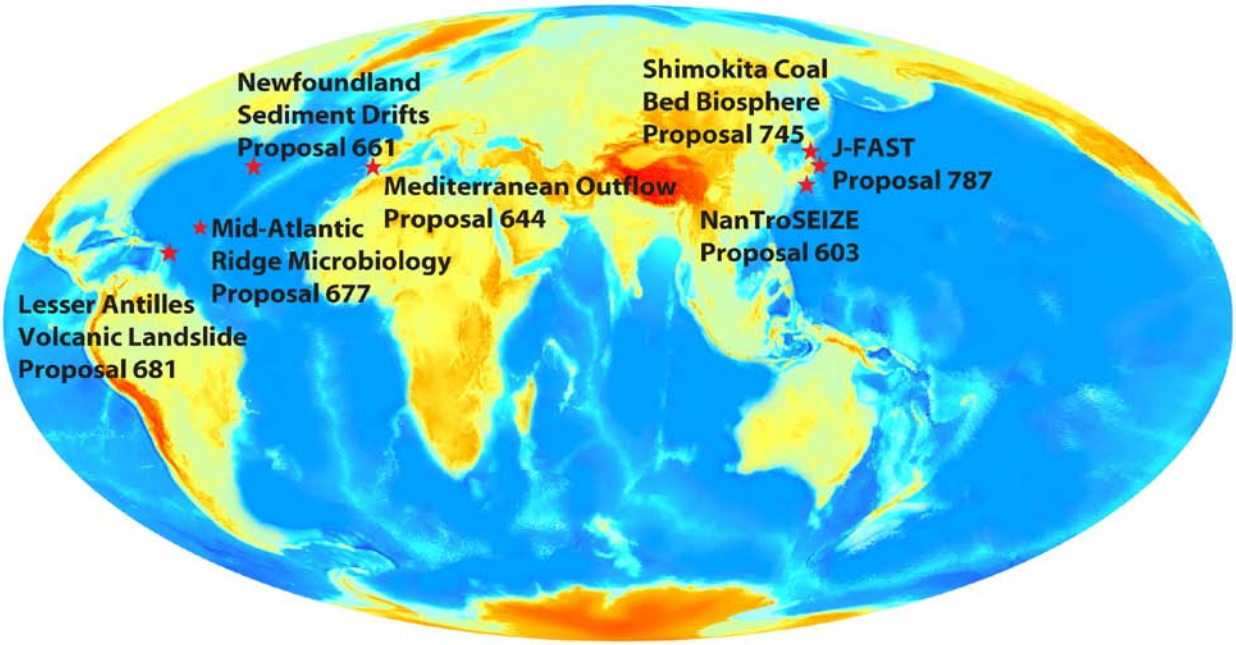
Annual Program Plan 2012

Integrated Ocean Drilling Program

IODP

INTEGRATED OCEAN DRILLING PROGRAM



Annual Program Plan FY2012

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1 Introduction

The Integrated Ocean Drilling Program (IODP) is an international partnership of scientists and research institutions established to explore Earth's history and structure as recorded in the ocean areas. IODP provides sediment and rock samples (cores), shipboard and shore-based facilities to study the samples, downhole geophysical and geochemical measurements (logging/petrophysics),and opportunities for special experiments (i.e., seafloor and subseafloor observatories) to determine in-situ conditions beneath the seafloor. IODP studies will lead to better understanding of plate tectonic processes, Earth's crustal structure and composition, environmental conditions, life in ancient oceans, and climate change. IODP program plan is the Initial Science Plan (ISP).

IODP is sponsored by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the U.S. National Science Foundation (NSF) as Lead Agencies; by the European Consortium for Ocean Research Drilling (ECORD); the People's Republic of China Ministry of Science and Technology (MOST); the Interim Asian Consortium (KIGAM); the Ministry of Earth Science of India (MoES), and the Australia-New Zealand IODP Consortium (ANZIC).

FY2012 is the ninth year of the 10-year program. In FY2011, the *JOIDES Resolution* (JR) continued operation in the Pacific Ocean and is scheduled to enter the Atlantic from September 2011, which is the fifth Expedition of FY2011. FY2012 will see 4 Expeditions in the Atlantic for deep biosphere, paleoclimate, paleoceanography and volcanism themes. The *Chikyu* operation of the NanTroSEIZE project Stage III will continue to challenge the deep riser target in FY2012 to 2013. Another deep riser target for microbiology will be conducted as Complementary Project borne out of non-IODP funding but conducted under IODP principles and with IODP science support. The Mission Specific Platform operation will not occur in FY2012 but will prepare for an FY2013 operation.

The year-round operations of *JR* and *Chikyu* in the remainder of the 10-year program will continue to require extra efforts for the IOs to either engage in non-IODP activities or invite outside funding sources to conduct operations under IODP umbrella. In this regard, FY12 plan includes a complementary project proposal implementation by CDEX, which succeeded in securing non-IODP source of funding to complement the expedition cost. Achieving ISP goals in the face of rising costs requires careful planning of ship tracks to achieve longer scientific drilling time.

The five major functions of IODP-MI are; (1) science support and review, (2) operation support and review, (3) engineering development, (4) data management and publications, and (5) outreach. The remaining 2 years are an important time period for renewal of the IODP to International Ocean Discovery Program for 2013-2023. With the New Science Plan in hand and the new Science Advisory Structure implemented, we are already positioning ourselves for the next decade. IODP-MI will continue to be active in all 5 functions as well as preparing for the next phase of IODP.

1.1 Summary of FY2010-2011 Activities

1.1.1 Summary of FY2010-2011 Expeditions (actual since October 1, 2009: #317-318; 324-336)

Expedition	Title	Note
#324-JR Sep '09 - Nov	Shatsky Rise	As scheduled
#317-JR Nov - Jan '10	Canterbury Basin	As scheduled
#318-JR Jan '10 - Mar	Wilkes Land	As scheduled
#325-MSP Feb - Apr	Great Barrier Reef	As scheduled
#326-C Jul - Aug	NantroSEIZE Stage 3 Top Hole	As scheduled
#327-JR Jul - Sep	Juan de Fuca Hydrogeology	As scheduled
#331-C Sep - Oct	Okinawa Hot Biosphere (not full Exp)	As scheduled
#328-JR Sep	Cascadia CORK APL	As scheduled
#329-JR Oct - Dec	South Pacific Gyre	As scheduled
#332/333-C Oct – Jan '11	NantroSEIZE Stage 2	As scheduled
#330-JR Dec – Feb '11	Louisville Seamount Trail	As scheduled
#334-JR Mar - Apr	CRISP A	As scheduled
#335-JR Apr - Jun	Superfast Spreading Crust	2 wks extension
#336-JR Sep - Nov	Mid-Atlantic Microbiology	Not complted yet

Scheduled but postponed expedition is #337 Shimokita-oki Microbiology CPP due to the March 11 Tohoku Earthquake Tsunami.

- Expeditions #319-323 were completed in FY2009.

2 Budget Summary

This Program Plan budget identifies a total program cost of $138,644,792 for FY2012 (see **Tables APP-1, APP-2 and APP-3**) to meet the high scientific priority needs identified by the SAS. Of this cost, 17% is Science Operation Costs (SOCs) and the remaining 83% is Platform Operation Costs (POCs). SOCs and POCs are originally defined in Annex I of the MOU between the Lead Agencies, NSF and MEXT. Following the latest POC-SOC guidance from Lead Agencies, the Operational SOC of USIO as defined by NSF in October 2007 and was effective for FY08-10 is categorized as POC to simplify budgetary accounting and provide budget clarity consistent with contractual funding. **Table APP-4** is the summary of IODP-MI Contract Budget for FY2012.

	IODP-MI	IODP-MI Operators & Subcontractors				Total
		USIO	CDEX	ESO	Bremen	
SOCs	5,791,730	4,196,305	9,935,434	2,962,639	348,259	$23,234,367
POCs	-	66,951,209	38,314,999	10,144,218	-	$115,410,426
Total	$5,791,730	$71,147,513	$48,250,432	$13,106,858	$348,259	$138,644,792

Table APP- 1: Summary IODP Budget for FY2012

Description	IODP-MI	USIO	CDEX	ESO	Bremen	Total
Management and Administration	3,730,105	657,926	783,113	839,071	-	$ 6,010,215
Technical, Engineering and Science Support		427,435	7,489,649	1,562,556	-	$ 9,479,640
Engineering Development	545,000	57,999	-	-	-	$ 602,999
Core Curation	-	391,862	591,696	83,429	348,259	$ 1,415,246
Data Management	629,922	1,058,768	770,088	336,884	-	$ 2,795,662
Publications	248,416	1,503,852	-	-	-	$ 1,752,268
Outreach	638,287	98,463	300,888	140,700	-	$ 1,178,338
Total	$ 5,791,730	$ 4,196,305	$ 9,935,434	$ 2,962,639	$ 348,259	$ 23,234,367

Table APP- 2: SOC Budget Summary for FY2012

Description	IODP-MI	USIO	CDEX	ESO	Bremen	Total
Management and Administration	-	3,961,293	824,500	286,593	-	$ 5,072,386
Technical, Engineering and Science Support	-	60,470,125	37,266,854	9,857,625	-	$ 107,594,604
Engineering Development	-	99,750	-	-	-	$ 99,750
Core Curation	-	124,288	15,000	-	-	$ 139,288
Data Management	-	2,182,956	-	-	-	$ 2,182,956
Publications	-	112,797	-	-	-	$ 112,797
Outreach	-	-	208,645	-	-	$ 208,645
Total	$ -	$66,951,209	$ 38,314,999	$10,144,218	$ -	$ 115,410,426

Table APP- 3: POC Budget Summary for FY2012

Description	IODP-MI	USIO	CDEX	Bremen	Total
Management and Administration	3,730,105	657,926	783,113	-	$ 5,171,144
Technical, Engineering and Science Support		427,435	7,489,649	-	$ 7,917,084
Engineering Development	545,000	57,999	-	-	$ 602,999
Core Curation	-	391,862	591,696	348,259	$ 1,331,817
Data Management	629,922	1,058,768	770,088	-	$ 2,458,778
Publications	248,416	1,503,852	-	-	$ 1,752,268
Outreach	638,287	98,463	300,888	-	$ 1,037,638
Total	$ 5,791,730	$ 4,196,305	$ 9,935,434	$ 348,259	$ 20,271,728

Table APP- 4: IODP-MI Contract Budget Summary for FY2012

IODP-MI's budget is $5,791,730 (100% SOC). This includes the costs for providing necessary integration/coordination functions to IODP as the Central Management Office/Organization. In FY2010, IODP-MI's organization and offices locations changed; the new Tokyo Office in the Etchujima campus of Tokyo University of Marine Science and Technology (TUMSAT) houses the headquarters function combining the science planning and operations managements. A Japanese corporation (*Ippan Shadan Hojin* (General Corporation) IODP-MI; ISHI) for IODP-MI operations in Tokyo was established in November, 2009. A downsized DC Office retains the accounting and contracting functions for a smooth international operation of IODP-MI. The details of the IODP-MI activities are described in **Appendix A**, which describes both the IODP-MI (US) and ISHI (Japan) activities. Also, the site survey database subcontract is included and not described separately.

The **USIO** budget is $71,147,513 (6% SOC; 94% POC). The USIO SOC budget of $4,196,305 includes costs for Management and Administration (M&A), Technical, Engineering, and Science Support (TESS), Engineering Development, Core Curation, Data Management, Publications and Outreach. The details of the USIO activities are described in **Appendix B**.

The **CDEX** budget is $48,250,432 (21% SOC; 79% POC). The CDEX SOC budget of $9,935,434 includes costs for Management and Administration (M&A), Technical, Engineering and Science Support (TESS), Core Curation, Data Management and Outreach. The details of the CDEX activities are described in **Appendix C**.

The **ESO** budget is directly funded through **EMA**. The ESO budget is $13,106,858(23% SOC, 77% POC). The ESO SOC of $2,962,639 includes support for planning for MSP expeditions in FY12-13 including preparing for the Chicxulub Drilling Proposal (#548), as well as associated costs for M&A, TESS, Core Curation, Data Management and Outreach. The details of the ESO activities are described in **Appendix D**.

The University of Bremen Core Repository budget is $348,259 (100% SOC). These funds are primarily for personnel and operating costs associated with IODP/ODP core sampling and core archiving operations separated from ESO Core Curation budget. The details of the BCR activities are described in **Appendix E**.

3 Organizational Structure

3.1 Organizational Framework

IODP operations are based on three components:

The Central Management Office (CMO):

IODP Management International, Inc. (IODP-MI) has received a 10-year contract from the Lead Agencies to run the CMO.

The Implementing Organizations (IOs):

There are three IOs:

1. The USIO is responsible for operations of the riserless vessel, the *JOIDES Resolution.*
2. Center for Deep Earth Exploration (CDEX), which is responsible for the riser-equipped ship, *Chikyu*.
3. ECORD Science Operator (ESO), which is responsible for mission-specific platforms (MSPs).

The Science Advisory Structure (SAS):

The IODP Science Advisory Structure consists of scientists, engineers, and technologists designated by IODP member organizations.

According to the principles upon which the program was founded, IODP "Science Operations Costs" (SOCs) will be, in principle, supplied to the nonprofit corporation known as IODP Management International, Inc. (IODP-MI), the IODP Central Management Organization (see **Fig. APP-1**). In turn, IODP-MI distributes SOCs to IOs (drilling operators) and to other subcontractors according to the budgets outlined in this and subsequent IODP Annual Program Plans (APPs). SOC funds are collected from IODP Members, commingled by the U.S. NSF, and provided through contract to IODP-MI (see **Fig. APP-1**). The flow of USIO SOC operations funding became an exception as described in Section 2, but the SOC operations USIO activities remain under the umbrella of IODP-MI.

Currently, IODP members are: the U.S.A. represented by the National Science Foundation (NSF); Japan, as represented by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT); the European Consortium for Ocean Drilling (ECORD) as represented by the ECORD Management Agency (EMA); the People's Republic of China as represented by the Ministry of Science and Technology (MOST); the Interim Asian Consortium represented by the Korea Institute of Geoscience and Mineral Resources (KIGAM); India as represented by the Ministry of Earth Sciences of India (MoES); and the Australia-New Zealand IODP Consortium (ANZIC). The NSF and MEXT are designated as Lead Agencies; EMA is a Contributing Member; and MOST, KIGAM, MoES, and ANZIC are Associate Members.

As detailed in **Figure APP-1,** Platform Operations Costs (POCs) are supplied directly from individual funding agencies of the countries or consortia operating IODP drilling assets: from

NSF to the USIO (Consortium for Ocean Leadership, Inc., Texas A&M University [TAMU], Lamont-Doherty Earth Observatory [LDEO] of Columbia University) for operation of the SODV; from MEXT to CDEX for the riser-equipped ship *Chikyu*; and from ECORD to ESO for MSP operations.

The technical management relationship consists of the following components:

a. Overall central management tasks and responsibilities for science operations by IODP-MI
b. Science advice provided by the SAS, supported by a planning office at IODP-MI
c. Multiple IOs, as listed above – USIO, ESO, and CDEX

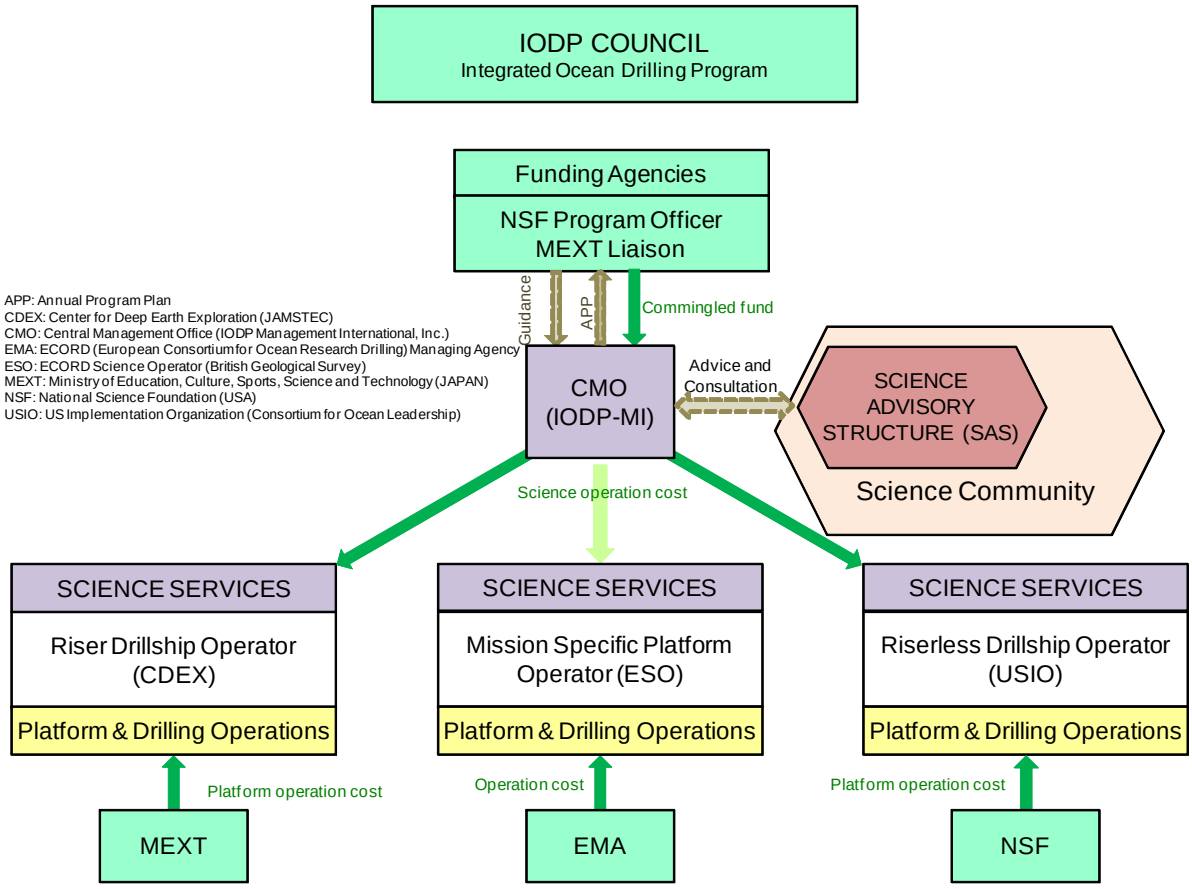

Figure APP- 1: IODP Program Management Structure (in principle).
SOCs and POCs are detailed in accompanying budgets, both in the Program Plan and in Appendices A-E. The funding agencies consist of NSF and MEXT (as Lead Agencies), EMA as a Contributing Member, MOST, the Interim Asian Consortium, MOES, and ANZIC as Associate Members. Solid arrows indicate flow of funds. Dotted arrows indicate flow of advice.

3.2 IODP-Management International – the Central Management Office/Organization

A Central Management Office (CMO) was established with the concurrence of MEXT and NSF to develop and manage IODP science operations and implementation plans. CMO functions are provided by IODP-MI through a 10-year contract with NSF (**Appendix A**). The CMO: a) receives advice and recommendations from SAS on scientific priorities and plans; b) requests

plans from IOs responsive to this advice; and c) works with IOs and the SAS to produce an integrated IODP Annual Program Plan (APP) (Fig. APP-2).

IODP-MI submits the program's Annual Program Plan to SASEC, which is the executive authority of the SAS (until end of September 2011) and a committee of IODP-MI Board of Governors (BoG), for review and approval prior to consideration by the IODP-MI BoG and Lead Agencies. The NSF is responsible for contractual approval of the Annual Program Plan (APP) in consultation with MEXT. After Lead Agencies' approval, any significant changes in the Annual Program Plan are to be considered and approved by IODP-MI and the Lead Agencies prior to implementation, in consultation with the SASEC and the IOs, as appropriate. Since a new SAS (Fig. APP-2) will be implemented by October 1st, this procedure will change during FY12.

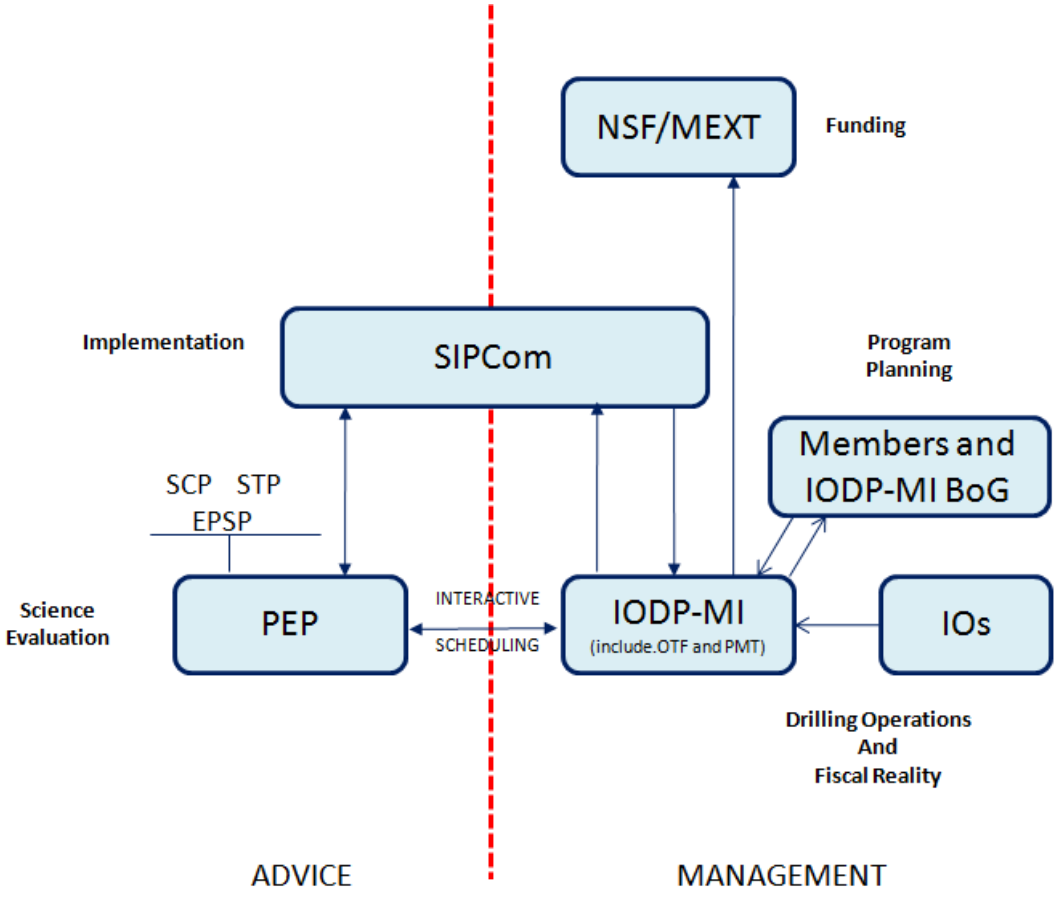

Figure APP- 2: The flow of scientific advice towards expedition scheduling.
Scientific advice to the IODP management structure occurs via advisory panels and committees. Scientific planning for the IODP is provided by a Science Advisory Structure (SAS) led by the Science Implementation and Policy Committee (SIPCOM). IODP-Management International, Inc. (IODP-MI) is the Central Management Organization (CMO) that translates the scientific priorities of the ocean-drilling community into program plans to carry out scientific IODP operations. It does so based on advice from the international IODP Science Advisory Structure (SAS), and in consultation with vessel operators or IOs.

The Annual Program Plan is to be consistent with budget guidance provided to IODP-MI by the Lead Agencies. The Annual Program Plan includes a presentation of total program costs, which include both SOCs and POCs. IODP-MI will manage SOC funds provided under contract with the NSF. Starting FY10, SOC for ESO is provided directly through EMA. The NSF is

expected to administer the contract with due consideration to the interests of MEXT. POCs will be provided directly to the IOs from the Lead Agencies and EMA (Fig. APP-1).

3.3 Implementing Organizations (IOs)

Riserless drilling capability is supplied by the NSF through a contract to the USIO, which consists of Ocean Leadership, Inc., the prime contractor and overall manager; Texas A&M University (TAMU), the subcontractor that operates the riserless drillship and provides associated services and functions such as expedition staffing, logistics, program-specific engineering development and operations, shipboard laboratories, curation, and distribution of core samples and data; and Lamont-Doherty Earth Observatory (LDEO) of Columbia University, responsible for geophysical and geochemical logging services aboard the riserless vessel, and involving acquisition, processing and interpretation of logging measurements. Details of the USIO and its operational plans for FY2012 are presented in **Appendix B**.

Riser-equipped drilling capability, by way of the vessel *Chikyu,* is supplied by CDEX (see **Appendix C**). CDEX is part of the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). CDEX also operates the Kochi Core Center Repository (KCC).

MSP drilling, sampling, and logging capability is supplied by the ESO (see **Appendix D**), a consortium led by the British Geological Survey (BGS), which conducts MSP operations and program-specific engineering development; the European Petrophysics Consortium (EPC) which provides logging services, and the University of Bremen which provides repository services for MSP samples and cores. The ESO has a contractual arrangement with the EMA, affiliated with the Centre Nationale de la Recherche Scientifique (CNRS) based in Paris. Details of ESO and its operational plans for FY2012 are presented in **Appendix D**. ESO will utilize Bremen curatorial personnel and services during actual MSP operations. These ESO funds are separate from the normal IODP core archive and sampling operations proposed by Bremen in the Annual Program Plan (See **Appendix E**).

3.4 Science Advisory Structure (SAS)

The SAS provides long-term guidance on the scientific planning of the IODP and recommends annual science and engineering (until end of September 2011) plans based on proposals from the international science community. The SAS in 2012 consists of the Science Implementation and Policy Committee (SIPCOM), the Proposal Evaluation Panel (PEP), as well as several advisory panels (see Fig. APP-3) and in total comprise approximately one hundred scientists from the international geoscience community in IODP member countries and consortia. In January 2008, SASEC decided to name a standing budget subcommittee, which will review the APP for FY12. SIPCOM will in 2012 arrange itself prior to and during its inaugural meeting in January 2012.

SIPCOM is hosted and supported in its work by IODP-MI, and reports to the Program Governing Board (PGB). The SIPCOM in conjunction with the IODP-MI Operations Task Force (OTF) determines drilling schedules, and provides scientific oversight and long-term planning to the program including approval of regional and thematic workshops for which program funds are requested. An important responsibility of the PEP is to review all drilling proposals and related workshop proposals, and to forward with detailed review comments those proposals that are deemed most competitive and ready to implement to the OTF and

SIPCOM for consideration of implementation. It considers recommendations from the various SAS support panels and is the focus of scientific review of drilling proposals for IODP.

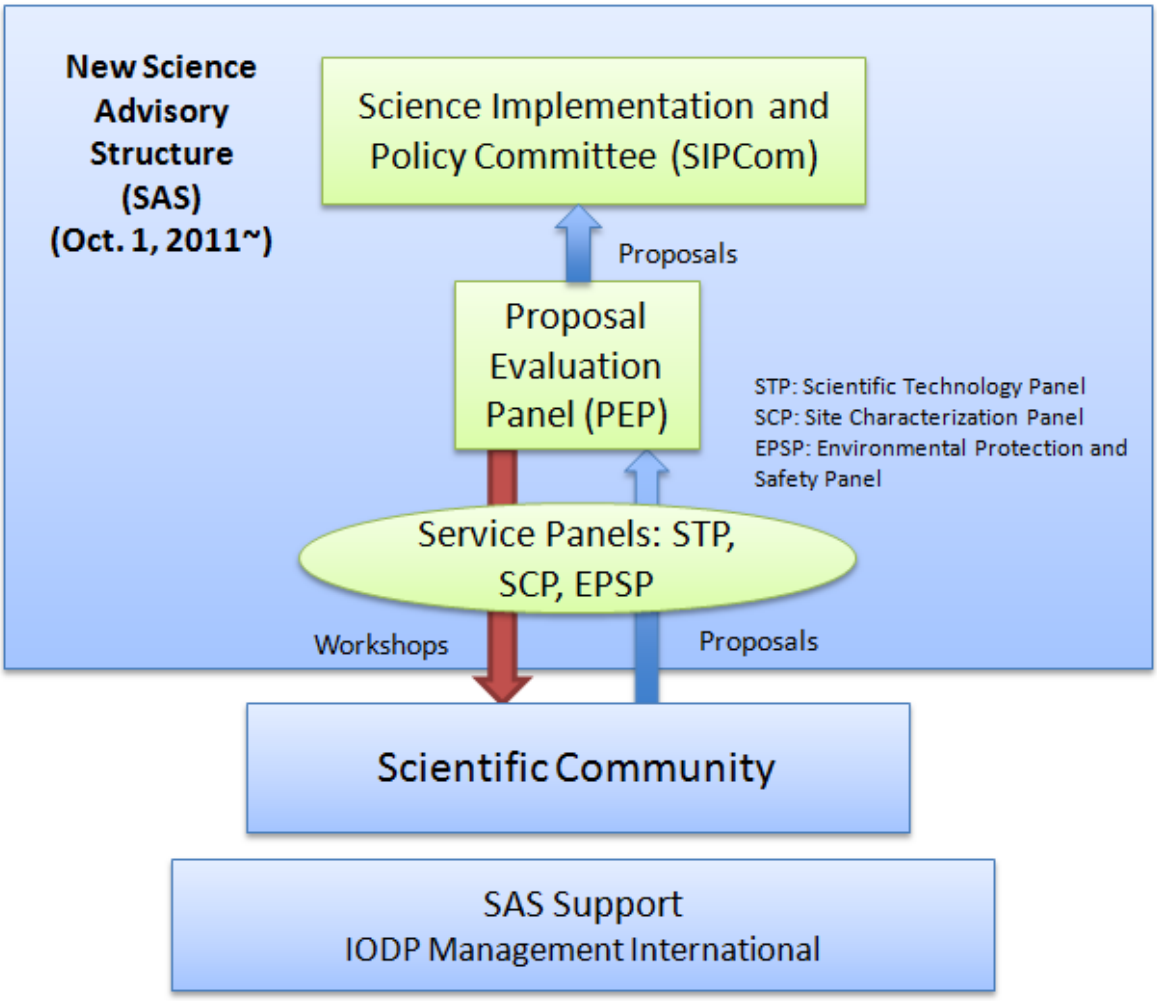

Figure APP- 3: IODP Science Advisory Structure (SAS). This new SAS scheme starts from FY12.

4 FY12 Expedition Operations

4.1 FY2012 Schedule

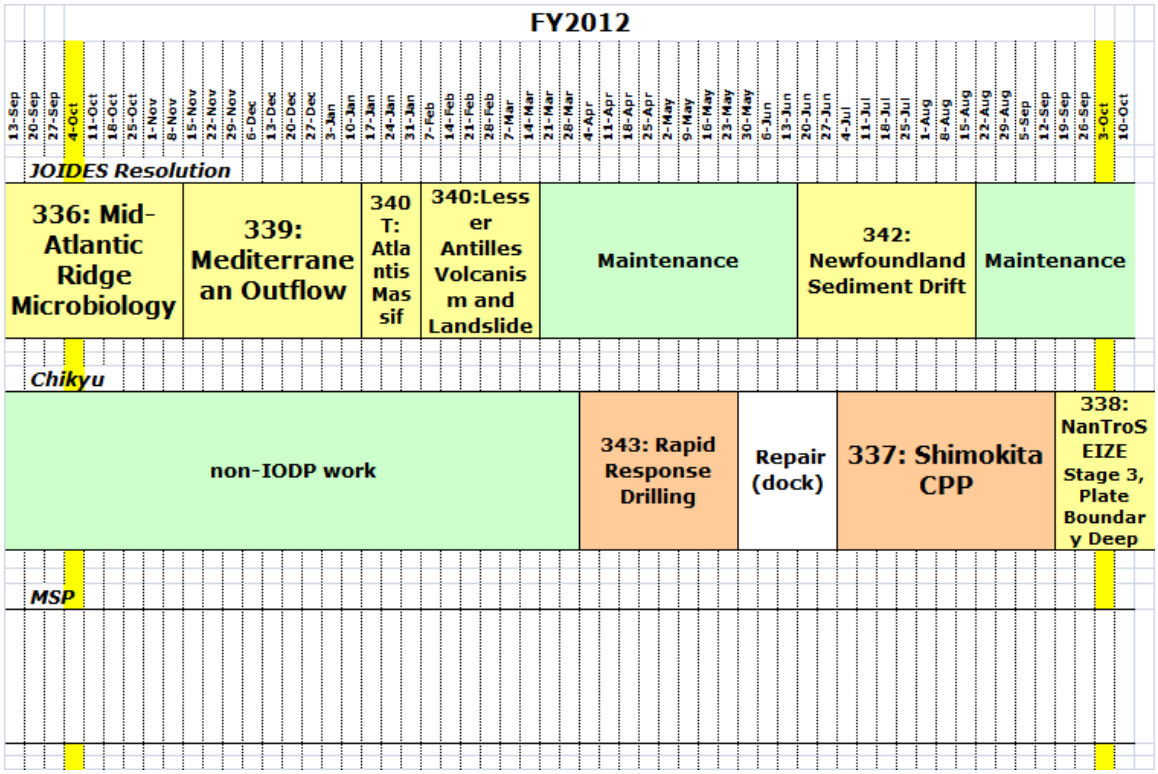

Figure APP- 4: Operation Schedule for FY2012.

USIO

The USIO plans to conduct eight months of operations (five expeditions) in FY2012, with four expeditions including a short one (about 3 weeks long) residing entirely within the fiscal year in the Atlantic Ocean area. The FY2012 program will begin with the continuation of the major portion of the Mid-Atlantic Microbiology expedition, and followed by Mediterranean Outflow expedition. The *JOIDES Resolution* will then conduct a short (20-day) Atlantis Massif Oceanic Core Complex and on to Lesser Antilles Volcanism and Landslides expedition before a three-month maintenance period. *JOIDES Resolution* will resume IODP activity in mid-June 2012 for Newfoundland Sediment Drift expedition before entering its second maintenance period (45 days through mid-October, 2012).

CDEX

FY2012 operations for *Chikyu* will consist of the rapid response drilling (RRD/J Fast) into the seismic fault zone of the Tohoku earthquake (The 2011 of the Pacific Coast of Tohoku Earthquake and Tsunami, M9.0) occurred on 2011 March 11, the first IODP CPP (Complementary Project Proposal) expedition at Shimokita-Oki enabled by additional non-IODP source of funding, and continuing efforts toward completion of the NanTroSEIZE program. The RRD will be drilling up to 1 km in near 7km water depth. The latter two expeditions aim for deep riser targets offshore Japan. The dock work includes replacement of the missing thruster (one of six) scheduled in mid 2012.

ESO

In order to implement at least one MSP expedition by the end of the program, the FY2012 activities of ESO will center around the planning of at least one of the following: Chicxulub impact crater; Hawaiian drowned reefs; Baltic Sea paleoenvironment; and Atlantis Massif seafloor processes. The planned hazard survey for the Chicxulub proposal will be conducted based on the POC cost included in FY2011 budget in FY2012 if required.

4.2 USIO Operations

4.2.1 Mid-Atlantic Ridge Microbiology

4.2.1.1 *Proposed Operations*

Mid-Atlantic Ridge Microbiology will install multilevel subseafloor borehole observatories (circulation obviation retrofit kits) at three sites (395A, NP-1, and NP-2) for long-term coupled microbiological, biogeochemical, and hydrological experiments. The basaltic crust will also be characterized by coring parts of the crust, collecting downhole in situ petrophysical data by wireline logging, and conducting hydrologic (packer) experiments. Coring at four sites will characterize the overlying sediment section.

4.2.1.2 *Logistics*

Operations for the Mid-Atlantic Microbiology Expedition require an estimated 62 days (2 in port, 10 in transit to and from the first/last sites, and 50 in operations).

4.2.1.3 *Core Storage*

Cores for the Mid-Atlantic Microbiology Expedition will be stored at the Bremen Core Repository.

4.2.2 Mediterranean Outflow

4.2.2.1 *Proposed Operations*

Mediterranean Outflow will core and log at six sites to obtain a Pliocene– Quaternary sedimentary record to understand the paleoceanography and global climate significance of Mediterranean Outflow Water, the influence of the Gibraltar Gateway, sea level changes and sediment architecture of the Cadiz contourite depositional system (CDS) and Iberian margin, and the synsedimentary neotectonic control on architecture and evolution of the CDS. In addition, to address Ancillary Project Letter (APL) 763, one site will be cored to obtain a high-fidelity record of millennial-scale climate variability for the Pleistocene to serve as a marine reference section of Pleistocene climate variability.

4.2.2.2 *Logistics*

Operations for the Mediterranean Outflow Expedition require an estimated 61 days (5 in port, 5 in transit, and 51 in operations).

4.2.2.3 *Core Storage*

Cores for the Mediterranean Outflow Expedition will be stored at the Bremen Core Repository.

4.2.3 Atlantic Massif Ocean Core Complex

4.2.3.1 *Proposed Operations*

Atlantis Massif Oceanic Core Complex will re-enter Hole U1309D for a check shot survey and wireline logging to provide velocity, porosity, and impedance contrasts to determine the relationship between measured seismic reflectivity and downhole geologic characteristics in the domal core of Atlantis Massif.

4.2.3.2 *Logistics*

Operations for the Atlantis Massif Oceanic Core Complex Expedition require an estimated 20 days (5 in port, 12, and 3 in operations).

4.2.3.3 *Core Storage*

No Cores will be collected for the Atlantic Massif Oceanic Core Complex.

4.2.4 Lesser Antilles Volcanism and Landslides

4.2.4.1 *Proposed Operations*

Lesser Antilles will core and log at a suite of sites to obtain a complete record of eruptive activity and volcanoclastic sedimentation of the most active volcanic complexes of the Lesser Antilles arc (Martinique, Dominica, Montserrat) over the last 1 to 5 m.y., focusing on edifice collapse and debris-avalanche emplacement, a dominant process in Caribbean volcanism. The results will have implications for hazard assessment and significantly improve our understanding of the history and long-term magmatic evolution of the arc.

4.2.4.2 *Logistics*

Operations for the Lesser Antilles Expedition are budgeted based on an estimated 41 days (1 in port, 2 in transit, and 38 in operations).

4.2.4.3 *Core Storage*

Cores for the Lesser Antilles Expedition will be stored at the Bremen Core Repository.

4.2.5 Newfoundland Sediment Drifts

4.2.5.1 *Proposed Operations*

Newfoundland Sediment Drifts will core and log a depth transect between 2400 m and 5000 m water depth into a sequence of sediment drifts of late Cretaceous-Oligocene age on the J Anomaly and SE Newfoundland Ridges. The drilling area contains an extensive record of early Late Cretaceous and Paleogene “extreme climate” events and the possible onset of Northern Hemisphere glaciation in the Eocene. In addition, engineering tests will be conducted on the Motion Decoupled Hydraulic Delivery System, which, if successful, will provide more isolation from drill string movement during deployment of wireline temperature and pressure probes than the collated delivery system.

4.2.5.2 *Logistics*

Operations for the Newfoundland Sediment Drifts Expedition are budgeted based on an estimated 60 days (4 in port, 11 in transit, and 45 in operations).

4.2.5.3 *Core Storage*

Cores for the Mid-Atlantic Microbiology Expedition will be stored at the Bremen Core Repository.

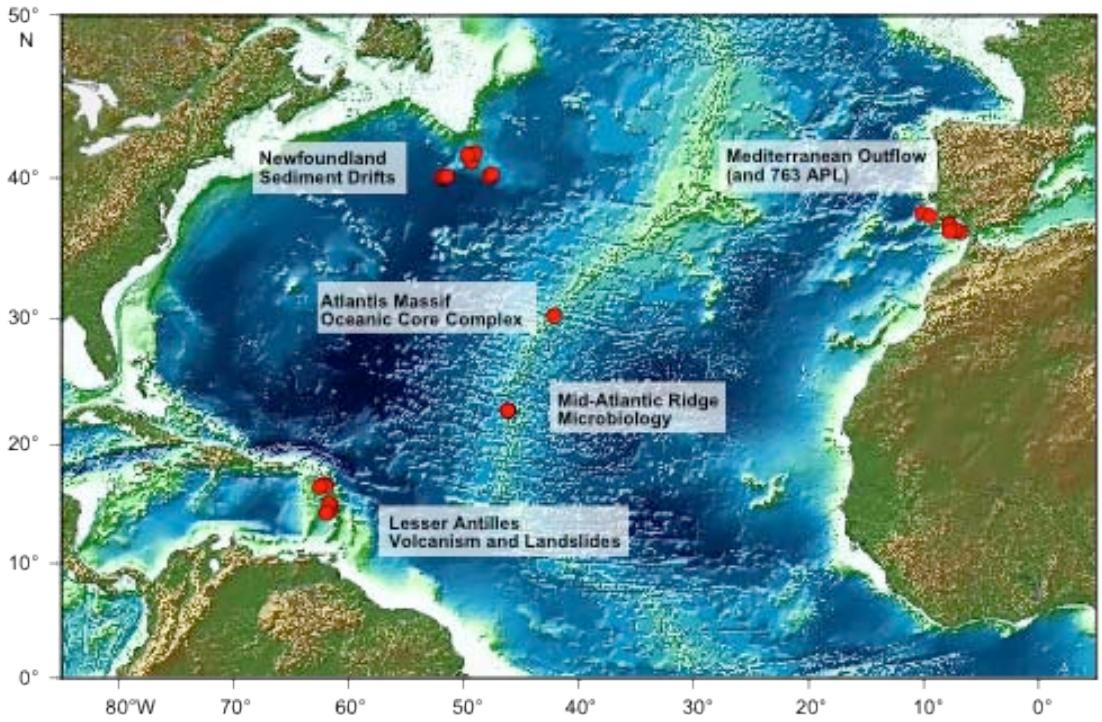

Figure APP- 5: IODP-USIO FY12 Site Map.

4.3 CDEX Operations

FY2012 operations for *Chikyu* will consist of conducting the Rapid Response Drilling into the 2011 Tohoku Earthquake fault, the delayed Coal-bed biosphere expedition and continuing efforts toward completion of the NanTroSEIZE program. From fall 2012, *Chikyu* will resume IODP operations with the start of riser drilling at site C0002, where drilling will proceed intermittently over two years (2012-2013) to reach the megasplay fault, décollement, and the oceanic crust, with an expected total depth of drilling to >5,000 m below sea floor. The ultimate goal remains > 7,000 mbsf to penetrate the plate boundary fault.

4.3.1 Expedition 343: J Fast (The Tohoku Earthquake Rapid Response Drilling)

4.3.1.1 *Proposed Operations*

The 2011 Tohoku Earthquake (March 11, Mw 9.0) off the Pacific coast of Japan produced a huge slip (~ 50 meters) on the shallow portion of the fault close to the toe of the megathrust. The large displacement on this portion of the subduction zone was unexpected by earthquake scientists. The main science goal of this project is to understand the physical mechanisms of large slip during earthquakes. Specifically, the level of frictional stress during the earthquake rupture and the physical characteristics of the fault zone will be investigated.

Two riserless holes will be drilled; one LWD hole to locate the fault zone, and one core hole to sample the fault zone down to 1,000 mbsf at ca. 6900 m water depth. Each hole will be completed with an observatory deployment, comprised of a suite of temperature and pressure sensors. The exact location where a large slip has occurred and where observatory installments and data recovery can be made is being finalized.

4.3.1.2 *Logistics*

Operation days for this program are estimated to be about 1.5 months (45 – 48 days).

4.3.1.3 *Core Storage*

Cores will be stored at the Kochi Core Center.

4.3.2 Deep Coal-bed Biosphere off Shimokita (Deep riser:CPP)

4.3.2.1 *Proposed Operations*

This project will extend the riser hole C9001D (drilled and cased during Chikyu's shakedown cruise in 2006) to 2200 mbsf to investigate a coal bed hydrocarbon-associated deep microbial ecosystem (**Fig. APP-6**). Eocene to Cretaceous lignite layers (~60% TOC) of approximately 100 m thick contain large amounts of coal bed methane, part of a microbial habitat that has never been explored by scientific ocean drilling.

4.3.2.2 *Logistics*

Operation days for this program are estimated to be 68 days (transit 4 days, drilling 64 days).

4.3.2.3 *Core Storage*

Cores will be stored at the Kochi Core Center.

4.3.3 NanTroSEIZE Stage 3, Plate Boundary Deep Riser - 2

4.3.3.1 *Proposed Operations*

Site C0002 is the centerpiece of the NanTroSEIZE project, intended to access the plate interface fault system at a location where it is believed to be capable of seismogenic locking and slip and to have slipped coseismically in the 1944 Tonankai earthquake (**Fig. APP-7**). The primary targets include both the basal décollement and the reflector known as the "megasplay fault". The megasplay fault zone and the accretionary prism domain are the location of a newly identified class of earthquakes known as very low frequency earthquakes as well as the first observation of shallow tectonic tremor. The megasplay fault reflector lies at an estimated depth of 5000 – 5200 mbsf, and the top of the subducting basement is estimated to lie at 6800 – 7000 mbsf. The operations during this phase of the aim to reach a point just above the "megasplay fault" zone with LWD, spot core at the deepest part of the hole, conduct WL logging and set 11-3/4" casing.

4.3.3.2 *Logistics*

This expedition is planned for total of 180 days (58 drilling days and 2 transit days in FY2012). Detailed logistics discussions are still underway among the NanTroSEIZE Project Management Team. At least one EPM (Expedition Project Manager/Staff Scientist) is assigned and 6 Co-Chief scientists will be selected. The shipboard science

party is envisioned to include 27 scientists onboard at a time and rotating every about 1.5 months, embarkation and disembarkation will be made by helicopter from Minami-Ise.

4.3.3.3 *Cores Storage*

Cores will be stored at the Kochi Core Center.

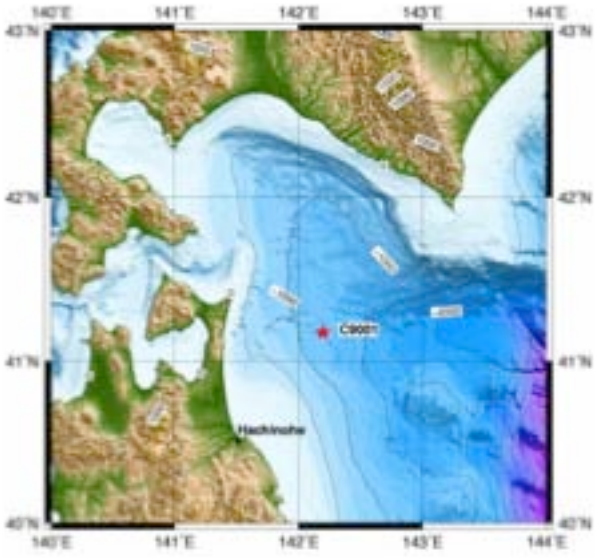

Figure APP- 6: IODP-CDEX FY12 off Shimokita Site Map

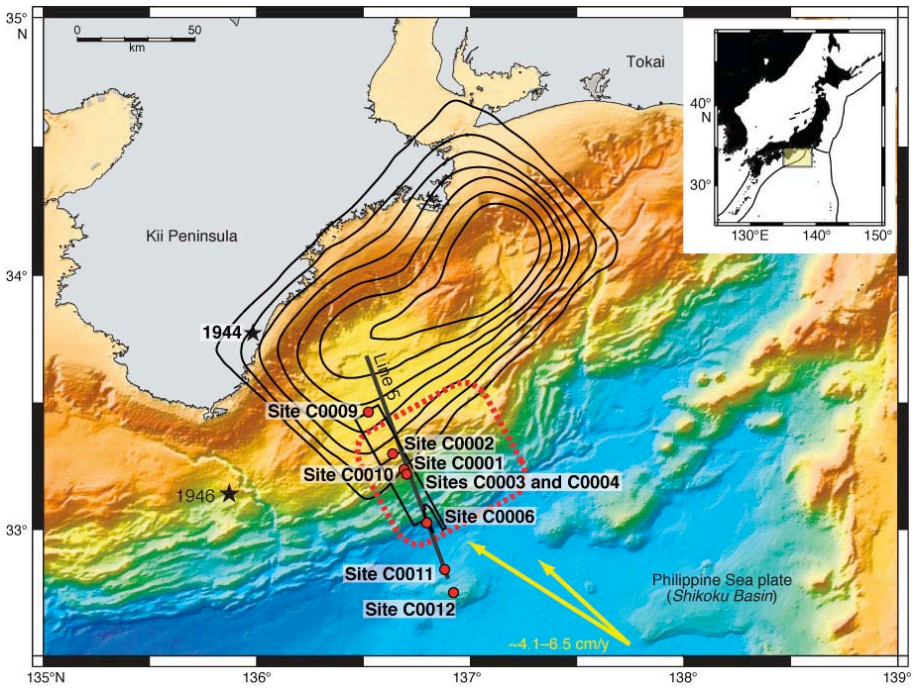

Figure APP-7: IODP-CDEX FY12 NanTroSEIZE Site Map. C0002 is the drill site for the Stage 3 drilling.

4.4 ESO Operations

4.4.1 Chicxulub: Drilling the K-T Impact Crater (tentative for FY2013)

4.4.1.1 *Proposed Operations (if scheduled for FY2013)*

The 2 proposed primary sites and 1 alternative site have been approved by SSP and preliminarily reviewed by EPSP. Initial scoping of this project has included discussions with the lead proponents on the scientific and technical requirements of the proposal, and the investigation of permitting issues with the proponents, ICDP and other institutes with experience of Mexican permitting. ESO will continue attempts to obtain the necessary permits for both the hazard site survey and scientific drilling with the Mexican authorities. A tender to provide a hazard site survey in FY2012, possibly combined with a tender to provide a drilling vessel and coring services to core in water depths of 17 metres, with penetrations not exceeding 1500 metres in FY2013, will be issued. It is anticipated that a technique similar to that used for the New Jersey Shallow Shelf Expedition will be employed, but the precise methodology will be dependent upon the eventual contract.

4.4.1.2 *Environment and Safety*

ESO will contract a geotechnical site investigation of the seabed in the vicinity of the proposed sites, and will seek an independent gas-hazard survey if required. ESO will investigate and apply for all necessary permits to work in Mexican waters.

4.4.1.3 *Logistics*

No major logistics are envisaged, other than the mobilisation of the hazard site survey which will be handled by the contracted survey company.

4.4.2 Hawaiian Drowned Reef / Baltic Sea Paleoenviroment /Atlantis Massif Seafloor Processes (tentative for FY2013)

4.4.2.1 *Proposed Operations*

There will be no operations relating to these expeditions as the main activities will be scoping and planning. A Project Management Team meeting was held in FY11 with the lead proponents of the Hawaiian Drowned Reefs expedition and ESO is continuing to investigate the necessary permits for working in Hawaiian waters. ESO will be in contact with the lead proponents for the Baltic Sea Paleoenvironment and the Atlantis Massif Seafloor Processes expeditions and Project Management Team meetings will be held as appropriate in FY12.

4.4.2.2 *Environment and Safety*

ESO will investigate and apply for all necessary permits to work in Hawaiian waters, or the Baltic Sea.

4.4.2.3 *Logistics*

Planning only

4.4.3 Onshore Science Party (OSP)

No OSP activity anticipated.

5 Management and Administration

5.1 Goals

The goal of Management and Administration of various IODP related entities, including IODP-MI, IOs, SAS, and Program Offices is to plan and coordinate with other IODP-related entities; oversee, review, and report on IODP activities.

5.2 Deliverables in FY2012

- Annual Program Plan – The Annual Program Plan (APP) is the central document in IODP, which describes all the planned activities and costs in Science and Platform Operations. APP is drafted by IODP-MI in close coordination with the IOs. After being approved by SIPCOM and the Program Governing Board (PGB), the APP is finalized by approval of the Lead Agencies. Both IODP-MI and IOs are required to assure the implementation of activities written in the APP.
- Quarterly and Annual Reports – IODP-MI and IOs develop quarterly and annual reports, including financial reports.
- Reporting and Liaising (Mostly for IOs) – Report and liaise with funding agencies and with IODP-related entities (e.g., SAS meeting), Program Member Offices and other national organizations and participate in IODP-MI Task Forces, working groups, etc.
- Coordination (for IODP-MI) – IODP-MI "coordinates" with IOs, SAS Panels, SPC, SASEC, Board of Governors, Program Offices, funding agencies and various subcontractors. "Coordination" is the major deliverable of Management and Administration of IODP-MI, and various task forces play a key function in this coordination.
- Contract Services – Provide contract services for IODP-related activities.

5.3 Budget

Expense Category	IODP-MI	USIO	CDEX	ESO	Bremen	Total
Salary and Fringes	1,774,603	361,573	345,472	592,071	-	$ 3,073,719
Travel	414,118	32,410	170,000	192,000	-	$ 808,528
Supplies	47,353	6,450	20,000	15,000	-	$ 88,803
Shipping	28,118	2,221	-	-	-	$ 30,339
Communication	78,603	10,890	8,000	-	-	$ 97,493
Contractual Services	136,200	-	76,600	-	-	$ 212,800
Equipment	26,176	-	-	15,000	-	$ 41,176
Other Direct Costs	1,154,344	6,885	-	25,000	-	$ 1,186,229
Total Direct Costs	3,659,515	420,429	620,072	839,071	-	$ 5,539,087
Modified Direct Costs (If applicable)	-	74,340	543,472	-	-	$ 617,812
Consumption tax (5%)	70,590	-	-	-	-	$ 70,590
Indirect Costs/Administrative Fee		237,497	163,041	-	-	$ 400,538
Total	$ 3,730,105	$ 657,926	$ 783,113	$ 839,071	$ -	$ 6,010,215

Table APP- 5-1: Management and Administration Budget Summary for FY2012.

Expense Category	IODP-MI	USIO	CDEX	Bremen	Total
Salary and Fringes	1,774,603	361,573	345,472	-	$ 2,481,648
Travel	414,118	32,410	170,000	-	$ 616,528
Supplies	47,353	6,450	20,000	-	$ 73,803
Shipping	28,118	2,221	-	-	$ 30,339
Communication	78,603	10,890	8,000	-	$ 97,493
Contractual Services	136,200	-	76,600	-	$ 212,800
Equipment	26,176	-	-	-	$ 26,176
Other Direct Costs	1,154,344	6,885	-	-	$ 1,161,229
Total Direct Costs	3,659,515	420,429	620,072	-	$ 4,700,016
Modified Direct Costs (If applicable)	-	74,340	543,472	-	$ 617,812
Consumption tax (5%)	70,590	-	-	-	$ 70,590
Indirect Costs/Administrative Fee		237,497	163,041	-	$ 400,538
Total	$ 3,730,105	$ 657,926	$ 783,113	$ -	$ 5,171,144

Table APP- 5-2: Management and Administration Contract Budget for FY2012.

5.4 Justification

5.4.1 IODP-MI

Salaries and Fringes – Include an anticipated cost-of-living allowance and estimated fringe benefits rate for IODP-MI and ISHI M&A staff.

Travel – Includes all domestic and foreign travel for the IODP-MI and ISHI M&A staff, the PEP and SIPCOM chairs, multiple task forces and work groups, Project Management Teams, Board of Governors and Executive Committee meetings.

Supplies – Office supplies and expendables.

Shipping – Includes costs for regular postage, overnight deliveries and bulk mailings.

Communication – includes inter-office (Tokyo-DC) communication charges.

Contractual Services – Include Contracts Officer position (currently a contractor).

Other Direct Costs –

IODP-MI ($799,520) - Includes association dues, meeting expenses, compensation for PEP and SIPCOM Chairs, honoraria for Panel Chairs and compensation for Specialty Coordinators. Includes support of workshops and Scoping Groups. Covers general audit, legal and administration service fees and corporate licenses and insurance, DC office and equipment rental, printing, software, repairs, relocation, recruiting and Bank Fees.

ISHI Subcontract ($354,824) - includes Tokyo office rental and equipment lease. Covers outsourced CPA service, legal and administration service fees and insurance. It also includes relocation and recruiting fee, education and back transfer fee.

5.4.2 USIO

Salaries and Fringes – Salaries, fringes, and sea pay, including an anticipated cost-of-living allowance and estimated fringe benefits rate.

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

Supplies – General office supplies and expendables and operational supplies.

Shipping – Postage, express mail, courier services and freight.

Communication – Telephone and fax charges.

Contractual Services – Consultant and contract services.

Other Direct Costs – Costs not covered in other categories:

- ***Training*** – Registration, transportation, per diem, and lodging expenses related to professional training.
- ***Business Conferences*** – Incidental expense associated with meetings hosted by the USIO.
- ***Insurance*** – Annual insurance premium.
- ***Services*** – Expert assistance.
- ***TAMU Computing Services*** – Use of TAMU's financial and management information System (FAMIS).
- ***Equipment Rental*** – Rental of equipment for when it is more economical to rent than purchase.
- ***Furniture*** – Office furniture.
- ***Recruiting*** –Employee recruitment.
- ***Maintenance and Repair*** – Equipment agreements and equipment repairs.
- ***Library*** – Books, journals, and other resources

Indirect Costs—Administrative and financial costs associated with operating the Program. The specific equations used to calculate these costs vary by institution (For details, see **5.3** of **Appendix B**).

5.4.3 CDEX

Salaries and Fringes - Salaries and fringes for staff in CDEX (For details, see Appendix C.3)

Travel – Transportation, per diem, accommodation and other associated cost for all foreign and domestic travel including international meetings (IODP related meetings), domestic meetings, travel to shore base, travel to Helibase, travel to subcontractor site.

Supplies - General office supplies

Communication - Telephone charges, Mobile phone charges, fax charges and postage.

Contractual Service – Part time worker and computer and software rental.

5.4.4 ESO (directly funded through EMA)

Salaries and Fringes – Portion of salaries at standard institution rates, including overheads.

Travel – Transportation, per diem and accommodation for all tasks, including ESO internal meetings, IOs meetings, ECORD Council meetings, ESSAC meetings, meetings of other IODP bodies including panels and committees, IODP-MI task forces, operational reviews and a range of appropriate scientific conferences (including conference fees) and workshops.

Supplies – General office supplies.

Equipment – Miscellaneous items, upgrades, etc.

Other Direct Costs – Training for all partners.

6 Technical, Engineering and Science Support (TESS)

6.1 Goals

Goals for this Work Breakdown Element (WBE) primarily relate to the Implementing Organizations and include managing, coordinating, and performing the activities and providing the services, materials, platforms, and ship- and shore-based laboratories necessary to support IODP expeditions.

6.2 Deliverables for FY2012

Generic deliverables for this Work Breakdown Element are presented below. These deliverables are applicable to the specific IO expedition operations described in **Section 4** of the main text of this report, as well as in **Appendices B** (USIO), **C** (CDEX), and **D** (ESO).

- Expedition Planning and Implementation: Provide scientific and operational planning and execution for each scheduled expedition, including provision of a drilling platform. Conduct long-range operational planning for out-year expeditions.
- Reporting: Provide expedition-related reports and content for expedition publications (e.g., *Scientific Prospectus, Preliminary Report,* etc.). Act as a liaison to Science Advisory Structure (SAS) and other panels and task forces as appropriate.
- Expedition Staffing: Provide selection and support for scientific staffing and Co-Chief Scientist selection for each scheduled expedition. Provide support for shipboard and shorebased technical personnel and activities.
- Logistical Support: Provide for expedition and ship- and shore-based activities including procurement, shipping, and inventory of equipment and supplies.
- Analytical Systems: Provide and maintain shipboard and shore-based analytical facilities and associated quality control/quality assurance protocols. Ensure effective capture and transfer of expedition data to database systems.
- Logging: Provide for the delivery of logging services including back-off/severing services where needed.
- Engineering Support: Provide engineering support for maintaining and developing shipboard and shorebased drilling, coring, logging, and downhole systems including third-party developments.
- Applications Development: Provide maintenance and support for custom software
- Applications for the capture and shipboard management of operational, sampling, and analytical information.
- Legacy Documentation.

6.3 Budget

Expense Category	IODP-MI	USIO	CDEX	ESO	Bremen	Total
Salary and Fringes	-	226,082	1,146,713	601,656	-	$ 1,974,451
Travel	-	47,603	-	77,500	-	$ 125,103
Supplies	-	2,000	150,000	73,400	-	$ 225,400
Shipping	-	4,397	500,000	-	-	$ 504,397
Communication	-	1,960	-	-	-	$ 1,960
Contractual Services		-	5,153,922	40,000	-	$ 5,193,922
Equipment	-	-	-	750,000	-	$ 750,000
Other Direct Costs	-	2,350	-	20,000	-	$ 22,350
Total Direct Costs	-	284,392	6,950,635	1,562,556	-	$ 8,797,583
Modified Direct Costs (If applicable)	-	269,892	1,796,713	-	-	$ 2,066,605
Indirect Costs/Administrative Fee	-	143,043	539,014	-	-	$ 682,057
Total	$ -	$ 427,435	$ 7,489,649	$ 1,562,556	$ -	$ 9,396,821

Table APP- 6-1: Technical, Engineering, and Science Support Budget for FY2012.

Expense Category	IODP-MI	USIO	CDEX	Bremen	Total
Salary and Fringes	-	226,082	1,146,713	-	$ 1,372,795
Travel	-	47,603	-	-	$ 47,603
Supplies	-	2,000	150,000	-	$ 152,000
Shipping	-	4,397	500,000	-	$ 504,397
Communication	-	1,960	-	-	$ 1,960
Contractual Services		-	5,153,922	-	$ 5,153,922
Equipment	-	-	-	-	$ -
Other Direct Costs	-	2,350	-	-	$ 2,350
Total Direct Costs	-	284,392	6,950,635	-	$ 7,235,027
Modified Direct Costs (If applicable)	-	269,892	1,796,713	-	$ 2,066,605
Indirect Costs/Administrative Fee	-	143,043	539,014	-	$ 682,057
Total	$ -	$ 427,435	$ 7,489,649	$ -	$ 7,834,265

Table APP- 6-2: Technical, Engineering, and Science Support Contract Budget for FY2012

6.4 Justification

6.4.1 IODP-MI

None.

6.4.2 USIO

Salaries and Fringes – Salaries, fringes, and sea pay, including an anticipated cost-of living allowance and estimated fringe benefits rate.

SOC – Salaries and fringes for staff providing technical support during CDEX expeditions.

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

SOC– Travel for USIO staff who will sail on the *Chikyu* during CDEX expeditions.

Supplies – Office and operational supplies.

SOC – General office supplies; electronic media and other computer supplies with an acquisition cost of less than $1,000 (for TAMU); and printer and copier supplies. Other drilling or science supplies may be purchased in support of USIO deliverables using cost avoidances gained during the fiscal year.

Shipping – Postage, express mail, and freight.

SOC – Shipping of tools to the *Chikyu* for use during CDEX expeditions.

Communication – Satellite, telephone, and fax charges.

SOC – Standard telephone line, long distance, and fax charges

Indirect Costs – Administrative and financial costs associated with operating the Program. SOC/POC—For LDEO, indirect costs at 53% are assessed on all charges except permanent equipment. In addition, subcontracts are charged indirect costs on the first $25,000 of each contract. The indirect costs for subcontracts established prior to FY12 have already been paid, so these subcontracts are not subject to indirect cost during FY12. MTDCs are the total direct costs minus these exceptions.
tance, and fax charges.

6.4.3 CDEX

Salaries and Fringes - Salaries and fringes for staff in CDEX (For details, see Appendix C.3)

Supplies - Consumables for onboard lab equipment and stationeries.

Shipping – Shipping of core samples to scientist including deep-freezing core.

Contractual Service -

1) ***Lab Technical Services*** - Annual contract for Lab Technical Services. The contractor provide 24 hours on-board lab technical services during expeditions as well as preparation works, equipment maintenance and procurement of lab consumables throughout the year. SOC covers personnel cost for lab technicians for IODP period and minimum onboard laboratory maintenance (4 Lab technicians) during non-IODP period. (SOC – $1,403,160)
2) ***Logistic Support*** - Transportation cost for science party (including Publication Assistants and APCT/DVTP engineers from TAMU) between hotel to Minami-Ise Heliport, hotel to Shingu shore base and their baggage transportation between Minami-Ise Heliport to Shingu base if necessary. (SOC – $50,000)
3) ***V-SAT*** - V-SAT communication during expedition. The bandwidth has been upgraded from 512kbps to 768kbps to provide better communication services together with network accelerator. (SOC – $150,000)
4) ***Equipment Maintenance*** - Annual maintenance for *Chikyu* Lab measurement instrument including the X-CT scanner's annual maintenance contract, required by Japanese law. (SOC – $250,000)
5) ***Wireline Logging*** -Contract for wire line logging for Exp.337. (SOC – $2,032,307)
6) ***LWD*** - Contract for LWD for Exp.343 and Exp.338.

   Expedition 343 (SOC-$564,925), Expedition 338 (Suit-1) (SOC-$205,295)
7) ***IODP borehole observatory-Mini-Temperature Logger string and pressure monitoring package*** (SOC $498,235).

6.4.4 ESO

Salaries and Fringes – Portions of salaries at standard institution rates, including overheads for planning of future MSP Expeditions.

Travel – Scoping, planning and preparation will require a variety of meetings among ESO staff, with co-chiefs and scientists, scoping groups (including Project Management Team meetings), discussion with actual or potential contractors, for contractual issues and staff exchanges.

Contractual services – Cost of MSCL (-S and -XYZ) servicing and maintenance. This includes software and electronic updates and spare parts as required and covers costs for license fees and safety testing for the MSCL source. Logging equipment servicing and maintenance is also covered.

Equipment – Logging-related computer hardware is required continue compatibility with logging tools. Funds for a Geotek MSCL XCT are requested. This X-ray core imaging system collects linear digital X-ray images on whole core. Funds are requested for FY12 because there is a long lead in time for the Geotek MSCL XCT to be ordered and built in time for an expedition in FY13.

Other Direct Cost – Bremen University laboratory upkeep and certification. And EPC funds requested to cover the fees and costs associated with gaining permits to import register and use the MSCL source on offshore expeditions in any given territory/territorial waters. These costs would be incurred in FY12 in readiness for an expedition in FY13.

7 Engineering Development

7.1 Goals

IODP-MI has limited staff resources (0.X FTE) in the area of Engineering Development and therefore outsources most implementation of engineering related development and all IO-related science support. IODP-MI's primary role in the Engineering Development process is to facilitate acquisition of technology needed for IODP to meet the objectives described in the Initial Science Plan and to oversee the contracts that are implemented to develop the required technology. IODP-MI will utilize the SAS-derived IODP Technology Roadmap as the primary guide for the acquisition this technology. However, with the removal of engineering advice from the new SAS, IODP-MI will need rely on consultant work of engineering advice in FY12 and beyond.

In addition to the projects funded by Science Operating Costs, IODP-MI Engineering project oversight has extended to Platform Operating Costs (POC) projects from FY2010 as a service to the funding agencies (when requested). The goal of this additional service is to provide uniform review and oversight to all areas of engineering within the Integrated Ocean Drilling Program. IODP-MI will not have any fiscal authority over POC-funded engineering projects, but will only offer advice to funding agencies for their use in prioritizing and monitoring POC-funded projects.

7.2 Deliverables in FY2012

IODP-MI will manage new and on-going engineering projects to ensure their successful completion using internal and external oversight resources. IODP-MI utilizes the programmatic, high-level advice from the Science Advisory Structure to complete broad reviews of projects. To implement this advice from SAS and to conduct detailed, low level engineering reviews of projects and initiatives, IODP-MI may assign external reviewer. The external reviewer will be industry and academic experts possessing experience in areas of specific technology of interest to the program.

Approaching to the end of the current IODP, IODP-MI will freeze reception of unsolicited proposals and concentrate to complete on-going projects. There will be a study and an engineering project in FY2012.

IODP-MI will continue its initiative to quantify coring and to identify the factors controlling the quantity of collected core.

IODP-MI will be actively managing one new engineering project; wireline hydraulic testing and borehole imaging tool for stress measurement.

IODP-MI will complete two engineering development projects' sea tests/trials with IOs' support; SCIMPI and MDHDS.

And USIO will be managing one project, Multi-sensor Magnetometer Module logging tool (MMM).

7.2.1 Coring Study

IODP-MI personnel initiated the first phase of a study in FY2008 to quantitatively evaluate coring results in an effort to identify, and ultimately remediate, factors that affect the quantity and quality of recovered core. IODP-MI personnel coordinated case studies to help

identify factors controlling the quantity and quality of core collected by IODP. IODP-MI will conclude the study with consultation of expert in FY2012 and generate the final report and information providing web site.

7.2.2 Wireline hydraulic testing and borehole imaging tool for stress measurement

A strong demand exists in the IODP community for in situ measurements of pore pressures and stresses at depth close to seismogenic zones. Yet, only limited experience with this respect has been obtained during DSDP/ODP/IODP, and the absolute magnitude of stresses has not been measured due to technical and theoretical difficulties. But these data are required for reliable estimates of fault failure potential.

The tool is composed of downhole pumping system, packers and sensors for fracture imaging, its outside diameter will be small enough to fit multiple platforms needs (TDCS for Chikyu, JR etc). Development will be conducted by two institutes (JAMTEC, Japan and CNRS-IPGS, France) with close collaboration, and joint testing at the last stage of the development. A feasibility study and preliminary engineering design has been completed by each institute.

Based on the result of FY10 EDP engineering development proposal evaluation, and additional feasibility study conducted in FY11, IODP-MI will start detailed design, tool fabrication, system integrate test and sea trial.

7.2.3 Sea tests/trials with IOs' support; SCIMPI and MDHDS

SCIMPI and MDHDS, including Common Deploying System (ERS) have been fabricated and field tested in FY11. With IOs' support, two sea tests/trials will be conducted at appropriate site in FY12 to complete the engineering development projects.

7.2.4 Multi-sensor Magnetometer Module logging tool (MMM); by USIO

The MMM is a new project that proposed two years ago and subsequently vetted through SAS and IODP-MI engineering management.

Multisensor Magnetometer Module (MMM): A new magnetometer tool under development at LDEO (FY12 will be the final year of the project). The MMM will produce continuous records of the magnetic field in the borehole, from which magnetization and polarity of the rocks surrounding the borehole can be calculated. This downhole magnetic information will complement core sample magnetic measurements and significantly enhance IODP's ability to magnetostratigraphically date sediment sequences. The tool fabrication, modifications to extend LDEO and Schlumberger telemetry systems and surface panel software, and third party tool certification, have been completed in FY11. The bench and field tests at the LDEO test well and sea deployment will be conducted in FY12.

7.3 Budget

Expense Category	IODP-MI	USIO	CDEX	ESO	Bremen	Total
Salary and Fringes	-	21,940	-	-	-	$ 21,940
Travel	20,000	10,968	-	-	-	$ 30,968
Supplies	-	5,000	-	-	-	$ 5,000
Shipping	-	-	-	-	-	$ -
Communication	-	-	-	-	-	$ -
Contractual Services	525,000	-	-	-	-	$ 525,000
Equipment	-	-	-	-	-	$ -
Other Direct Costs	-	-	-	-	-	$ -
Total Direct Costs	545,000	37,908	-	-	-	$ 582,908
Modified Direct Costs (If applicable)	-	37,908	-	-	-	$ 37,908
Indirect Costs/Administrative	-	20,091	-	-	-	$ 20,091
Total	$ 545,000	$ 57,999	$ -	$ -	$ -	$ 602,999

Table APP- 7: Engineering Development Budget for FY2012.

7.4 Justification

7.4.1 IODP-MI

Travel – Travel costs for engineering development personnel required to attend science advisory structure panel meetings, contractor oversight and workshops as needed.

Contractual Services – IODP-MI is requesting $525,000 for subcontracts to complete two projects above. $25,000 is requested to retain an engineering /drilling consultant to conclude the Core Quality and Quantity Study. And $500,000 is requested in FY12 to conduct engineering development for wireline hydraulic test and borehole imaging tool for stress measurement.

7.4.2 USIO

Salaries and Fringes – Salaries, fringes, and sea pay, including an anticipated cost-of-living allowance and estimated fringe benefits rate.
SOC – Salaries and fringes for staff supporting the USIO.

Travel – Transportation, per diem, lodging, and other associated costs.
SOC – Travel for meetings with contractors and calibration tests of the MMM tool in the Schlumberger calibration facility for magnetic tools.

Supplies – Office and operational supplies.
SOC – Operational, logistic, and shipping supplies.

Indirect Costs – Administrative and financial costs associated with operating the Program.

SOC—Indirect costs at 53% are assessed on all charges except permanent equipment. In addition, subcontracts are charged indirect costs on the first $25,000 of each contract. The indirect costs for subcontracts established prior to FY12 have already been paid, so these subcontracts are not subject to indirect cost during FY12. MTDCs are the total direct costs minus these exceptions.

7.4.3 CDEX

No budget for CDEX is requested.

7.4.4 ESO

No budget for ESO is requested.

8 Core Curation

8.1 Goals

The major goal associated with this Work Breakdown Element is to provide services in support of IODP core sampling and curation of the core collection archive. IODP supports operations at three core repositories: the Gulf Coast Repository (GCR) operated by the USIO, the Kochi Core Center Repository (KCC) operated by CDEX, and the Bremen Core Repository operated by Bremen University (Table APP-8).

Repository	Institution	Geographic Location
GCR	Texas A&M University	Pacific Ocean (east of western trench boundaries); Caribbean Sea and Gulf of Mexico; Southern Ocean (>60°S, except Kergurelen Plateau)
BCR	University of Bremen	Atlantic Ocean, Mediterranean Sea, Arctic Ocean (north of Bering Strait)
KCC	Kochi University	Western Pacific Ocean (west of trench boundaries); Indian Ocean, Kergurelen Plateau; Bering Sea

Table APP- 8: Core Distribution Scheme for IODP.

8.2 Deliverables in FY2012

The primary deliverables for the repositories during FY2012 are listed below.

- Policy and Procedures: Work with other IOs, the Science Advisory Committee (SAS), and the IODP central management office (IODP-MI) to 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 specific expeditions identified in Section 4 of this Annual Program Plan and review all shipboard and moratorium-related requests in coordination with the other members of the Sample Allocation Committee (SAC) for each expedition.
- Sample Materials Curation System (SMCS): Work with IODP-MI and the other IOs to complete testing and begin use of the successor database to the SMCS system for future expeditions and post-moratorium materials.
- Sample Requests: Respond to post-moratorium sample requests from the scientific community.
- Core Sampling: Provide curator specialist on board the drillship to supervise core sampling during ship operations.
- Core Curation: Conduct all responsibilities associated with curation of core collections.
- Use of Core Collection: Promote the outreach use of the core collection in collaboration with Implementing Organization (IO) and IODP-MI education/outreach personnel by providing materials for display at meetings or museums, as well as conducting tours and supporting other program outreach activities.

- Meetings: Host and/or participate an annual IODP curatorial staff meeting. Act as IO liaison for meetings with the other IOs, IODP-MI, and the SAS, as appropriate.
- Legacy Documentation: Routinely archive electronic copies of documents and reports produced by the USIO on behalf of IODP.

8.3 Budget

Expense Category	IODP-MI	USIO	CDEX	ESO	Bremen	Total
Salary and Fringes	-	279,000	310,766	67,929	192,626	$ 850,321
Travel	-	48,000	-	7,000	6,550	$ 61,550
Supplies	-	15,000	50,000	2,500	9,580	$ 77,080
Shipping	-	18,750	50,000	6,000	40,000	$ 114,750
Communication	-	2,625	4,000	-	-	$ 6,625
Contractual Services	-	-	52,500	-	-	$ 52,500
Equipment	-	-	-	-	-	$ -
Other Direct Costs	-	28,487	-	-	-	$ 28,487
Total Direct Costs	-	391,862	467,266	83,429	248,756	$ 1,191,313
Modified Direct Costs (If applicable)	-	-	414,766	-	-	$ 414,766
Indirect Costs/Administrative Fee	-	-	124,430	-	99,503	$ 223,933
Total	$ -	$ 391,862	$ 591,696	$ 83,429	$ 348,259	$ 1,415,246

Table APP- 8 -1: Core Curation Budget for FY2012.

Expense Category	IODP-MI	USIO	CDEX	Bremen	Total
Salary and Fringes	-	279,000	310,766	192,626	$ 782,392
Travel	-	48,000	-	6,550	$ 54,550
Supplies	-	15,000	50,000	9,580	$ 74,580
Shipping	-	18,750	50,000	40,000	$ 108,750
Communication	-	2,625	4,000	-	$ 6,625
Contractual Services	-	-	52,500	-	$ 52,500
Equipment	-	-	-	-	$ -
Other Direct Costs	-	28,487	-	-	$ 28,487
Total Direct Costs	-	391,862	467,266	248,756	$ 1,107,884
Modified Direct Costs (If applicable)	-	-	414,766	-	$ 414,766
Indirect Costs/Administrative Fee	-	-	124,430	99,503	$ 223,933
Total	$ -	$ 391,862	$ 591,696	$ 348,259	$ 1,331,817

Table APP- 8 -2: Core Curation Contract Budget for FY2012.

8.4 Justification

8.4.1 IODP-MI

None budgeted

8.4.2 USIO

Salaries and Fringes – Salaries, fringes, and sea pay, including an estimated fringe benefits rate.

SOC/POC – Salaries, fringes, and sea pay for staff supporting the USIO.

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

SOC/POC – Travel to IODP meetings and workshops, IO meetings, and USIO meetings, including an annual IODP Curators meeting; professional conferences; and travel costs for USIO staff that will sail on FY12 expeditions.

Supplies – Office and operational supplies.

SOC/POC – General office supplies, printer supplies, general laboratory supplies, specialized supplies for sampling and curatorial tasks, and supplies for packing extra-large shipments, packing deep frozen microbiological shipments, and hosting sampling parties.

Shipping – Postage, express mail, and freight.

SOC/POC – Postage for regular correspondence, regular-sized sample shipments to scientists, and as many as 10 special sample shipments for FY12 (for deep-frozen microbiological samples, U-channels, or whole core sections for X-ray fluorescence scanning) at an average cost of $1,000 each.

Communication – Telephone and fax charges.

SOC/POC – Standard telephone line, long distance, cellular phone, and fax charges.

Other Direct Costs – Costs not covered in other categories.

Training – Registration, transportation, per diem, and lodging expenses related to professional training.
SOC/POC – Registration and travel costs for professional training courses and meetings (TAMU).
Business Conferences – Incidental expenses associated with meetings hosted by the USIO.
SOC/POC – Expenses for groups of scientists, educators, or others visiting GCR.
Services – Expert assistance.
SOC/POC – Annual physical examinations for seagoing personnel.
Maintenance and Repair – Maintenance agreements and equipment repairs.
SOC/POC – Repairs and maintenance for storage buildings; refrigeration units; deep freezers; laboratory, repository, and office equipment; forklift; and shrink-wrap machine.

8.4.3 CDEX

Salaries and Fringes - Salaries and fringes for staff in KCC. (For details, see Appendix C.3)

Supplies - General office supplies, general laboratory supplies and curatorial tasks.

Shipping - Courier and postage for sample shipping, containers and other associated cost for shipping, u-channels.

Communication - Telephone charges, Mobile phone charges, fax charges and postage.

Contractual Service -

1) ***Industrial waste disposal*** - Disposal cost for industrial waste designated by the local government. Most core storage-materials and materials used for core transport are in this category. (SOC – $10,000)
2) ***Core management system maintenance*** - Annual maintenance cost for the core storage management software being used at KCC. (SOC – $15,000)
3) ***Rental*** - Annual rental cost of one forklift used at KCC to move IODP cores from yard to storage and computer for IODP curation staff. (SOC – $20,000)

4) ***Brochures, DVD*** - KCC's own outreach materials to introduce core data archived in KCC and how to submit sample request, etc. (SOC – $7,500)

8.4.4 ESO

Salaries and Fringes - SOC – Portions of salaries at standard institution rates, including overheads.

Travel - SOC – This category is an estimated projection for travel to meetings related to IODP curatorial topics. It may include visits to the Gulf Coast and Kochi Repositories for technical and training exchange, as well as cooperative work.

Supplies - SOC – The bulk of this category is for materials related to sampling needs. This includes plastic scoops and tubes, u-channels, Pmag cubes, Styrofoam plugs, sample bags, shipping boxes, labels and ink bands for the printers; tape for the d-tubes and for packing, etc. The amount is loosely based on past needs for MSP core sampling, but future sampling activity levels are difficult to assess. We can only assume that sampling levels will increase as the size of our collection increases.

Shipping - SOC – These costs are primarily for courier shipping of samples (incl. u-channels, and archive core halves for non-destructive measurements requests) worldwide to the requesting investigators. As with the Supplies category, the amount depends on the amount of sampling activity, which certainly will continue to increase with the size of our collection.

8.4.5 Bremen

Salaries and Fringes - SOC - This category is the equivalent of 1.6 FTE positions, and is used to cover 80% of the salaries of W. Hale and A. Wülbers. Due to an expected standard 4 per cent annual salary increase, based on our (80%) FY10 salary expenditure of $178,093.82, prorated for 2 years to 2012, we have added $14,532.46 to this category.

Travel - SOC - This category is an estimated projection for travel to meetings related to IODP curatorial topics. It may include visits to the Gulf Coast and Kochi Repositories for technical and training exchange, as well as cooperative work.

Supplies - SOC - The bulk of this category is for materials related to sampling needs. This includes plastic scoops and tubes, u-channels, Pmag cubes, Styrofoam plugs, sample bags, shipping boxes, labels and ink bands for the printers; tape for the d-tubes and for packing, etc. The amount is loosely based on past needs, but future sampling activity levels are difficult to assess. We can only assume that sampling levels will increase as the size of our collection increases.

Shipping - SOC - These costs are primarily for courier shipping of samples worldwide to the requesting investigators. As with the Supplies category, the amount depends on the amount of sampling activity, which certainly will continue to increase with the size of our collection. In addition, the increasing use of non-destructive scanning instruments by many institutes to analyze DSDP/ODP/IODP archive-half core material is creating an uncertain situation with regard to shipping large volumes of core sections around the world, with costs running into the thousands of dollars per shipment. Furthermore, the growing importance of microbiological investigations to the program will likely also have an impact on these costs, because shipping samples in a frozen state is more expensive by an order of magnitude. It is impossible to predict how many of these kinds of shipments will be required, and therefore

what the costs will be, even for the near future. Therefore, we would like to have at least $40,000.00 for this category, and hope that this amount is not exceeded.

Indirect costs - This is a flat-rate cost for university and institute administration costs and materials of 40%, based on the high-maintenance nature of this contract and extraordinary size of the operation.

9 Data Management

9.1 Goals

The goals of data management include: management of data supporting IODP activities, management of expedition and post-expedition data, management of sample and data requests and core repository inventory tracking, ensuring long-term archiving of IODP data and information, increasing access to data, IT support services, management of the IODP drilling proposal application database, and the IODP Site Survey Data Bank.

9.2 Deliverables in FY2012

The IOs are responsible for capturing and storing all drilling-related data generated during shipboard operations and on-shore sampling parties. Each IO uses its own specific protocols and databases for this. The system used by the USIO is a customized LIMS (Laboratory Information Management System) data system put into production in FY2009, with upgrades made in FY2010. USIO will utilize LIMS to manage all new data, whether it is generated from new drilling activities or from new analysis of sample materials collection prior to FY2009. The JANUS system has been transitioned to an archival system. Updates to JANUS will hereafter be limited to corrections of inaccurate data. The system used by CDEX is the J-CORES system which was modified in FY2010 to improve data access and visual core description (VCD) generation. During FY2011, J-CORES Public Data Center was upgraded to improve the tracking of versioning for updates to J-CORES data. These upgrades were used to the publish corrections J-CORES data errors from Expeditions 314-316. For expedition use (shipboard and shore-based core description), ESO is using a modified version of the DIS developed for the International Continental Drilling Program (ICDP). ESO-generated expedition data are subsequently legacy-stored in the World Data Center (WDC) PANGAEA system. In FY2012, each IO is responsible for providing access to metadata describing data stored in their respective databases as well as access to data resources (core measurements data, borehole logging data and core photographs and digital images), for providing access to data for caching of core measurement, borehole logging and digital images data, and for providing curatorial data for central inventory and sample request data management systems.

The Scientific Drilling Information Service (SEDIS) will provide central access to the distributed IO databases (see **Figure APP-8**) by harvesting metadata from each IO and by integrating the distributed data systems using a web services approach. SEDIS will cache IOs data resources and present data from the distributed data systems in an integrated system for discovery, retrieval and querying. SEDIS serves as the “one-stop” access point for accessing IOs data, post-expedition data and SSDB holdings, supporting service-oriented software applications access and query access to the source data systems to facilitate visualization and analysis of IODP data. SEDIS developments in FY2011 have implemented controlled vocabulary for IODP measurement terminology and a structured ontology relating the IODP measurements to domains that will be represented as related concepts with search algorithms.

Promotion of SEDIS within the IODP community and to external science communities will be a strong focus of data management development in FY2012. The SEDIS portal is currently online and serves as a central data and publications discovery interface for the scientific community. With the completion of an integrated access point for IODP web services data with documented schemas, vocabularies and namespaces, software application developers will be able to build automated access to IODP data into analytical tools used by the IODP scientific community and geosciences educators. Outreach to application developers is on-going to promote the use of SEDIS as a machine-to-machine system to providing access to IODP data. In FY2011, SEDIS was registered as a component and service with the Group on Earth Observations System of Systems (GEOSS), a global network of scientific data systems. The utilization of SEDIS by GEOSS member organizations will be tracked in FY2012. Integration of SEDIS with other global data networks, such as Word Data Centers (WDC), will be pursued in FY2012 to increase the accessibility of IODP data and use of IODP research in related scientific disciplines.

In FY2012, IODP-MI will initiate an effort to establish permanent accessible archives of IODP data and information. There will be at least two permanent archives of IODP data, with one located in the US and one located at an international scientific data center. If funding allows, IODP-MI will deploy three permanent archives, hosted in the U.S., Japan, and Europe. The FY2012 budget includes funds to plan the permanent archives and to establish the archives and processes for loading IODP data following standards-compliant, open-access protocols. The permanent archives will be fully operationalized in FY2013, with mechanisms established for loading FY2013 Expedition data to the archives in subsequent fiscal years. SEDIS functionality will be integrated into permanent archives solutions to ensure that the IODP archive leverages the functionality for data search, retrieval, and citability that exist within the SEDIS system.

Sample requests and related core repository data will be handled by the Sample Materials Curation Management System (SMCS). Re-engineering and enhancements to SMCS were underway as of FY2011 in order to improve the usability of the Sample and Data Request Management (SDRM) system web interface. Development of the Central Inventory system for tracking IODP sample materials was re-started in FY2011 and will is expected to be completed in FY2012. The launch of SDRM v.2 and the Central Inventory as integrated systems will be completed in early FY2012.

The Site Survey Databank (SSDB) is the system for pre-proposal site characterization and site survey information. SSDB supports the Site Survey Panel, Environmental Protection and Safety Panel and several other SAS panels, Task Forces and IOs work groups. The SSDB is hosted by the Scripps Institution of Oceanography at University of California San Diego. The SSDB site information packages are online resources used by SAS panel meetings and cited in IODP *Scientific Prospectuses*. In FY2012, the SSDB will have 2 submission deadlines in support of panel meetings for the new SAS structure. SSDB will continue to be managed for year-round support with special support in place during submission deadlines and panel review periods.

The IODP Proposal Database maintenance and upgrades will be performed in FY2011 in support of the post-2013 new Science Plan. Starting with the IODP drilling proposal

submission deadline in first quarter of FY2012, proposal will be handled by the Proposal Database version 2 (PDB v2). The PDB v2 improves the administrative functionality for reviewing and managing the IODP proposal process, including versioning and revisions of proposals, tracking proposals' status through the IODP SAS processes, and increasing the integration of proposals coversheet information with the SEDIS data inventory. The PDB v2 will ensure support for changes to the scientific themes and SAS review processes related to the post-2013 scientific ocean drilling program.

The IODP Central Registry LDAP (Lightweight Directory Access Protocol) system is currently operational. Maintenance of the Central Registry, including integration with other IODP systems, is expected during FY2012.

Further details of IO data management activities are included in **Appendices B** to **D**.

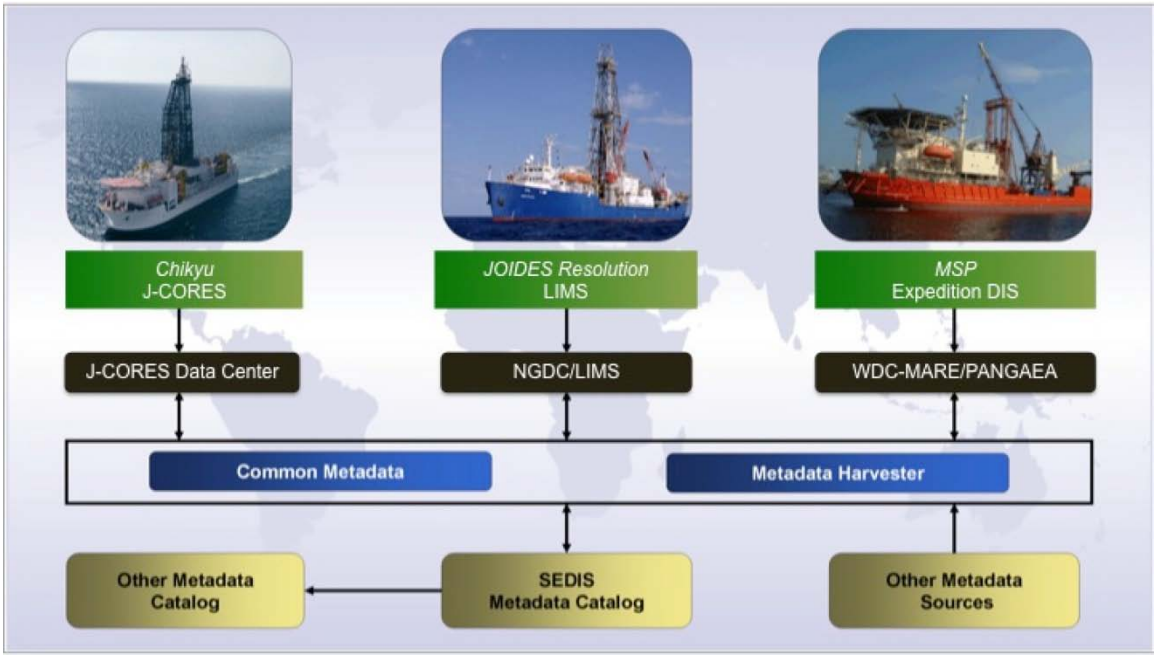

Figure APP- 8: Expedition data management by IOs and IODP-MI data systems.

9.2.1 Expedition Data

IOs are responsible for maintaining and managing databases supporting expedition data during moratorium. IODP-MI operates and maintains data management and harvesting systems for storage and archiving of expedition and post-expedition data, including core and sample tracking.

a. ***Management of data access systems:*** CDEX uses J-CORES for shipboard data collection and the J-CORES Public Data Center for caching of versioned post-moratorium data in SEDIS. USIO uses LIMS for shipboard data collection and archives post-moratorium data at the National Geophysical Data Center (NGDC). SEDIS caches post-moratorium USIO data from both the JANUS and LIMS systems via the NGDC archives. ESO uses the DIS system for collection of data during expedition and the WDC-PANGEA for access to data sets and web services via SEDIS.

b. ***Acquisition of core and logging data***: Each IO is responsible for capturing the scientific data that will be collected during the scheduled expeditions for FY2012 and

arranging for storage of the data in a database so it is accessible to the expedition participants and to the scientific communities via SEDIS. IODP-MI maintains the SEDIS system with ISO-compliant metadata and OGC standards-compliant web services for IODP data from internal and external service-enabled applications.

9.2.2 Program-wide data systems

IODP-MI provides program-wide data systems in support of four major program activities: Site Characterization, Drilling Proposals, Sample Materials Requests, and Data Access.

c. **SSDB:** The Site Survey Databank will be operated year-round in FY2012 for submission of site characterization and site survey data. Data submitted to SSDB is put through a QA/QC process and published in online formats with user authentication and authorization security systems to control access. The SSDB supports SSP, EPSP, OTF and other Expedition planning and implementation groups. SSDB operation, hosting and maintenance costs are included in the FY2012 budget.
d. **PDB:** The Proposal Database version 2 will be launched in FY2011 for use in the drilling proposal deadlines in FY2012. The PDB v2 includes online forms for completion of necessary drilling proposal information, a database for storage of information and proposal versions, and scripts for converting inputted data to the IODP drilling proposal document format. PDB operation, hosting and maintenance costs are included in the FY2012 budget.
e. **SMCS:** The Sample Materials Request Systems (SRMS) version 2 is an upgraded system for tracking user requests for materials in all IODP repositories. The system works in coordination with each repositories in-house sample management system. The Central Inventory is the master system that links the repositories sample management systems to a Program-wide inventory of IODP sample materials. SMCS hosting, maintenance and administration fees are included in FY2012 budget.
f. **SEDIS:** The Scientific Earth Drilling Information System is the program-wide data access system. SEDIS harvests metadata from each of the IOs and Program-wide data systems and provides a searchable interface for discovery of IODP data. SEDIS hosting, maintenance and administration fees are included in FY2012 budget.
g. **Metadata access from each IO:** Each IO is responsible for providing metadata describing the datasets they have in their own databases. IODP-MI is responsible for providing metadata from SSDB and PDB. These metadata will continue to be regularly harvested by SEDIS to provide central access to the program data by the scientific community.
h. **Evaluation, maintenance, and possible enhancements:** The Program-wide data systems developed in previous fiscal years will operated, hosted and maintained in FY2012. This could require some minor adjustments and enhancements.

9.2.3 Common vocabularies and terminology within IODP

This is an important aspect of data management within IODP. The process will continue during FY2012 with review of IODP measurement terminologies and development of controlled vocabularies and terminologies for specific disciplines to be coordinated by IODP-

MI. FY2011 work included development controlled vocabularies to create semantic relationship between different terminologies in the IOs source data. The IODP controlled vocabularies provide interoperability of the IODP data systems within the SEDIS integration framework. Updates, maintenance and expansion of the IODP controlled vocabularies and the IODP will continue FY2012.

Standardization of vocabularies paleotaxonomic data will be continued in FY2012. The Taxonomic Names List database server is hosted by IODP-MI and provides all IOs with standardized paleotaxonomic terms, synonyms, relationships, etc. These standardized vocabularies will be published using web services and can support interoperability of data systems in several scientific disciplines.

9.2.4 Permanent archiving of IODP data

Planning for and implementation of permanent archives for IODP data will be a major initiative in FY2012. IODP-MI will establish at least two permanent archives of IODP data, with one to be located in the US and one to be located at an international data center. The IODP permanent archives will include IODP Expedition data, SSDB data, IODP drilling proposals, and post-expedition data harvested by SEDIS. The IODP permanent archives will be accessible archives with web-based interfaces for searching and retrieval of IODP data. The FY2012 budget will include funds for planning of the permanent archives and for the beginning of development of these systems. The permanent archives will be completed in FY2013, with mechanisms for FY2013 Expedition data in subsequent fiscal years.

9.2.5 Cyber security for IODP computer systems

IODP-MI and IOs are responsible for security of their own Informational Technology infrastructure and equipment. IODP-MI has policies and practices in place to monitor and protect IODP-MI network, servers, and computer resources to ensure safe, reliable operation and security for IODP data and IT resources. IODP-MI will develop a cyber security plan during third and fourth quarters of FY2011, to be implemented in FY2012. The IODP-MI cyber security plan will formalize existing practices and policies for protecting the IODP-MI IT resources and the IODP data.

9.3 Budget

Expense Category	IODP-MI	USIO	CDEX	ESO	Bremen	Total
Salary and Fringes	203,259	667,404	528,122	176,884	-	$ 1,575,669
Travel	22,500	42,726	-	39,000	-	$ 104,226
Supplies	-	29,190	12,000	6,000	-	$ 47,190
Shipping	-	1,165	-	-	-	$ 1,165
Communication	-	9,135	-	-	-	$ 9,135
Contractual Services	394,000	-	67,929	75,000	-	$ 536,929
Equipment	-	69,598	-	40,000	-	$ 109,598
Other Direct Costs	-	141,570	-	-	-	$ 141,570
Total Direct Costs	619,759	960,788	608,051	336,884	-	$ 2,525,482
Consumption Tax (5%)	10,163					$ 10,163
Modified Direct Costs (If applicable)	-	184,867	540,122	-	-	$ 724,989
Indirect Costs/Administrative Fee	-	97,980	162,037	-	-	$ 260,017
Total	$ 629,922	$ 1,058,768	$ 770,088	$ 336,884	$ -	$ 2,795,662

Table APP- 9-1: Data Management Budget for FY2012.

Expense Category	IODP-MI	USIO	CDEX	Bremen	Total
Salary and Fringes	203,259	667,404	528,122	-	$ 1,398,785
Travel	22,500	42,726	-	-	$ 65,226
Supplies	-	29,190	12,000	-	$ 41,190
Shipping	-	1,165	-	-	$ 1,165
Communication	-	9,135	-	-	$ 9,135
Contractual Services	394,000	-	67,929	-	$ 461,929
Equipment	-	69,598	-	-	$ 69,598
Other Direct Costs	-	141,570	-	-	$ 141,570
Total Direct Costs	619,759	960,788	608,051	-	$ 2,188,598
Consumption Tax (5%)	10,163				$ 10,163
Modified Direct Costs (If applicable)	-	184,867	540,122	-	$ 724,989
Indirect Costs/Administrative Fee	-	97,980	162,037	-	$ 260,017
Total	$ 629,922	$ 1,058,768	$ 770,088	$ -	$ 2,458,778

Table APP- 9-2: Data Management Contract Budget for FY2012.

9.4 Justification

9.4.1 IODP-MI

Salaries and Fringes — Include salaries and fringe benefits rate for IODP-MI staff.

Travel – Travel cost for staff attending data management coordination and task force meetings, visits to vendors and professional meetings.

Contractual Services – The Data Management budget for FY2012 will be mainly used for the operation and maintenance of SSDB, SMCS, PDB, SEDIS and other Program-wide data systems managed by IODP-MI. Applications such as IODP user registry, IODP holes KML database, Taxonomic Names List database, and digital object identifier (DOI) registration application are included in the FY2012 contractual services budget. The FY2012 activities will also include planning and establishment of permanent accessible archives for IODP data.

Other Direct Costs – Salaries and fringes of staff supporting data management (including ISHI subcontracts).

9.4.2 USIO

Salaries and Fringes – Salaries, fringes and sea pay, including an anticipated cost-of-living allowance and estimated fringe benefits rate.

Travel—Transportation, per diem, lodging, and other associated cost.

Supplies – Office and operational supplies.

Shipping – Postage, express mail, and freight.

Contractual Deliverables:

1) 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). Respond to data requests from the scientific community. Process downhole log data. Provide database services for postmoratorium ESO and CDEX log data.

2) Operate and maintain computer and network systems both on ship and shore.

3) Monitor and protect USIO network and server resources to ensure safe, reliable operation and security for IODP data and IT resources.

4) Provide software development services as needed (excluding analytical systems), maintain software, and provide training support for shipboard scientists as necessary.

5) Routinely archive electronic copies of documents and reports produced by the USIO on behalf of IODP, including documentation of all information technology architecture and corresponding services configurations.

Communication – Telephone and fax charges.

Equipment — Procurement, upgrading or fabrication of equipment with an acquisition cost of more than $5,000, plus those items as defined by Ocean Leadership, Columbia University, or TAMRF policy.

Other Direct Costs — Costs not covered in the other categories:

Relocation – Relocation costs for new employees.

Training – Registration, transportation, per diem, and lodging expenses related to professional training.

Business Conferences – Incidental expenses associated with meetings hosted by USIO.
Software – Software purchases and upgrades.

Services – Expert assistance.

Recruiting – Employee recruitment.

Maintenance and Repair – Maintenance agreements and equipment repair.

Library – Books, journals, and other resources.

Indirect Costs – Administrative and financial costs associated with operating the Program.

9.4.3 CDEX

Salaries and Fringes - Salaries and fringes for staff in CDEX (For details, see Appendix C.3)

Supplies – Computer consumables.

Contractual Service:

1) Annual maintenance for IODP specific software (GeoFrame, GeoLog, SeizEarth, etc.) and computers on Chikyu and on shore (Wireline/Log data storage/computers, etc.)

9.4.4 ESO

Salaries and Fringes – Portion of salaries at standard institution rates, including overheads.

Travel – ESO database group meetings, Data Management Coordination Group meetings, data management liaison and travel to offshore expedition.

Supplies – Computer consumables.

Contractual Services –

1) Expedition Data: maintain and manage expedition databases. Operate and maintain data management systems for future MSP Expeditions and load post-moratorium data to the WDC-MARE and LDEO (downhole log data) long-term data archives.
2) Upload sample and curation data to the SMCS system and other metadata to SEDIS.
3) Operation and maintenance: provide operation and maintenance of computer and network systems.
4) Software Development: provide software development services as required for expeditions (excludes analytical systems).
5) Cooperate on the development of common IODP standards via the DMCG.

Equipment – ESO computer infrastructure upgrade and maintenance, and Bremen computer infrastructure upgrade and maintenance. BSCW license for communication and data transfer.

10 Publication

10.1 Goals

The goals of IODP Publications are editing, production, and distribution of IODP scientific drilling expedition plans, initial reports and scientific results and program activities.

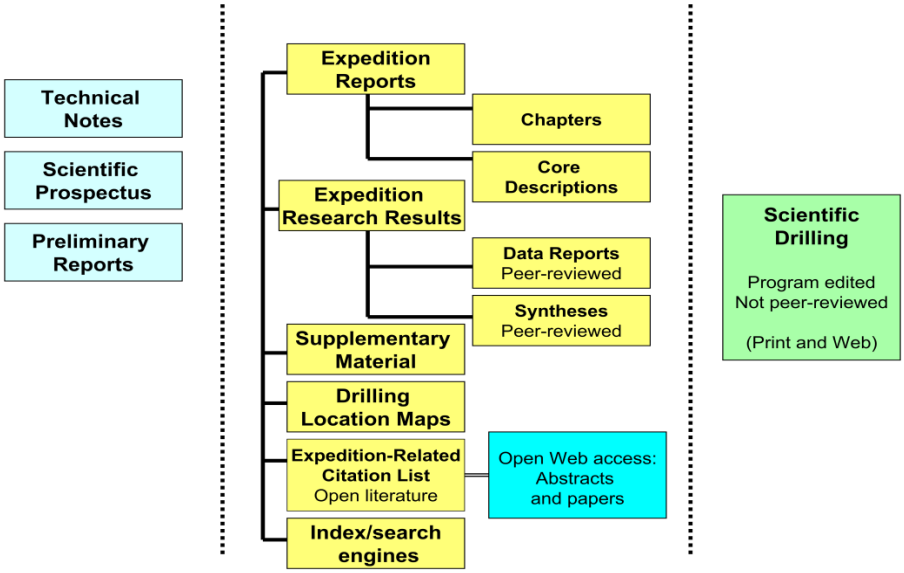

Figure APP- 9: IODP Main Publications.

IODP Publications fall into four categories: Reports, IODP *Proceedings*, publications in open literature, and the *Scientific Drilling* journal published jointly with ICDP (**Figure APP-9**):

- Documentation of IO specific technology and data (Technical Notes);
- Proper scientific documentation of all drilling expeditions (Scientific Prospectus);
- Rapid documentation and publications of major findings (Preliminary Reports);
- Wide community distribution of IODP science achievements and program activities (*Scientific Drilling*) in a journal format with peer-review for Science Reports;
- Extensive legacy documentation of all expedition results (Expedition Reports of the *Proceedings*); and
- Peer-reviewed publication of post-expedition research results (open literature and data reports in *Proceedings*).

10.2 Deliverables in FY2012

The following major deliverables are covered by the FY2012 APP:

- Approximately eight Scientific Prospectuses for FY 2012/2013 expeditions;
- Approximately ten Preliminary Reports;
- Approximately ten Proceedings of the IODP volumes covering expedition reports;

- Approximately ten Proceedings volumes covering expeditions research content;
- Two issues of the journal Scientific Drilling;
- Publications specialist support for approximately eight expeditions (5 USIO, 2 CDEX, 1 ESO);
- Recording publication citations and post-expedition research submissions;

IODP-MI oversees all publication activities and is the program publisher. The production of Scientific Prospectuses, Preliminary Reports and *Proceedings* Volumes are managed under contract with IOs, with publication services mainly taking place at USIO-TAMU. IODP-MI reviews and edits all IODP publications.

Each IO is contractually responsible for the production of the Technical Notes. Scientific Prospectuses, Preliminary Reports and the *Proceedings* on each respective expedition; thematically related expeditions conducted within a short period of time may be considered one single project for which an integrated set of *Proceedings* is produced. Scientific Prospectus is due six months pre-expedition. Preliminary Reports are due two months post-expedition and *Proceedings* 12 months post-expedition. In FY2012 the final editing and production of all IODP Reports and *Proceedings* is provided by the USIO in order to secure cross-program consistency in format and appearance. CDEX and ESO will deliver the edited draft material, including all necessary content and scientific editing. Tracking of IODP scientific publications in the open literature for inclusion in the *Proceedings* volume in FY2012 is provided by the USIO and IODP-MI, based on an IODP-MI contract for generating the necessary data.

Technical Notes, Scientific Prospectus, Preliminary Reports and *Proceedings* are all published electronically on the Web in html and PDF formats. Volumes of electronic *Proceedings* are also available on DVD in PDF format. The latter is supplied to funding agencies, libraries, expedition members, and also used for scientific outreach.

IODP-MI, with support from ICDP, produces the journal *Scientific Drilling*, including solicitation of articles, editing, production and distribution of the journal. Each IODP Expedition results in a peer-reviewed Science Report published in *Scientific Drilling*. *Scientific Drilling* is delivered in both print and electronic format on the Web. Printed copies (c. 5,500) are distributed by IODP-MI to funding agencies, member institutions, libraries, the PMOs, the IODP scientific community, and to ICDP (for further distribution). The database of Scientific Drilling subscribers is regularly checked for inactive addresses and the subscriptions are updated accordingly. As of FY2011, there are approximately 2,500 individual subscribers receiving the *Scientific Drilling* journal, in addition to the issues distributed at international scientific conferences, at IODP Member Institutions, through the PMOs and by other means.

During FY2012, IODP-MI will coordinate a plan to establish permanent archives of IODP publications. The initial scoping of this effort was begun in FY2011. One approach under consideration is to utilize online library facility associated with universities or research institutions to maintain an accessible and searchable catalogue of IODP publications. The FY2012 budget will include funds to plan for and establish the permanent archives of IODP publications. The permanent archives will be fully operational during FY2013, with mechanisms established for loading FY2012-2013 Expedition publications to the archives in subsequent fiscal years.

10.3 Budget

Expense Category	IODP-MI	USIO	CDEX	ESO	Bremen	Total
Salary and Fringes	136,110	1,346,202	-	-	-	$ 1,482,312
Travel	6,000	40,000	-	-	-	$ 46,000
Supplies	3,500	36,500	-	-	-	$ 40,000
Shipping	23,500	27,600	-	-	-	$ 51,100
Communication	-	8,000	-	-	-	$ 8,000
Contractual Services	72,500	-	-	-	-	$ 72,500
Equipment	-	-	-	-	-	$ -
Other Direct Costs	-	45,550	-	-	-	$ 45,550
Total Direct Costs	241,610	1,503,852	-	-	-	$ 1,745,462
Consumption Tax (5%)	6,806	-	-	-	-	$ 6,806
Modified Direct Costs (If applicable)	-	-	-	-	-	$ -
Indirect Costs/Administrative Fee	-	-	-	-	-	$ -
Total	$ 248,416	$ 1,503,852	$ -	$ -	$ -	$ 1,752,268

Table APP- 10: Publication Budget for FY2012.

10.4 Justification

10.4.1 IODP-MI

Salaries and Fringes — Include salary and fringe benefits rate for IODP-MI staff.

Travel – Travel costs for staff providing publications support.

Shipping – Shipping cost for *Scientific Drilling*.

Contractual Services – Services for publishing *Scientific Drilling (IODP contribution - excluding ICDP support)*.

10.4.2 USIO

Salaries and Fringes —Salaries, fringes, and sea pay, including an estimated fringe benefits rate.

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

Supplies – Office and operational supplies.

Shipping—Postage, express mail, and freight.

Communication – Telephone and fax charges.

Other Direct Costs – Costs not covered in the other categories:

Training – Registration, transportation, per diem, lodging expenses, and membership dues related to professional training.

Business Conferences – Incidental expenses associated with meetings hosted by the USIO.

Services – Expert assistance.

Equipment Rental – Rental of equipment when it is more economical to rent than purchase such as Water cooler rental.

Maintenance and Repair – Maintenance agreements and equipment repairs.

Library – Books, journals, and other resources.

11 Outreach

11.1 Goals

The goals of outreach include management of outreach and educational activities, media and public relations, participation of the international scientific conferences and exhibitions, and maintenance and support of IODP and each IOs website. Outreach also manage to develop informational and multimedia materials to provide program highlights and achievements, which will promote the program and scientific expeditions to the media, the public, student/educators, stakeholders, and the IODP community.

11.2 Deliverables in FY2012

Outreach continues to overseas whole the program's outreach activities and makes an effort to send positive messages of the program to the society. The following 4 will be major deliverables targeted in FY2012.

11.2.1 Increasing Awareness of Media and General Public

Outreach activities will be achieved through rigorous promotion of IODP, highlighting: 1) scientific objectives; 2) IODP's value as a global leader in the collection of Earth systems data; 3) IODP's international cooperation; 4) individual scientists participating in IODP research activities; 5) how IODP contributes to solutions for challenges the world faces today and 6) vision and science plan in the New Science Plan. IODP outreach will initiate an effort to establish networks and reach the international and major national press, and IODP-MI and IOs work closely to issue quality press releases on time. Press conferences on the current and post 2013-2023 program will continue to be planned and held to increase visibility and send positive images of the IODP program and its activities.

11.2.2 Active Participation in Scientific International Conferences

Outreach in FY12 includes participation of high-profile exhibits at internationally important scientific conferences, primary AGU, EGU and IGC. IODP-MI, IOs and the other scientific organization (ICDP for IGC) will corporate to hold IODP booths and a joint booth to show the program presence internationally.

11.2.3 Program updates-Town Hall Meetings

Program highlights and scientific achievements will be presented at major science conferences, including in AGU, EGU, and JPGU, to facilitate direct outreach and provide program update and highlights to the IODP community.

11.2.4 Informational and Multimedia Materials

Outreach activities in FY2012 will include developing, up-dating and printing of graphic and informational materials in printed and on line formats, and multimedia highlighting the achievements of IODP and scientific expeditions. Each IO continues to produce community newsletter and IODP-MI will corporate and support for ensuring the contents and quality.

11.3 Budget

Expense Category	IODP-MI	USIO	CDEX	ESO	Bremen	Total
Salary and Fringes	187,797	33,132	111,452	100,700	-	$ 433,081
Travel	40,000	12,500	-	28,000	-	$ 80,500
Supplies	-	3,400	10,000	12,000	-	$ 25,400
Shipping	25,000	2,800	10,000	-	-	$ 37,800
Communication	-	500	-	-	-	$ 500
Contractual Services	353,000	21,700	130,000	-	-	$ 504,700
Equipment	-	-	-	-	-	$ -
Other Direct Costs	4,000	-	-	-	-	$ 4,000
Total Direct Costs	609,797	74,032	261,452	140,700	-	$ 1,085,981
Consumption Tax (5%)	28,490	-	-	-	-	$ 28,490
Modified Direct Costs (If applicable)	-	-	131,452	-	-	$ 131,452
Indirect Costs/Administrative Fee		24,431	39,436	-	-	$ 63,867
Total	$ 638,287	$ 98,463	$ 300,888	$ 140,700	$ -	$ 1,178,338

Table APP- 11-1: Outreach Budget for FY2012.

Expense Category	IODP-MI	USIO	CDEX	Bremen	Total
Salary and Fringes	187,797	33,132	111,452	-	$ 332,381
Travel	40,000	12,500	-	-	$ 52,500
Supplies	-	3,400	10,000	-	$ 13,400
Shipping	25,000	2,800	10,000	-	$ 37,800
Communication	-	500	-	-	$ 500
Contractual Services	353,000	21,700	130,000	-	$ 504,700
Equipment	-	-	-	-	$ -
Other Direct Costs	4,000	-	-	-	$ 4,000
Total Direct Costs	609,797	74,032	261,452	-	$ 945,281
Consumption Tax (5%)	28,490	-	-		$ 28,490
Modified Direct Costs (If applicable)	-	-	131,452	-	$ 131,452
Indirect Costs/Administrative Fee		24,431	39,436	-	$ 63,867
Total	$ 638,287	$ 98,463	$ 300,888	$ -	$ 1,037,638

Table APP- 11-2: Outreach Contract Budget for FY2012.

11.4 Justification

The total outreach budget reflects the resources of the three IOs and IODP-MI in producing effective outreach to the scientific community, academic and government, the active / participant IODP community (stakeholders), emerging generations of researchers, related professional audiences (e.g., commercial/ industry engineers, petrologists, geophysicists), and the media (general and special interest/science) Deliverables are tied to reaching these target audiences and to the shared goals of expanding awareness about the value of scientific ocean drilling and generating public interest and aware nesses in IODP's activities.

11.4.1 IODP-MI

Salaries and Fringes **–** Salaries for IODP-MI outreach personnel including ISHI subcontracts.

Travel – Travel costs for staff to one Outreach Task Force Meeting per year and to conferences where booths must be staffed.

Contractual Services – Website hosting, maintenance and support; multimedia production and library maintenance; exhibition booths in AGU, EGU, IGC and other international

conferences; Town Hall Meetings; News monitoring, distribution and informational resources; printing and graphic design.

Other Direct Costs – Salaries and fringes of ISHI subcontractor outreach personnel.

11.4.2 USIO

Salaries and Fringes – Salary and fringes, including an anticipated cost-of-living allowance and estimated fringe benefits rate.

Travel –Transportation, per diem, lodging, and other associated costs. A portion of the cost of participating in outreach to stakeholders, press events, media training, and staffing of booths at national and international meetings.

Supplies – Office and operational supplies. General office supplied, printer and copies supplies, and electronic media and other computer supplies with an acquisition cost of less than $1,000.

Shipping – Postage, express mail, and freight. General postage and express mail/ courier services for regular correspondence.

Communication – Telephone and fax charges. Standard telephone line charges, long distance charges, and fax charges.

Contractual Services – Consultant and contract services. Platform enrichment activities, including preparation of public relations materials, posters and multimedia products; media training; and booth rentals and associated costs at national meetings.

Indirect Costs – Administrative and financial costs associated with operating the Program. The approved provisional rate of 33% was used to calculate Ocean Leadership G&A costs. Each year, G&A costs are charged on all Ocean Leadership direct costs and on the first $100,000 of all subcontracts Ocean Leadership administers under a particular contract (e.g., total annual G&A on LDEO and TAMRF subcontracts = $66,000). The G&A costs for the two subcontracts (LDEO and TAMRF) are divided evenly between SOC G&A and POC G&A ($33,000 each = $16,500 SOC + $16,500 NSF).

11.4.3 CDEX

Salaries and Fringes - Salaries and fringes for staff in CDEX. (see FTE allocation table)

Supplies - General office supplies.

Shipping - Shipping for AGU, JPGU etc.

Contractual Service -

1) ***WEB Maintenance*** - Annual maintenance/licensing/rental costs for CHIKYU HAKKEN Website. http://www.jamstec.go.jp/chikyu/eng/index.html (SOC – $10,000)
2) ***WEB for Expedition Promotion*** -To launch a web sites for each expedition for promotion etc. (SOC-USD 70,000)
3) ***Outreach Publication*** - To publish bi-annual news letter “CHIKYU HAKKEN News Letter” both in English and in Japanese etc. (SOC – $50,000)

11.4.4 ESO

Salaries and Fringes – Portions of salaries at standard institution rates, including overheads.

Travel – Attend outreach meetings associated with the New Jersey Shallow Shelf (onshore) and Great Barrier Reef Environmental Changes (offshore and onshore) expeditions, and for forthcoming expeditions (Chixculub, Hawaii Drowned Reefs, Baltic Sea Paleoenvironment and Atlantis Massif Seafloor Processes) as appropriate. Attend conferences (EGU, AGU, IGC) and other E&O activities. BGS 3: non Europe journeys@ $3,500, 3 Europe journeys @$2,000. Bremen: 1 non Europe journeys @$3,500, 4 Europe journeys @2,000

Supplies- Printing brochures for expeditions, support of booths, materials etc

12 FY2010-2011 Scientific Operation Summary

12.1 Relation to IODP Initial Science Plan

IODP Initial Science Plan contains three major themes and eight initiatives. IODP strives to address these themes and initiatives. During FY2010-2011, IODP completed ten successful expeditions addressing all three major themes and five initiatives.

12.1.1 Theme 1 The Deep Biosphere and Subsurface Ocean

Three expeditions addressed the two initiatives of Theme 1: The Deep Biosphere and Subsurface Ocean during FY2010-2011.

Initiative: Deep Biosphere

- Expedition 329 South Pacific Gyre Microbiology
- Expedition 331 Deep Hot Biosphere

Initiative: Gas hydrate

- Expedition 327 Juan de Fuca Ridge-Flank Hydrogeology
- Expedition 328 Cascadia A-CORK

12.1.2 Theme 2 Environmental Change, Process, and Effects

One expedition in FY2010-2011 addressed Theme 2 Environmental Change, Process and Effects as a secondary outcome of its Theme 1 focus.

- Expedition 329 South Pacific Gyre Microbiology

12.1.3 Theme 3 Solid Earth Cycles and Geodynamics

Five expeditions addressed three initiatives of Theme 3 Solid Earth Cycle and Geodynamics. DV Chikyu continued to address the initiative, Seismogenic Zone, in the Nankai Trough.

Initiative: Seismogenic Zone

- Expedition 328 Cascadia A-CORK
- Expedition 332 and 333 NanTroSEIZE Stage 2
- Expedition 326 NanTroSEIZE Stage 3
- Expedition 334 Costa Rica Seismogenesis Project (CRISP)

Initiative: Large Igneous Provinces

- Expedition 330 Louisville Seamount Trail

Initiative 21st Century Mohole

- Expedition 335 Superfast Spreading

12.2 Expedition Specific Scientific Highlights

Achieving expedition specific objectives will require considerable shore-based analysis and integration among disciplines, and it is too early to gauge how scientifically successful an

expedition will be. Nonetheless, there are several positive indications from each expedition, among which are the following:

12.2.1 Expedition 326 NanTroSEIZE Stage 3: Plate Boundary Deep Riser: Top Hole Engineering (CDEX)

- Scientific objectives for the uppermost 1400 m at Hole C0002F were previously fulfilled during NanTroSEIZE Stage 1 Expeditions 314 and 315.
- The objectives for this expedition were installation of the wellhead assembly and drilling and casing the uppermost 800 m of the planned 7 km deep hole.
- The wellhead, 36 inch conductor, and 20 inch casing in Hole C0002F were set and cemented to a depth of 872.5 meters below seafloor, somewhat in excess of the minimum requirement set out for this top hole portion of the planned riser borehole.
- Hole C0002F is now ready for deep riser drilling.

12.2.2 Expedition 327 Juan de Fuca Ridge-Flank Hydrogeology (USIO)

- Two new CORK observatories were successfully installed at Site U1362.
- A 24 h pumping and tracer injection experiment was completed in Hole U1362B and indicates generally high permeability in the formation surrounding the borehole.
- Recovered five of the autonomous temperature loggers deployed in Hole U1301B during Expedition 301 and indicate that thermal conditions in Hole U1301B are recovering toward natural conditions.

12.2.3 Expedition 328 Cascadia Subduction Zone ACORK Observatory (USIO)

- Permanent hydrologic borehole observatory successfully installed.
- Advanced CORK design (ACORK) will facilitate pressure monitoring at multiple formation levels on the outside of a 10.75 inch casing string.
- The ACORK observatory will allow documentation of the average state of pressure in the frontal part of the Cascadia accretionary prism, the pressure gradients driving flow from the consolidating sediments, the mode of formation of gas hydrates, the influence of gas hydrates and free gas on the mechanical properties of their host lithology, the response of the material to seismic ground motion, and the magnitude of deformation at the site caused by secular strain and episodic seismic and aseismic slip in this subduction setting.
- The observatory will later be connected to the NEPTUNE Canada fiber-optic cable for power and real-time communications from land.

12.2.4 Expedition 329 Subseafloor life and habitability in the South Pacific Gyre (USIO)

- Documented many fundamental aspects of subseafloor sedimentary habitats, metabolic activities, and biomass in this very low-activity sedimentary ecosystem.
- Significantly improved understanding of how oceanographic factors control variation in subseafloor sedimentary habitats, activities, and biomass from gyre center to gyre margin.
- Quantified the availability of dissolved hydrogen throughout the sediment column.
- Documented first-order patterns of basement habitability and potential microbial activities.

12.2.5 Expedition 330 Louisville Seamount Trail (USIO)

- Five seamounts were drilled in the Louisville Seamount Trail and reached volcanic basement at four of these.
- 1114 m of sediment and igneous basement at five seamounts was cored, of which 806 m was recovered (average = 72.4%).
- Sampling is adequate to address all the scientific objectives of this expedition: to constrain the paleolatitude history of the Louisville hotspot for comparison with the Emperor Seamounts, to reconstruct ages along the Louisville Seamount Trail, to characterize the geochemical evolution of the Louisville mantle source and the genetic relationship with Ontong Java Plateau, to determine the partial melting systematics for Louisville magmas, to add paleoceanography and paleoclimate data at 40°–50°S paleolatitudes in the Southern Ocean, and to describe fossil microbial traces within the seamount igneous basement.

12.2.6 Expedition 331 Deep Hot Biosphere (CDEX)

- 300 m of core recovered from 21 of 24 holes.
- Four artificial hydrothermal vents were created by drilling Holes C0013E, C0014G, C0016A, and C0016B.
- These newly created hydrothermal vents will serve as windows into the subseafloor for long-term monitoring studies of fluid composition and flow and *in situ* microbial colonization.
- Recovered Kuroko-type massive sphalerite-rich ore for the first time from an active deep-sea hydrothermal system in Hole C0016B.

12.2.7 Expedition 332 NanTroSEIZE Stage 2: Riserless Observatory (CDEX)

- Exchanged the SmartPlug temporary observatory with an upgraded GeniusPlug, both attached to a retrievable casing packer above the screened megasplay fault zone at Site C0010.
- The data collected from the recovered SmartPlug provide complete time series data over >15 months of seafloor and formation pressure and four independent temperature records from the fault zone.
- SmartPlug was replaced with a GeniusPlug, which is similar in geometry but hosts an OsmoSampler for collecting fluids for geochemical analysis and a flow-through osmotic colonization system for microbiological study.

12.2.8 Expedition 333 NanTroSEIZE Stage 2: subduction inputs 2 and heat flow (CDEX)

- Fulfilled objectives of drilling and coring previously unsampled intervals of sediment and basalt at IODP Sites C0011 and C0012 in the Shikoku Basin and drilling and coring an Ancillary Project Letter (738-APL: Nankai Trough Submarine Landslide History [NanTroSLIDE]) at a site near the updip terminus of the megasplay fault.

12.2.9 Expedition 334 Costa Rica Seismogenesis Project - CRISP (USIO)

- Cores reaching upper plate basement depth and the Cocos Ridge basement to understand the processes that control the triggering of large earthquakes at erosional subduction zones were sampled.
- Completed LWD operations reaching a total depth of 960 mbsf.

12.3 Major peer-reviewed publications in FY2010-2011

Bailey, I., C. T. Bolton, R. M. DeConto, D. Pollard, R. Schiebel, and P. A. Wilson (2010), A low threshold for North Atlantic ice rafting from "low-slung slippery" late Pliocene ice sheets, *Paleoceanography*, 25(1), (Citation PA1212). (Expedition 303/306)

Barke, J., H. A. Abels, F. Sangiorgi, D. R. Greenwood, A. R. Sweet, T. Donders, G.-J. Reichart, A. F. Lotter, and H. Brinkhuis (2011), Orbitally forced Azolla blooms and middle Eocene Arctic hydrology; clues from palynology, *Geology*, 39(5), 427-430. (Expedition 302)

Davis, E. E., A. La Bonte, J. He, K. Becker, and A. Fisher (2010), Thermally stimulated "runaway" downhole flow in a superhydrostatic ocean crustal borehole; observations, simulations, and inferences regarding crustal permeability, *Journal of Geophysical Research*, 115(B7), B07102. (Expedition 301)

DiCaprio, L., R. D. Mueller, and M. Gurnis (2010), A dynamic process for drowning carbonate reefs on the northeastern Australian margin, *Geology*, 38(1), 11-14. (Expedition 325)

Ferretti, P., S. J. Crowhurst, M. A. Hall, and I. Cacho (2010), North Atlantic millennial-scale climate variability 910 to 790 ka and the role of the equatorial insolation forcing, *Earth and Planetary Science Letters*, 293(1-2), 28-41. (Expedition 303/306)

Kitamura, Y., T. Kanamatsu, and X. Zhao (2010), Structural evolution in accretionary prism toe revealed by magnetic fabric analysis from IODP NanTroSEIZE Expedition 316, *Earth and Planetary Science Letters*, 292(1-2), 221-230. (Expedition 316)

Kleiven, H. F., I. R. Hall, I. N. McCave, G. Knorr, and E. Jansen (2011), Coupled deep-water flow and climate variability in the middle Pleistocene North Atlantic, *Geology*, 39(4), 343-346. (Expedition 303/306)

Lopez, C., G. Spence, R. Hyndman, and D. Kelley (2010), Frontal ridge slope failure at the northern Cascadia margin; margin-normal fault and gas hydrate control, *Geology*, 38(11), 967-970. (Expedition 311)

Lund, S., E. Platzman, N. Thouveny, G. Camoin, F. Corsetti, and W. Berelson (2010), Biological control of paleomagnetic remanence acquisition in carbonate framework rocks of the Tahiti coral reef, *Earth and Planetary Science Letters*, 298(1-2), 14-22. (Expedition 310)

Malinverno, A. (2010), Marine gas hydrates in thin sand layers that soak up microbial methane, *Earth and Planetary Science Letters*, 292(3-4), 399-408. (Expedition 311)

Menabreaz, L., N. Thouveny, G. Camoin, and S. P. Lund (2010), Paleomagnetic record of the late Pleistocene reef sequence of Tahiti (French Polynesia); a contribution to the chronology of the deposits, *Earth and Planetary Science Letters*, 294(1-2), 58-68. (Expedition 310)

Naafs, B. D. A., R. Stein, J. Hefter, N. Khelifi, S. de Schepper, and G. H. Haug (2010), Late Pliocene changes in the North Atlantic Current, *Earth and Planetary Science Letters*, 298(3-4), 434-442. (Expedition 303/306)

Riedinger, N., B. Brunner, M. J. Formolo, E. Solomon, S. Kasten, M. Strasser, and T. G. Ferdelman (2010), Oxidative sulfur cycling in the deep biosphere of the Nankai Trough, Japan, *Geology*, 38(9), 851-854. (Expedition 314-316)

Sakaguchi, A., et al. (2011), Seismic slip propagation to the updip end of plate boundary subduction interface faults; vitrinite reflectance geothermometry on Integrated Ocean Drilling Program NanTro SEIZE cores, *Geology*, 39(4), 395-398. (Expedition 316)

Stigall, J., and B. Dugan (2010), Overpressure and earthquake initiated slope failure in the Ursa region, northern Gulf of Mexico, *Journal of Geophysical Research*, 115(B4), B04101. (Expedition 308)