International Ocean Discovery Program: Current Structure, Proposals in the System, Future Directions for MSROC planning purposes

Sean Gulick, Co-Chair
Science Evaluation Panel
1. New Structure of IODP #2

- Each facility is overseen by a separate Facility Board
- Co-mingled funds to operate all three IODP facilities abandoned in favor for independent facility funding

- The JOIDES Resolution Facility Board (JRFB) provides operational and management oversight of the JOIDES Resolution Science Operator (JRSO) and the Science Support Office (SSO) as part of the IODP
1. New Structure of IODP #2

- Going from 9 panels (OTF, SASEC, SPC, PEP, SCP, STP, EDP, SIPCOM, EPSP) to 3 panels (JRFB, SEP, EPSP)
- SEP and EPSP are advisory panels to JRFB
- SEP now merges both science and site characterization

- At least one global circum-navigation (2013-2023)
- Charting out the JR track up to 5 years in advance

- Nominally JR- 8 mo/yr operations, MSP- 1 per year, Chikyu- variable
- Schedules are determined at FB Meetings about ~2 years before sailing (this May JRFB scheduled FY19)
Proposal Submission History

New program


New  Revised

IODP Science Support Office • Scripps Institution of Oceanography • www.iodyp.org
File Submissions to SSDB
Active proposals: 92
by science plan themes

- Climate and Ocean: 44
- Biosphere: 7
- Earth Connections: 22
- Earth in Motion: 19

As of 25 April 2017
Active proposal status: 92
by target ocean

- Pacific: 37
- Atlantic: 24
- Indian: 10
- Southern: 11
- Mediterranean: 5
- Arctic: 5

As of 25 April 2017
How many proposals address which challenges?

1: CO2
2: Ice sheets and sea level
3: Precipitation
4: Chemical perturbations
5: Subseafloor communities
6: Life limit
7: Ecosystems
8: Upper mantle
9: Crustal architecture
10: Chemical exchanges
11: Subduction zones
12: Earthquakes, landslides, tsunami
13: Carbon storage
14: Tectonic-Thermal-biogeochemical link

As of 25 April 2017
Active proposal status: 92
by review stage

- SEP: 42
- FB: 46
- JRFB: 30
- CIB: 8
- EFB: 6
- JR-Chikyu Umbrella: 2
- Holding Bin: 4

As of 25 April 2017
Active proposals: 92
by lead proponent’s member affiliation

- US: 37
- ECORD: 32
- Japan: 10
- ANZIC: 8
- Brazil: 1
- India: 1
- Korea: 3

As of 25 April 2017
Active proponent distribution

1088 unique proponents

- US: 346
- ECORD: 428
- Japan: 129
- ANZIC: 67
- Brazil: 22
- China: 11
- India: 8
- Korea: 5
- Others: 72

As of 25 April 2017
Drilling Platforms for 92 Active Proposals

As of 25 April 2017

- JR: 63
- Chikyu: 17
- MSP: 12
- Multiple: 7

- JR: 70
- Chikyu: 11
- MSP: 11
- Multiple: 7
Active proposals: 92
by proposal category

- Pre: 23
- APL: 12
- Umbrella: 8
- ADP: 2
- Full: 47 (incl. 2 CPPs)

As of 25 April 2017
Science Support Office (SSO)

- Proponents (YOU)
- Science Evaluation Panel (SEP)
  - External Reviewers
  - EPSP
- JR Facilities Board
- JRSO
- MSP Facilities Board
- ESO
- Chikyu Facilities Board
- CDEX
Two deadlines for proposals:
~ April 1 & ~ October 1
Submit site survey data within 1 month
Proposal assigned a number (e.g., 999-Pre)
SEP Review Procedures:
(general evaluation criteria for IODP proposals)

• Are the scientific questions/hypotheses being addressed exciting and of sufficiently wide interest to justify the requested resources?
  – *SEP deactivates the pre-proposal or full proposal if there isn’t a strong science question/hypothesis.*
  – *SEP aims to give a clear signal to the proponents to rethink their science question/hypothesis, if needed.*

• To what degree does the integrated experimental design of site characterization, drilling, sampling, measurements, and downhole experiments constitute a compelling and feasible scientific proposal?
  – *SEP deactivates the pre-proposal or full proposal if there isn’t a strong, strategic, drilling plan, including alternate sites, to address the science question/hypothesis.*
  – *SEP aims to give a clear signal to the proponents about how to improve the drilling plan, if needed. In such a case, SEP encourages proponents to come back with a new pre-proposal or full proposal (but only if there is a strong science question/hypothesis).*

• Will the proposal significantly advance one or more goals of the Science Plan?

• Would the proposal engage new communities or other science programs into the drilling program?
SEP typically meets in January and June
SEP watchdogs are assigned to your proposal, SEP submits their review of 999-Pre
Scenario 1: SEP deactivates your proposal
Scenario 2: Using SEP reviews as guidance, you submit 999-Full1
Watchdog Preparation of Proposal Reviews

• **WD1** presents the science case of the proposal after consultation with the other assigned WDs
• **WD2** advises the WD1 on the science case, and WD2 writes the science part of the response letter to proponents (together with WD1)
• **WD3** presents the new site survey data after consultation with the other assigned WDs, unless there are no new data. If no data, then WD3 advises on data that are necessary.
• **WD4** advises the WD3 on the site survey data, and WD4 writes the site survey part of the response letter to proponents (together with WD3).
• **WD5** advises watchdogs 1-4 on the drilling plan, platform, technical issues and feasibility of the proposed program. WD5 writes a statement of these issues in the response letter
What Makes a Full Proposal Excellent?

- Strong and compelling science questions/hypotheses of global importance
- Innovative with potential for success
- Responsive to the input from SEP

What Will Cause a Full Proposal to be Declined?

- Science is incremental
- Science is one-sided (doesn’t consider alternative hypotheses)
- Science addresses a regional question not of global significance
- Proponents are unresponsive to review comments
- Site survey data are insufficient to underpin the science or conduct operations safely
What Science Evaluation Panel and Environmental Protection and Safety Panel Watch For…

- Is this the right place to drill for the science?
- Are there any problems with the site that will affect recovery?
- Are there any hazards at the site?
- What can we predict about the lithology from the images and does that affect possible success?
- Have they adequately determined velocity in order to estimate target depths and thus drilling times?
Objective: to develop the data package so that the proposal may be forwarded to the Facility Board (FB)

- Data reviewed by SEP are sufficient to support the scientific objectives of the drilling effort and there are no further concerns.
- Data reviewed by SEP are sufficient to support the scientific objectives of the drilling effort, but minor concerns require follow-up by proponents (specify in text).
- Data reviewed by SEP are insufficient to support the drilling effort, but other data are believed to exist; and/or data are not annotated or organized sufficiently to fully review, or there are scientific concerns.
- Data reviewed by SEP are insufficient to support the drilling effort, and additional data are not believed to exist.
- No data have been reviewed by SEP.

“Insufficient” indicates that the data package is not sufficient to convince the SEP that the scientific objectives can be addressed. For example: 1) the data package may lack items that are fundamental to determining the correct site location or target depth; 2) the data may be of insufficient resolution to demonstrate the existence of targeted strata; 3) the data may not demonstrate unequivocally that the proposed locations are correct (e.g. sites are not plotted correctly or mismatches exist between navigation files and proposed locations); 4) site locations are deemed to be inadequate for addressing the objectives (e.g. missing critical sections, misinterpretations, science or safety concerns, etc.).

“Minor concerns” may include missing items or questions that do not affect the assessment that drilling is warranted at proposed sites, meaning the objectives can be met based on existing data despite the concerns. Examples include: 1) missing image files (e.g. bathymetry); 2) minor issues with velocity that may slightly affect the proposed depth of penetration; 3) minor navigation issues. These can be addressed while proposal resides at the FB.
Scenario 1: SEP reviews 999-Full1, and asks for revision
Scenario 2: SEP sends 999-Full1 out for external review and to EPSP
Scenario 3: SEP deactivates 999-Full1
Let’s assume Scenario 1: SEP reviews 999-Full1, and asks for revision
Using SEP reviews as guidance, you submit 999-Full2
Scenario 1: SEP sends to external review & to EPSP, and may send you a review to address with an addendum.
Environmental Protection and Safety Panel

- Examines every site you propose for concerns over environmental effects
- Examines every site you propose for concerns over hydrocarbons and overpressure
- JOIDES Resolution and most Mission Specific Platforms do not have a blow-out preventer
- EPSP has VETO rights
Scenario 2: SEP deactivates your proposal
You receive External Reviews and EPSP evaluation
• Submit 999-PRL (response to external reviews)
• Submit 999-Add (additional info requested by SEP and/or EPSP)
Scenario 1: SEP rates it, and sends to FB
Scenario 2: SEP puts its Holding Bin & forwards to FB
For JR expeditions, JRFB meets in May, decides whether to put it on schedule, or to hold it for consideration later.
IODP NEEDS SEISMIC IMAGING!

2015 SEP Consensus Statement: “The SEP wishes to convey concern regarding the increased pressures on the acquisition of academic active-source seismic data, some of which by design is conducted in support of scientific ocean drilling. Continued reduction in the international marine geoscience communities’ ability to collect seismic data in areas of scientific interest is jeopardizing the scope and impact of IODP science. The SEP consensus is that the IODP should stress the importance, both to member country funding agencies and environmental permit organizations worldwide, of high-quality subsurface images for science and safety in connection with expected continuation of IODP…”
IODP NEEDS SEISMIC IMAGING!

Australasian IODP Workshop, Consensus Statement

Following community discussions at the Australasian IODP Workshop, it was agreed that a consensus statement relating to the importance of site survey data and especially the availability of high quality seismic reflection profiles should be developed. The statement, below details the critical importance of this material in continued productivity and safety of sub-seafloor research.

This statement will be circulated internationally, to research vessel managers and stakeholders, on behalf of the Workshop team.

Consensus statement on need for site survey data for IODP
WHO HAS CAPABILITY

- Europeans have several smaller (1-3 km) systems, Sercel or Bolt airguns either leased or owned used by UK, Germany, France, Italy, and Spain. Most capable system is Spain’s and available to other EU researchers.
- Australia’s Investigator is also equipped for seismic survey work and is fitted with a seismic compressor system. Arrangements for a seismic acquisition system are currently under being considered.
- Japan’s Kairei has an MCS system with 8 LL guns and a streamer (??km).
- US best in the academic world- R/V Marcus Langseth
Escenarios de equipamiento móvil

**ESCUENTRO DE FUENTES SÍSMICAS**

- Cañones de aire comprimido SERCEL® GGUN-II
- Cañones de aire comprimido BOLT, modelos 1500LL y 1900LL
- 2 compresores LMF 25/138-207E50
- 2 compresores Hamworthy 4TH 190 W 70 móviles (contenedores de 10'
- 2 controladores de cañones de aire comprimido RTS® BigShot
- Controlador de cañones de aire comprimido Hydrasystema® Hydrapulse
- Sistema de integración de datos de navegación EIVA® NaviPac
- 2 sistemas de generación y datación de eventos FEI-Zyfer® GPStarplus 565
- Contenedor-taller de 20'

**ESCUENTORES DE SÍSMICA DE REFLEXIÓN DE ALTA RESOLUCIÓN**

- Mimi Streamer de alta resolución GeoResources® Geo-Sense 24
- Streamers tri-canal SfG modelo 16.3x60.175
- Sistema de adquisición de datos IXSEA DelphSeismic Plus
- Sistema de navegación integrado EIVA® NaviPac

**ESCUENTRO DE SÍSMICA DE REFLEXIÓN MULTICANAL**

- Streamer multicanal SERCEL® Sentinel (6 km, en dos chieres IBERCISA®)
- Sistema de adquisición de datos SERCEL® SEAL 406XL
- Sistemas de estabilización y posicionamiento acústico (birds) SERCEL® Nautilus
- Sistema de recuperación del streamer (retrievers) con sensores de campo magnético y rumbo
- OYO GEOSPAC® HSRD-500
- Boya de cola del streamer PartnerPlast® 800L Mini
- Sistema RGPS SEAMAP® Novatel OEM 04
- Sistema de navegación integrado EIVA® NaviPac
- Contenedor de sistemas de adquisición de sísmica de 10'
- Pastaica streamer ODIM® 700/63 550 64
- Sistema de control de calidad de datos sísmicos a tiempo real SERCEL® SQC-Pro.
- Sinorontización de todas las redes de comunicaciones entre sistemas mediante servidor de tiempos dedicado.
## Science Equipment

### MCS Acquisition
- Secret SealXI (408)
- SSI Seisnet active tape emulation

### Hydrophone arrays
- Sentinel Solid Acquisition Section (SSAS) 3Hz
- 12.5 meter groups
- 150m sections
- up to four towed each 6.75 km long
- separation 50 - 150 meters

### Source Arrays
- 4 Sub-Array w/ 10 elements each
- 9 active elements w/ one spare per Sub-Array
- Each Sub-Array is 15 meter in length
- 1850 cu. in. per Sub-Array

### Source Controller
- SeaMAP DigiShot

### MCS geometry sensors
- ION Digicourse 5011 Compassbirds
- ION Digicourse Digirange
- PBX System PosNET Streamer Tailbuoy GPS
- PBS System Seismic Source GPS (1 per Sub-Array)

### MCS Navigation
- ION Concept Systems, Ltd
- Spectra Navigation Management System
- Sprint Navigation Processing System
- Reflex 3D Binning System

### MCS QC
- Secret SealXI
- SSI Seisnet active tape emulation
- ProMaxx
- Focus

### Communications
- HighSeasNet
- Inmarsat Sailor 500 FleetBroadband
- Iridium Sailor Satellite Phone

### Multibeam / Echosounder
- Kongsberg EM122 1° x 1°
- Knudsen 3260 Echosounder

### Marine Mammals Observation / Mitigation
- Seiche Passive Acoustic Monitoring Streamer
- 2 x Fujinon Big Eye Binoculars
CONCLUSIONS:

- IODP fails without adequate imaging and lots of proposals in the system or planned which need survey work.
- Many international options for seismic equipment and capable vessels for deployment, but no one likes a transit AND the US system – R/V Marcus Langseth is 2x as capable as any other academic option globally.
- International community has many seismic experts and SEP is a place where such expertise meets 2x a year.
- Informal discussions show that there is significant interest in use of the Langseth when it is in the right place. Key partners? Financial options for use? Ship track planning? Too late?