

Towards Post-2024 Scientific Ocean Drilling Vienna, April 22-23, 2023 Discussion

Following the formal proceedings of the April 2023 IODP Forum Meeting, the attendees engaged in open discussions about post-2024 scientific ocean drilling plans and options. Each of the International Ocean Discovery Program (IODP) partners presented their status and their current thoughts about future scientific ocean drilling programs. Their slides, where available, are attached. In summary:

- ECORD and Japan are formalizing their joint vision for the International Ocean Drilling Programme (indicated as IODP³) through putting together a memorandum of understanding. The new program will maintain the ECORD and Japan identities as platform providers, while inviting associate members and temporary members. They plan to develop a proposal process similar to the current process with a single Mission-Specific Platform Facility Board. ECORD and Japan welcome collaboration with other scientific ocean drilling programs and other research programs (e.g., ICDP) through a Forum-like body.
- The U.S. National Science Foundation is evaluating options for scientific ocean drilling after the current program concludes, and intends to make its decision public within FY2023. Further community input is needed to develop a strategy for where and how scientific ocean drilling will proceed over the next 10 to 20 years. NSF will solicit community input on prioritized scientific ocean drilling objectives, a portfolio of possible approaches, reimagining the methods of scientific ocean drilling and sub-seafloor sampling, and a plan for international engagement. And NSF, through the National Academy of Science is undertaking a 2025-2035 Decadal Survey of Ocean Sciences to guide future investments in research, infrastructure, and workforce development.
- The U.S. Scientific Ocean Drilling Alliance (US-SODA) continues to advocate for a new U.S. drilling vessel, a dedicated IODP-like program, and bridge programs that will support U.S. research efforts during a transition phase. US-SODA feels that NSF has not yet provided a clear vision or plan on how the U.S. will continue to be part of international scientific ocean drilling. In addition, US-SODA is concerned that the U.S. is losing most of its significant ocean drilling capabilities to provide answers to the critical calls of addressing societal challenges as well as its international leadership position in scientific ocean drilling.
- China is planning to commit multiple platforms (China Multifunction Platform; CMP) to its developing post-2024 scientific ocean drilling program, including a newly built riser drilling vessel that is scheduled to be fully complete by 2024. The CMP program will be jointly managed by Tongji University and the Guangzhou Marine Geological Survey, and it will potentially implement one to two expeditions per year. China continues its

intentions to building a CMP core repository, and IODP-China is developing a 10-year science plan based on the 2050 Science Framework.

- India remains interested in a post-2024 scientific ocean drilling and has been in talks with different platform providers and PMOs about the emerging programs. India will continue to hold these bilateral and multi-lateral meeting and has updated its National Committee of Experts on the developments. At this time, India's Ministry of Earth Science has yet to decide on the level of financial support beyond 2024. However, there is growing interest within the Indian research community for developing new drilling proposals in the Indian Ocean.
- ANZIC shared their strategy for securing future funding, with Australia seeking new and increased funding under the National Collaborative Research Infrastructure Strategy (NCRIS) and New Zealand will use successful NCRIS funding to explore additional options with the Ministry for Business, Innovation, and Employment. ANZIC also discussed a need for clarity from platform providers on membership models, program plans, risk mitigations, and opportunities to engage internationally as a guide to ANZIC's decisions on how to invest in post-2024 research and scientific ocean drilling.
- Korea continues its goal of fostering cutting-edge science through participation in IODP, which includes preparation and submission of drilling proposals and education programs for graduate students based on IODP themes. Korean scientists are currently in the process of requesting funding to rejoin IODP, but it is uncertain if funding will be granted. Korea's goal post-2024 is to successfully carry out an expedition in the sea east of Korea. Korea will focus intensive geophysical surveys and preliminary studies on the research area.

Attached Presentations

1. ECORD-Japan
2. United States
3. China
4. India
5. ANZIC
6. Korea

Scientific Ocean Drilling beyond 2024 and the MSP concept -

A joint vision for future scientific ocean drilling

Gilbert Camoin

Director, ECORD Managing Agency (EMA), CEREGE-CNRS, Aix-en-Provence, France

Nobu Eguchi

Director, Science Services Department Institute (MarE3), Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan

David McInroy

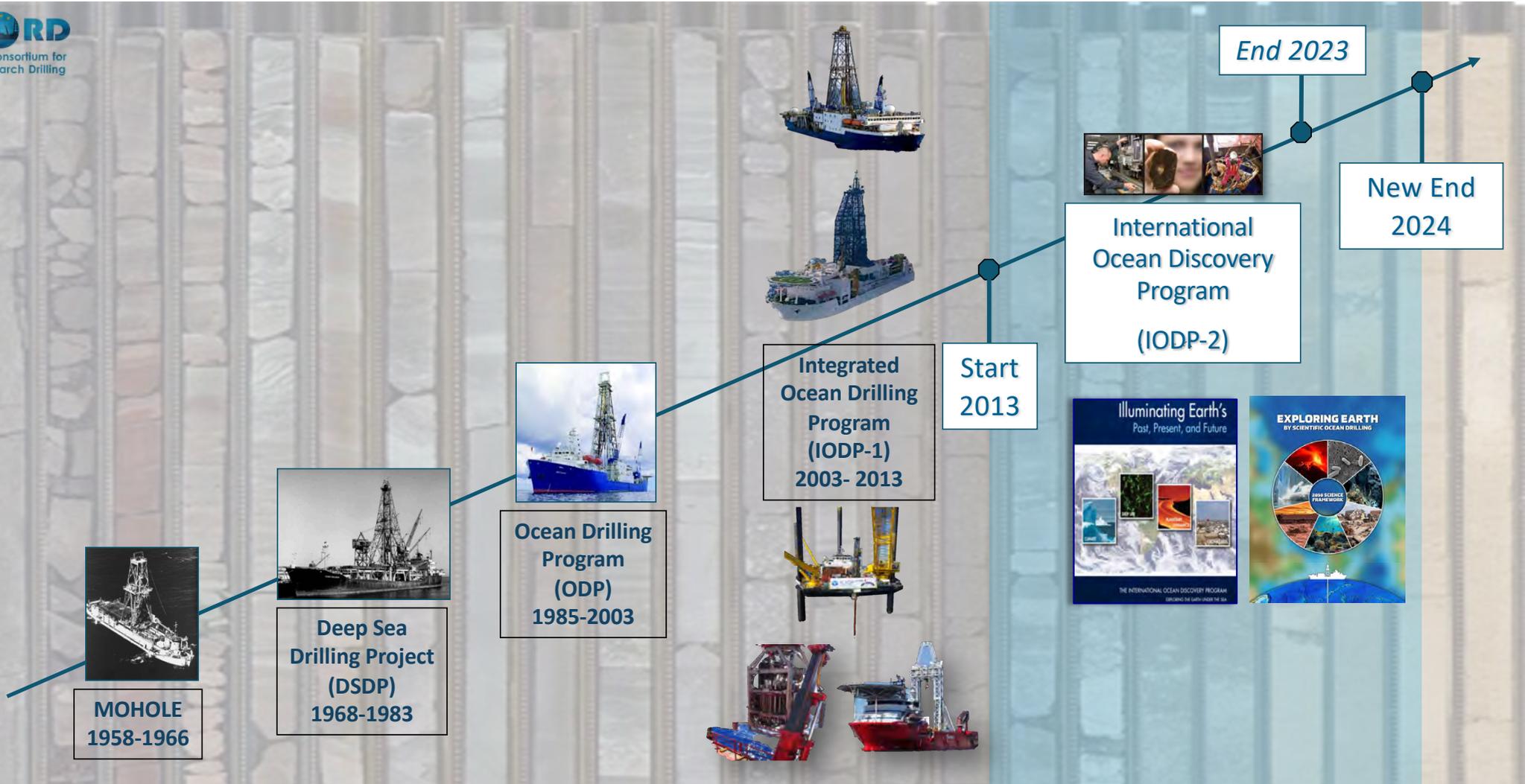
Science Manager, ECORD Science Operator (ESO), British Geological Survey, Edinburgh, UK

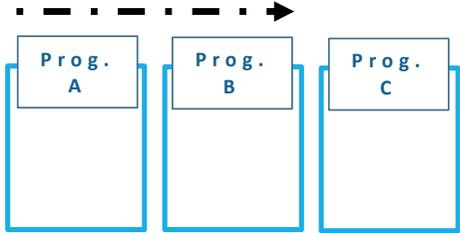
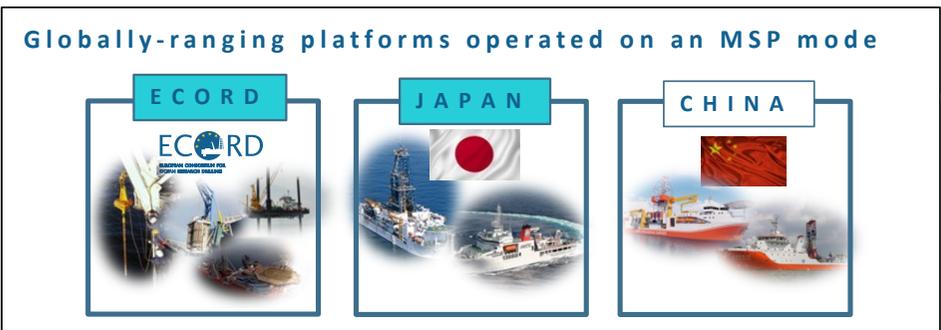
Angelo Camerlenghi

Chair, ECORD Science Support and Advisory Committee (ESSAC), OGS, Trieste, Italy

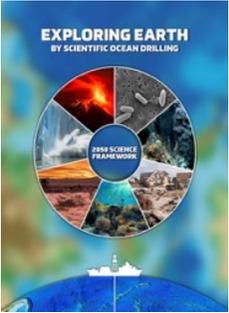
On behalf of ECORD-JPN working groups and bilateral meeting groups



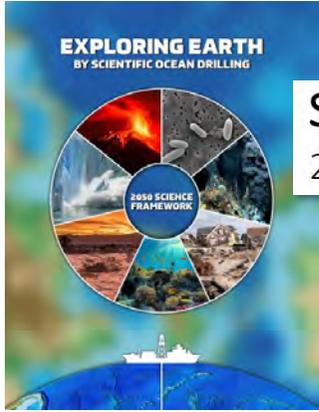




Non-platform providers



*A unique situation
in the history of
scientific ocean drilling*



Science Framework Working Group

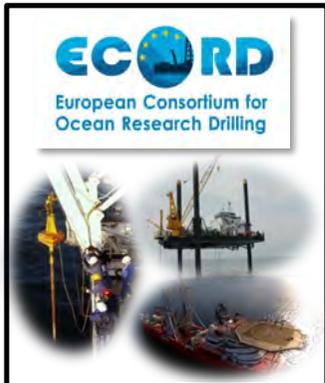
2020 Consensus Statements



CONSENSUS STATEMENT #1

The *Enduring Principles* (p.7) in the *2050 Science Framework* are critical in providing the foundation for a cohesive set of ground rules for future scientific ocean drilling program(s).

- ✓ **ECORD-Japan partnership, through a MoU**
- ✓ **Basic principles of the programme**
 - *Single international Science Framework*
 - *International staffing of expeditions and advisory panels*
 - *Transparent, open, flexible and international*
 - *Program-wide standard policies and guidelines*
 - *Sustainable management of knowledge-based resources*
 - *Public access to knowledge-based resources*





- ✓ *ECORD and Japan will keep their own identity and entities*
- ✓ *3 joint entities:*
 - *'Vision Task Force'*
 - *'Communication Task Force'*
 - *'Workshop Programme'*



Facility Board

Evaluation Panel

Support Office

Cash/IKC
→

Drilling proposals
→

Science Framework Working Group

2020 Consensus Statements

CONSENSUS STATEMENT #2

Implementation of the *2050 Science Framework* must be driven by a *Common Proposal Process* powered by bottom-up submission of proposals, prepared by international teams of scientists, and developed through an open, transparent, and merit-based peer-review process.

SUPPORTING OBSERVATIONS AND IDEAS

- Current panels and Facility Boards are working well and should be used as our starting point to develop a new scientific advisory structure in support of the innovative 2050 Science Framework.
- All proposals should come through a common review process and the new scientific advisory structure should prioritize promoting important science endeavors and projects.

Name of the program

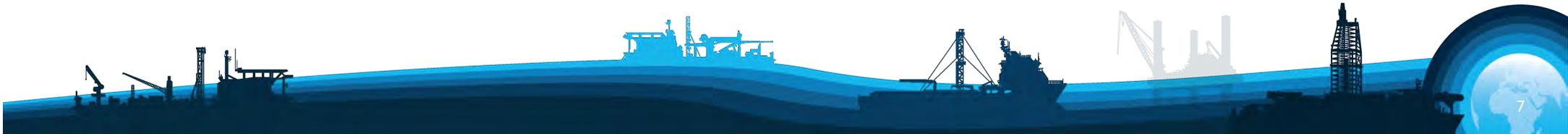


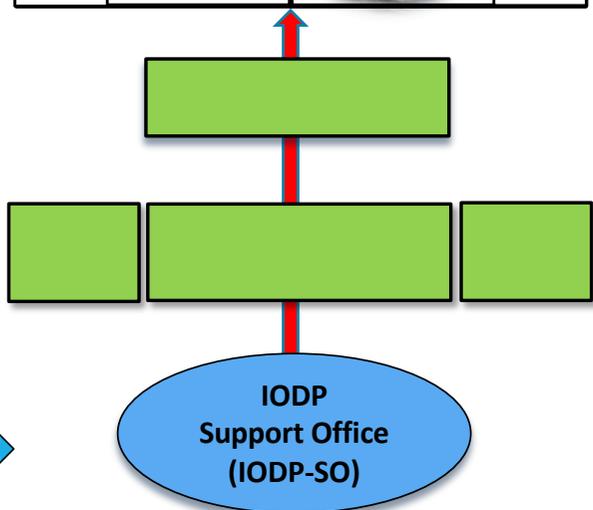
International Ocean Drilling Programme (IODP³)

Keep “IODP brand” but different name

Make difference from previous two IODPs

= IODP³: IODP-cubed





IODP Support Office (IODP-SO)

- ✓ **Tasks:** All tasks currently conducted by SSO (PDB, SSDB, Web etc.) plus expedition-related publications
- ✓ **Location:** in Europe and/or Japan
- ✓ **Timeline:** Call for “letter of interest” soon > start phase: Spring 2024 for a smooth transition from current SSO

Cash/IKC
→

Drilling proposals
→



- ### Evaluation system
- ✓ ToR not written yet
 - ✓ SEP-like panel: Core group of about 30 scientists/experts + Ad-hoc members
 - ✓ No external review
 - ✓ No standing EPSP-like panel, some expertise may need to participate to SEP and/or during workshops
 - ✓ Operators will have responsibility for safety and environmental issues of the programme



MSP Facility Board

Adhoc
EPSP

Science Evaluation
Panel (SEP)

Adhoc
ILP

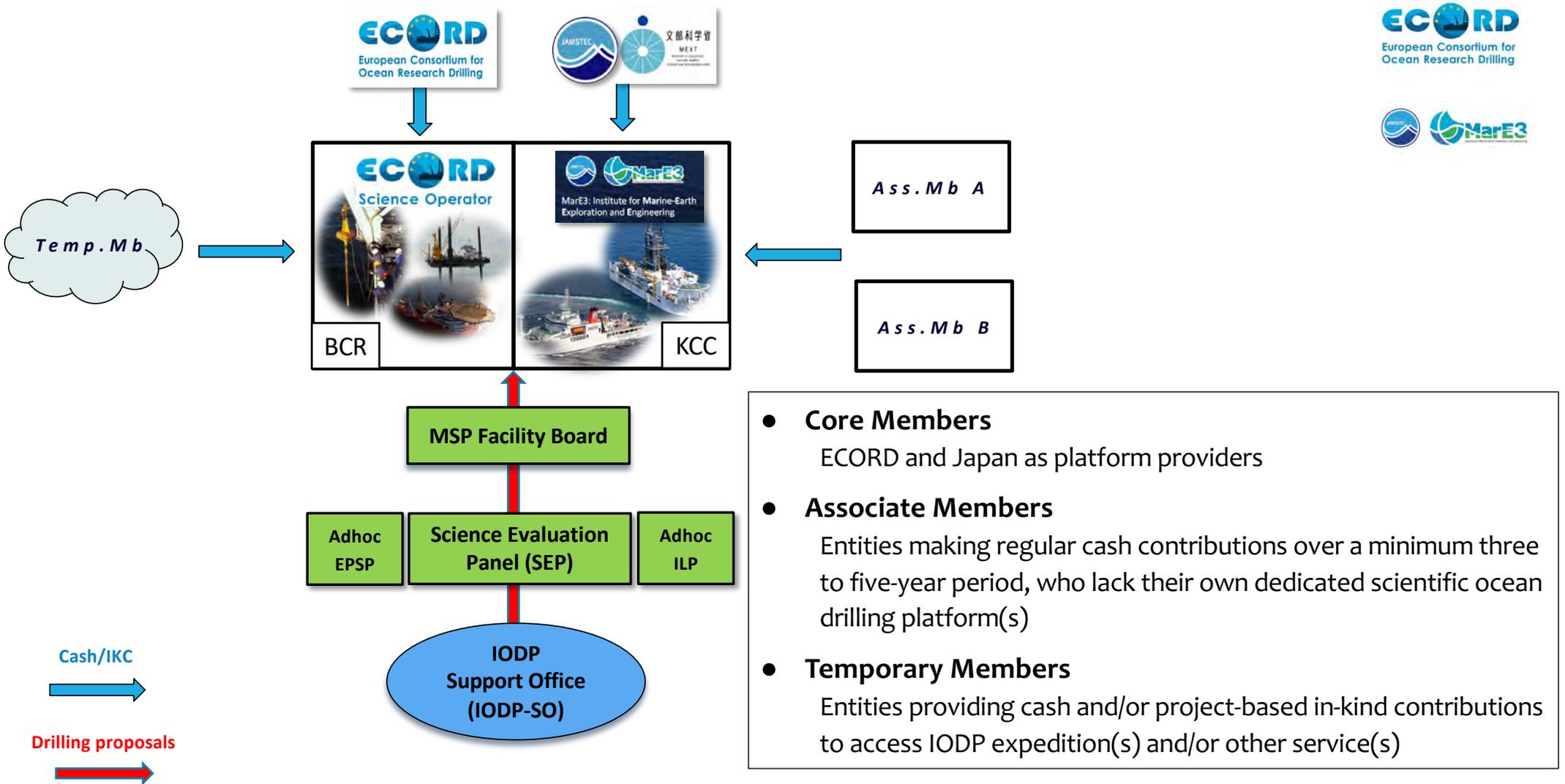
IODP
Support Office
(IODP-SO)

Cash/IKC
→

Drilling proposals
→

MSP - Facility Board

- ✓ The MSP Facility Board will be the entity responsible for selecting and scheduling drilling proposals for implementation by the ECORD Science Operator (ESO), JAMSTEC, or as expeditions implemented jointly by ESO and JAMSTEC/MarE3
- ✓ Membership:
 - Science Board (voting members)
 - Non-voting members: representatives from funding agencies, operators, PMOs; ad-hoc specialists/experts
 - Liaisons



- **Core Members**
ECORD and Japan as platform providers
- **Associate Members**
Entities making regular cash contributions over a minimum three to five-year period, who lack their own dedicated scientific ocean drilling platform(s)
- **Temporary Members**
Entities providing cash and/or project-based in-kind contributions to access IODP expedition(s) and/or other service(s)

Proposal submissions:



Submission of drilling proposals to the IODP evaluation system is open to scientists from all nations

Panels and boards:



Selection of panel and board members is subject to a competitive process. National representation ratios are subject to the relative levels of financial contributions by IODP members

Expeditions:

Participation rights in IODP expeditions are based on relative financial contributions of IODP members.
Co-chief Scientists not counted towards quotas

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	Panels	Proposal submission	Expeditions	Samples/Data	Workshops	Training
Core	yes	yes	yes	yes	yes	yes
Associate	yes	yes	yes	yes	yes	yes
Temporary	no	yes	yes*	yes	yes	yes*
Non-members	no	yes	no	yes	yes	no

**subject to cash and/or in-kind contributions = financial contribution*

IODP³

Temp. Mb



Ass. Mb A

Ass. Mb B

MSP Facility Board



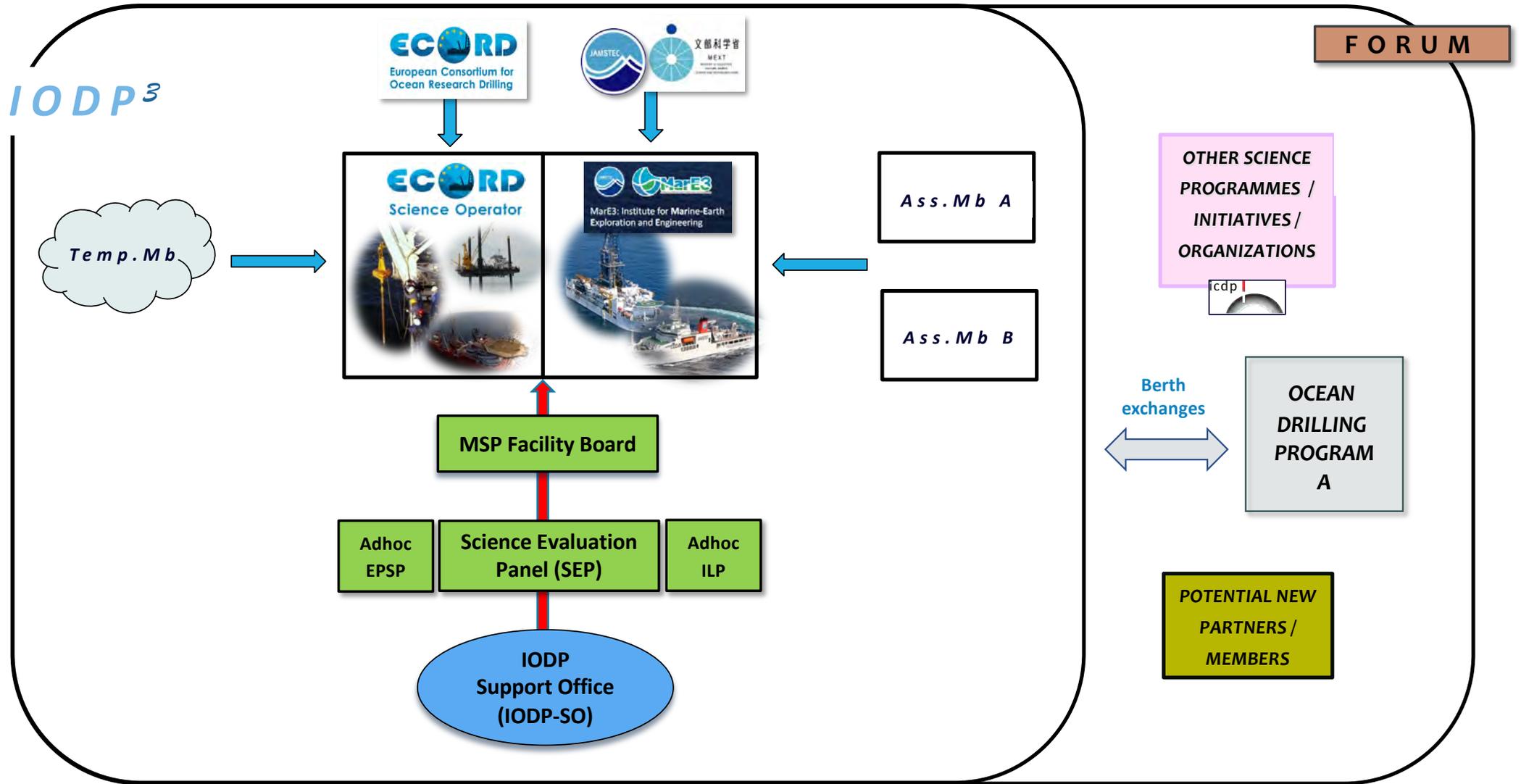
IODP Support Office (IODP-SO)



Cash/IKC

Drilling proposals

IODP³





Scientific Ocean Drilling with Mission-Specific Platforms and Chikyu



David McInroy
dbm@bgs.ac.uk



British Geological Survey @

the Lyell centre

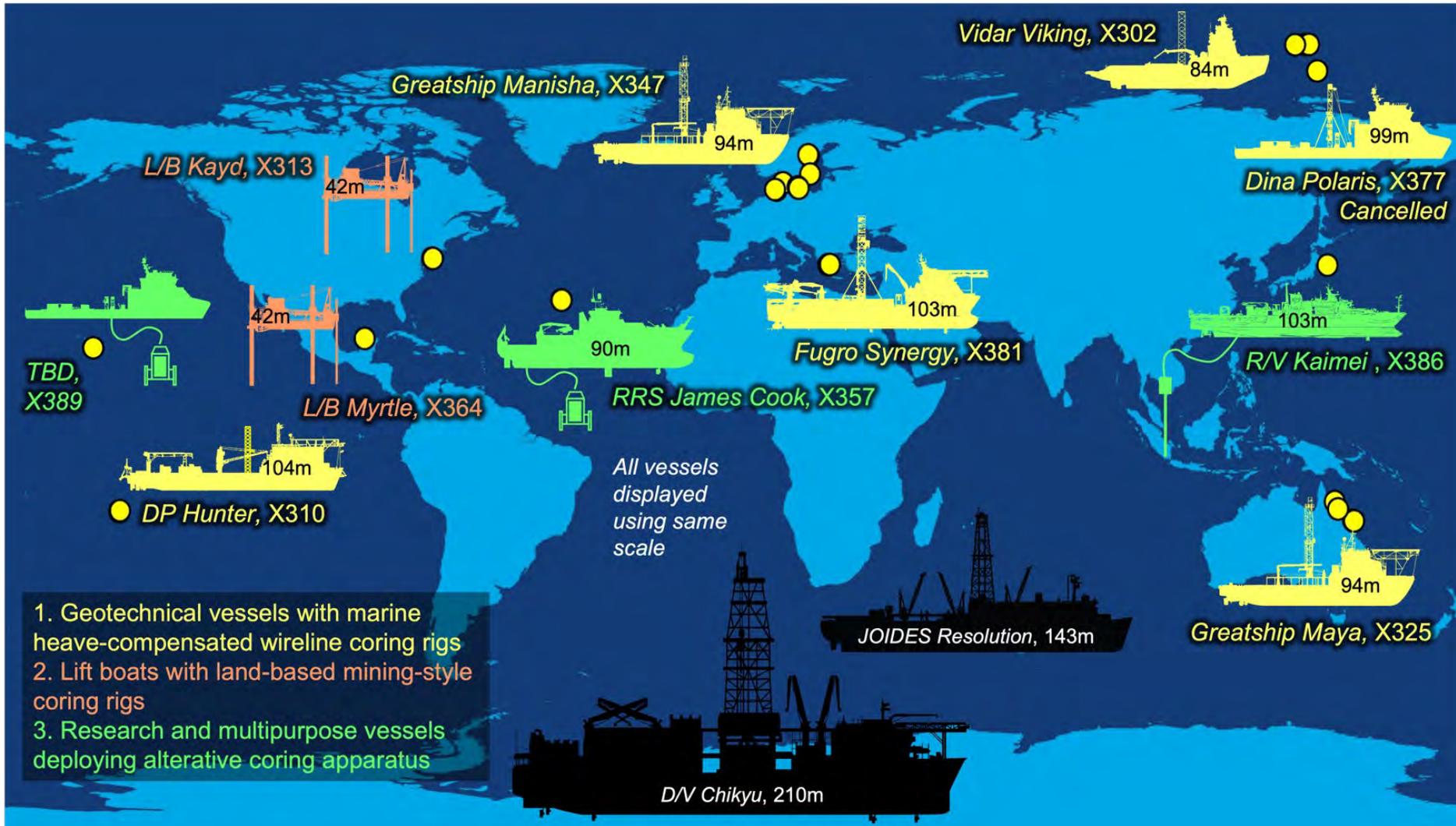
Operational options for offshore drilling: mission-specific platforms



British Geological Survey







Geotechnical / multipurpose vessel deploying marine heave-compensated wireline coring



- Min water depth: ~20 m (determined by platform)
- Typical pipe deployment (water + penetration):
2000 m typical (determined by coring apparatus) (\$)
 - 3000 m for larger geotechnical vessels (\$\$)
 - 10-11 km for deep-water drill ships (\$\$\$\$)
- Easily moveable between sites
- No need for extra survey(s) to land legs and elevate
- Good market availability
- Can transit globally when budget allows
- Effective heave compensation required
- Seabed templates becoming more sophisticated

- Core diameter: 61 - 64 mm
- Typical coring rate: 50 m/day
- Typical open hole rate: 80 m/day
- Supports full downhole logging
- Supports borehole instrumentation

Scaling-up: larger geotechnical, well-intervention and deep water drilling vessels with marine heave-compensated wireline coring



*Fugro Synergy
X381, 2017
Gulf of Corinth*

1



*Dina Polaris
Arranged for X377, 2022*

2

MSPs capable of
deploying up to 3000 m
of drill pipe

Capable of
implementing many
'JR-type' expeditions



*Noble Tom Madden
Deep water drillship*

3

Example of a deep water drill ship capable of
deploying 11-12 km of pipe – but expensive



DNV Chikyu

4

Alternative: work with JAMSTEC
and deploy *Chikyu* as an MSP



Lift boat or fixed platform deploying onshore mining-style wireline coring



- Water depth range: 4 – 110 m (platform-determined)
- Smaller lift boats up to 55 m water depth (\$)
- Larger up to 84 m (\$\$) and 110 m water depth (\$\$\$)
- Typical pipe deployment (water + penetration):
2400 m typical (coring apparatus-determined)
- Can access very shallow water
- Essentially a land-based set up with no swell
- Can use land-based mining-style equipment
- Smaller, less accommodation (shared cabins)
- Need seabed survey(s) for safe landing of legs
- Cannot easily cross oceans, used near market areas



'Lighter' coring system, higher rotational speed, smaller gap between borehole wall and drill pipe, can lead to better hole condition and better core quality



- Core diameter: 61 - 83 mm
- Typical coring rate: 30 m /day
- Typical open hole rate: 50 m/day
- Supports full downhole logging
- Supports borehole instrumentation

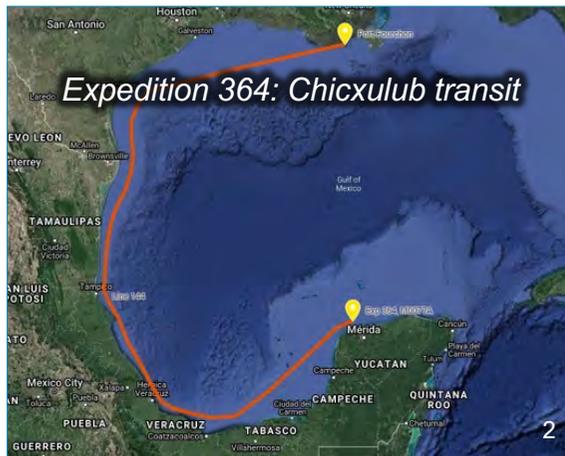
Lift boats: other considerations



*L/B Kayd
X313, 2009
New Jersey Shelf*



*Heavy lift vessel carrying
a jack-up platform*



Expedition 364: Chicxulub transit

*Modular platforms e.g. Combifloat
<https://combifloat.com/self-elevating-platforms/>*



*ICDP Deep Lake Drilling System
mounted on a barge
Lake Ohrid, Macedonia*

Research or multipurpose vessels deploying alternative coring apparatus: seafloor drills (SFD) & giant piston corers (GPC)



1
RRS James Cook
X357, 2015, Central North Atlantic



2
R/V Kaimei, X386, 2020 - 2022
Japan Trench



3
MARUM MeBo70
X357, 2015, Central
North Atlantic



4
Benthic Geotech PROD Systems



5
OSIL Giant Piston Corer
Operated by JAMSTEC
X386: Japan Trench

SFD

- Core diameter: typically 61-73 mm
- Max pipe: 50 - 200 m
- Water depths: Up to 2-4 km
- Typical coring rate: 15 m /day
- Heave-free, mining-style coring
- No or limited downhole logging
- No or limited borehole instrumentation

GPC

- Core diameter: 100 mm
- Max pipe: Typically 40m, but up to 70 m
- Water depths: up to full oceanic depth
- Typical coring rate: 1 core per day
- No downhole logging
- No borehole instrumentation

- Water depth range: 10m up to limit of coring apparatus
- Cost-effective platforms to deploy smaller-scale coring methods
- Sizeable, well-equipped labs for 3rd party equipment
- Nationally-owned assets offer in-kind contribution opportunities
- In-kind contributions = less cost to ECORD
- Compromise needed to take advantage of alternative coring methods: lower penetration, no downhole logging.

Ice-breaking research vessels deploying alternative coring apparatus



 Australian Government
Department of the Environment and Energy
Australian Antarctic Division

RSV Nuyina

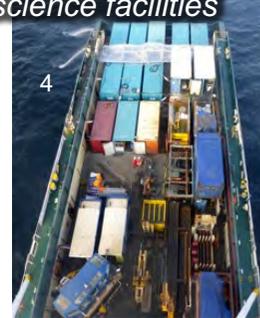


 Natural
Environment
Research Council

*RRS Sir David
Attenborough*

MSP Phases: Opportunities

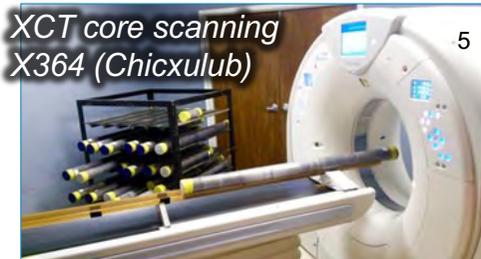
Offshore Phase



+ 3rd party equipment

- Measurement of ephemeral properties
- Observations to guide drilling

Between offshore and Onshore Science Party, 2-3 months



- Time for core measurements (e.g. X-ray CT scanning, dating)
- Science Party can digest offshore data
- Produce a targeted sampling plan

Onshore Science Party at MARUM (University of Bremen) and IODP Bremen Core Repository



- Full suite of IODP measurements
- Development of shore-based collaborations (SP and beyond SP)

Thank you

MSP Facts

- 9 expeditions completed
- 195 boreholes
- 3605 cores
- 7505 m recovered
- 480 days offshore
- 209 days onshore @ OSP
- 1335 mbsf deepest hole
- 19.8 m shallowest water
- 8023 m deepest water

Credit: ECORD-IODP

Operational options for offshore drilling



Nobu Eguchi
Director of Operations, Operation Dept.
MarE3/JAMSTEC



Two potential vessels for new SOD



DV CHIKYU
Riser/Riserless Drilling



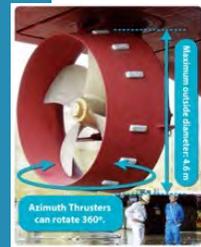
RV KAIMEI
Giant Piston Core System (GPC)
Boring Machine System (BMS)

Deep-Sea Scientific Drilling Vessel Chikyu



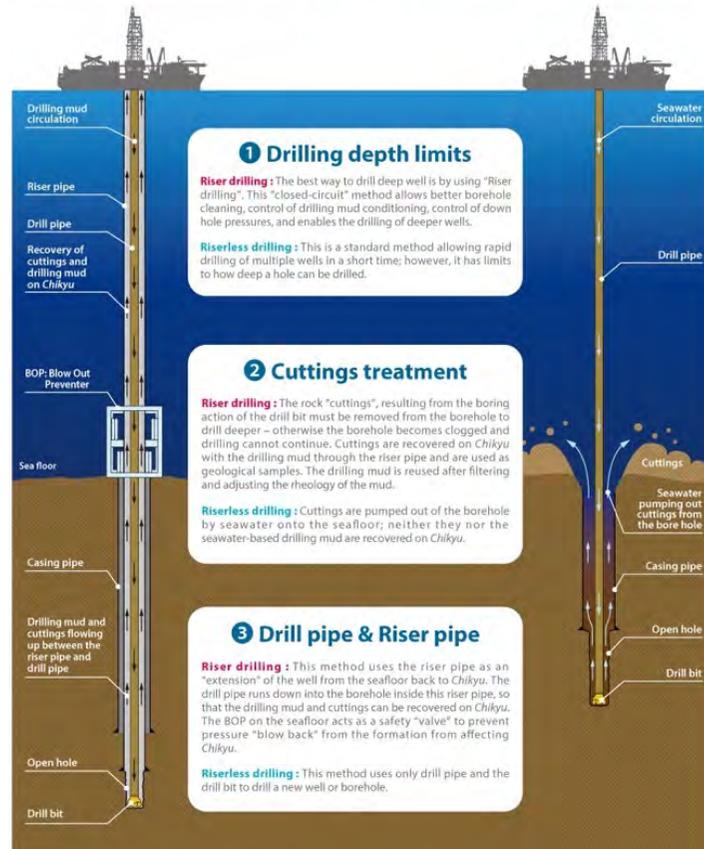
Principle Particulars

Length overall	210.0m
Breadth	38.0m
Depth	16.2 m
Height	130.0m
Draft	9.2 m
Gross Tonnage	56752 ton
Accommodation	200 people
Transit Speed	11.5knots
50 science berth (incl. lab technicians)	
ROV (max. 3,000mbsl) available	
UWTV (max. 7,000mbsl) available	
Riser operation WD limit: 2,500m	
Max. pipe length: 9,000m	
Six azimuth thrusters	



Riser drilling and Riserless drilling

Riser drilling



Riserless drilling



1 Riser pipe

The riser pipe connects the ship to the BOP on the seabed, and the borehole below that. Drilling mud is cycled from the bottom of the borehole back to the ship through the riser pipe. The drill pipe also passes through the riser pipe.



2 Drill pipe

Drill pipe is used to drill the well, rotated by the top drive in the derrick. The drill bit at the end of the drill pipe "digs" the borehole. The drill pipe passes through the riser pipe and casing pipe.



3 Casing pipe

Casing pipe prevents borehole collapse. The casing pipe is run into the borehole and cemented to the sediments or rock formations below the seabed.



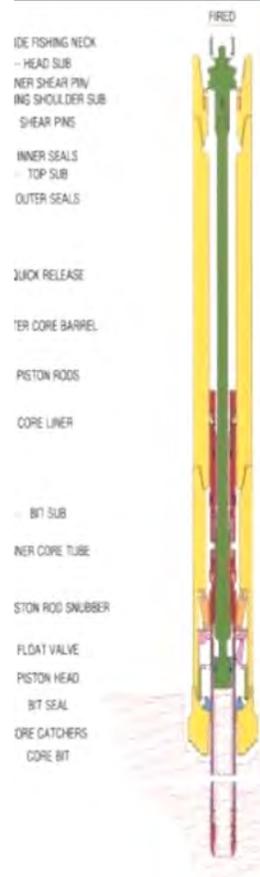
Coring tools (flexible selection)

Soft Sediment



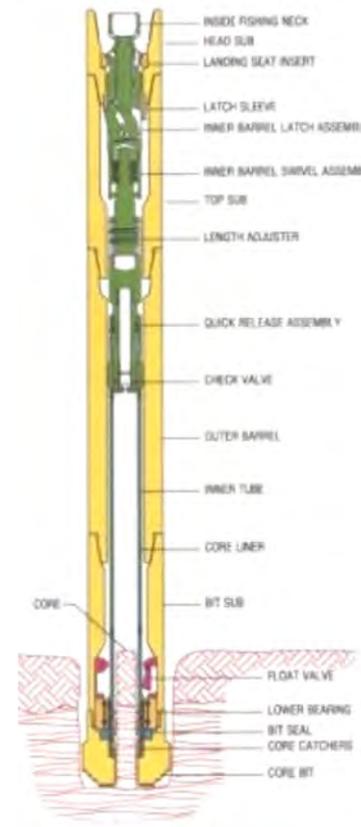
Hard Formation

HPCS:
Hydraulic Piston Coring System



- EPCS:
Extended Punch
Coring System
- ESCS
Extended Shoe
Coring System

RCB:
Rotary Core Barrel

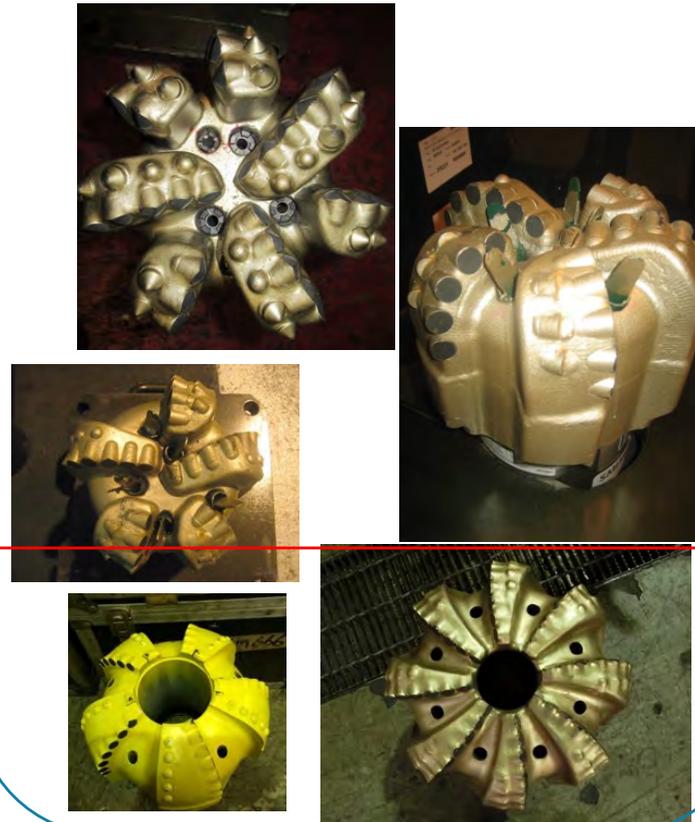


Coring and Drilling bits (flexible selection)

Roller Cone type



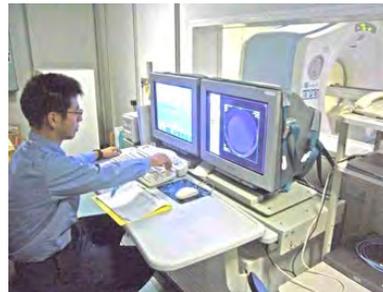
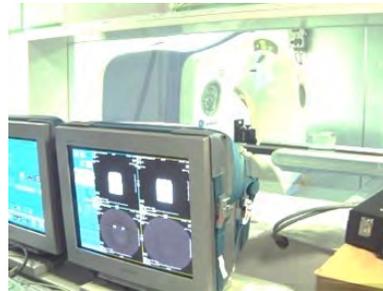
Fixed Cutter Type



Coring bits

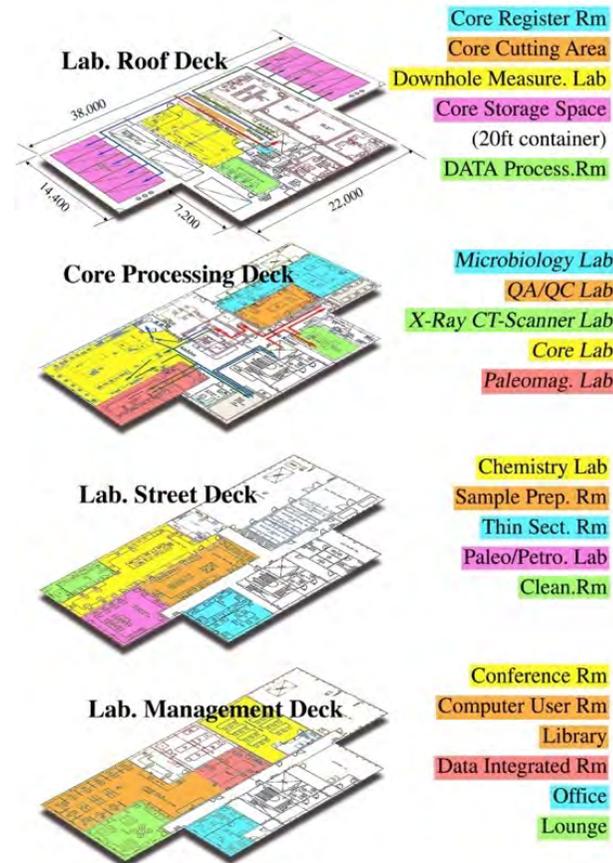


Laboratory Area (flexible spacing)



© JAMSTEC/IODP

Laboratory Stack



Previous IODP Expeditions (flexible duration)

Expedition duration is flexible,
15 days to 176 days

CHIKYU operations (2007-2022)

Integrated Ocean Drilling Program (IODP) &
International Ocean Discovery Program (IODP)

Expedition		Duration (days)	Expedition		Duration (days)
314	NanTro SEIZE	56	348	NanTro SEIZE	139
315	NanTro SEIZE	33	365	NanTro SEIZE	32
316	NanTro SEIZE	50	380	NanTro SEIZE	27
319	NanTro SEIZE	114	358	NanTro SEIZE	176
322	NanTro SEIZE	31	331	Deep Hot Biosphere	34
326	NanTro SEIZE	33	343	JFAST	54
332	NanTro SEIZE	48	343T	JFAST	15
333	NanTro SEIZE	30	337	Deep Coalbed Biosphere	67
338	NanTro SEIZE	105	370	T-Limit	75

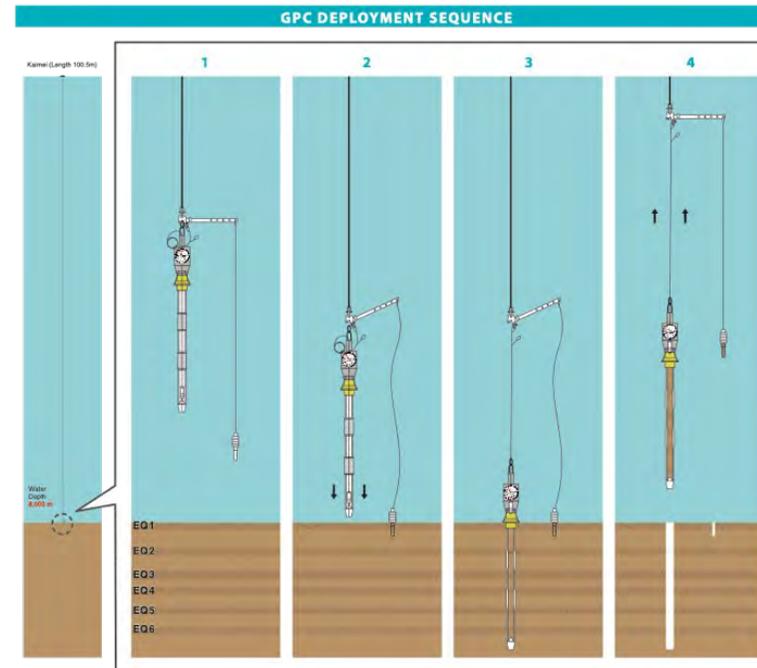


Giant Piston Coring System (RV Kaimei)



ECORD/IODP/JAMSTEC

Main weight: 2 – 6 ton
Barrel length: 10 – 40 m
Core size: 110mm
Main cable: 12,000 m



Exp. 386 Japan Trench

The deepest site ever drilled and cored: 8,023 mbsl

The deepest sub-sea level sample taken at 8,061 mbsl.

29 holes in 15 sites, Total core length: 830m (87.8%)

Water depths: 7,445 – 8,023m

Boring Machine System : BMS (RV Kaimei)



Cellula Robotics (Canada)

Principal Particulars

W x D x H	3.1x3.1x5.7m
Maximum depth	3,000m
Weight in air	13tf
Hydraulic source	40 hp x 2
Power source	3300V 3phase
Thruster	Hydraulic drive system x 4
Observation	8 cameras & Lights
Boring Performance Diameter x Excavation	Coring H8: $\phi 61.1\text{mm} \times 60\text{m}$ 146T: $\phi 123\text{mm} \times 7.5\text{m}$ Casing $\phi 450\text{mm} \times 2.0\text{m}$
Boring Equipments	Drill-head, Wireline, Tool arms, Carousel, Foot clamp, Mud water system
Navigation Sensors & Positioning	Depth, Heading, Atitude, Altitude, Acoustic Responder



Courtesy of Seafloor Geoservices

Chikyu Facts

18 expeditions completed (2007-2019)
Deepest water: 6,897.5 mbsl (+844.5mbsf coring)
Deepest penetration: 3,262.5mbsf (riser operation)
Highest current experienced: > 6 knots
Longest expedition (176 days)
Shallowest limit of operation: 600m
Long-time borehole measurement system installation: 3 sites
Drilled boreholes: 114 (incl. 21 LWD holes)
Core recovered: 5,777m

Chikyu is a crucial MSP for deep water/deep penetration operation in post-2024 SOD

Operational flexibility with MSP



Operational flexibility with MSP

Technology



Any suitable vessel

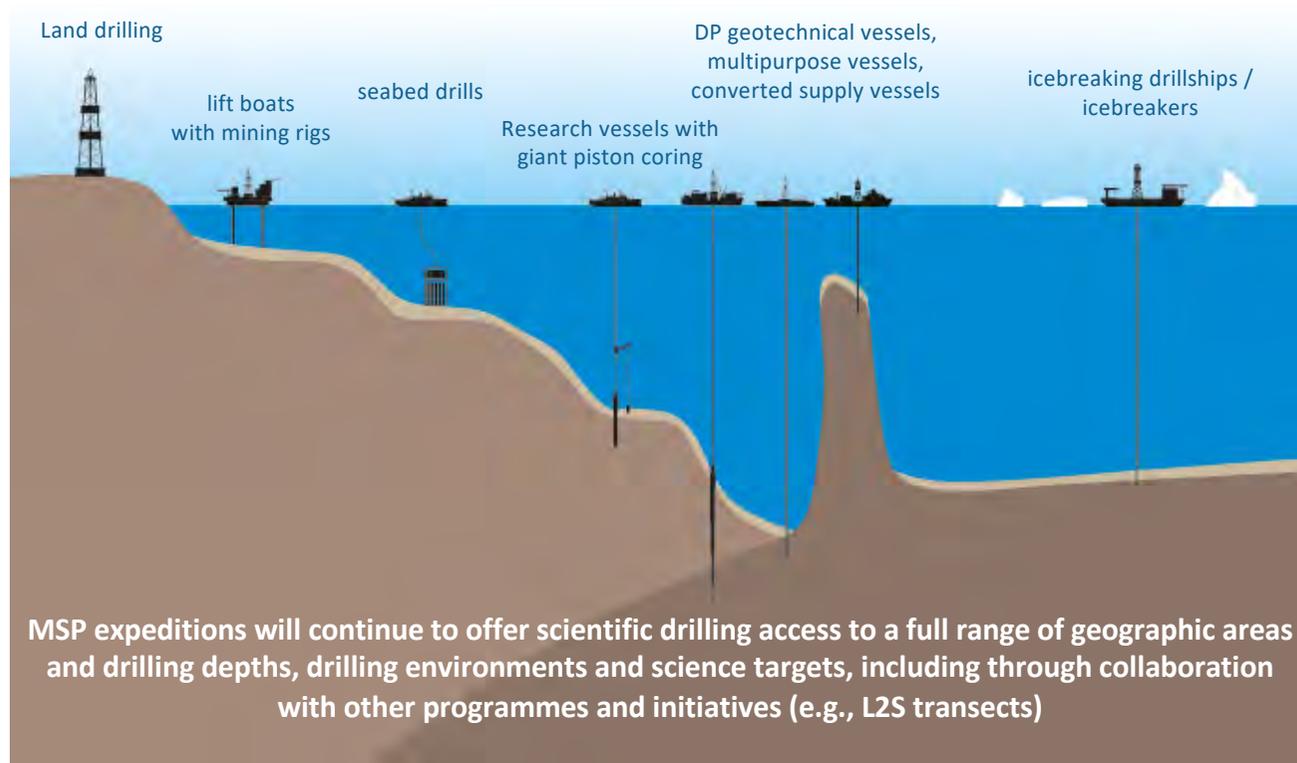
A wide array of drilling and coring systems:

- icebreaking and high-class drillships
- riserless/riser drilling
- lift boats with mining rigs
- seabed drills
- giant piston coring

- ✓ Regional and/or technological clustering
- ✓ Joint efforts between ocean drilling programmes
- ✓ Encourage implementation in several phases ('Flagship Initiatives' / 'Missions')
- ✓ Select the adequate technology to achieve scientific objectives
- ✓ Tailor expeditions to better adapt to the scientific needs
- ✓ New opportunities provided by technological development

Operational flexibility with MSP

Technology



Operational flexibility with MSP

Proposals



Science in IODP is driven by community-generated proposals targeting the research themes outlined in the program's overall science plan and utilizing multiple drilling platforms. IODP proposal submission is a process designed to transform exciting science into successful expeditions.

Proposal Submission Guidelines

IODP Science Evaluation Panel



Approved by the JOIDES Resolution Facility Board
July 2020. Latest revision February 2021.



To further increase operational flexibility of MSP expeditions, **variable operational times** (less or more than the standard two-month JR-type expedition) can be proposed

> **change the paradigm of the JR drilling**

Operational flexibility with MSP

Proposals



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Three different implementation plans:

- A) Basic Plan to guarantee the fulfillment of the crucial scientific objectives
- B) Intermediate Plan in which specific priority sites are proposed for drilling/coring to guarantee the achievement of major scientific objectives and benefits achievable beyond the Basic Plan
- C) Full Plan including all proposed sites for drilling/coring to achieve all scientific objectives to their full extent and benefits achievable beyond the Intermediate Plan

Operational flexibility with MSP

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Proposal guidelines not yet discussed

- ✓ Detailed guidelines will come at a later stage
- ✓ No big changes expected with respect to current program
- ✓ Submission possible 2023 onwards
- ✓ EFB and CIB requested that MSP and Chikyu proposals are transferred to the new program.
- ✓ Some JR proposals may be transferred too, upon proponents' request

Operational flexibility with MSP

Staffing

- ✓ **No need to limit to about 30 scientists as in past and current programmes**

	Moratorium access to samples	Moratorium access to data	Co-author of Report	Reviewing obligation
Involved in Offshore and/or OSP	Yes	Yes	Yes	No, apart from team leaders
Not involved in O/OSP	Yes	Yes	No	Yes
Rest of community	No	No	No	No

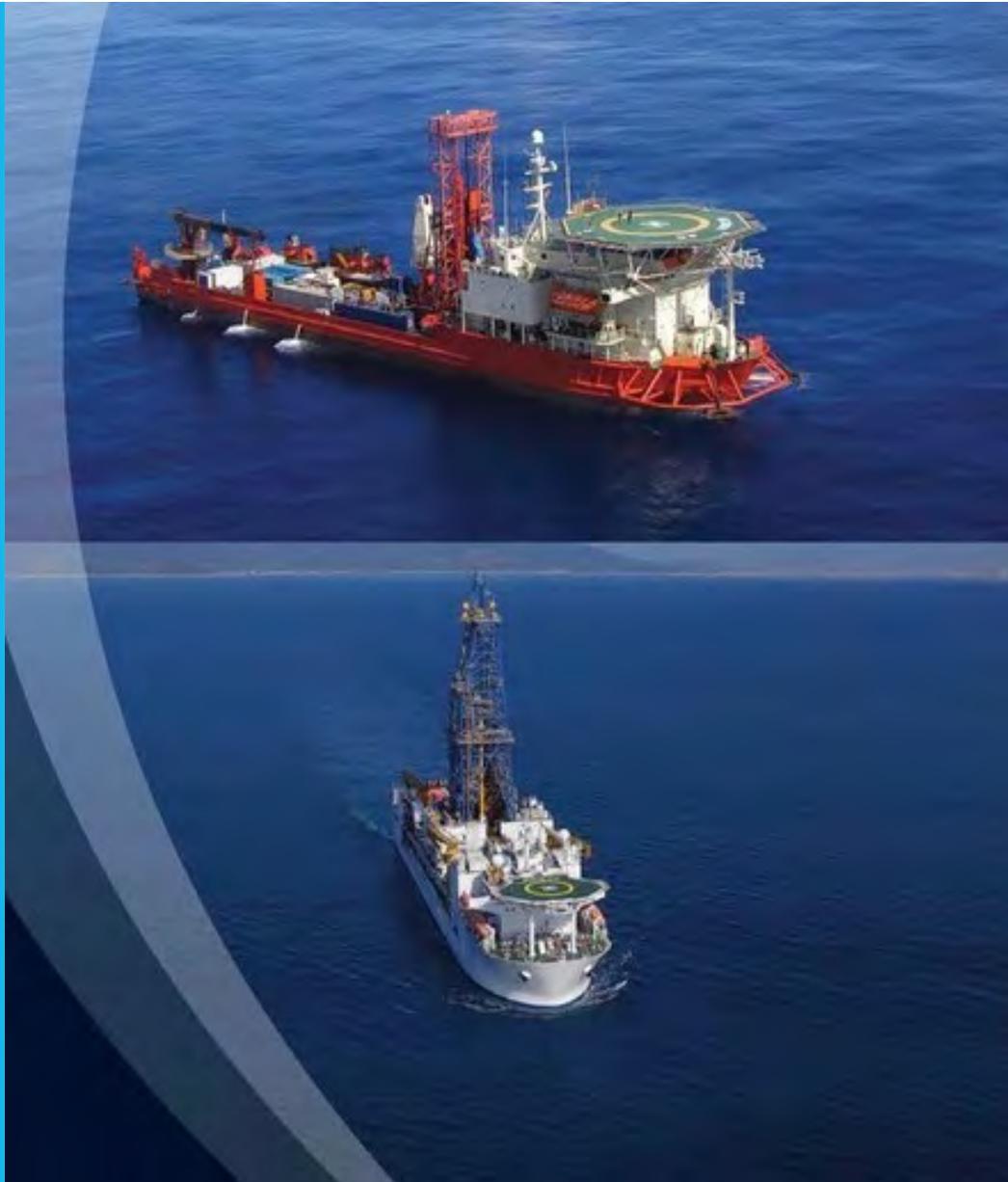
Co-chief Scientists not counted towards quotas

“Virtual Expeditions”



- ✓ There is a rapidly growing interest in the use of scientific ocean drilling legacy data and samples among the activities of future programs
- ✓ JRFB has started a Working Group to explore the scope and requirements for developing Virtual Expeditions that could occur in any new phase of scientific ocean drilling
- ✓ ECORD, JAPAN, ANZIC are developing concepts and in some cases, activities.

Conclusions



Key messages



ECORD and Japan build a combined post-2024 programme, inspired by the 2050 Framework and based on Mission-Specific Platform (MSP) expeditions, which will begin immediately after the conclusion of the current IODP phase

The ECORD-Japan Scientific Ocean Drilling Programme will be based on the ‘philosophy’ of previous international scientific ocean drilling programmes and be transparent, flexible and open to the international community

ECORD and Japan will keep their own functioning and identity and create three joint entities

ECORD and Japan will invite other international entities to join this initiative and share overarching resources

Key messages

MSP expeditions will (continue to) offer scientific drilling access to a full range of geographic areas and drilling depths, drilling environments and science targets, including through collaboration with other programmes and initiatives (e.g., L2S transects)

MSP expeditions will play a prominent role in achieving the goals of the 2050 SF

MSPs offer new opportunities provided by technological development and can be assembled to accommodate novel instrumentation and/or analyses if required

MSP expeditions, by their nature, offer a remarkable operational flexibility concerning the duration of the expeditions, their staffing and their funding > optimization of scientific outcomes and maximum return on investment



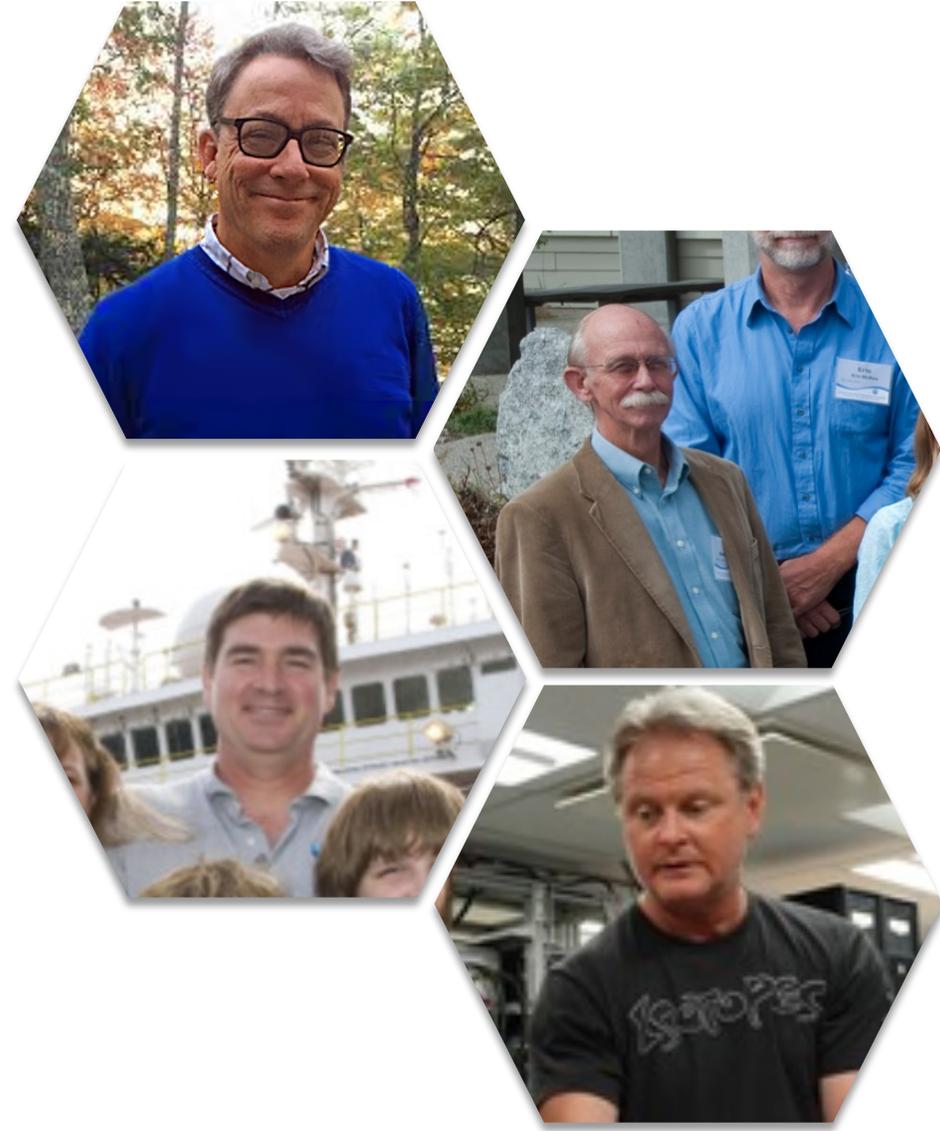
NSF/OCE UPDATE

to IODP Forum, Vienna, Austria
April 23, 2023

Kevin Johnson
NSF/ODP

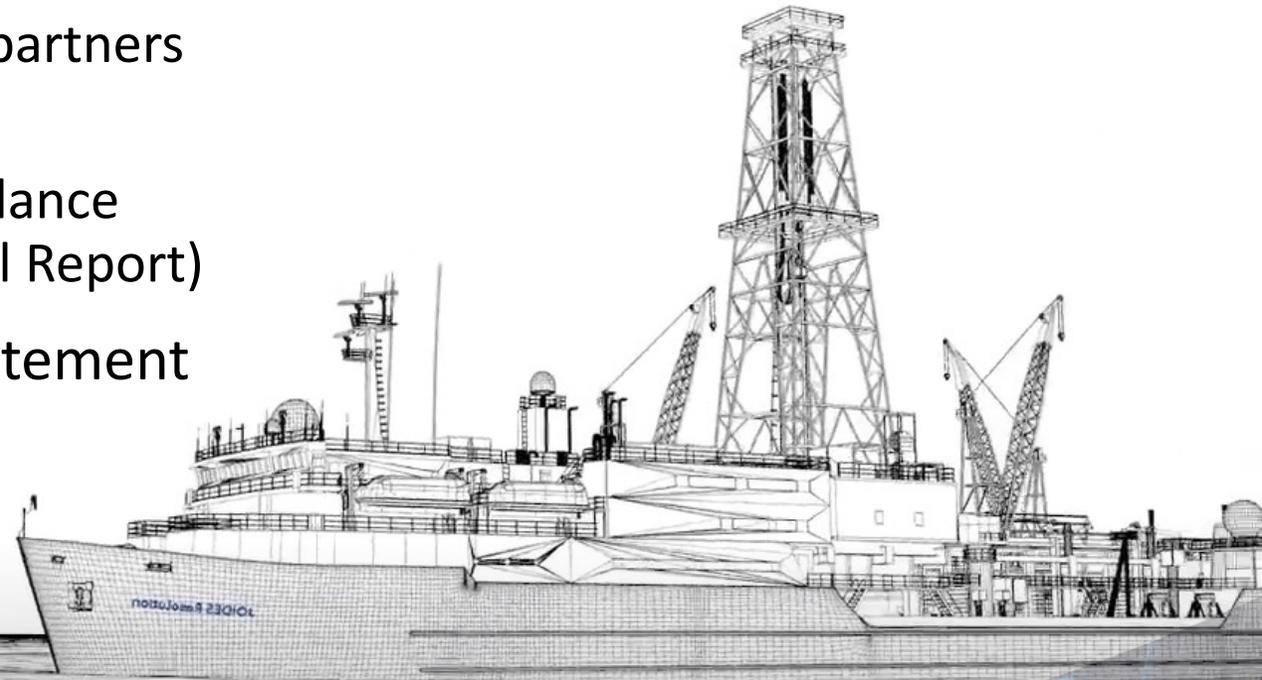
NSF/OCE Leadership Changes

- **James McManus** has replaced Terry Quinn as OCE Division Director.
- **Bob Houtman**, Integrated Programs Section Head, has retired.
- **Jamie Allan**, Program Director in ODP, will retire during FY 2023.
- **Kevin Johnson**, previously Program Director in MGG, is the new ODP lead as of January 7, 2023.



Post-IODP JR Operations

- Reminder: JRSO award and IODP end Sept. 30, 2024
- International Support:
 - Support from international funding agency partners has waned.
 - Shortfall in partner support has portfolio balance implications for OCE. (“Sea Change” Decadal Report)
- State of the JR: JR Environmental Impact Statement expires Dec. 31, 2028



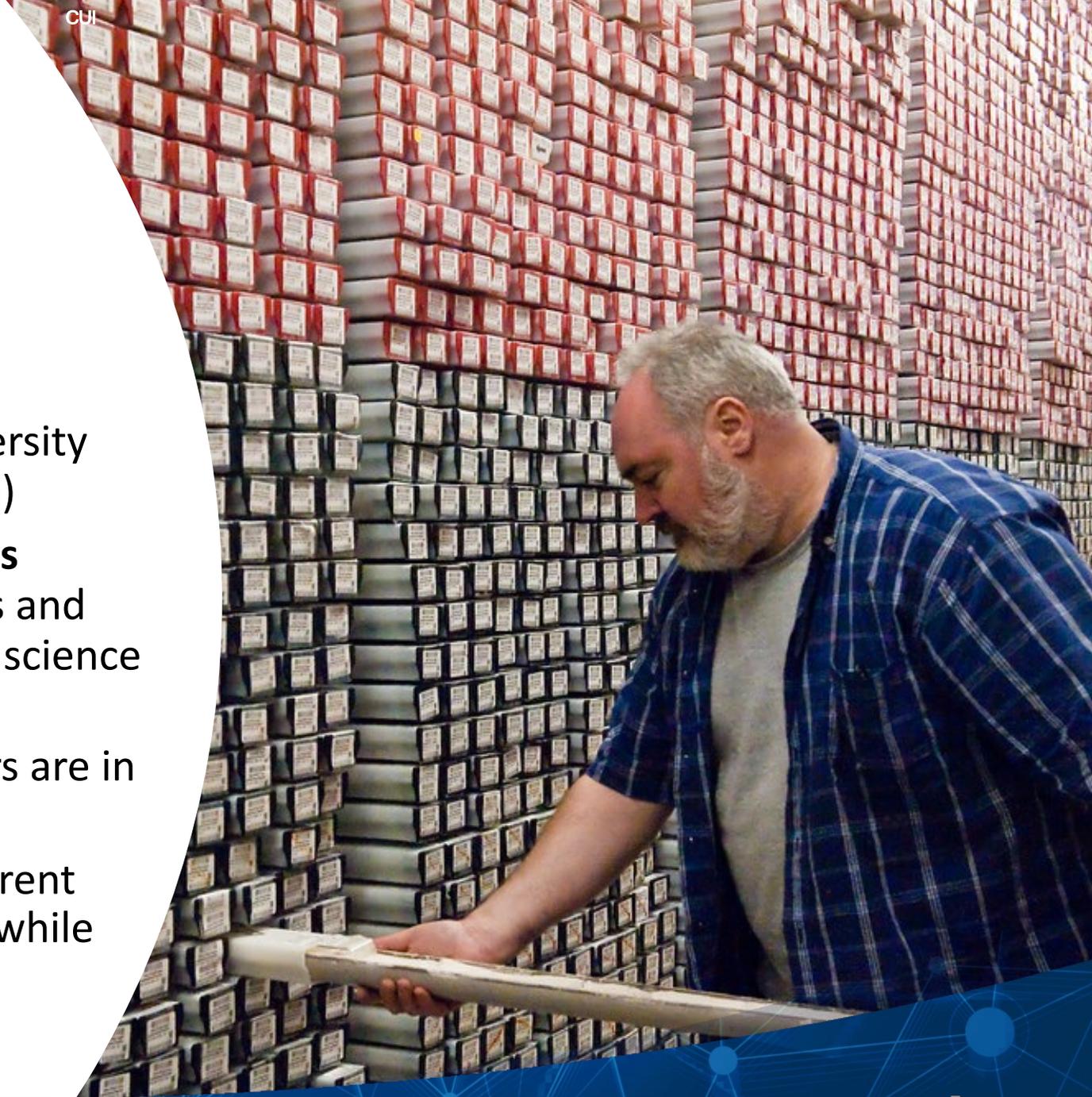
Options for the Future

- Post-IODP Options
 - Option 1: New program using equitable berth model, JR operations end 2028
 - Option 2: end JR operations at end of current award (FY 2024)
 - Option 3: Continue to support missions on available platforms, including working with international partners
- NSF intends to make its decision public within FY 2023.



Continuation of Core and Data Repositories

- U.S.-owned cores:
 - Domestic: 156 km at TAMU
 - International: 310 km at Bremen University (Germany) and Kochi University (Japan)
- Regardless of the decision on the JR, **NSF is committed to maintaining access** to cores and related data for the U.S. and international science communities.
 - Memoranda between NSF and partners are in review.
 - U.S.-owned cores would be kept at current locations under the same governance while discussions are underway.



NSF Receives Community Input

- U.S. SODA letter campaign:
 - U.S. and international researchers emphasized the critical contributions of SOD and desire for continued access to assets.
 - NSF is grateful for these voices of support
- Science Mission Requirements Report:
 - NSF received the solicited report in Sept. 2022.
 - Reviewing its recommendations and will issue a response soon.

SCIENCE MISSION REQUIREMENTS

FOR A GLOBALLY RANGING, RISERLESS DRILLING VESSEL
FOR U.S. SCIENTIFIC OCEAN DRILLING



Further Community Input Needed

- Time to develop a strategy for where and how scientific ocean drilling will proceed over the next 10 to 20 years.
- OCE is soliciting a new decadal study from NAS
- Leverage the *Ideas Lab*: how technology is evolving and how to best manage scientific priorities
- Workshops: Identify science priorities with highest level of urgency



Further Community Input Needed (cont'd)

OCE will solicit community input on:

- Prioritized scientific ocean drilling objectives
- Portfolio of possible approaches
- Reimagining the methods of scientific ocean drilling and sub-seafloor sampling
- Plan for international engagement





QUESTIONS?



UNITED STATES SCIENTIFIC OCEAN DRILLING ALLIANCE

US-SODA

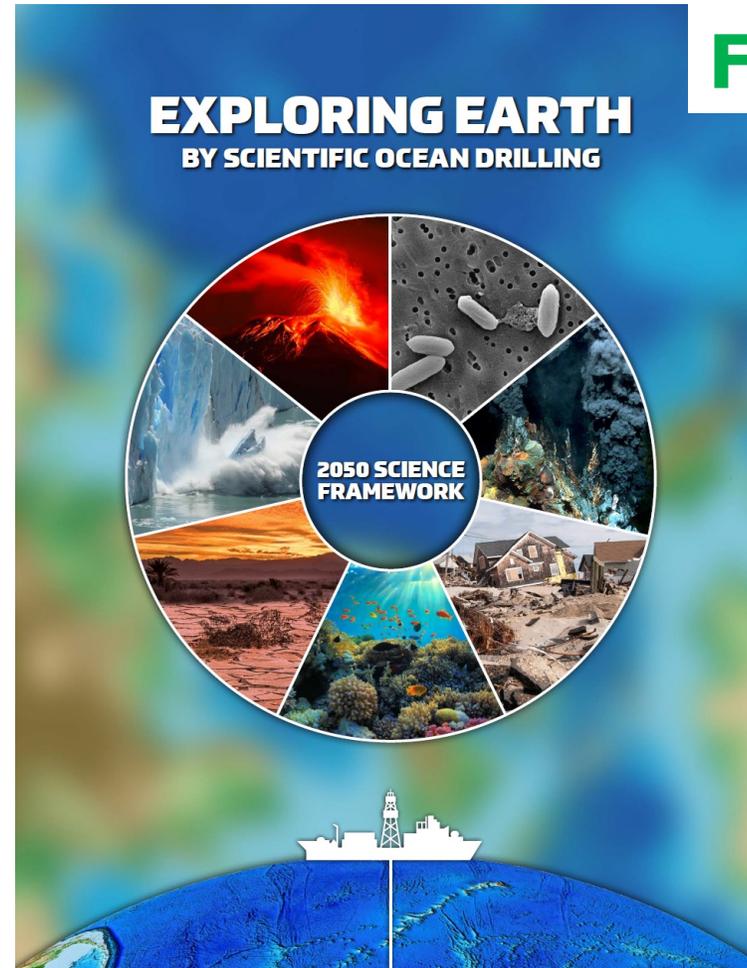
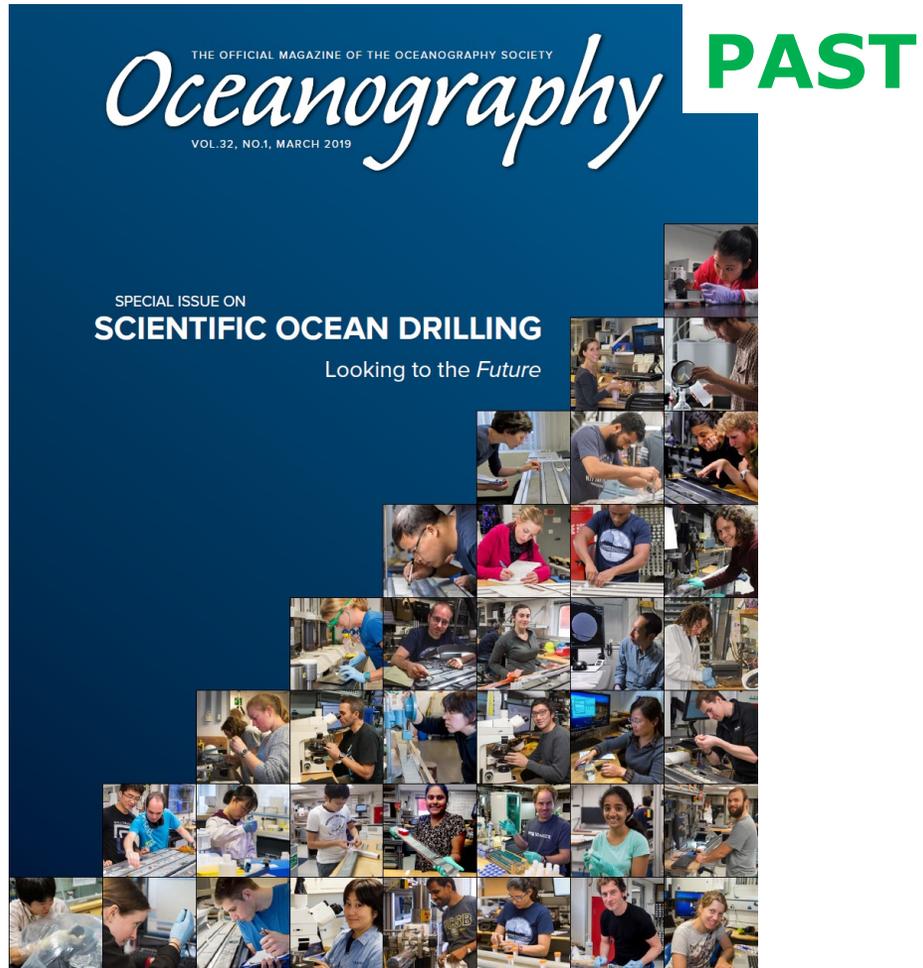
ANTHONY KOPPERS (chair)

Associate Vice President for Research Advancement and Strategy
Oregon State University

email: anthony.koppers@oregonstate.edu

Scientific Ocean Drilling: Past and Future

Five Decades of Impressive Research and an Ambitious 2050 Science Framework



- A novel approach standing apart from previous DSDP-ODP-IODP science plans
- Focus on transdisciplinary and collaborative science
- Focus on new global science with societal impact
- Driving home the message that a dedicated US drilling vessel is critically needed
- New continuous cores >200 m and seafloor monitoring are required to achieve goals

The 15 Founding Institutions in **US-SODA**



Scientific Ocean Drilling: Present and Future

US-SODA Promoting Scientific Ocean Drilling to the Benefit of Society

1

Providing Assistance

- The US-SODA institutions represent a strong combined knowhow garnered over decades of *scientific ocean drilling*
- We stand ready to assist the NSF in the process leading to a new U.S. drilling vessel and future accompanying drilling program(s)

PLAN A

Dedicated US Drilling Vessel

PLAN B

Building Bridging Programs

2

Our Goals

- Promoting *scientific ocean drilling* as a critical foundation for e.g. climate science, hazard assessment, and resilience planning
- Advocating for innovative new *scientific ocean drilling* facilities and strategies that lead to major progress and solutions
- Supporting *scientific ocean drilling* research workforce development and STEM training

Scientific Ocean Drilling: Present and Future

Providing Critical Data to NSF on Scientific Ocean Drilling

1

US-SODA Letters

- US-SODA sent four letters to the NSF Director and GEO and OCE leadership between May 2022 and February 2023
-
- Goal:** providing NSF with the data to show the need-impact-scope of scientific ocean drilling

4

2

Institutional Letters

- We encouraged letters to be sent to NSF leadership by U.S. and international institutions
-
- Goal:** providing NSF with the data to show how scientific ocean drilling is important to a large variety of institutions and their faculty and students

50

3

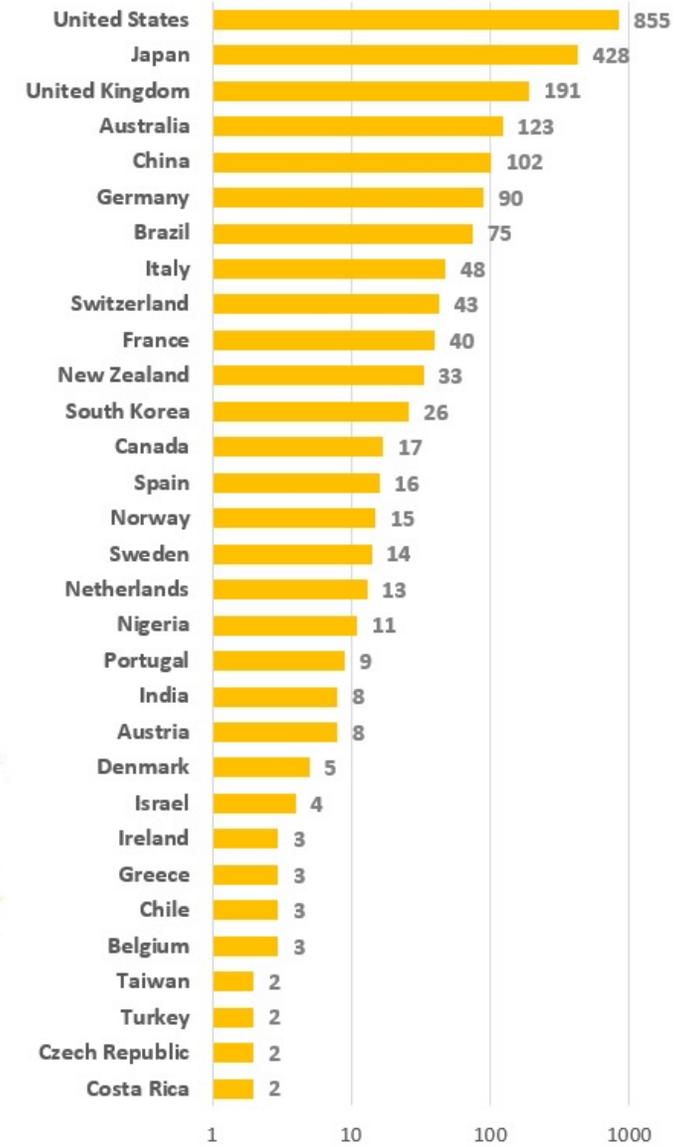
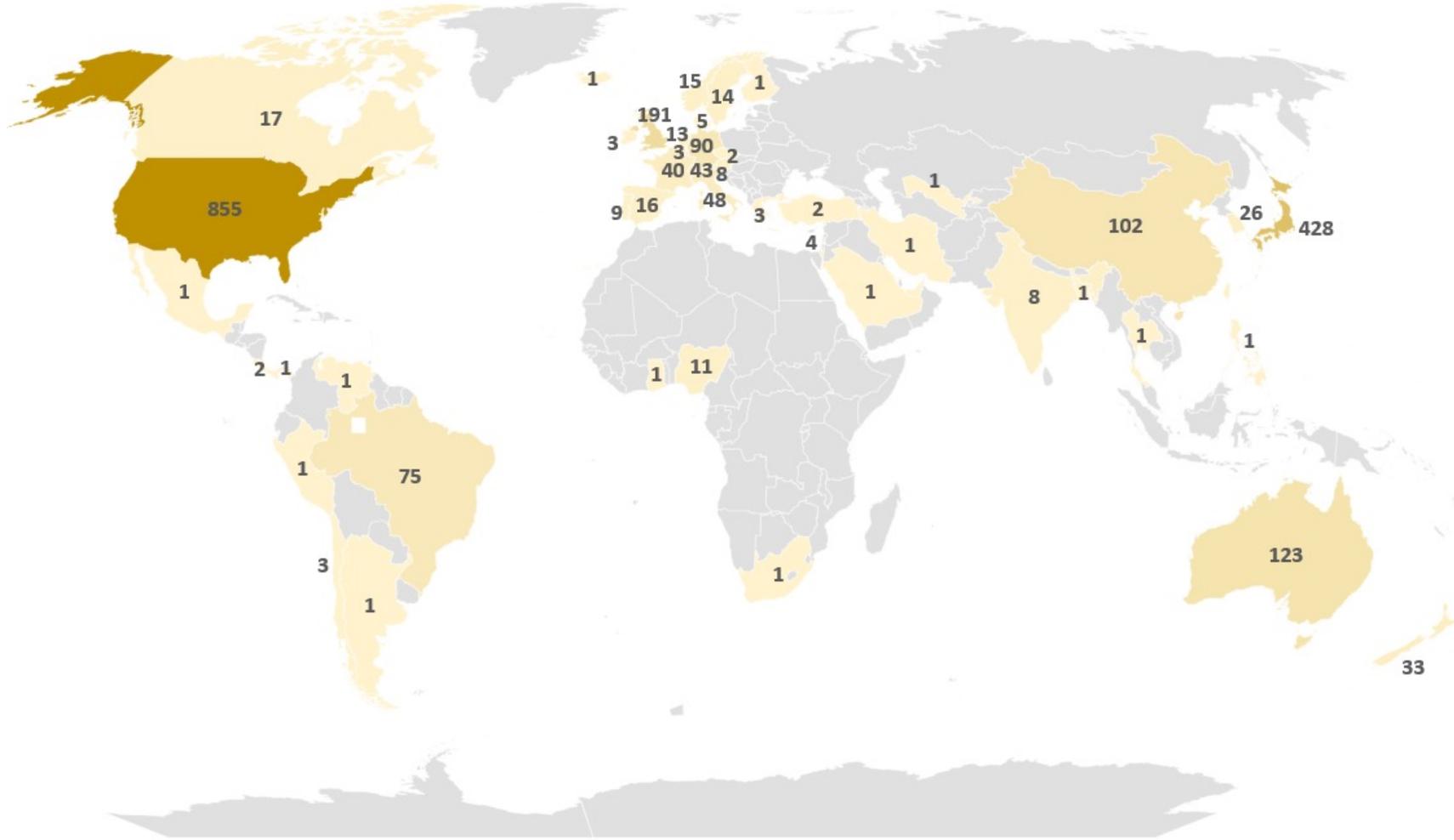
Scientists Petition

- We encouraged scientists from the U.S. and around the world to fill out the US-SODA petition in support of *Continued, Future Riserless Drilling*
-
- Goal:** providing NSF with the data to show the broad scope and international character of scientific ocean drilling

2,225

US-SODA Petition by Country

2,213 Signatures | 3 August 2022



#1 US (855) – #2 ECORD (504) – #3 JAPAN (428) – #4 ANZIC (156)

Scientific Ocean Drilling: Present

Performing a U.S. gap analysis based on limited information

1

2

Limited International Partnership

- At present the international *scientific ocean drilling* community stands at a junction: will it honor and continue decades of intense and successful international collaboration or does every country or alliance go its own way?
- NSF has not yet provided a clear vision or plan on how the U.S. will continue to be part of international *scientific ocean drilling*

No U.S. Drilling Vessel, No Program

- The U.S. lost most (if not all) of its significant *scientific ocean drilling* capabilities to provide answers to the critical calls of addressing societal challenges around climate change, sea-level rise, geohazards, healthy oceans, seafloor monitoring, and more ...
- No new dedicated IODP-like program is taking the place of the current NSF-ODP program in 2024
- NSF paused working with its community on a new dedicated U.S. drilling vessel

Scientific Ocean Drilling: Future

Enabling Decades of Science Success Through a New Dedicated U.S. Drilling Vessel

1

2050 Science Framework

- The *2050 Science Framework* is innovative and charts an ambitious path forward for three decades of future international *scientific ocean drilling*
- Many *Strategic Objectives* and *Flagship Initiatives* address global societal challenges that also are of high priority in the U.S.

2

A New U.S. Drilling Vessel

- Leaders from the U.S. oceanographic institutions have come together in US-SODA to express their strongest support for continuing to fund *scientific ocean drilling* and for the lease or acquisition of a newly-build global-ranging riserless U.S. drilling vessel

PLAN A

Dedicated US Drilling Vessel

PLAN B

Building Bridging Programs



**UNITED STATES
SCIENTIFIC OCEAN DRILLING ALLIANCE**

US-SODA

THANK YOU! QUESTIONS?



国际大洋发现计划
INTERNATIONAL OCEAN
DISCOVERY PROGRAM, CHINA

Post-2024: IODP-China

Dr. Shouting Tuo

the IODP-China Office

State Key Laboratory of Marine Geology, Tongji University

IODP Forum, 22-23, April, 2023, Vienna, Austria

Main Progress

Post-2024 China
Ocean Drilling
Development

1

China Multifunction
Platform

2

Executive Science
Plan (2025-2035)

3

Core Repository &
Research Center

4

Outreach and
Education

5

1. the Strategic Research Report on Post-2024 China Ocean Drilling Development

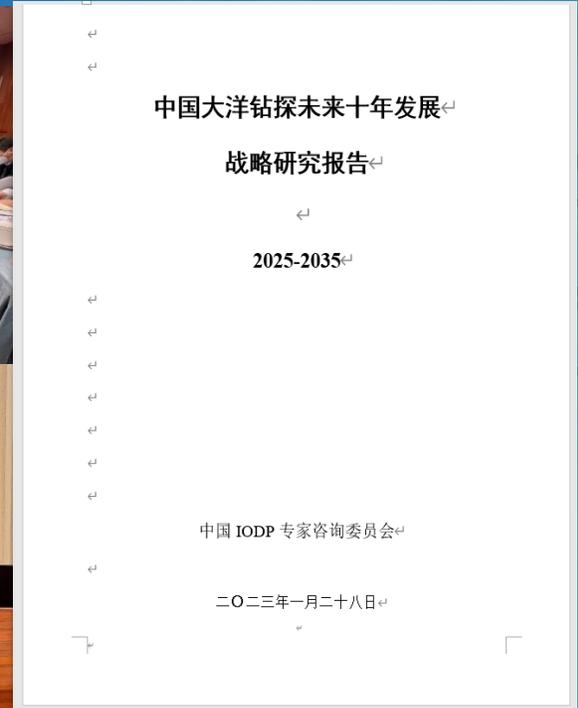
Beijing, Sept., 7, 2022



Dec., 30, 2023 (virtual)



Beijing, Jan., 31, 2023



- IODP-China and MOST have organized 9 fruitful workshops on post-2024 development
- The IODP-China Scientific Committee has accomplished a strategic research report on post-2024 China Ocean Drilling development
- The report described the future objectives, tasks and organizational structure of China Ocean Drilling
- MOST strongly supports China to be a platform provider in post-2024, making greater contributions

China's ocean drilling vessel completes hull assembly



- On 18 Dec., 2022, China's ocean drilling vessel has completed its hull assembly, marking a key step closer to the ship's delivery.
- The vessel, featuring a designed displacement of 42,000 tonnes, with a drilling capacity of more than 10,000 meters.
- It is expected to be fully completed by 2024.

2. China Multifunction Platform (CMP)

riser drilling vessel



Ocean Drilling Vessel

shallow water drilling vessel



Marine Geology No.10

seafloor drilling rig

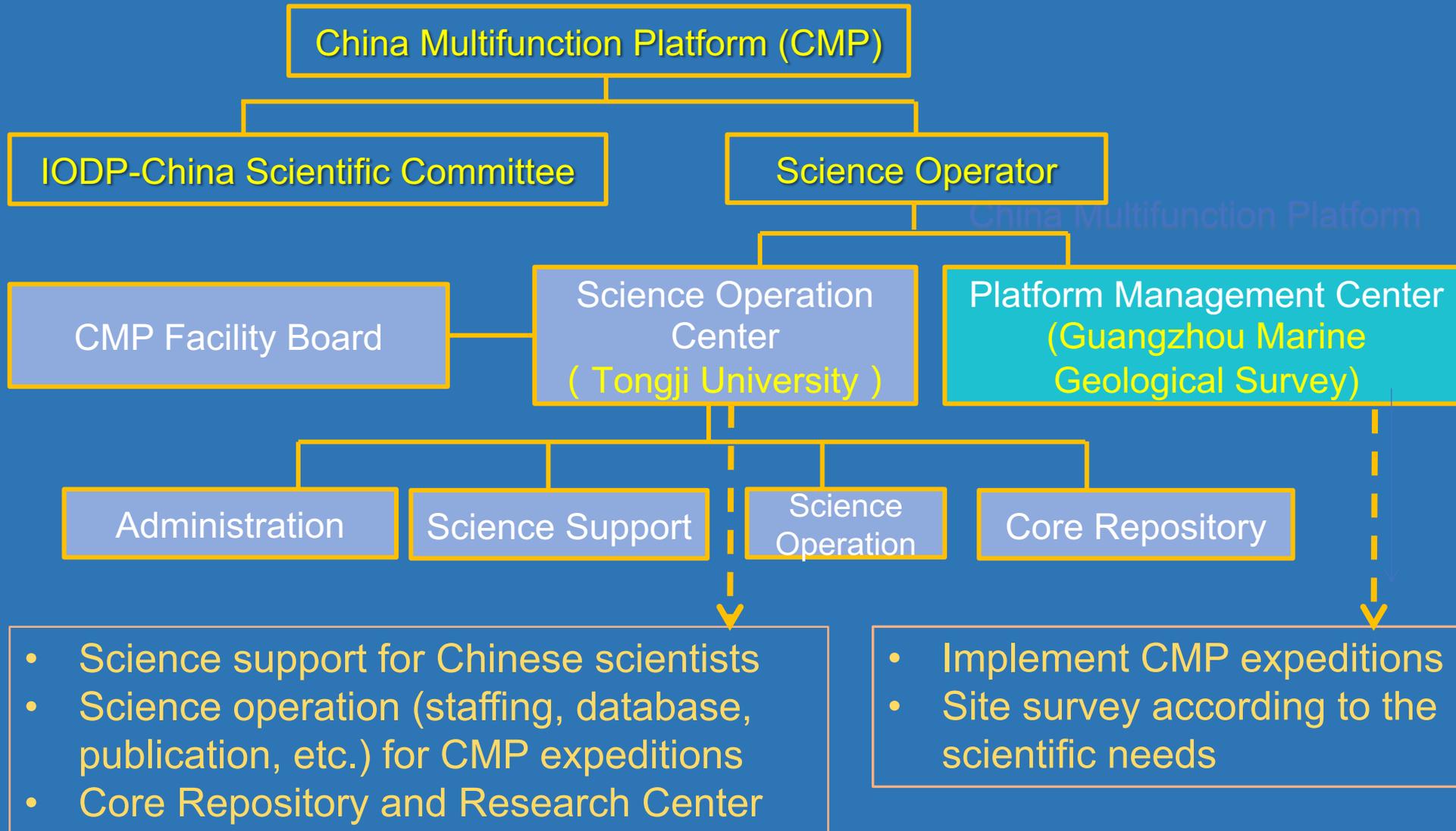


Hainiu II

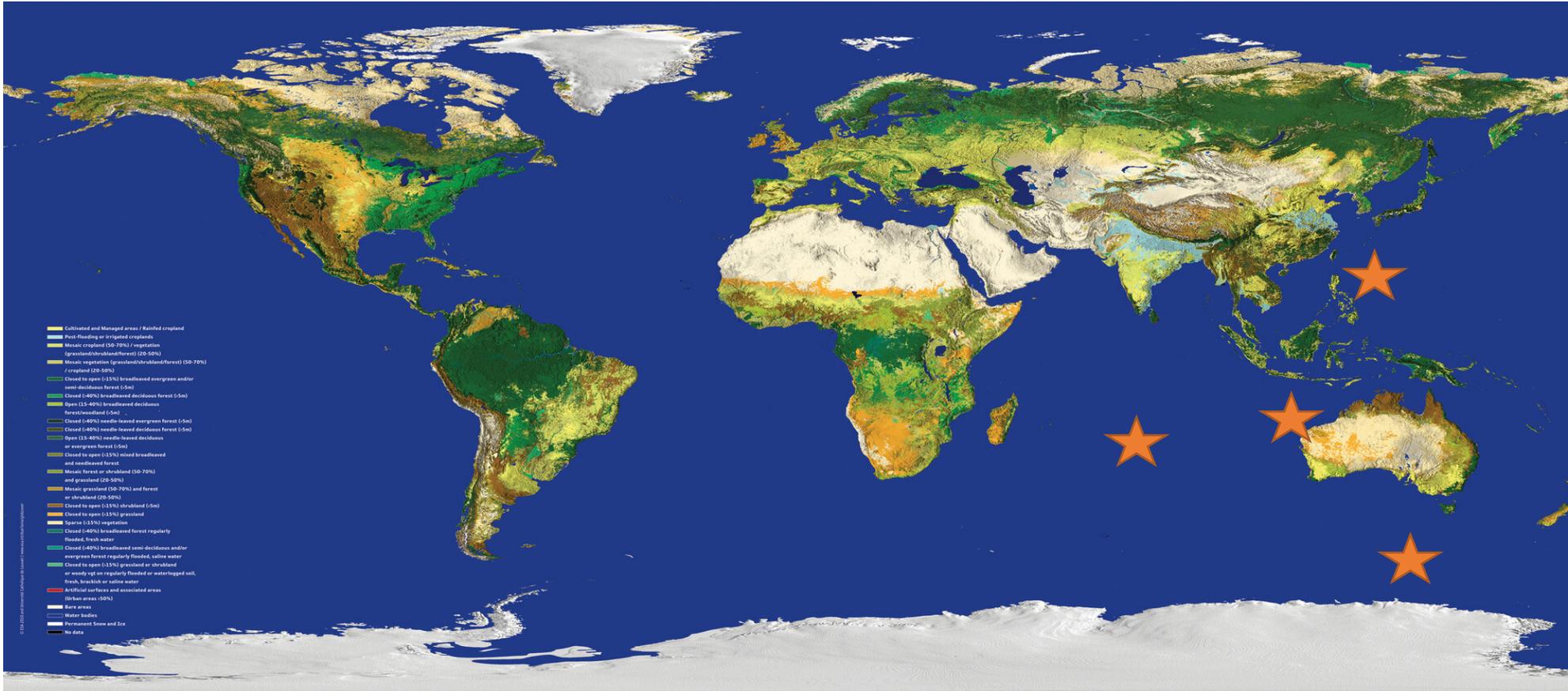
Platforms
provided by
third parties

China Multi-function Platform includes a riser drilling vessel, and shallow water drilling vessels (e.g., Marine Geology No.10), and seafloor drilling rig (e.g., Hainiu II), which will integrate deep-sea drilling and site observation, running in parallel with *Chikyu*, and MSP

CMP Structure: the CMP will be jointly operated by Tongji University and Guangzhou Marine Geological Survey

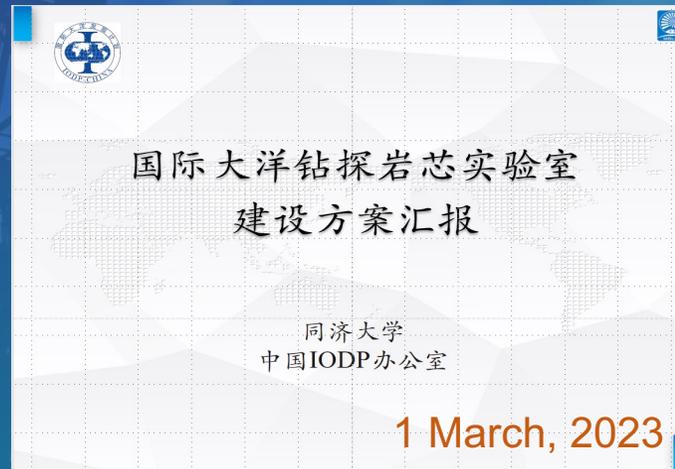
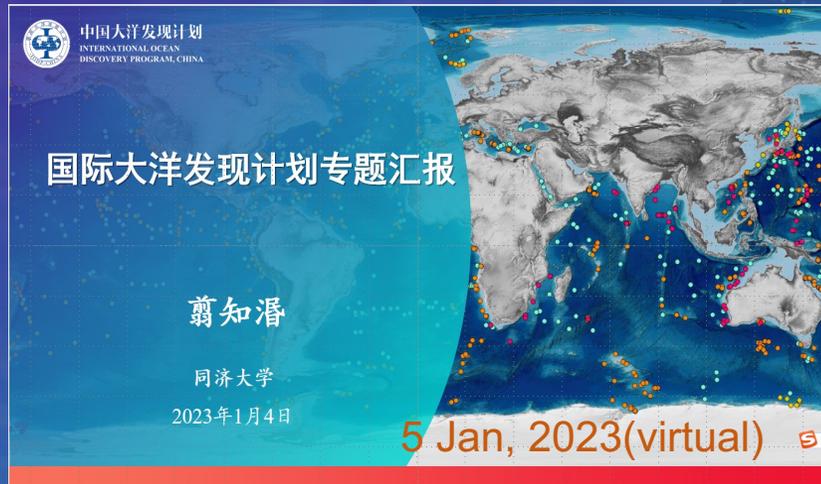


Possible future expedition schedules



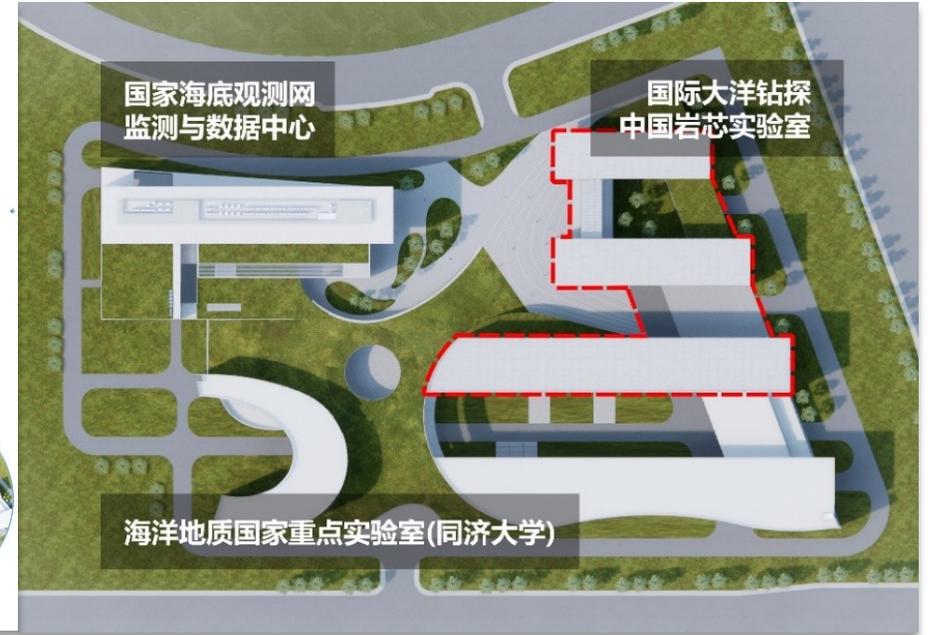
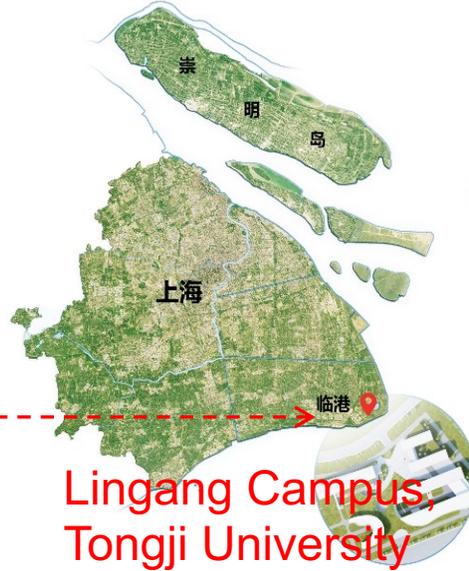
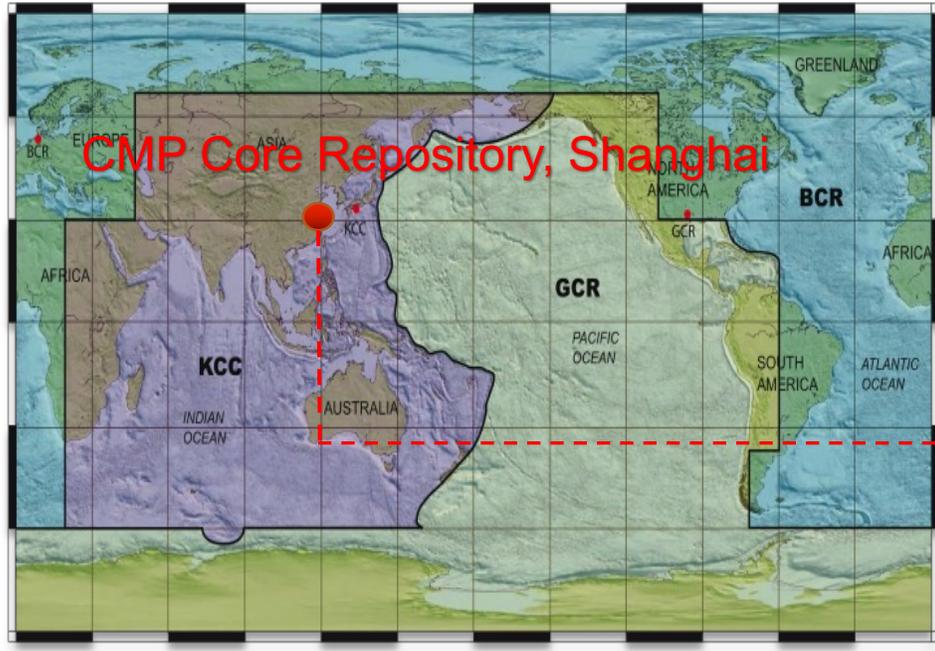
- CMP will potentially implement 1-2 international expeditions per year
- Possibly in Western Pacific, Indian Ocean, Southern Ocean and Antarctica
- Welcome collaborations with other programs (eg. ICDP, ECORD-JAPAN SOD Program) to implement joint expeditions
- Welcome international partners to join CMP

3. CMP Core Repository & Research Center



- Shanghai Municipal Government has organized 2 workshops on the CMP Core Repository construction
- The IODP-China Scientific Committee has submitted the construction program planning of the CMP Core Repository to the government
- the Government expresses strong will to provide funding for the core repository

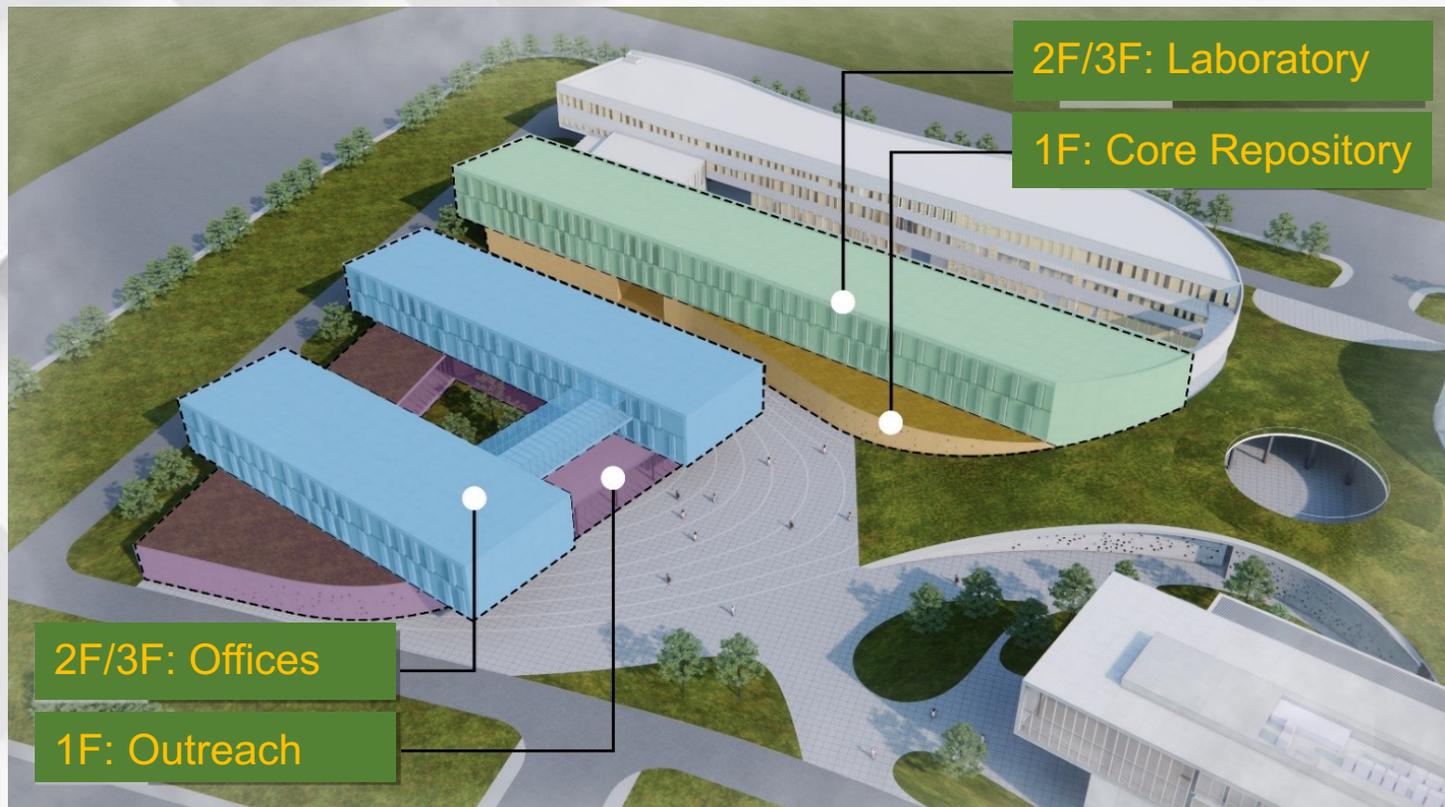
CMP Core Repository & Research Center



- Located in Lingang Campus, Tongji University, Shanghai

- Total construction area: 14, 000 m²
- Refrigerated storage area: 2, 200 m²
- Construction area: 9, 000 m² , Core capacity: 150 km

CMP Core Repository & Research Center



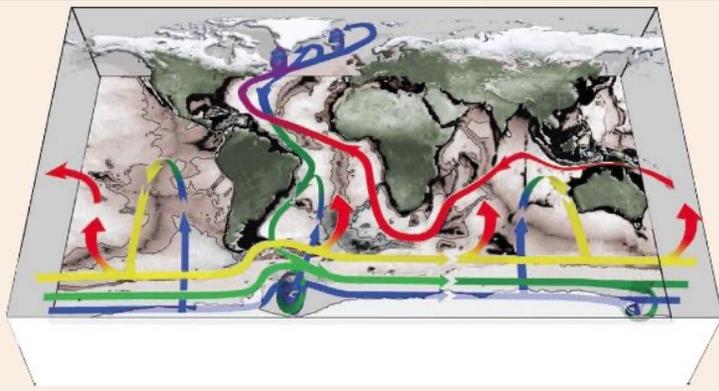
Five Functions

- Core storage
- Subsea technology development
- Scientific research center
- Deep-time digital ocean center
- Education and outreach

To be constructed in late 2023

4. IODP-China Executive Science Plan (2025-2035)

Low-latitude forcing of climate changes



Deep life and deep carbon cycle under the seafloor

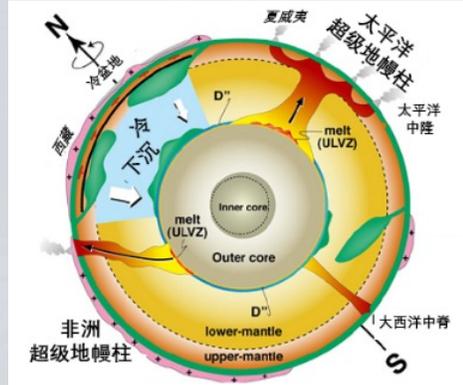
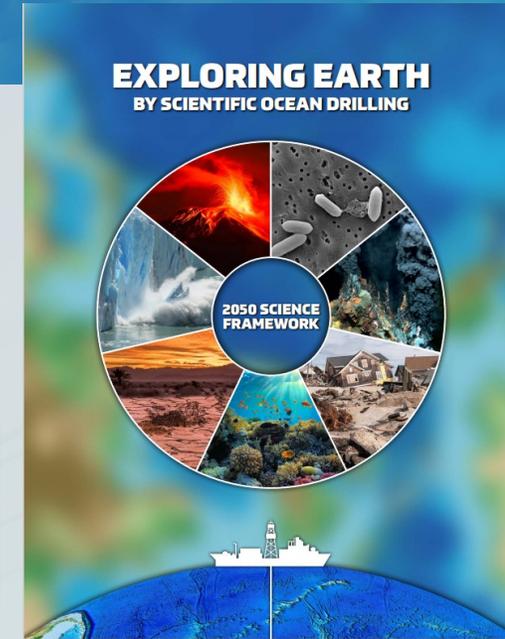
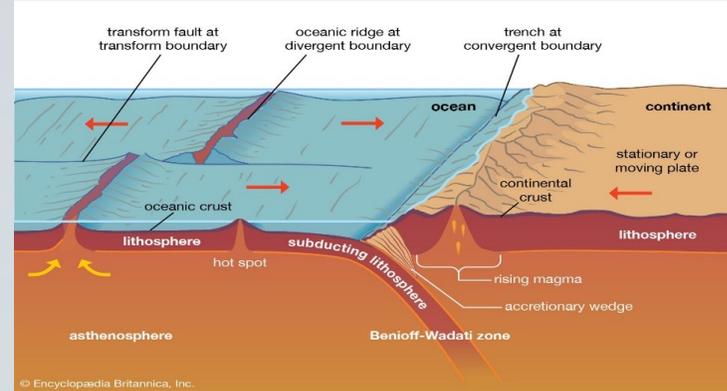


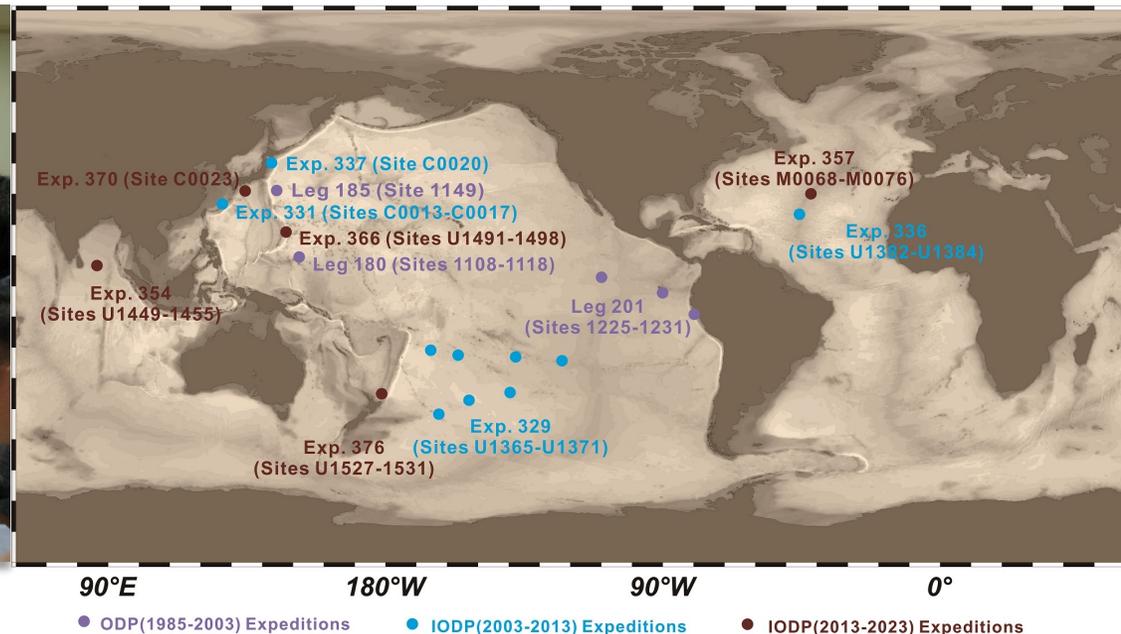
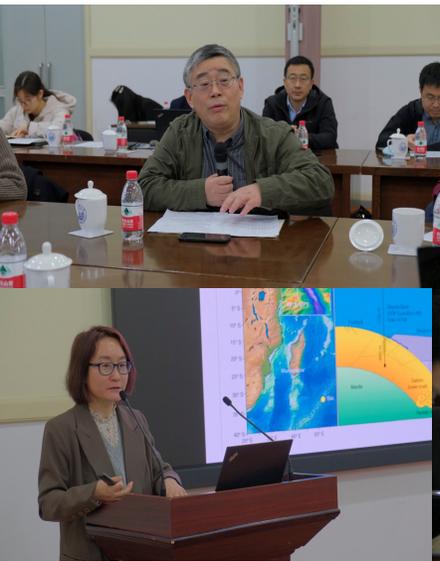
Plate tectonics in the oceanic subduction zone



- Based on the IODP 2050 Science Framework, IODP-China is developing a 10 years science plan
- 3 working groups on 3 scientific themes were established
- 3 domestic workshops have been successfully held, which laid a solid foundation for the IODP-China Executive Science Plan

Deep life and deep carbon cycle workshop

- Took place on 12 March, in Tongji university, Shanghai
- More than 40 scientists all over the China participated the workshop
- 3 scientific themes: deep carbon cycle and microbial activities, deep habitat boundaries and environmental evolution, and deep microbial activities and elemental cycles
- Reached several key consensus statements on deep life and deep carbon cycle



Low-latitude forcing of climate changes workshop



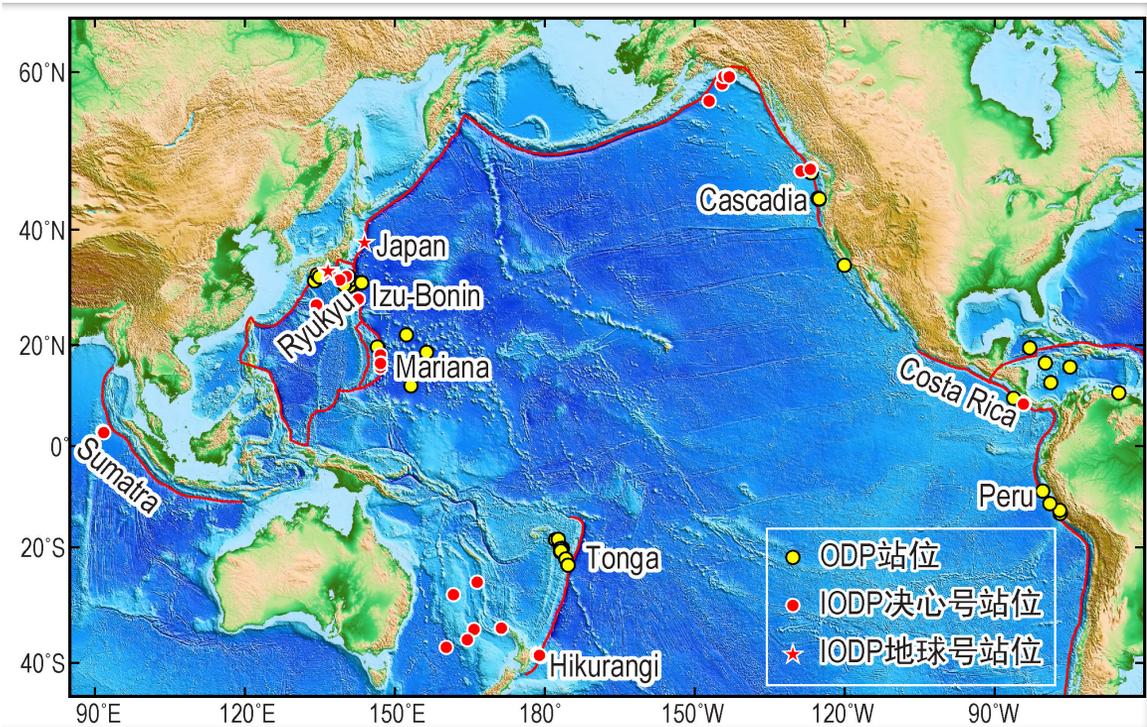
- Took place on 6-7 April, in Peking university, Beijing
- More than 70 scientists all over the China participated the workshop
- Focused on: the hydrothermal circulation, marine C-N biogeochemical process and implications for ecology and climate, continent-ocean interactions, climate evolution and ocean material cycle



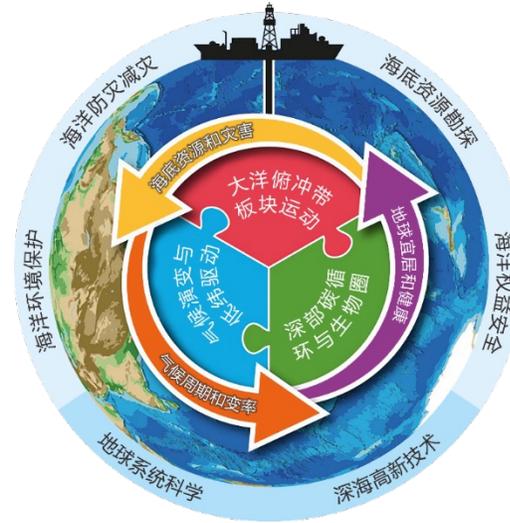
Plate tectonics in the oceanic subduction workshop



- Took place on 9 April in Shanghai
- Focused on dynamic process of the subduction, subduction zone and big mantle wedge, expansion in the context of convergence



Upcoming workshops



4/27-28

5/25-26

7/5-7

South China sea drilling

IODP-China Executive Science Plan (2025-2035) workshop

the 7th Conference on Earth System Science

- Based on these workshop series, a science plan working group report will be completed by late 2023
- The report will be also published in English

5. The live ship-to-shore video broadcast : Expedition 397

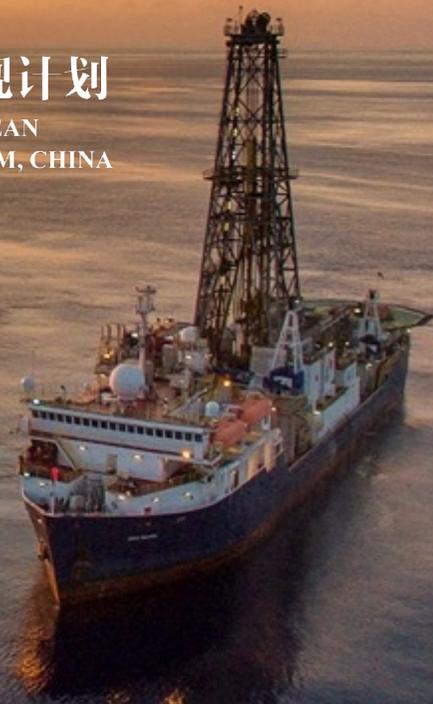


- On Nov. 28 2022, IODP-China organized an online“live ship-to-shore video broadcast of IODP Expedition 397”, focused on "explore the history of climate change via deep-sea cores"
- 2 Chinese shipboard scientists, were invited to provide a virtual tour of the ship and educate audiences about expedition science, lab work, and life at sea, and also answer audience questions.
- The video broadcast reached approximately 3.5 million participants online, setting a new record.

Thank you !



中国大洋发现计划
INTERNATIONAL OCEAN
DISCOVERY PROGRAM, CHINA



IODP FORUM MEETING - 2023



IODP-India

**National Centre for Polar and Ocean Research
Ministry of Earth Sciences, Government of India**



Ministry of Earth Sciences
Government of India



Personnel in IODP-India

[@ IODP-India PMO \(NCPOR\), Goa](#)

Dr. Thamban Meloth
Director, NCPOR & Chair
IODP-India (director@ncpor.res.in)



Dr. Dhananjai Pandey,
Group Director, Geosciences Division
(pandey@ncpor.res.in)



Coordinator:
Ms. Tejaswini Pakhidde
(iodp.india@ncpor.res.in)



URL: <https://ncpor.res.in/iodps>

Panel Members

JOIDES Resolution Facility Governing Board and FORUM member
– **Dhananjai Pandey**

Science Evaluation Panel (SEP) –
Dr Rajeev Saraswat
National Institute of Oceanography
Member: SEP – Science
Expertise: Paleoclimate



Dr Nisha Nair
National Centre for Polar & Ocean Research
Member: SEP – Site
Expertise: Geophysics



IODP-India Program Advisory Structure

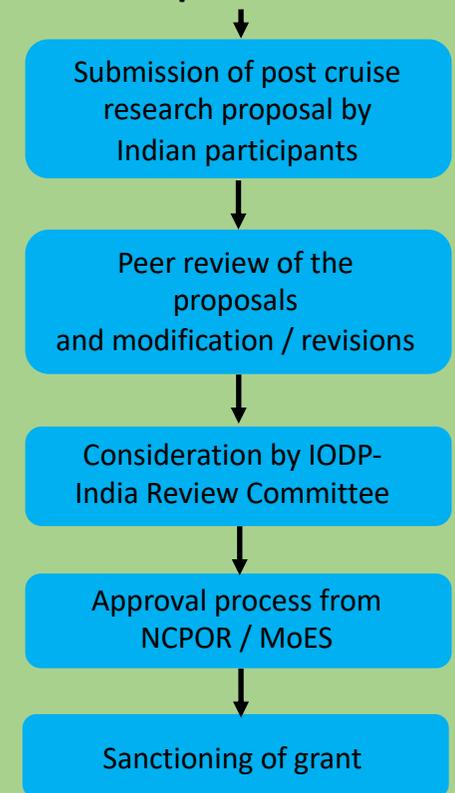
- Ministry of Earth Sciences (MoES)
- Governing Body (GB) of NCPOR, Goa
- Research Advisory Committee (RAC)
- National Committee of Experts (CoE)
- Independent Review Committee (IRC)



Nominations and Post-cruise research support

- **Completed Nominations/Alternates for Expedition 395, 400, 401, 402 and 403 (ongoing)**
- **Post-cruise research support (for two (+1) years)**
Total cost = ~30,000 USD
06 projects: Ongoing
11 projects: Completed
- **Annual science review meeting of IODP-India funded projects – Feb 2023**
- **Ex-officio participations in Virtual IODP expedition guidelines**
- **Initiated supporting young scientists for Legacy Cores / Virtual Expeditions**

Post Cruise Research Funding process



IODP-India: Post 2024 scenario

- **MoES has offered financial allocation till Sept 2024 in terms of existing MoU.**
- **IODP-India has been in talks with different platform providers and PMOs about emerging scenario post 2024**
- **May hold a few more bilateral/multi-lateral meetings in near future.**
- **National Committee of Experts (CoE) has been regularly updated with the developments.**
- **MoES is yet to decide on the level of financial support beyond 2024.**



Open Day



Meet the Scientist



**National Workshop on Tectonics aspects of the proposal –
December 2022**

Future Plan

Growing scientific interest in the Indian Ocean and Southern Ocean

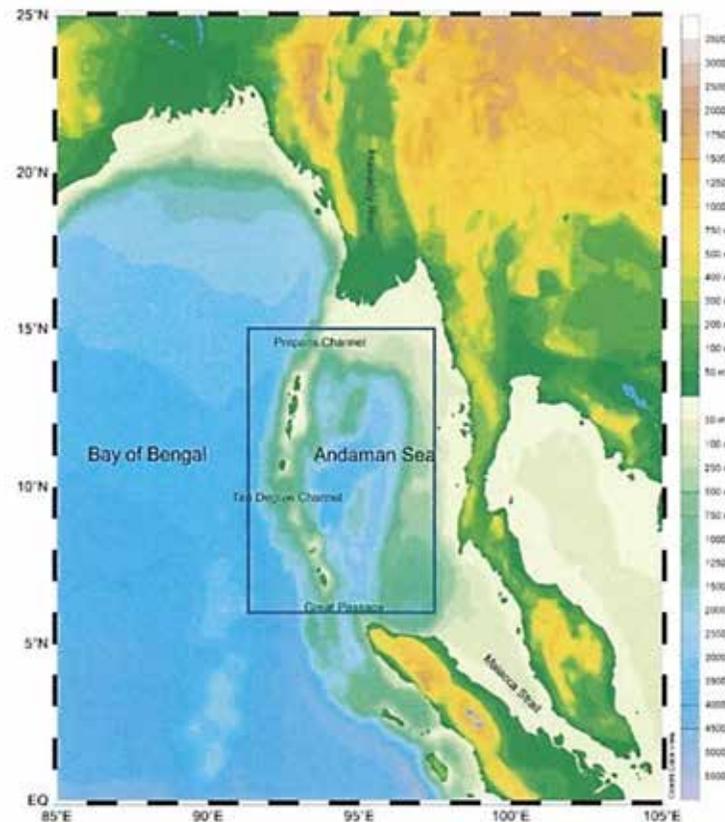
Development of new drilling proposals in Indian Ocean

A follow up brainstorming session is planned for drilling in Andamans. This workshop will aim to nurture scientific objectives for drilling in the forearc and backarc regions of Andamans.

**SPADE Workshop - Scientific
Proposals for Andaman
Drilling Endeavour - 2017**

**Site Survey data Visualisation
WS 2019**

**Outreach workshop for young
students:
18th March 2023**



**National Workshop on Climatic
aspects of the proposal –
September 2022**

**National Workshop on Tectonics
aspects of the proposal –
December 2022**

**International Workshop
Proposed
– December 2023**

Thank you

ANZIC post-2024

OUTLINE

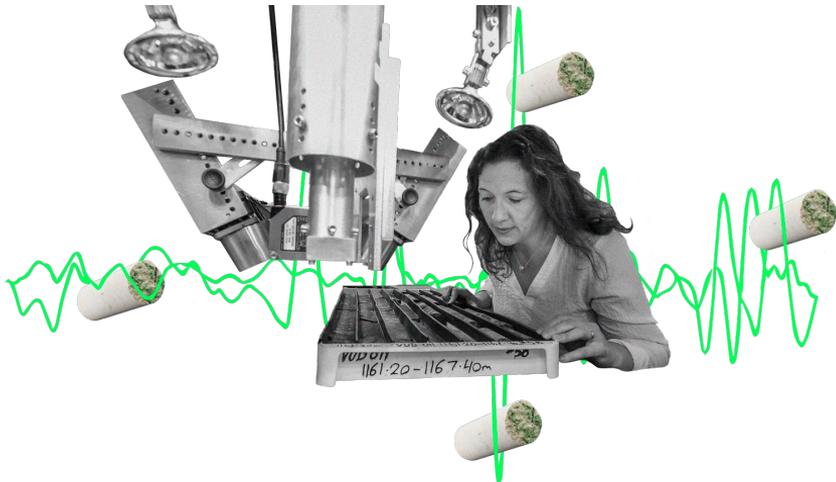
- ANZIC strategy for new funding
- Post-2024 opportunities, challenges and risks
- Future DEEP workshop – setting a base for post-2024 planning
- ANZIC Marine Geoscience Masterclass – the next generation



ANZIC strategy for new funding

- **Australia:** seeking new and increased funding under the National Collaborative Research Infrastructure Strategy (NCRIS)
- **New Zealand:** use NCRIS to explore additional funding options with Ministry for Business, Innovation and Employment





AuScope

NCRIS
National Research
Infrastructure for Australia
An Australian Government Initiative

NCRIS funding bid under 2023 Guidelines (submitted 15 March):

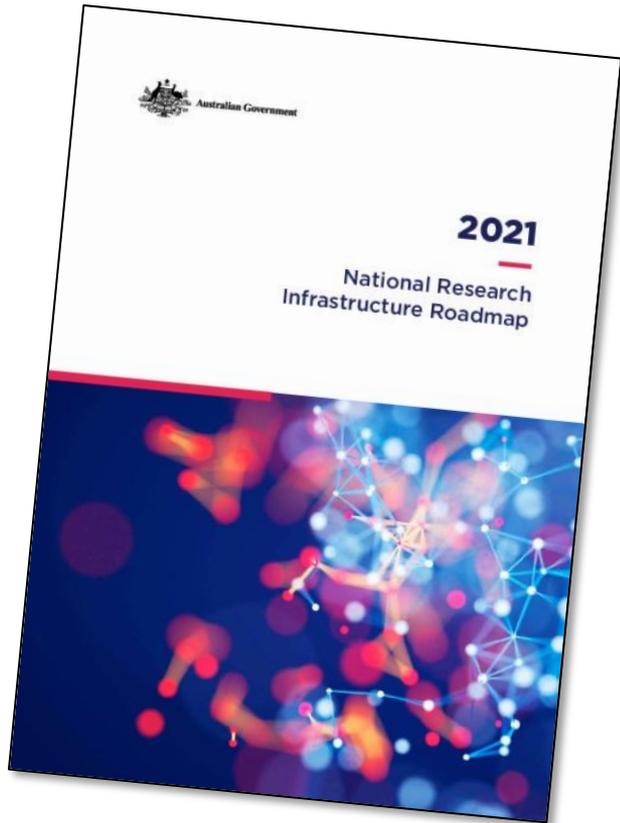
- Requested increased funding over four years (mid-2023 to mid-2027)
- Increase the number of Australian researchers on each drilling expedition
- Access to emerging scientific ocean drilling programs
 - expanded Europe/Japan Mission Specific Platform program
 - China Multifunction Platform
- Membership of the International Continental Drilling Program (ICDP)
- Support for Virtual Expeditions
- New training opportunities

Key Partners
& Collaborators

- unique uses per year
- 36,000 secondary school students engaged per year
 - An average of 750 academic papers per year
 - 1,600,000 total drillcore meters scanned nationally
 - 1,652 instrument deployments nationally



Context for ANZIC funding through NCRIS



“Build on strong existing National Research Infrastructure foundations and deliver step-change capability to support future research needs”

System-wide enhancements

- Continental-scale observations
 - including increased observational capacity in the coastal zone

Step change

- World-leading environmental and climate infrastructure to underpin Australia’s national adaptation strategy

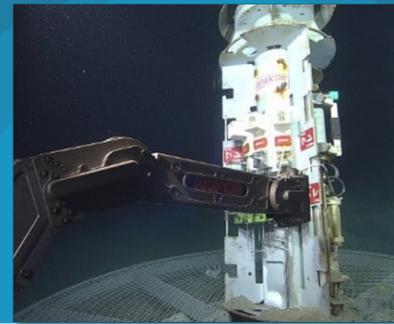
GeoDiscoveryNZ



- GeoDiscoveryNZ advances scientific drilling of our oceans, land, lakes and Antarctica
- We are committed long-term to the ANZIC collaboration
- Together with Australia, international partnerships are essential for growing capability and bringing significant new knowledge and critical thinking down-under, as well as attracting additional scientific infrastructure and equipment



GeoDiscoveryNZ
Ocean and Land Scientific Drilling and Discovery



Post-2024 opportunities, challenges & risks

- ANZIC ultimately needs clarity on membership models, program plans and opportunities to engage internationally to guide our investment in research and scientific drilling



Retirement of *JOIDES Resolution*

Opportunities

- | “focus on sustainable evolution of the ocean science drilling community over the longer term”
- | A new future focussed, global-ranging drilling vessel
 - | in time...



Retirement of *JOIDES Resolution*

Challenges

- | Leveraging “the considerable financial resources that will be available after the JR is retired”
- | Engaging with new *Decadal Survey of Ocean Sciences* process

Risks

- | Loss of funding body support for a diminished international program with significantly fewer expeditions per year
- | Losing the 5-year forward schedule model which helped plan for and build proposal pressure



Expanded ECORD/Japan MSP

Opportunities

- | Ongoing access to scientific ocean drilling under a flexible and adaptive program
- | Expanded researcher participation (>1 per expedition)
- | New drilling platforms (e.g. *Nuyina*)

Challenges

- | Balancing Associate versus Temporary membership
- | Transferring proposals to the new program
- | Securing funding for *Chikyu* riser drilling outside Japan
- | Accessing alternative drilling platforms (e.g. *Nuyina*)



Expanded ECORD/Japan MSP

Risks

- | Loss of funding body support for a diminished international program with significantly fewer expeditions per year
- | Inability to deliver the planned 2–3 expeditions per year
- | Reduced value of Associate Membership if large cash contributions from other members eventuate later?
- | Demonstrating the "added value" of membership
 - | e.g. could independently negotiate/fund access to seafloor rigs



China Multifunction Platform

Opportunities

- | Access to scientific ocean drilling under a new program with a new, state-of-the-art vessel
- | Supporting science diplomacy

Challenges

- | Engaging with China's decadal planning process

Risks

- | Regional geopolitics
- | New ocean drilling vessel is not a like-for-like replacement for *JOIDES Resolution* → capability gap



Ocean Drilling Vessel



Marine Geology No.10

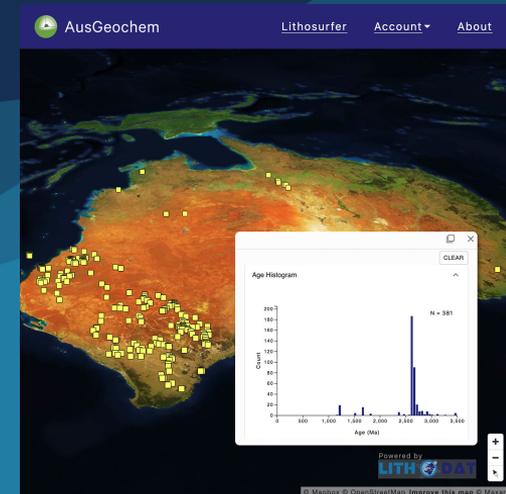


Hainiu II

Legacy Assesst Projects

Opportunities

- | Value-add to existing core and data holdings
- | Demonstrating ANZIC/AuScope capabilities in data management and delivery
 - | e.g. AuScope's [AusGeochem](#) platform for visualising, analysing and extracting georeferenced data
- | Legacy data provide a guide for framing new expedition research aims
- | Potentially allows greater inclusivity and opportunities for participation from early career researchers



Legacy Assess Projects

Challenges

- | Establishing FAIR databases
- | Aligning multiple funding agencies for support of multi-institutional, international and cross disciplinary projects

Risks

- | Managing expectations of funding agencies around lack of actual sampling

FUTURE D.E.E.P.

WORKSHOP



Future Drilling to Explore Earth's Past



ANZIC's Australasian and Southern Ocean regional planning hybrid workshop to support scientists in developing proposals for the next generation of scientific drilling.

3-4 April, 2023



Hybrid

Sunday
April 2

12-4pm

Social
Fieldtrip*

Hike Kunanyi/
Mt Wellington



Ice Breaker

Future DEEP
Workshop
Reception

5-7pm

In-person
only

Monday
April 3

9am -5pm
Future DEEP
Workshop
Day 1

Plenary session outlining
the broad science plans
of the scientific drilling
programs (post-
IODP platform
providers, ICDP)
& capabilities
(inclu. national
drilling & digital
infrastructures)



Tuesday
April 4

In-person
only



9-5pm
Future DEEP
Workshop
Day 2

Site Surveys.
Breakout sessions
to develop drilling
proposals.

Highlights

- Brought the community together
- Celebrated, promoted and collaborated
- Engaged students and Early Career Researchers
- Updates on the status of ANZIC and international scientific drilling capabilities and opportunities
- Supported the development of existing and new proposals or ideas



Outcomes

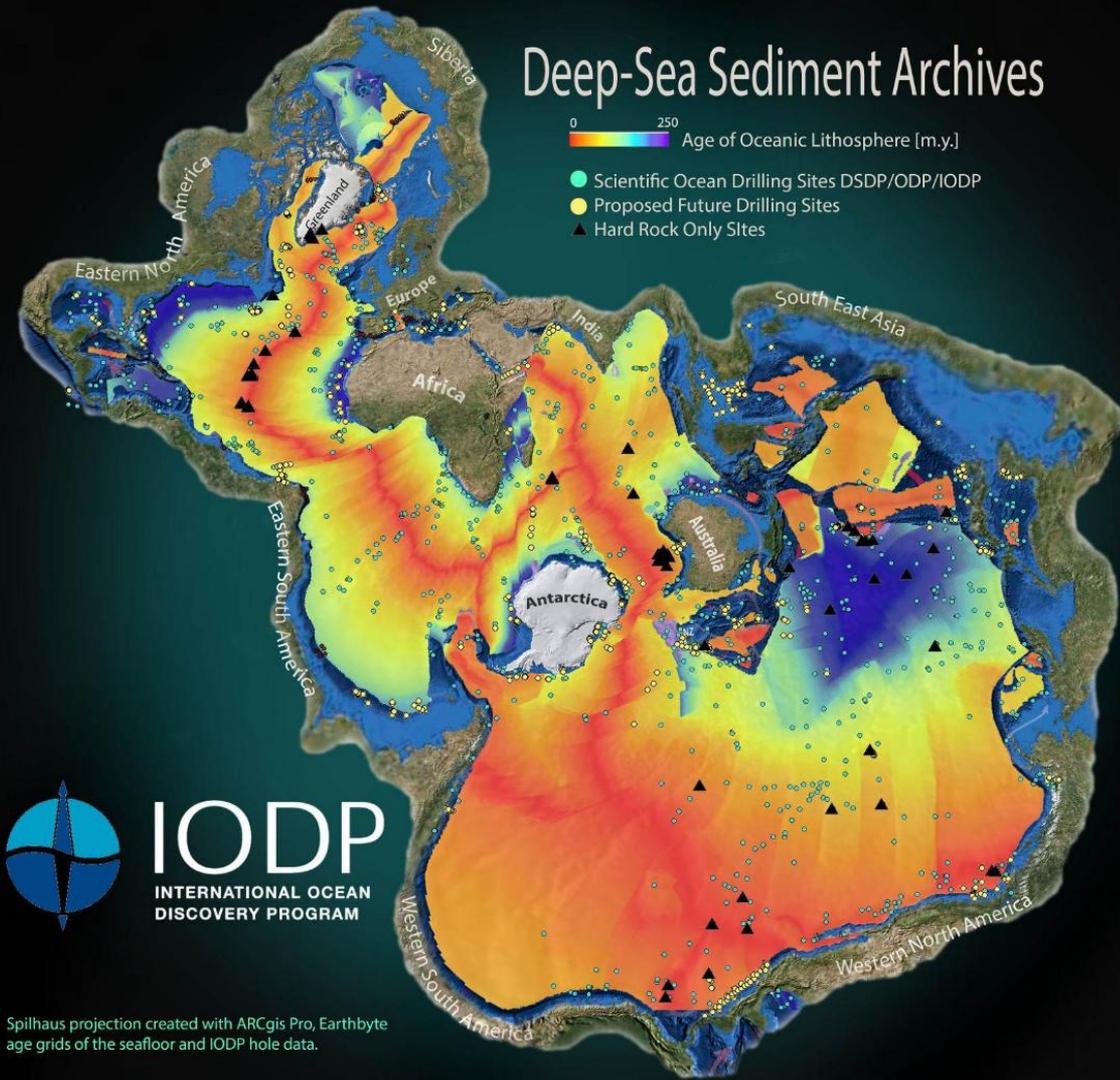
Breakout topics

- ICDP, geohazards, accessing site survey data, million-year climate, Antarctica & Southern Ocean, virtual expeditions, coastal zone, microbiology

Future DEEP Workshop Report

- Guide ANZIC & international science community in developing new and existing proposals in the Southern Ocean & ANZIC region
- Inform and increase collaboration & awareness of scientific drilling ideas
- Gather ideas to support the launch of Australian ICDP membership and LeAPs
- Coordinate ANZIC & GeoDiscoveryNZ strategic support for scientific drilling proposals
- Support the ANZIC Strategy Committee in developing national priorities post-IODP

Deep-Sea Sediment Archives



IODP
INTERNATIONAL OCEAN
DISCOVERY PROGRAM

Spilhaus projection created with ARCGIS Pro, Earthbyte age grids of the seafloor and IODP hole data.



ANZIC Marine Geoscience Masterclass

Southeast Queensland

2023 & 2024 Masterclasses hosted by



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA



Queensland
University
of Technology



The ANZIC Masterclass program aims to provide students with hands-on experience and a real-world context to develop their skills and knowledge in IODP science and related fields

- 10-day ANZIC Masterclass in Brisbane and beyond
 - **January 2024** & December 2024
- Targeted at 2nd to 3rd year undergraduates
- The program will
 - host a **series of plenary talks and workshops** at UQ and QUT (Brisbane)
 - **field experience at Heron Island Research Station**
 - explore ethical and legal responsibility of working on **Sea Country** and Indigenous perspectives with First Nations Australians and Pacific Islanders
 - focus on learning opportunities related to IODP science, such as **core properties, geobiology, tectonic modelling and new technologies**
- ANZIC is open to students from other PMOs joining the ANZIC Masterclass. Please email sarah.kachovich@anu.edu.au if interested





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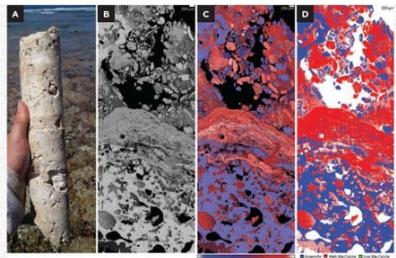
Field Trip - Heron Reef Research Station

Modern biology with Ancient Beginning

Links to IODP Expedition 325: Great Barrier Reef and Expedition 389: Hawaiian Drowned Reefs

Activities planned:

- Reef walks
- Reef flat surveys
- Carbonate Allochems
- Geomicrobiology in the reef
- Snorkelling windward and leeward reef slopes
- Laboratory work on samples collected
- Deployment of small AUV for robotics experience



Post-2024 Korea-IODP

Korea Institute of Geoscience and Mineral Resources

Yoon-Mi Kim

History of K-IODP

Goal

- ▶ Developing cutting-edge marine science and technology and fostering international-level scientific experts through participation in IODP drilling expeditions
- ▶ Preparation and submission of an IODP drilling proposal
- ▶ Education programs for graduate students based on themes of IODP

In K-ODP stage

- From 1997 to 2003
- Contribution: 0.3 M US\$/year
- 6 shipboard scientists

1st phase of K-IODP

- From 2004 to 2010
- Contribution: 1 M US\$/year
- 19 shipboard scientists
- K-IODP office (KIGAM)

2nd phase of K-IODP

- From 2011 to 2022
- Contribution: 1 M US\$/year (JRFB)
(2011-2020)
- 40 shipboard scientists
- IODP Drilling in Korean EEZ in 2013
- Approval of proposal 885 in Korean sea (Ulleung Basin Gas Hydrates)

Current Status of Korea-IODP project

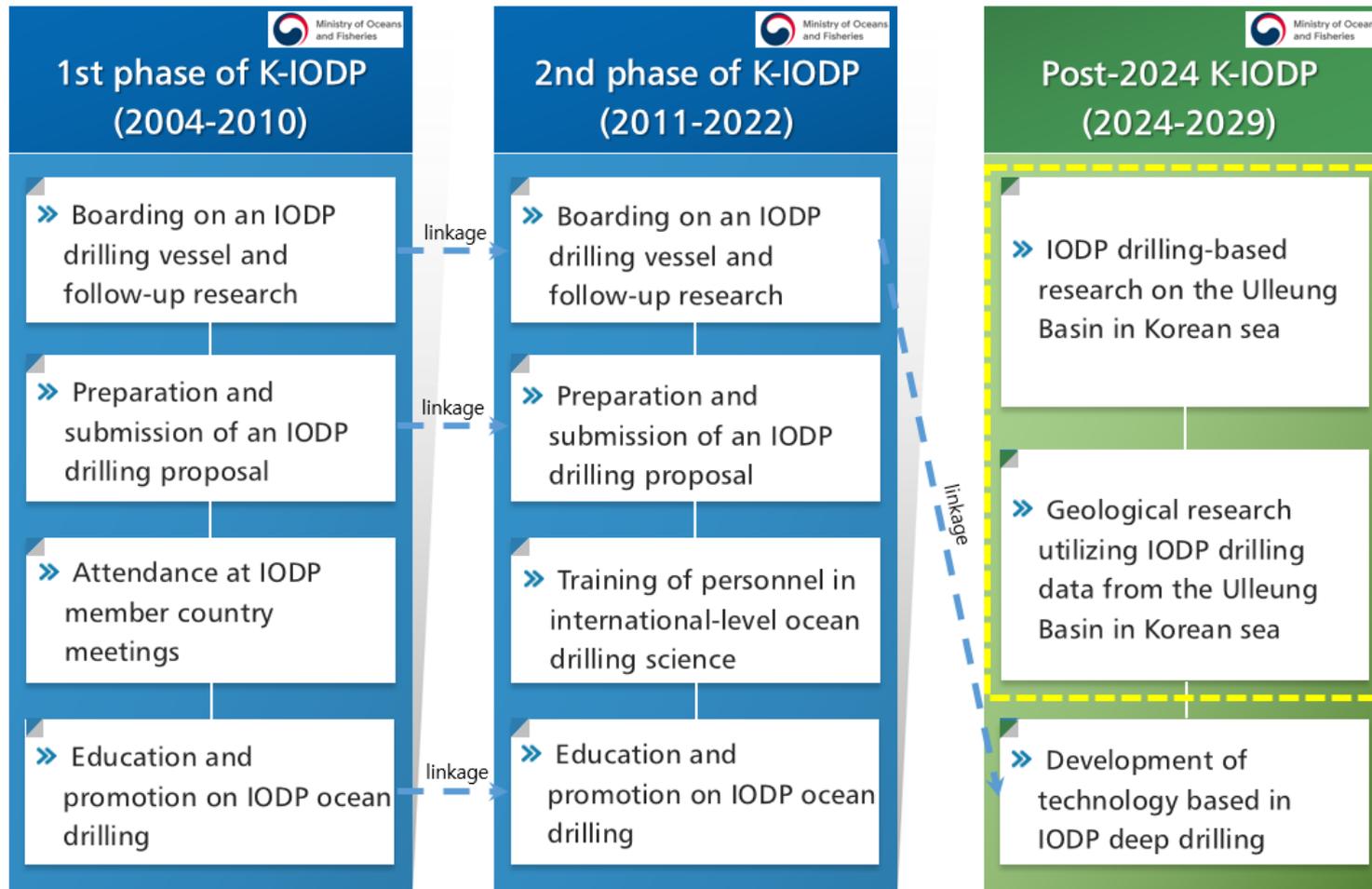
- Korea has been a member country of IODP since 1997. The budget for K-IODP program is provided by the Ministry of Oceans and Fisheries, which has provided funding to sustain the IODP program for 20 years.
- However, the Korean government cut the entire budget, and since 2021, Korea has not been able to pay the membership fees for the IODP.
- In 2022, K-IODP recently requested the budget of 2023 to the government, unfortunately it was not approved. So, this year, there is no IODP-related projects in Korea
- But Korean scientists are aware of the importance of the IODP program and consistently wish for Korea's participation in IODP.
- Korean scientists are continuously requesting the government to enable the start of the K-IODP program from next year. And we are currently in the process of demanding next year's budget from the government.

Current Status of Korea-IODP project

- For the budget of 2024, K-IODP needs to establish the plan of new projects and persuade the government of the value of IODP.
- While the previous K-IODP project was focused on onboard research, proposal submission, education and promotion, the new K-IODP project aims to prepare a drilling proposal for Korean sea approved in 2022, with the goal of successfully carrying out drilling operations and research.
- However, the approved proposal was forwarded to the JRFB, and the JR demobilization has left Korea with a new concern about how to proceed with its activities in IODP.
- Currently, Korean scientists are working to obtain government funding, and we expect to know the result around September of this year.

Post-2024 K-IODP plan

- ▶ K-IODP after 2024 is different from the previous K-IODP projects in terms of research purpose and contents.
- ▶ The aim of post-2024 K-IODP project is to successfully carry out drilling at the approved proposal sites in Korean sea. We will focus on intensive geophysical surveys and preliminary studies on the research area.



Summary

- Korean scientists want to continue their participation in IODP and are currently persuading the government for budget allocation for the year 2024.
- To persuade the government, K-IODP has set a new goal of preparing for successful IODP drilling through intensive research on Korean sea. This budget includes onboard research funds as well.
- Currently, securing the budget for K-IODP from the government is the most important issue, and after this is resolved, K-IODP intends to discuss the direction of Korea's IODP activities including approved proposal (JRFB).
- We expect to know the result of the K-IODP budget around September of this year.